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Cover image: Absolute cerebral blood flow (CBF) using arterial spin labeling (a special magnetic resonance imaging technique) in a patient with congenital central hypoventilation syndrome (CCHS) and an age-matched control. This shows average of the two subjects' normalized images. The mean whole-brain map of CBF (not shown) is higher in CCHS than control.

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Abstracts of
4th International Congress of the Association of Sleep Medicine (WASM)
&
5th Conference of the Canadian Sleep Society (CSS)

September 10–14, 2011, Quebec City, Canada

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September 10–14, 2011, Quebec City, Canada

Welcome Addresses

Dear Colleagues and Friends,

On behalf of the World Association of Sleep Medicine (WASM) and the Canadian Sleep Society (CSS), we are delighted to welcome you to our joint congress of the 4th International World Sleep Congress and 5th Conference of the CSS in Quebec City, Canada from September 10–14, 2011.

The congress is an international forum of professionals advancing current thinking to improve sleep health, and encourage prevention and treatment of sleep disorders. The congress brings together leading experts to discuss, debate, and disseminate knowledge amongst sleep professionals, clinicians, researchers, technologists and trainees for the advancement of sleep health worldwide.

Your involvement in this congress is greatly valued. We hope that you'll enjoy the science, collegiality and social events at our world sleep conference in this charming city.

Welcome to Quebec City!

Best regards,

Christian Guilleminault, MD, DM, DBiol
President, **WASM**

Helen S. Driver, PhD, RPSGT, DAB
President, **CSS**

Dear Colleagues and Friends,

On behalf of the World Association of Sleep Medicine (WASM) and Canadian Sleep Society (CSS), we are delighted to welcome you to this international sleep meeting in Quebec City, Canada. The scientific committee has put together an outstanding program with courses and workshops, keynote lectures, symposia, and nearly 500 oral and poster presentations covering all areas of sleep medicine from basic sciences to technological advances and clinical applications.

With its theme on *Sleep, Health, and Society*, this international event brings together more than 1000 participants from 44 countries. Leading experts from around the world will present the latest developments in the field about sleep and its disorders with content that should be of interest to clinicians, researchers, technologists, students and trainees, and even the lay public.

We trust this educational forum provides an ideal opportunity to meet colleagues and share new ideas on the most recent advances in the field to promote healthy sleep worldwide and improve the prevention, diagnosis, and treatment of sleep disorders.

We wish to thank you for attending this meeting and are grateful to all of those who have contributed to its content and organization. We hope that you have a pleasant learning experience and that you enjoy Quebec City and its rich culture. We look forward to greeting you personally during the meeting.

Best regards,

Charles M. Morin, PhD
Richard Allen, PhD

WASM/CSS 2011
Program Co-Chairs

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ORAL PRESENTATIONS

A: Aging and Developmental Issues

SPINDLES AND SLOW WAVES ARE ASSOCIATED TO VERBAL LEARNING IN OLDER SUBJECTS

Marjolaine Lafortune, Jean-François Gagnon, Véronique Latreille, Jacques Montplaisir, Julie Carrier. *Center for Advanced Research in Sleep Medicine, Hôpital du Sacré-Cœur de Montréal, Canada*

Introduction and Objectives: Sleep spindles and slow waves (SW; <4Hz; >75uV) are involved in declarative sleep-dependent memory consolidation. We aimed to evaluate the association between neural synchronization during N-REM sleep and verbal learning performances in older healthy subjects.
Materials and Methods: Healthy volunteers (49-79 years) without sleep disorders participated in a baseline polysomnographic (PSG) sleep recording followed by a neuropsychological assessment, including a verbal memory test: The Rey Auditory Verbal Learning Test (RAVLT). Spindles (25 subjects; 20M) and SW (34 subjects; 18M) were automatically detected on artefact free N-REM sleep on F3, F4, C3, C4, P3, P4, O1 and O2 (linked-ears). All night spindles and SW mean density (nb/min), duration (s), amplitude (μV) and frequency (Hz) were analysed. Regression analyses were performed between spindles, SW characteristics and raw scores on RAVLT.
Results: Spindles density and spindles amplitude were positively correlated with RAVLT learning performance and delayed recall performance ($R>0.41$, $p<0.05$ in all cases). SW amplitude was positively correlated with RAVLT first trial performance and delayed recall performance ($R>0.40$, $p<0.05$). No significant correlation was found between age and spindles characteristics, between age and SW characteristics or between age and RAVTL scores.
Conclusion: Older subjects who showed higher spindles density, larger spindles and larger SW in frontal areas performed better on a verbal learning task. The mechanisms underlying the association between neural synchronization during N-REM sleep and verbal learning in aging still have to be determined.
Acknowledgements: This research was supported by scholarships from the Fonds de la recherche en santé du Québec (FRSQ) and grants from the Canadian Institutes of Health Research (CIHR) and Canadian sleep society (CSS).

THE EPIDEMIOLOGY OF SLEEP AND ITS DISORDER IN CHINESE CHILDREN AGED 0-5 YEARS

Xi-cheng Liu[1], Xiaona Huang[2], Hui-shan Wang[2], Jing-xiong Jiang[2], Lin An[3]. *[1]Bronchoscopy Center, Affiliated Children Hospital of Beijing Capital Medical University, Beijing, China; [2]Dept. of Children Health, National Ccenter for Maternal and Children Health, Chinese Disease Prevention Control Center, China; [3]Dept. of Public Health, Peking University Health Science Center, Beijing, China*

Introduction and Objectives: This study was to investigate the sleep patterns and the prevalence and types of sleep problems among urban children under 5 years of age.
Materials and Methods: Data were gathered on 14,883 children selected from 12 cities, using the Children's Sleep Status Questionnaire (CSSQ). The parents were asked about their children's average sleep time in a twenty-four-hour period and common sleep problems noted during the past month.
Results: Of 14778 subjects over 1 month old, 20.3% were reported as suffering from at least one of sleep disturbances studied. The five most common sleep problems were difficulty falling asleep (7.5%), nocturnal awakening (4.9%), bruxism (4.7%), snoring (4.4%) and mouth breathing (3.0%). Excluding the cases with sleep disorders, the average daytime sleep significantly decreased with increasing age, from an average of 6.86 hours in newborn, 3.77 hours at 6 months, 2.76 hours at 12 months, 2.28 hours at 2 years and 1.96 hours at 5 years-old. As to nighttime sleep, there was no difference between age groups, except that sleep was slightly shorter at 1 and 2 months than other age groups. Overall, the average sleep time over a 24-h period progressively shortened with age, from 15.81 hours at 1 month to 12.56 hours at 12 months, 12.02 hours at 2 years, and 11.31 hours at 5 years. The number of naps and nocturnal awakenings, respectively, decreased from 4 and 2 per day at 1 month of age to 1 and 0 per day at the 24 and 18 months. Most children continued to nap up to the age of 5 years.
Conclusion: Our findings suggest that sleep problems are common in Chinese children aged 0-5 years. Also, with the development of society, certain changes in sleep time of the children have occurred, there being about 0.5-1.0 hr. less sleep than is commonly reported in medical textbooks.

INCREASED SLOW-WAVE SLEEP IN RESPONSE TO PROLONGED EXERCISE AFTER 4 MONTHS OF ENDURANCE TRAINING IN OLDER MEN

Michel O. Melancon[1], Dominique Lorrain[2], Isabelle J. Dionne[1]. *[1]Research Center on Aging, Sherbrooke Geriatric University Institute, and Department of Kinanthropology, University of Sherbrooke, Canada; [2]Research Center on Aging, Sherbrooke Geriatric University Institute, and Department of Psychology, University of Sherbrooke, Canada*

Introduction and Objectives: Sleep in older individuals is characterized by

an increased fragmentation and by decreases in slow-wave sleep (SWS). Electrophysiological studies investigating the effects of exercise on SWS are scarce and produced equivocal results. The current study examined the effects of acute exercise and chronic endurance training on sleep architecture with special attention to SWS.
Materials and Methods: Thirteen community-dwelling healthy older men (64±3 y) with no sleep complaints served as their own controls for assessment of body composition, cardiopulmonary exercise testing, and polysomnographic recordings of 6 nights according to the following conditions: 1) familiarization night, 2) 'sedentary-night' (SED), and 3) 'exercise-night' (EXR). These 3 nights were evaluated both before- and after 4 months of endurance exercise training. The supervised training program consisted of 45-min sessions of inclined treadmill exercise @ 80% of max. heart rate, thrice weekly during 4 months. The rules of Rechtschaffen & Kales, including a 75 μV criterion for delta waves, were used for scoring sleep stages.
Results: Fitness was improved by training as indicated by increases in the two submaximal ventilatory thresholds (VT1: +9.8%, $p<0.05$; VT2: +6.5%, $p<0.01$). Whereas sleep efficiency only tended to increase in response to EXR ($p=0.076$), a significantly higher amount of SWS (expressed as % total sleep time) was observed in the post-training EXR-night compared to the pre-training SED-night ($p<0.05$). Finally, the number of minutes of non-rapid eye movement sleep was higher during the pre-training EXR-night as compared to the SED-night after training ($p<0.05$).
Conclusion: These results suggest that the increased physical demand generated by prolonged exercise in healthy older men is compensated, in the trained state, by an increase in restorative slow-wave sleep.
Acknowledgements: This study was funded by a grant from the Research Center on Aging, Sherbrooke, Quebec, CANADA.

ASSOCIATION BETWEEN SUBJECTIVE SLEEP QUALITY AND INCIDENT COGNITIVE IMPAIRMENT IN COMMUNITY-DWELLING OLDER MEN AND WOMEN

Olivier Potvin[1], Dominique Lorrain[1], Hélène Forget[2], Micheline Dubé[3], Sébastien Grenier[4], Michel Préville[1], Carol Hudon[5]. *[1]Université de Sherbrooke, Canada; [2]Université du Québec en Outaouais, Canada; [3]Université du Québec à Trois-Rivières, Canada; [4]Centre de recherche Institut universitaire de gériatrie de Montréal, Canada; [5]Université Laval, Canada*

Introduction and Objectives: Neuropsychiatric symptoms may be early signs of dementia and might precede cognitive decline. This study investigates whether poor sleep quality, in older men and women with intact cognitive functioning, is associated with one-year incident cognitive impairment.
Materials and Methods: The sample comprises 1665 community-dwelling older adults aged 65 to 96 with no cognitive impairment. Participants were randomly recruited in the province Québec, Canada. Data were obtained from the participants during two in-home interviews separated by 12 months. Sleep quality was measured by the Pittsburgh Sleep Quality Index (PSQI). Incident cognitive impairment was defined as a loss of at least two points on the Mini-Mental State Examination (MMSE) between baseline and follow-up interviews in addition to a follow-up score lower than the 15th percentile according to normative data. Amnestic and non-amnestic cognitive impairment were further determined based on MMSE delayed recall performance. The association between sleep quality at baseline and incident cognitive impairment were assessed by odds ratios adjusted for age, education level, baseline MMSE score, psychotropic drug use, anxiety, depression, cardiovascular conditions, and chronic diseases.
Results: Global PSQI score was significantly linked with general incident cognitive impairment (odds ratio: 1.16, 95% CI: 1.05-1.29) in men, but not in women. In women, sleep disturbance score (2.57, 1.39-4.75) and long sleep duration (3.60, 1.45-8.93) were linked to non-amnestic and amnestic incident cognitive impairment, respectively. In men, habitual sleep efficiency score (1.95, 1.42-2.66) and short sleep duration (4.92, 1.71-14.17) were associated with general and amnestic incident cognitive impairment, respectively.
Conclusion: Sleep quality in elders should receive particular attention by clinicians since poor sleep quality can be an early sign of cognitive decline. Further studies should examine whether the poor sleep quality preceding cognitive decline is the consequence of particular sleep disorders and/or an underlying neurodegenerative disorder.
Acknowledgements: This study was supported by research grants from the Canadian Institutes of Health Research (CIHR) and the Fonds de recherche en santé du Québec. Olivier Potvin is supported by a postdoctoral fellowship award from the CIHR.

ASSOCIATIONS BETWEEN SLEEP PROBLEMS AND INTERNALIZING TROUBLES: A LONGITUDINAL STUDY OF THE FRENCH TEMPO COHORT

Evelyne Touchette[1], Aude Chollet[1], Cédric Galéra[2], Eric Fombonne[3], Bruno Falissard[4], Michel Boivin[5], Maria Melchior[1]. *[1]CESP, INSERM U1018, Epidemiology of Occupational and Social Determinants of Health, France; [2]Service de Pédopsychiatrie universitaire, Hôpital Charles-Perrens, Université Victor Ségalen Bordeaux 2, France; [3]Montreal Children's Hospital, Department of Psychiatry, Canada; [4]Paris Sud Innovation Group in Adolescent Mental Health, France; [5]Groupe de Recherche en Inadaptation Psychosociale, Ecole de Psychologie, Laval University, Canada*

Introduction and Objectives: Sleep problems during infancy were associated with an increased risk of presenting depressive and anxiety problems later in life (Gregory et al., 2008). We aimed to evaluate the association between sleep problems and internalizing problems during an 18-year period.
Materials and Methods: The study sample is composed of 674 French adults aged 22 to 35 years in 2009 (mean age=28.8±3.6) who had previously participated in a study on children's mental health in 1991 (mean age=10.3±3.6) and in 1999 (mean age=18.8±3.6). At all assessments, participants' internalizing and sleep problems were assessed using the ASEBA system. The presence of internalizing problems was defined as a score above the 85th percentile of the distribution. The association between childhood sleep problems and longitudinal internalizing problems was estimated using multinomial regression models controlling for sex, age, childhood externalizing problems, parental depression, and childhood cumulative negative life events.
Results: Compared to participants who did not have sleep problems in childhood, those who did were 1.98 times (95% CI = 1.05–3.76, P=0.04) more likely to present internalizing problems in adolescence. Compared to participants who did not have internalizing problems in childhood, those who did were 2.22 times (95% CI = 1.08–4.57, P=0.04) more likely to present internalizing problems in adolescence, 4.73 times (95% CI = 2.02–11.11, P<0.001) more likely to suffer from chronic internalizing problems that lasted through adulthood, and 2.38 times (95% CI = 1.21–4.69, P=0.01) more likely to suffer from chronic sleep problems that lasted through adulthood.
Conclusion: Children who have sleep problems appear vulnerable to internalizing symptoms later on in adolescence, which should be brought to the attention of clinicians and public health specialists.
Acknowledgements: Research supported by France's National Research Agency (grant to M. Melchior) and "Faculty of Social Sciences, Laval University" (postdoctoral fellowship to E. Touchette).

B: Chronobiology/Circadian Disorders

NIGHT SHIFT WORK AND THEIR ASSOCIATION WITH METABOLIC SYNDROME

Juan Carrillo[1], Jacqueline Peters[2], Gisella Arellano[2], Mariana Dastres[1], Claudio Morales[2], Jecar Neghme[1]. *[1]Occupational Health Unit and Sleep Studies Unit, Felix Bulnes Clinical Hospital, Chile; [2]Clinical Laboratory, Felix Bulnes Clinical Hospital, Chile*

Introduction and Objectives: The metabolic syndrome is the clustering of cardiovascular risk factors including abdominal obesity, high blood pressure, elevated triglycerides, low HDL cholesterol and high fasting glucose. There is evidence of an adverse association between shift work and the metabolic syndrome in both men and women. We wanted to explore the association between shift work with the prevalence of metabolic syndrome in health workers.
Materials and Methods: We conducted a cross sectional study as part of a program of occupational health in health care workers of a public hospital in the city of Santiago. This included medical assessment, measurement

of weight, height, waist circumference, the realization of fasting glycemia, lipid profile and blood pressure were measured for those diagnosed with metabolic syndrome who met the current criteria of NCEP-ATPIII. We performed a chi-square test and calculated the odds ratio (OR).
Results: We studied 118 subjects with mean age of 45.9 (±12.0) years, of which 87 (73.7%) were women, 57 (48.3%) were working in rotating shifts system. 49 had metabolic syndrome (41.5%). Workers, of which 33 (67.35%) were employed in rotating night shift work and 16 (32.65%) did so during the day. Workers who work in shifts had an OR = 3.87 (95% CI, 1.78 to 8.4) of having metabolic syndrome ($p < 0.000$).
Conclusion: In the group studied, workers who were employed in shifts had a 3.8 times higher risk of metabolic syndrome than those who worked during the day.
Acknowledgements: Workers and managers of the Félix Bulnes Clinical Hospital

NATURAL CIRCADIAN PHASE-SHIFTS DURING SUMMER NIGHTWORK IN POLICE OFFICERS

Jeanne Sophie Martin, Alexandre Sasseville, Joëlle Lavoie, Jérôme Houle. *Centre de recherche Université Laval Robert-Giffard, Canada*

Introduction and Objectives: It is often reported that night shift workers do not usually adapt to the night schedule due to the resynchronising effect of light during the commute home combined with low light exposure at night in the workplace. However, police officers who are patrolling at night do experience natural light towards the morning especially in summer time. It is unclear if this light which may start as early as 4AM may cause phase-delay or if it would be counterbalanced by light received later in the morning. This study investigated the phase-shift experienced by patrol police officers during night shifts in summer time.
Materials and Methods: Salivary samples were obtained before and after 4 consecutive night shifts in 13 officers (mean age 28.5±2.67). Pre-night shifts (hourly) collection went from 19h00 to 23h00 whereas post-night shifts collection went from 21h00 to 04h00 (in order to detect an expected phase-delay). Elisa was used to assay melatonin concentration. Police officers were assessed between May and October and wore a wrist photometer. Work schedule was 23h00-07h00.
Results: DLMO before the night shift ranged from 20h00 to 23h00 with a mean of 21h10±0h41. Phase-shift ranged from 1 to 7 hours with a mean of 3h02±1h46. There was no correlation between the amount of phase-shift experienced and sunrise which varied (during the experiment) from 04h50 (June) and 07h15 (October). Interestingly the police officer tested in October showed a 3.5hr phase-delay.
Conclusion: Preliminary analysis revealed substantial phase-shifts in some patrol police officers whereas very small phase-shifts were observed in others. Light exposure analysis shall provide more information regarding the possibility that light intensity received in morning or evening (before the night shift) could explain this variability.
Acknowledgements: This research was funded by the Canadian Institutes of Health Research. We thank the police officers of Quebec City.

CORTISOL AND MELATONIN RHYTHMS DISSOCIATION DURING AN ANTARCTIC SUMMER EXPEDITION: EVIDENCE FOR TWO DISTINCT CIRCADIAN OSCILLATORS

Nathalie Pattyn[1], Aisha Cortoos[2], Olivier Mairesse[2], Elke De Valck[3], Raymond Cluydts[3], Pierre-Francois Migeotte[2], Xavier Neyt[2]. *[1]Royal Military Academy, Belgium & Vrije Universiteit Brussel, Belgium; [2]Royal Military Academy, Belgium, Belgium; [3]Vrije Universiteit Brussel, Belgium*

Introduction and Objectives: Sleep complaints are consistently cited as the most prominent problem in Arctic and Antarctic expeditions. Continuous bright light exposure in the summer, and continuous darkness in the winter suggest a fundamental disturbance of circadian sleep-wake regulation in this environment. However, there is no clear evidence to date of a consistent circadian disruption, nor of an established relationship to the sleep complaints. Sleep-wake regulation and circadian rhythmicity of cortisol and melatonin were investigated during a 4 month summer expedition in Antarctica.
Materials and Methods: After an habituation night and acclimatization to the environment, polysomnography was performed in 21 healthy male subjects, free of medication. Circadian rhythms were determined with a 18 hours profile (saliva sampling every 2 hr) of cortisol and melatonin. All data collection was performed during the continuous illumination of the Antarctic summer.
Results: Polysomnography results showed, in addition to high sleep fragmentation, a dramatic decrease in slow wave sleep (SWS) and an increase in REM sleep. Furthermore, SWS occurred at the end of the night, rather than the beginning. Autonomic activation showed a concurrent variation, with a high proportion of low frequency heart rate variability, and a delayed occurrence of the high frequency component. Cortisol rhythmicity and serum levels were preserved, and secretion profiles were remarkably synchronized among participants. Melatonin secretion however, showed a severe phase delay, with no secretion onset as late as 24.00 and peak values around 06.00.
Conclusion: The present results show a complete dissociation of cortisol and melatonin secretion profiles. The delayed and decreased SWS could be subtended by the phase delay in melatonin secretion. The modified autonomic regulation is related to the disturbed pattern of sleep stages. These findings suggest two distinct oscillators regulating cortisol, being more sensitive to social schedule, and melatonin, being more sensitive to photoperiod.
Acknowledgements: The present research was supported by a DoD grant ERM HF-13

BODY TEMPERATURE REGULATION ACROSS MENSTRUAL, CIRCADIAN AND SLEEP-WAKE STATES

Ari Shechter, Philippe Boudreau, Diane Boivin. *Centre for Study and Treatment of Circadian Rhythms, McGill University, Canada*

Introduction and Objectives: Menstrual cycle-associated changes in reproductive hormones affect body temperature in women, which may influence sleep. We aimed to characterize the interaction between the menstrual, circadian and sleep-wake cycles on body temperature regulation.
Materials and Methods: Eight healthy women were studied during their mid-follicular (MF) and mid-luteal (ML) phases with an ultradian sleep-wake cycle (USW) procedure. The 72-hour USW consists of 36 cycles of 60-minute wake episodes alternating with 60-minute nap opportunities. Constant conditions, including maintained semi-recumbent position, small iso-caloric snacks, time-isolation, and dim ambient light (<10 lux) were maintained throughout wake episodes, and nap episodes occurred in darkness (<0.03 lux). Core body temperature (CBT) and distal skin temperature (DT) were recorded and used to calculate a distal-core gradient (DCG).
Results: DT and DCG circadian rhythms were not affected by menstrual phase, though the circadian CBT amplitude was significantly reduced during ML compared to MF. DT and DCG showed rapid, large nap episode-dependent increases, whereas CBT showed slower, smaller nap episode-dependent decreases. Nap episode-dependent decreases in CBT were further modulated as a function of both circadian- and menstrual factors with nap episode-dependent deceases occurring more prominently during the late afternoon/evening in ML, whereas nap episode-dependent DT and DCG increases were not significantly affected by menstrual phase but only circadian phase.
Conclusion: This study explored how the thermoregulatory system is influenced by an interaction between circadian phase and sleep-wake state, and how this is further modulated by the menstrual cycle. These results help clarify the role of thermoregulation in sleep initiation. Specifically, the similarity in the timing of DT and DCG increases following the transition into nap episodes may explain the similarity in circadian sleep propensity we previously reported in MF and ML, and lend indirect support to the hypothesis that vasodilation of distal skin regions is more closely related to sleep initiation than decreased CBT.
Acknowledgements: Research was supported by the Canadian Institute of Health Research (CIHR). AS is supported by a McGill University Faculty of Medicine fellowship. PB is supported by the Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST).

LIGHT THERAPY FOR TREATMENT OF FATIGUE AND SLEEPINESS FOLLOWING TRAUMATIC BRAIN INJURY

Kelly Sinclair, Jennie Ponsford, Steven W. Lockley, Shantha M.W. Rajaratnam. *Monash University, Australia*

Introduction and Objectives: Fatigue and sleep disturbances are some of the most pervasive complaints following Traumatic Brain Injury (TBI). They

occur chronically, across the range of injury severity, and negatively impact on acute recovery, long term rehabilitation, mood and quality of life. Effective treatment is not well established. Recent research investigating short wavelength (blue) light exposure has demonstrated potency for acute subjective and physiological alerting effects, circadian phase shifting and enhancement of mood. The current study aimed to investigate the effects of 4 weeks of short-wavelength light therapy (LT) on fatigue and excessive daytime sleepiness (EDS) in individuals with TBI.
Materials and Methods: Using a randomised, placebo-controlled design, we investigated a 4-week, 45min/day 'at-home' treatment with short wavelength (blue) light therapy (goLITE®, Philips Lighting) (465nm, 85 $\mu W/cm^2$) compared with yellow light therapy (574nm, 19 $\mu W/cm^2$) designed specifically to be deficient in short wavelength blue light or treatment as usual in 25 individuals (8, 9, 8) with TBI who self reported fatigue and/or EDS. Subjective assessments of fatigue and EDS were conducted at baseline (week 0), mid-way through and at the end of LT (weeks 4 & 6), and again 4 weeks following cessation of LT (week 10).
Results: We observed a trend for the mean decrease in fatigue (from baseline) across the 4-week treatment phase to be highest in the blue group (-1.14±1.25), compared with yellow (-0.17±0.64) or treatment as usual (-0.24±0.74), (p=0.07). The mean decrease in EDS was also highest in the blue group (-4.00±5.25) compared with yellow (-2.61±2.50) and treatment as usual (-0.56±2.57), although group differences were not significant (p=0.19).
Conclusion: Preliminary findings suggest that short wavelength light may be effective in alleviating fatigue and possibly EDS following TBI. The trial is ongoing.
Acknowledgements: Supported by grants from: The Jack Brockhoff Foundation, Centre for Integrated Research and Understanding Sleep (CIRUS, Woolcock Institute of Medical Research), RACV Sir Edmund Herring Memorial Scholarship, and Victorian Neurotrauma Initiative. goLITE®

CIRCADIAN MISALIGNMENT AS AN ENDOPHENOTYPE FOR DEPRESSION

Nevin Zaki[1], Katharina Wuff[2], Russel Foster[2], Guy Goodwin[2]. [1]*Faculty of Medicine, Mansoura University, Egypt;* [2]*Oxford University, United Kingdom*

Introduction and Objectives: Introduction: Alterations have been described in the circadian rhythms of several biological markers in depressed patients. Thus, taking aspects of the circadian system into consideration is fundamental for studying depression. Objectives: To compare the circadian profiles of control subjects and high risk participants to discover whether circadian rhythm misalignment can be considered as a reliable endophenotype for depression.
Materials and Methods: 20 high-risk participants with a clinically depressed first degree relative and 20 healthy control subjects age and sex matched were studied for 4 consecutive weeks in their normal environment. The General Health Questionnaires (GHQ), CAGE, Mood Disorder Questionnaire (MDQ), Morningness and Eveningness (M/E),and Pittsburgh sleep quality index (PSQI) were completed. Participants were asked to wear Actigraphs on their non dominant wrist, daily routines were recorded in a diary. The subjects collected sequential four-hourly urine samples over 48hs for measuring MT6s.
Results: Controls had a morningness preference, while the high risk group were more evening types (p=0.017 for chronotypes). The high risk group scored higher on the (MDQ). The T-test done for the actigraphy sleep parameters showed statistically significant difference, high risk individuals had a poorer sleep quality (subjective sleep quality P=0.036 and Global score P=0.037). A trend of higher M10 onset (p=0.087) indicated that high risk group have a phase shift. 1/3 of the sample had a sleep onset which was later than the acrophase of melatonin secretion while 2/3 of the sample had a sleep onset which was earlier than the acrophase. The magnitude of time difference was higher in the high-risk subjects
Conclusion: Results imply that circadian phase misalignment could be considered a possible endophenotype for depression. It plays a strong role in predicting depression in subclinical cases, high risk subjects, and during the prodromal phase; thus further confirming the need of chronobiologic treatments.
Acknowledgements: We Would Like To Acknowledge The Egyptian Ministry Of Higher Education And The Egyptian Cultural Office In London For Funding The Study. Furthermore, We Would Like To Acknowledge the Efforts Of: Dr Osama El Boriae (Professor Of Psychiatry) & Dr Wafaa Elb

C: Excessive Daytime Sleepiness (not Narcolepsy or other sleep disorder)

SILENT SNORING – AN ENIGMA!

Vijayakrishnan Paramasivan. *Madras ENT Research Foundation, India*

Introduction and Objectives: Upper Airway Resistance Syndrome (UARS) is a recent entity in the spectrum of sleep-disordered breathing where transient increases in upper airway resistance result in partial airway block with repetitive EEG arousals. UARS is not associated with apnea, although snoring and excessive daytime somnolence (EDS) is common. This study investigates the prevalence of UARS in patients with snoring and a subset of patients with hyper somnolence who do not manifest snoring, defined as silent upper airway resistance syndrome (SUARS).
Materials and Methods: A retrospective case study of parameters in Polysomnographies performed in the Dept. of Snoring & Sleep Disorders between Apr 2008 and Mar 2009 (1 year).
Results: A total of 224 Polysomnographies were analyzed with respect to objective parameters like AHI, Basal SPO2 and EEG arousals. Obstructive sleep apnea was diagnosed in 159 patients (71.3%), and 24 patients (9.3%) were found to have UARS. In five patients with UARS (2.2%) ironically snoring was absent by history and during polysomnography leading us to a diagnosis of SUARS.
Conclusion: UARS may occur in the absence of clinically significant snoring and may be an occult cause of EDS. We report a prevalence of 20.8% in silent variety of UARS patients and nearly 2.2% of all patients studied for hyper somnolence.
Acknowledgements: I thank Prof. Mohan Kameswaran for his valuable guidance and help. I thank all the patients without whom this study would not have been possible.

D: Insomnia

IS A SELF-HELP BOOK BETTER THAN SLEEP HYGIENE ADVICE? A RANDOMIZED CONTROLLED TRIAL OF INSOMNIACS

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Introduction and Objectives: Insomnia is a very prevalent condition, and low-threshold treatment options are needed. This study compares the effects of two types of written material for insomnia.
Materials and Methods: A randomized controlled trial with follow-up after three months, using intention-to-treat analyses. Insomniacs were recruited through newspaper advertisements to a web-based survey. In total, 77 and 78 participants were randomized to either a self-help book or standard sleep hygiene advice, respectively. Outcome measures were scores on validated questionnaires (Bergen Insomnia Scale, BIS; Pittsburgh Sleep Quality Index, PSQI; Dysfunctional Beliefs and Attitudes about Sleep, DBAS-16; Hospital Anxiety and Depression Scale, HADS). Use of sleep medications was also recorded.
Results: Response rate was 81.9%. Mean age was 50 years. The self-help book gave significantly better scores on BIS (p=0.006), PSQI (p=0.012), and DBAS-16 (p=0.010) compared to sleep hygiene advice. The proportion using sleep medications was reduced in the self-help book group, whereas it was increased in the sleep hygiene group. Compared to pre-treatment, the self-help book improved scores on BIS and PSQI with effect sizes of 0.61 and 0.62, and scores on depression were reduced with an effect size of 0.18. Compared to pre-treatment, the sleep hygiene advice improved scores on BIS and PSQI (effect sizes of 0.24 and 0.28), but worsened DBAS-16 (effect size of -0.36) and increased the number of sleep medications taken per week (effect size of -0.50).
Conclusion: In this randomized controlled trial, the self-help book improved sleep and reduced the proportion using sleep medications compared to sleep hygiene advice. The self-help book appears as an efficient low-threshold

intervention, which is cheap and easily available for patients suffering from insomnia. Sleep hygiene advice also improved sleep at follow-up, but increased sleep medication use. Thus, caution is warranted when sleep hygiene advice is given as a single treatment.

TEEN SLEEP, MEDIA EXPOSURES, AND PHYSICAL ACTIVITY: RESULTS FROM THE 2007 AND 2009 YOUTH RISK BEHAVIOR SURVEYS

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Introduction and Objectives: To quantify the association between different media exposures, vigorous physical activity, and self-reported sleep time in teens.
Materials and Methods: All Youth Risk Behavioral Surveys (YRBS) with sleep data were analyzed to produce a nationally representative sample of US high-school students (2007 N=14,041, 2009 N=16,410). Media exposure was evaluated with two questions on average school day use: "How many hours of TV do you watch?" and "How many hours do you play video or computer games or use a computer for something that is not school work?" Media exposure was dichotomized into light (1hr or less/day) or heavy (3hrs or more/day). Physical activity was assessed with the question "On how many of the past 7 days did you exercise or participate in physical activity for at least 20 minutes that made you sweat and breathe hard?" categorized as light (less then 3 days/week) or heavy (3 days or more/week). The outcome variable of self-reported sleep duration was assessed with the question: "On an average school night, how many hours of sleep do you get?" Logistic regression models were used to adjust for age, gender, race/ethnicity, presence of sadness, and substance abuse.
Results: Compared to teens who reported sleeping 8 hrs/night, those reporting 4 or less hrs/night of sleep were more likely to report heavy videogame/computer use (2007 adjusted odd ratio 2.3 (95% C.I. 1.7-3.0), 2009 2.0 (95% C.I. 1.5-2.6)) while being less likely to meet recommended physical activity levels (2007 0.7 (95% C.I. 0.6-0.9), 2009 0.5 (95% C.I. 0.4-0.6)). TV exposure did not display significant associations with self-reported sleep in these samples.
Conclusion: In these large samples of US teens, self-reported short sleep duration was associated with higher gaming/computer use, lower vigorous physical activity, and was unrelated to television watching.
Acknowledgements: Center for Disease Control

DEPRESSIVE SYMPTOMATOLOGY, MEDICATION PERSISTENCE, AND ASSOCIATED HEALTH CARE COSTS IN OLDER ADULTS WITH INSOMNIA

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Introduction and Objectives: The effect of insomnia along with the decreased cognitive functioning associated with aging is a serious concern within the elderly (65 years and older) population. We examined the association of patient health care utilization and depressive symtomatology with medication adherence in insomnia in Medicare-HMO enrolled elderly patients.
Materials and Methods: This was a retrospective, longitudinal cohort study which included elderly patients (65 and older) enrolled continuously for 1-5 years in the Medicare HMO. Medication possession ratio was used to estimate the adherence in insomnia medication. Different MPR thresholds (0.8, 0.6, 0.4 and 0.2) were used to determine non adherence. Associations between depressive symptoms, medication adherence and health care costs were assessed using ordinary least square multiple regressions.
Results: A total of 2068 patients with a primary diagnosis of insomnia were included in the study. Sixty percent of these patients had depressive symptomatology. The severity of comorbidity (Charlson index) was 4 and the patient perception of quality of life (Short Form-12 scores) were between 79 and 82. The prevalence of non adherence was 70% even with a low MPR of 0.2. Insomnia patients with depressive symptoms were 92% less likely to be adherent to their insomnia medications ($p<0.05$). After controlling other variables, we found MPR was a good predictor of total health care costs (10% increases in MPR for every 2% decrease in total health care costs, $p<0.001$)
Conclusion: We found strong associations between depressive symtomatology, medication adherence, and health care costs in elderly patients with insomnia. Disease and risk management programs in managed care settings should be used to optimize the medication adherence in the elderly.
Acknowledgements: Elisha Stephen

MONTHLY FLUCTUATIONS OF SLEEP AND INSOMNIA SYMPTOMS OVER THE COURSE OF A YEAR IN A POPULATION-BASED SAMPLE

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Introduction and Objectives: The longitudinal course of insomnia is not well documented. Most studies examining temporal fluctuations of symptoms have used yearly assessment intervals. The objective of this study was to document the course of insomnia symptoms and sleep quality by examining their fluctuations over shorter (i.e., monthly) intervals for one year.
Materials and Methods: Participants were 100 adults (mean age = 49.9 years; 66% women) selected from a larger sample enrolled in a longitudinal study of insomnia. They completed 12 monthly telephone interviews assessing sleep and insomnia symptoms, use of sleep aids, stressful life events, and physical and mental health problems for the previous month. Of a potential 1200 interviews, 1121 (94.3%) were completed. Participants were classified in one of three groups based on data collected at each assessment: good sleepers (GS; n= 42 at baseline), insomnia symptoms (SYMP; n= 34 at baseline), and insomnia syndrome (SYND; n= 24 at baseline).
Results: There were significant fluctuations of sleep/insomnia symptoms over time, with 66% of the participants changing status at least once over the 12 assessments (GS, 50%, SYND, 58.3%, and SYMP, 91.2%). On average, the sleep status of an individual changed 2.58 times over the 12 monthly assessments. Individuals with SYMP changed status significantly more frequently (3.41) than GS (1.93), but not more than SYND (2.54). Moreover, 83% of individuals with SYMP at baseline reported improved sleep (i.e., became GS) at least once over the year, compared to 29.4% who reported sleep worsening (i.e., became SYND). Among GS, risks of developing insomnia symptoms and syndrome over the subsequent months were respectively 14.4% and 3.2%.
Conclusion: Repeated assessment of sleep and insomnia symptoms showed significant variability over monthly intervals. These findings highlight the importance of conducting assessment at shorter than the usual yearly interval in order to capture more reliably the course of insomnia over time.
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COMPARATIVE EFFICACY OF BEHAVIOR THERAPY AND COGNITIVE THERAPY AS SINGLE THERAPIES FOR INSOMNIA: A PRELIMINARY REPORT

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Introduction and Objectives: Considerable evidence speaks for the efficacy of cognitive-behavior therapy (CBT) for insomnia. Yet, the unique contribution of its components remains poorly understood. This presentation summarizes preliminary results from a randomized controlled trial assessing the relative efficacy and contribution of cognitive therapy (CT) and behavior therapy (BT), compared to full CBT, for improving nighttime sleep and daytime functioning.
Materials and Methods: 186 adults with chronic insomnia were recruited. This report comprises the first 100 participants (63% women; age = 38.8 years, insomnia duration = 12.8 years). They were randomly assigned to one of three 8-week treatment conditions: BT (n=32), CT (n=33), or CBT (n=35). Main end points were insomnia severity, measured by the Insomnia Severity Index (ISI), completed at baseline, mid, and end of treatment, and remission defined as an ISI score below 8.
Results: Between-group differences were assessed using mixed model analyses. A significant interaction effect was observed for insomnia severity. Simple effects for treatment conditions were significant only at post-treatment ($p=0.003$). Pairwise comparisons revealed significant differences between CBT (M=6.58) and the other conditions (M=9.46 for each), $p=0.0007$, but there was no significant difference between BT and CT. Remission rates were also significantly different at post-treatment, $F(2,79) = 4.34$, $p=0.02$; there was a higher remission rate in CBT (72.4%) relative to CT (33.3%) and

BT (49.7%), but these latter conditions did not differ significantly from each other (p=0.20).
Conclusion: These results provide evidence about the efficacy of CT and BT as single therapies for chronic insomnia. Further results on their unique contribution with regard to nighttime and daytime functioning parameters are awaited. This dismantling study should improve our understanding of the mechanisms underlying the efficacy of CBT for insomnia and enhance its efficacy and efficiency.
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EFFECTS OF COGNITIVE BEHAVIORAL THERAPY FOR STRESS-INDUCED SLEEP DISTURBANCE AND HYPERAROUSAL

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Introduction and Objectives: Stress-induced hyperarousal is thought to play a role on the onset and relapse of insomnia. Although effectiveness of Cognitive Behavioral Therapy for Insomnia (CBT-I) has been established, there has been no research to clearly demonstrate whether or not CBT-I is effective for stress-induced hyperarousal. This study was planned to clarify this issue.
Materials and Methods: There were 63 participants with primary insomnia who visited the outpatient clinic of Japan Somnology Center. All the participants were assigned to (1) a six-sessions of CBT-I simultaneous with pharmaceutical treatment (CBT-I group; n= 34, 70% female, mean age: 49.4±14.7 years) or (2) treatment as usual (TAU; n=29, 62% female, mean age: 43.2±16.1 years) by sleep disorder physicians in an open-label manner. Both groups completed questionnaires assessing the stress-induced sleep disturbance and hyperarousal (Ford Insomnia Response to Stress Test: FIRST) and the insomnia symptom (Pittsburgh Sleep Quality Index: PSQI; Athens Insomnia Scale: AIS) both at the baseline and at the end of the treatment.
Results: There were significant group x time interaction on all scales by using a repeated-measures ANOVA (FIRST: $F(1,55) = 4.95$, $p<0.05$, PSQI: $F(1,58) = 22.91$, $p<0.001$, AIS: $F(1,60) = 13.16$, $p<0.001$, respectively). The scores of the FIRST decreased at the end of the treatment in both groups and between groups at the end of the treatment. Significant decrease in the score of the FIRST was observed only in CBT-I group. The rates of change after the treatment of CBT-I were larger than that of TAU (FIRST: d = 0.59, PSQI: d=1.23, AIS: d=0.92).
Conclusion: These results showed that CBT-I improves not only insomnia symptoms but also stress-induced hyperarousal. Intervention targeting maladaptive coping with insomnia is likely to reduce the stress-induced hyperarousal (Mendoza et al., 2010), possibly leading to preventing the relapse of insomnia.

THE NATURE AND PREVALENCE OF MIDDLE-OF-THE-NIGHT USE OF PRESCRIPTION HYPNOTICS

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Introduction and Objectives: Middle-of-the-night (MOTN) awakening with difficulty returning to sleep is common and associated with significant adverse consequences. Given that there are no FDA-approved hypnotics with an indication for MOTN use and no data on safety and efficacy of medications when used in the MOTN, a study was undertaken to assess the prevalence and nature of off-label MOTN hypnotic use.
Materials and Methods: 1,927 subjects, ages 18-64yrs, who received a hypnotic prescription in the past year, were randomly sampled from 120,000 eligible members of a large commercial health plan (>34 million lives). Respondents with a history of MOTN hypnotic use who reported never using a hypnotic twice in the same night (n=209), plus a weighted sample of at-bedtime only users (n=303), were studied further with additional questions.
Results: 20.1% of the 1,927 subjects reported using hypnotics indicated for use during MOTN awakening at least some of the time – 11.5% never used hypnotics twice in the same night and 9.0% did – and 79.5% used them at bedtime only. Of those studied further, 43.0% of MOTN and 28.0% of bedtime users reported MOTN awakening as their biggest sleep problem. Of those reporting MOTN insomnia as their biggest sleep problem, 51.5% reported MOTN use. 81.7% used hypnotics MOTN on their own initiative, 12.1% under doctors' direction, and 5.2% were not sure. 69.5% of MOTN users had a MOTN dosing rule to determine when during the night to take the medication: average MOTN use time was 6 hours before having to arise. Hypnotics taken MOTN and at-bedtime were essentially the same with the three most commonly used drugs being zolpidem, eszopiclone and temazepam.
Conclusion: Despite the absence of any clinical information supporting MOTN use, a number of non-geriatric patients with a prescription hypnotic use it off-label in the middle of the night.
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ENHANCED USE-DEPENDENT PLASTICITY IN PRIMARY INSOMNIA

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Introduction and Objectives: Healthy sleep provides favorable conditions for neuroplasticity and memory consolidation. Primary Insomnia patients (PIP) report cognitive and memory impairment. Investigations, focused on neuropsychological and behavioral measures, showed inconsistent deficits in memory and learning. It is unknown if PIP are able to exhibit use dependent plasticity (UDP) changes resulting from motor training, one of the initial steps in the formation of motor memories and motor skill development. Here, we tested the ability of PIP to sustain UDP using a TMS paradigm. Furthermore, because an imbalance of excitatory and inhibitory influences are likely in PI, we also studied GABA and glutamate. Additionally, we evaluated sleep spindles on polysomnography.
Materials and Methods: PIP (n=18; 57.8±1.5;12F) and Good Sleepers (GS) (n=10; 60.4±3.4;7F), underwent training consisting of thumb movements at 1 Hz for 30min. TMS was applied over M1 to elicit consistent thumb-movements before and after training. A training target zone (TTZ) was defined as a window of ±20° centered on the mean direction of training movements. The percentage of TMS-evoked thumb movements falling within the TTZ was calculated for baseline, p1, and p2. In addition, glutamate (ICF) and GABA (SICI and LICI) were assessed. An algorithm detected fast and slow spindles and quantified their characteristics.
Results: PIP showed increased UDP relative to GS as reflected by increased movements falling within the TTZ during p1 (p=0.02). There were no differences in SICI or LICI between groups. However, PIP demonstrated increased ICF compared to GS. PIP also demonstrated increased fast spindle densities.
Conclusion: The main finding of this study is that PIP experienced an enhanced ability to sustain UDP resulting from motor training which was associated with increased intracortical facilitation in PIP. Results suggest that PIP may have an enhanced capacity to undergo UDP changes possibly due to increased glutamatergic mechanisms. PIP also demonstrated increased fast spindles, potentially related to UDP.
Acknowledgements: Supplement to Novel Strategies to Enhance Motor Function After Stroke (RO1 HD053793-SA1)

THE ROLE OF ANDROGEN-DEPRIVATION THERAPY AND HOT FLASHES IN THE EVOLUTION OF INSOMNIA IN PATIENTS WITH PROSTATE CANCER

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Introduction and Objectives: Androgen-deprivation therapy leads to nocturnal hot flashes and nocturia which may both disturb sleep. As part of a larger longitudinal study, this investigation aimed to: (1) compare the evolution of rates of insomnia in patients receiving ADT + radiotherapy (ADT-RTH) to patients receiving RTH only; and (2) assess the mediating role of hot flashes and urinary symptoms in the relationship between ADT and insomnia.
Materials and Methods: Sixty men scheduled to receive RTH for prostate

cancer, with (n=28) or without (n=32) ADT, were assessed prior to receiving any treatment (baseline) and at seven additional times over a period of 16 months (1, 2, 4, 6, 8, 12, and 16 months) using the Insomnia Severity Index and a measure of physical symptoms assessing the frequency of hot flashes and night sweats (2 items) and urinary symptoms (3 items). Linear mixed models using a factorial (2 groups x 8 times) design tested main and simple effects. Physical symptoms were added as covariates to test mediation.
Results: After controlling for age and physical activity frequency, a significant time effect was found in ADT-RTH patients, F(7,354)=2.16, p=0.04, but not in RTH only patients, F(7,354) =0.89, p=0.51. In ADT-RTH patients, significant differences between the baseline assessment (M=4.4) and evaluations at 2 months (M=6.0; t(354)=2.13, p=0.03), 4 months (M=6.0; t(354)=2.17, p=0.03), and 6 months (M=6.9; t(354)=3.25, p=0.001) were found. A significant mediating role of night sweats (p=0.006) was found in the relationship between ADT and insomnia symptoms, while the mediating role of hot flashes frequency (p=0.07) and excessive urinary frequency (p=0.07) was marginally significant.
Conclusion: ADT appears to be associated with an increased risk for insomnia through the influence of nocturnal hot flashes and to a lesser extent of urinary symptoms.
Acknowledgements: NARSAD and the Canadian Institutes of Health Research.

EFFECT OF MIDDLE-OF-THE-NIGHT DOSES OF ZOLPIDEM SUBLINGUAL TABLET 3.5 MG ON NEXT-MORNING DRIVING PERFORMANCE

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Introduction and Objectives: Zolpidem sublingual tablet 3.5 mg (ZST) has been developed for as needed use when middle-of-the-night (MOTN) awakening in insomnia patients is followed by difficulty returning to sleep. It is recommended that it be taken at least 4 hours before the patient must be active. The aim of this study was to assess its effect on driving performance 3 and 4 hours after MOTN dosing.
Materials and Methods: The study was conducted as a 4-way double-blind crossover design in 40 healthy volunteers (20 females), mean (±SD) age 37 (±15) years, possessing a valid driver's license. Treatments were ZST administered MOTN 3 and 4 hours before driving, zopiclone 7.5 mg at bedtime 9 hours before driving and placebo. Effects were evaluated using a one-hour standardized driving test on the highway in normal traffic. The test measures Standard Deviation of Lateral Position (SDLP in cm), an index of weaving. Increases in SDLP from placebo of ≥2.5 cm were considered to reflect clinically relevant impairment of driving.
Results: For ZST, symmetry analyses of the proportion of drivers exceeding the 2.5 cm threshold showed a significant increase in risk of impaired driving at 3 hours after dosing (p=0.0117), but not at 4 hours after dosing. Mean increases in SDLP from placebo, although statistically significant, were small (1.5cm [p<0.0001] at 3 hours and 0.8cm [p=0.0174] at 4 hours after intake). Symmetry analysis for zopiclone showed a significant risk of impaired driving. Mean increase in SDLP for zopiclone was 2.5cm [p<0.0001], which was significantly worse than for ZST administered 4 hours before driving.
Conclusion: ZST appears to have a minimal effect on driving performance when taken in the middle of the night at least 4 hours before driving.
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SKP-1041, A NOVEL MODIFIED-RELEASE FORMULATION OF ZALEPLON, SIGNIFICANTLY IMPROVES SLEEP IN PATIENTS WITH MIDDLE-OF-THE-NIGHT AWAKENING: RESULTS OF A PHASE II, DOUBLE-BLIND, CROSSOVER, PLACEBO-CONTROLLED, DOSE-RANGING TRIAL

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Introduction and Objectives: Most chronic insomnia patients report middle-of-the-night (MOTN) sleep difficulty, with or without sleep onset complaints. Bedtime ingestion of current hypnotics provide a sleep initiation effect whether or not it is needed. SKP-1041 is a novel formulation of zaleplon designed to release active drug over a 2-hour period beginning 2 hours after ingestion. This release profile provides zaleplon during the hours needed to reduce MOTN wake time, while allowing physiologic sleep initiation.
Materials and Methods: This phase II, double-blind, crossover study enrolled adult, non-elderly patients with primary insomnia characterized by MOTN awakening. Participants received placebo and SKP-1041 10 mg, 15 mg, and 20 mg before bedtime for 2 consecutive nights with 4-7 days of washout between treatments. Previous reports have confirmed an identical zaleplon release profile with all 3 doses, and dose-proportional Cmax and AUC. Sleep/wake episodes were recorded by polysomnography for 8 hours after lights-out. The primary endpoint was Wake After Sleep Onset during hours 3-7 (WASO 3-7); secondary endpoints included Total Sleep Time 3-7 (TST 3-7) and Number of Awakenings After Sleep Onset 3-7 (NAASO 3-7). Residual effects were evaluated within 1 hour of awakening using the Digit Symbol Substitution Test (DSST) and Digit Span Test (DST).
Results: 62 patients were evaluated for efficacy. WASO 3-7 was significantly (p≤0.01) decreased and TST 3-7 was significantly (p≤0.009) increased with all SKP-1041 doses compared to placebo; TST analyzed by hour was significantly (p<0.0001 to p=0.0259) greater at hours 3, 4, and 5 compared to placebo. NAASO 3-7 was significantly (p≤0.02) decreased with SKP-1041 15 mg and 20 mg compared to placebo. Residual drug effects were not detected on the DSST and DST. All doses were well-tolerated.
Conclusion: All doses of SKP-1041 significantly reduced MOTN wakefulness, relative to placebo, without evidence of residual effects.

PREVALENCE, COURSE AND LONG-TERM IMPACT OF NON-RESTORATIVE SLEEP: A FIVE-YEAR COMMUNITY-BASED FOLLOW-UP STUDY

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Introduction and Objectives: There is limited data on the longitudinal course of non-restorative sleep (NRS) and its long-term impacts on health. We aimed to explore the longitudinal course of NRS, its predictors and health impact in a community-based cohort in Hong Kong Chinese.
Materials and Methods: A total of 2291 middle-aged adults (46.3+5.1 years, 50.0% males, response rate: 41.3% at follow-up) were recruited into a 5-year follow-up study. NRS was defined as feeling of unfreshness after getting up in the morning for at least 3 times/week in the past 12-month. Socio-demographics, other concurrent sleep complaints and daytime symptoms were measured at baseline. Chronic medical problems in recent one year were additionally assessed at follow-up.
Results: The prevalence of NRS was 7.4% at baseline and 7.2% at follow-up. NRS had considerable persistence (31.9%) and incidence (5.2%) rates. Incidence of NRS was predicted by female gender (AOR (95%CI) = 1.67 (1.11-2.52)), unwilling to get up in the morning (AOR (95%CI) = 1.96 (1.18-3.25)), and daytime fatigue (AOR (95%CI) = 2.18 (1.24-3.84)); while the persistence of NRS could only be predicted by difficulty in initiating sleep (AOR (95%CI) = 2.36 (1.13-4.92)). NRS at baseline was significantly associated with multiple medical disorders at follow-up including frequent episodes of allergic rhinitis (AOR (95%CI) =1.62 (1.02-2.57)) and laryngopharygngitis (AOR (95%CI) = 2.47 (1.17-5.25)), diabetes mellitus (AOR (95%CI) =2.63 (1.23-5.63)), gastroesophageal reflux disease (AOR (95%CI) = (2.03 (1.05-2.31)), eye

diseases (AOR (95%CI) = 2.45 (1.16-5.12)) and eczema (AOR (95%CI) = 2.18 (1.28-3.69)) even after controlling for socio-demographics, other subtypes of insomnia, habitual snoring and short sleep duration.
Conclusion: NRS is a common problem that tends to persist in middle-aged adults. The independent association of NRS with pervasive medical disorders argues for its distinct nosological status and need for medical intervention.
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E: Neurological Sleep Disorders Affecting Sleep/Waking

ANTIEPILEPTIC THERAPY IN NFLE PATIENTS: EFFECTS ON MACROSTRUCTURAL AND MICROSTRUCTURAL PSG PARAMETERS

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Introduction and Objectives: Nocturnal Frontal Lobe Epilepsy (NFLE) is a sleep-related epilepsy characterized by a wide range of ictal paroxysmal motor events ranging from smaller events to paroxysmal awakenings, tonic-dystonic seizures or hyperkinetic complex phenomena. Seizures can recur many times during the night and antiepileptic therapy (especially with carbamazepine) seems to be effective in reducing the frequency of seizures in about two thirds of patients. In this paper we analyze the modifications of macrostructural and microstructural polysomnographic (PSG) parameters in a group of 20 patients with NFLE after 6 months of antiepileptic therapy.
Materials and Methods: The baseline PSG recordings of 20 patients (14 males and 6 females, mean age 34 years ±13.3) with a diagnosis of NFLE were compared with the PSG recordings carried out after 6 months of regular AED. Only patients in monotherapy were selected for the study. Carbamazepine was used in 14 patients, topiramate in 5 patients, levetiracetam in 1 patient. Conventional sleep measures and Cyclic Alternating Pattern (CAP) parameters were analyzed and compared.
Results: Baseline PSG conventional findings included: increased REM latency and WASO and decreased sleep efficiency. CAP analysis revealed a significant increase in sleep instability (mean CAP rate 76%) and the emergence of ictal phenomena in phase A1 of CAP. Pharmacological treatment is clinically accompanied by a reduction in the percentage of seizures and improved subjective sleep quality. On PSG findings, we observed the normalization of macrostructural alterations and a partial reduction of microstructural instability (mean CAP rate 62%).
Conclusion: Antiepileptic therapy, in spite of a good clinical efficacy and a normalization of polysomnographic conventional abnormalities, only partially attenuated the microstructural instability, which remained above the normal values. Although interictal epileptiform abnormalities are less frequently followed by major seizures, they probably continue to act as an intrinsic sleep disturbance factor.

SLEEP AND WAKE DISORDERS ASSOCIATED WITH TRAUMATIC BRAIN INJURY: IMPACT OF SUCCESSFUL MANAGEMENT ON RECOVERY OF COGNITION AND COMMUNICATION

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Introduction and Objectives: Although sleep and wake disturbances such as excessive daytime sleepiness, and insomnia are among the most commonly reported neuropsychiatric sequelae following traumatic brain injury (TBI), the impact of these disorders on aspects of recovery has received limited scientific attention to date. Disturbances in sleep and wakefulness are reported to exacerbate other trauma related disorders in cognition, communication, and mood, as well as compromise the rehabilitation process and community reintegration. The objective of this study was to longitudinally evaluate the impact of successful management of sleep and wake disorders on recovery of aspects of cognition (primarily sustained attention, speed and capacity of language processing, and working memory), as well as communication and mood in adults with moderate-severe TBI.
Materials and Methods: A sample of 12 adults with TBI underwent evaluation of neuropsychological/mood status and communication specifically at baseline, and following optimization of sleep and wakefulness. The evaluation included a formal neuropsychological battery and self report measures, including the Daily Cognitive-communication and Sleep Profile. Sleep was assessed by clinical interview, polysomnography and MWT (or MSLT where indicated). Treatment included behavioral interventions, pharmacological management or continuous positive airway pressure, depending on the identified disorder.
Results: Clinically and statistically significant improvements using t-tests were found across several key domains of cognition (as measured by the Repeatable Battery of Neuropsychological Status ($p<0.05$), communication (as measure by the Latrobe Communication Questionnaire $p<0.01$), and mood (as measured by the Beck Depression Inventory $p<0.01$) in response to treatment of the sleep/wake disorder. Functional improvements were also reported including return to work, and increased social interaction.
Conclusion: Our results underscore the importance of the systematic and comprehensive management of sleep/wake disorders following TBI. Furthermore, our results illustrate that successful management may optimize cognitive and communication outcomes that are essential underlying components of successful community reintegration.

H: REM Behavior Disorders

HIPPOCAMPAL PERFUSION PREDICTS THE EMERGENCE OF NEURODEGENERATIVE DISEASE IN IDIOPATHIC REM SLEEP BEHAVIOR DISORDER

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Introduction and Objectives: REM sleep behavior disorder (RBD) is a risk factor for the development of neurodegenerative diseases, particularly for alpha-synucleinopathies such as Parkinson's disease (PD) and Lewy body dementia (LBD). In the present study, we aimed at identifying biological markers predicting the short-term emergence of alpha-synucleinopathies in RBD patients, using functional brain imaging.
Materials and Methods: 18 idiopathic RBD patients were scanned using Single Photon Emission Computed Tomography (SPECT) with 99mTc-Ethylene Cysteinate Dimer (ECD) in the morning in an awake resting state. After the scanning procedure, patients had a yearly clinical follow-up for two to four years. Patients were then subdivided in 2 groups: those who developed a neurodegenerative disease (PD or LBD) within the follow-up period (n=9), and those who remained stable (n=9). SPECT data analysis was performed using Statistical Parametric Mapping (SPM8) implemented in Matlab (version 7.11), and compared regional cerebral blood flow (rCBF) between the two groups using a 2-sample t test. Regression analysis was also performed between rCBF and UPDRS-III at the time of scanning, across all patients.
Results: Regional CBF was higher in the right hippocampus of patients who developed a neurodegenerative disease compared to those who remained stable ($p<0.05$ after correction for multiple comparisons, small volume correction (SVC)). There was a significant positive correlation between UPDRS-III and rCBF in the right hippocampus ($p<0.05$ corrected, SVC).
Conclusion: It is possible to predict the short-term development of neurodegenerative disease in RBD patients, using SPECT imaging. Disease progression can be predicted by abnormal perfusion in the right hippocampus at baseline. Perfusion within this brain structure is also correlated with scores of motor impairment, further suggesting its involvement in the development of full-blown neurodegenerative disorder such as PD or LBD.
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DECISION MAKING IN IDIOPATHIC RAPID EYE MOVEMENT SLEEP BEHAVIOR DISORDER

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Introduction and Objectives: Patients with idiopathic REM sleep disorder (iRBD) have a 12 year risk of 52.4% to develop a neurodegenerative disease such as Parkinson disease, Lewy body dementia, or Alzheimer disease (Postuma 2009). Studies reported neuropsychological deficits in iRBD. No study so far has assessed decision making in iRBD patients. The present study aims to investigate decision making under ambiguity as well as several executive functions by means of computerized neuropsychological tests in iRBD patients.
Materials and Methods: 17 iRBD patients were compared with 30 age- and education-matched control subjects in an extensive test battery assessing decision making under ambiguity (Iowa Gambling Task, IGT), information sampling, reflection impulsivity, intra- and extradimensional set shifting, working memory and planning, as well as response inhibition and control.
Results: Compared with controls, iRBD patients showed impaired decision making in the IGT and did not learn over the task. iRBD patients did not develop an advantageous decision strategy and frequently shifted between different choices. An analysis of the last two blocks of the task revealed that 62.5% of iRBD patients selected randomly between advantageous and disadvantageous alternatives, while 25% showed an advantageous and 12.5.% a disadvantageous decision pattern. This distribution significantly differed from the control group (66.7% advantageous performance). iRBD patients performed as controls in most of the other executive tasks. Disadvantageous decision making was not related to high risk taking or impulsivity.
Conclusion: As suggested by the present investigation, iRBD patients may show difficulties in decision making under ambiguity in a stage when other cognitive functions are well preserved. Whether the presence of decision making deficits has a predictive value for developing more pervasive cognitive difficulties and/or a neurodegenerative disease has to be assessed by follow-up investigations.

IMPAIRED DECISION-MAKING IN IDIOPATHIC REM SLEEP BEHAVIOR DISORDER

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Introduction and Objectives: REM sleep behavior disorder (RBD) occurs idiopathically (iRBD) or secondarily to synucleinopathies including Parkinson disease (PD). Previous studies have shown that patients with PD showed impaired decision-making ability. Given this, we investigated the decision-making ability in patients with RBD.
Materials and Methods: Consecutive thirty-eight patients with idiopathic RBD (iRBD group) and 34 age-matched healthy control subjects (HC group) were enrolled. The Iowa Gambling Task (IGT) and the Sniffin's Stick Test were conducted for all subjects. Performance in the both IGT and Sniffin's Stick Test were compared between the two groups. In the iRBD group, proportions of the patients with impaired decision-making ability or olfactory dysfunction were compared. In addition, the correlations between performances of these two test or other clinical RBD variables were also investigated.
Results: Both total IGT score and scores in Sniffin's Stick Test were significantly lower in the iRBD group than in the HC group. In the HC group, the IGT score for final block was significantly higher than that for first and second blocks. In contrast, the iRBD group showed no significant difference in the score among the five blocks. The proportion of the patients with iRBD with olfactory dysfunction (78.4%) was higher than that with impaired decision-making (40.5%). However, the proportion of the patients with impaired decision-making ability was not different between the patients with and without olfactory dysfunction. Furthermore, total IGT score showed correlation neither with the score of Sniffin's Stick Test nor with any clinical RBD variables.
Conclusion: The present results revealed that the impaired decision-making ability as well as olfactory dysfunction in patients with iRBD could be a herald of PD. However, considering the lack of association between the above functions or clinical RBD variables, these dysfunctions in iRBD could not necessarily follow ascending disease process of PD.

REM SLEEP BEHAVIOR DISORDER IN A LARGE COHORT OF PARKINSON'S DISEASE PATIENTS: FREQUENCY AND ASSOCIATED FACTORS

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Introduction and Objectives: REM sleep behaviour disorder (RBD) is considered a preclinical marker for Parkinson's disease (PD). Data on the frequency, phenomenology, course of the syndrome and associated risk factors in clinically apparent PD are limited, a definition of RBD in treated PD patients is lacking and requires modification of ICSD criteria. We investigated the frequency, phenomenology and associated risk factors of REM sleep behaviour disorder (RBD) in different stages of Parkinson's disease (PD).
Materials and Methods: An unselected cohort of sleep disturbed PD patients (n=457) was investigated with video-supported polysomnography. RBD was diagnosed according to the International Classification of Sleep Disorders, 2nd edition (ICSD 2), with one modification as historical information was not included. We determined the frequency of RBD and analyzed the influence of age, clinical disease features, disease duration, cognitive and physical impairment, medication, comorbidity, and sleep architecture.
Results: RBD was found in 210/457 patients, amounting to an overall frequency of 46%. Hoehn & Yahr stage was determined at median 3 (range 0-5). According to our cohort and modified definition, there was no preferred PD subtype for RBD (p=0.142). There was no gender preference (p=0.770). RBD was associated with older age (p=0.000). Adjusted for age and gender, PD patients with RBD had longer disease duration (p=0.024), higher Hoehn & Yahr stages (p=0.002), more falls (p=0.018), more fluctuations (p=0.005), more psychiatric comorbidity (p=0.026) and a higher dose of levodopa (p=0.002). The presence of RBD was related to slightly increased sleep efficiency (p=0.007), a higher amount of REM sleep (p=0.000) and more periodic limb movements in sleep (p=0.019).
Conclusion: RBD is a frequent and clinically relevant nocturnal disturbance for all stages of PD. It increases with age and disease duration, does not seem to be influenced by dopaminergic medication and may clinically significantly contribute to the nocturnal problems of PD patients and their bed partners.

I: Sleep Breathing Disorders

SLEEP BREATHING DISORDERS AT PATIENTS WITH ACROMEGALY

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Introduction and Objectives: Acromegaly is rare endocrine disease characterized by elevated levels of growth hormone (GH) and insulin-like growth factor type1 (IGF-1) and associated with many co-morbidities including sleep breathing disorders (SBD). However detailed data about SBD in patients with acromegaly are limited. Evaluation of frequency and types of SBD in patients with active acromegaly was the aim of this study.
Materials and Methods: We examined 10 patients with de novo active acromegaly, age 57 (28; 75) y., GH levels 27 (5; 53) μg/l, IGF-1 levels 766 (360; 1250) μg/l, duration of acromegaly 8 (5; 16) years. Sleep breathing study was conducted using the cardiorespiratory monitoring for all patients. Numbers of sleep obstructive and central apnea, (IAH), were estimated. Three patients were also examined after 1, 3 and 6 months of treatment of OctreotideLAR 20 mg i/m every 4 week. Data are expressed in Median (min; max).
Results: Severe or moderate SBD were found in 7/10 patients. Number of sleep obstructive and central apnea was 253 (11; 593) and 9 (1; 46) respectively. index of apnea-hypopnea (IAH) was 44 (12.2; 79.2) ep/hour. Medium

levels of saturation were 92 (85; 95)% and peak of desaturation was 71 (49; 88)%. Central sleep apnea were compounded 5-18% from all SBD. Strong correlations were found between IGF-1 levels (which reflected the activity of acromegaly) and frequency of central apnea episodes (r=0.78, p=0.036), medium level of saturation (r=-0.93, p=0.001) and desaturation peak (r=-0.75, p=0.05). Severity of central and obstructive apnea was also strongly correlated with each other (r=0.89, p=0.006). OcreotideLAR treatment was associated with significant improvement of sleep breathing parameters even after 1 month of therapy.
Conclusion: Sleep breathing disorders were found at the majority of observed patients with acromegaly. Activity of acromegaly was associated with higher severity of SBD and development of central sleep apnea. Medical treatment with OctreotideLAR improved sleep breathing parameters.

ELEVATED PANCREATIC POLYPEPTIDE (PP) LEVELS IN OBSTRUCTIVE SLEEP APNEA

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Introduction and Objectives: PP is a hormone that plays a role in appetite regulation, promoting satiety. Its secretion is stimulated by food intake and proportional to caloric content. Since its release relies on vagal cholinergic mechanisms, PP is thought to be an indicator of the vagal tone at the level of the pancreas. There is evidence that cardiac sympatho-vagal balance is altered in Obstructive Sleep Apnea (OSA), with a decrease in daytime para-sympathetic activity. We therefore hypothesized that OSA may be associated with reduced levels of PP which may have an adverse impact on appetite regulation.
Materials and Methods: Following a night of polysomnography, obese men and women (n=78, BMI: 38±2 kg/m^2) with (n=48) or without OSA (n=30) underwent a 2-h oral glucose tolerance test (OGTT) with sampling at 30-min intervals. Fifteen subjects were then enrolled for a 24-h study with blood sampling at 20-min intervals in the laboratory, including identical carbohydrate-rich meals presented at 5-hour intervals at 0900h, 1400h, and 1900h. Plasma PP levels were measured by radioimmunoassay (ALPCO, Salem, NH).
Results: All statistical analyses were controlled for sex, age and BMI. Contrary to expectations, the presence of OSA was associated with significantly higher basal PP levels (p=0.023). This impact of OSA tended to be larger in women than in men (p=0.11 for sex x presence of OSA interaction). The presence of OSA was also associated with a larger PP response to glucose (p=0.007) that was similar in men and women but greater in older than younger individuals (P<0.0001). Similar findings of elevated PP levels were obtained during 24h blood sampling with the OSA group having higher circulating PP levels (68.0 pmol/L) than the non-OSA group (40.5pmol/L; p=0.01).
Conclusion: These findings demonstrate for the first time a dysregulation of PP release in OSA that may reflect a resistance to PP and its effects on satiety.
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NEW INSIGHTS INTO MONOCYTE DIFFERENTIATION IN SLEEP APNEA PATIENTS

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Introduction and Objectives: Blood monocytes are multipotent cells and can differentiate into macrophages and dendritic cells (DCs) which promote atherogenesis, or into endothelial-like cells (ELCs) promoting neovascularization. Hypoxia profoundly affects monocyte differentiation. Thus, we investigated the effects of obstructive sleep apnea (OSA) and intermittent hypoxia (IH) in-vitro on monocyte differentiation.
Materials and Methods: Peripheral blood monocytes from 15 healthy controls (age = 40±10.8 years, BMI=27.7±4.9 kg/m^2, RDI = 7.9±2.9 events/hr) and 17 co-morbidity free OSA patients (age=45±13.3 years, BMI=28.4±3.7 kg/m^2, RDI=33.2±17.7 events/hr) were cultured for 9 days. Oxidized-LDL (OxLDL) was added for the last 24 hours of culture. Control cultures were also exposed to IH (BioSpherix-OxyCycler-C42-system). Flow cytometry, light- and Time-Lapse microscopy were used.
Results: Macrophages, DCs and ELCs developed in OSA and in control cultures maintained for 9 days, but in different proportions. The percentage of stellar-shaped DCs was significantly higher in OSA (44.1±22.8% vs. 23.6±14%, respectively, p=0.01). OxLDL activation further increased DCs generation (OSA: 61.6±24% vs. Control: 37.8±23.7, p=0.01). Moreover, OSA, but not controls DCs, were transformed into foam cells. The number of macrophage-derived foam cells was also higher in OSA (12±4.9% vs 5.4±4.5%, p=0.02). However a dichotomy was noted in the development of spindle-shaped ELCs - all subjects could be sub-divided into two distinct groups with low- (5-15%) and high-ELC development (>20%). High-ELCs levels were detected in 8 out of 17 OSA and in 6 out of 15 controls. Exposure of control cultures to 24 cycles of IH in the last 24 hrs or to 10 cycles of IH for 9 consecutive days induced DC development.
Conclusion: Increased monocyte differentiation into macrophages and DCs followed by foam cell formation may promote atherogenesis in OSA. OxLDL can further exacerbate these processes. Yet, ELC development, which was an individual trait, could potentially differentiate between OSA with good or bad prognosis for cardiovascular morbidity.

TUMOR GROWTH AND CIRCULATING VEGF INDUCED BY INTERMITTENT HYPOXIA IN A MOUSE MODEL OF SLEEP APNEA

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Introduction and Objectives: Data from an animal model of obstructive sleep apnea (OSA) have recently shown that a pattern of intermittent hypoxia similar to the one experienced by OSA patients enhances tumor growth (Almendros et al.; ATS Congress, 2011). Moreover, it is also known that cancer progression is associated with the levels of circulating vascular endothelial growth factor (VEGF). The aim of this study was to test the hypothesis that tumor growth rate and concentration of circulating VEGF show parallel increases in a mouse model of cancer where the animals were subjected to intermittent hypoxia mimicking OSA.
Materials and Methods: A melanoma tumor was induced in ten male C57BL/6NCrl mice (Charles River) by subcutaneous injection of B16F10 cells (ATTC) in their left flank region. Five of these animals were chronically subjected to intermittent hypoxia with a pattern mimicking OSA: 20 s of 5% O2 and 40 s of room air (6 h/day for 17 days). The other 5 animals were kept under normoxia (control). At day 17, the tumors were excised and weighed, and VEGF concentration in plasma was measured by ELISA.
Results: Tumor weight was 3-fold greater (p=0.008) in the intermittent hypoxia group (1.94±0.39 g) than in the normoxia group (0.63±0.07 g). VEGF plasma concentration was significantly increased (p=0.016) from 63.2±2.4 pg/mL in control animals to 115.0±14.3 pg/mL in those subjected to intermittent hypoxia. Moreover, VEGF values were strongly correlated with those obtained from tumor weight (r=0.78, p=0.005).
Conclusion: The increased levels of VEGF observed and their positive correlation with tumor weight suggest that VEGF plays an important role in the enhancement of tumor progression induced by intermittent hypoxia mimicking OSA.
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OBSTRUCTIVE SLEEP APNEA AND ALLERGIC RHINITIS: IMPACT OF TREATING UPPER AIRWAY INFLAMMATION ON SLEEP PARAMETERS

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Introduction and Objectives: Nasal obstruction has been associated with obstructive sleep apnea (OSA). Symptoms present in OSA, such as daytime sleepiness, are also common in patients with allergic rhinitis (AR). OSA has been shown to be associated with a variable degree of nasal inflammation, uvula congestion and airway hyperreactivity, all of which may exacerbate the disease. The purpose of this study was to determine the effects of in-

tranasal corticosteroid on sleep parameters and upper airway inflammation in OSA patients with AR versus non-AR.

Materials and Methods: Patients in the AR (n=34) and non-AR (n=21) groups both received mometasone, 200 mcg twice daily for a period of 12 weeks. Before and after treatment, each patient underwent a full night polysomnography, maintenance of wakefulness testing (MWT), subjective sleepiness assessment (Epworth and Quebec Sleep questionnaires), and tissue biopsies from the inferior turbinate, nasopharynx and uvula. All biopsies were processed for the detection of immunoreactivity of EG2 (eosinophils), CD4 T cells, CD8 T cells, CD68 (macrophages) and Elastase (neutrophils).

Results: Patients reported less sleepiness after treatment as measured by the ESS and QSQ. Treatment improved the supine AHI in allergic subjects more than in non-allergic subjects even after adjusting for age, body mass index and sex (p=0.05). AR group showed higher oxygen saturation nadir after treatment. These sleep parameters improvements were associated with significant reduction of the eosinophil counts ($P< 0.0001$), and to a lesser extend of the CD4 counts ($P<0.05$), in the tissue biopsies from patients with allergic rhinitis.

Conclusion: Inflammation plays a role in OSA. Controlling inflammation of the upper airway is useful in improving clinical symptoms associated with this condition. Allergic rhinitis probably impacts on OSA through both obstructive and inflammatory phenomenon.

OBJECTIVE OUTCOMES AND USE OF CPAP FOLLOWING MAXILLOMANDIBULAR ADVANCEMENT SURGERY FOR TREATMENT OF OBSTRUCTIVE SLEEP APNEA

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Introduction and Objectives: Obstructive episodes during sleep can be measured by the apnea hypopnea index (AHI). This index is used to assess the severity of sleep apnea. Excessive daytime sleepiness can be measured by the Epworth Sleepiness Scale (ESS). In the literature, there are conflicting studies as to whether or not the apnea hypopnea index is correlated in any way with the subjective symptoms of daytime sleepiness. Continuous positive airway pressure (CPAP) and maxillomandibular advancement (MMA) surgery are two options to treat OSA. The purpose of this study was to determine the success rate of MMA surgery for OSA, determine if there is a correlation between AHI and ESS and if there is a need for CPAP following surgery.

Materials and Methods: All patients undergoing maxillomandibular advancement surgery to treat obstructive sleep apnea between February 2000 and August 2009 were asked to participate in the study. They were evaluated before and approximately six months after surgery using an overnight polysomnograph and a self administered questionnaire which included both the Epworth Sleepiness Scale and documentation of CPAP use. Criteria for successful treatment of OSA was a postoperative AHI$<$10, or a 50% reduction in AHI.

Results: Out of one hundred seventy-one patients, 100 pre- and postoperative AHIs were available. The average preoperative AHI was 46.2 and the average postoperative AHI was 9.1 ($p<0.001$, paired T test). In this patient population, MMA surgery was successful in 87% of cases. The Pearson correlation coefficient shows a moderate positive correlation between the AHI and ESS that is statistically significant (R 0.361, $p<0.001$). Out of one hundred sixteen patients, CPAP use was eliminated in 93.7% following surgery.

Conclusion: In this patient population: 1. The success rate of MMA was 87% 2. There was a moderate positive correlation between AHI and ESS. 3. MMA surgery eliminated the use of CPAP in most patients (93.7%).

THREE-YEARS OF RECALL: CLINICAL PROFILE OF OSA TREATMENT

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Introduction and Objectives: There is limited investigation of the real consequences of patients' decision not to receive CPAP treatment. Our objective was to compare those who were treated with CPAP therapy (G1) with who did not receive any treatment (G2); and those who received treatment and continued (G1A) and who abandoned treatment (G1B). We sought to evaluate the consequence of voluntary discontinuation of CPAP treatment with regard to several clinical and laboratory salient outcomes after 3 years of follow-up.

Materials and Methods: Data from 673 participants (459 OSA patients and 214 non-OSA) underwent clinical BP measurements, laboratory analysis and pulmonary function tests. After 3 years, participants completed questionnaires by telephone to identify possible treatment complaints regarding the use of CPAP.

Results: 329 participants completed the telephone interview; 229 were OSA patients and 100 controls. The mean age of G1 (N=30) was 54.3±9.6 years and of G2 (N=199) was 54.3±8.7years,p=0.4. There were differences in neck circumference at baseline (G1:38.6±3.9 cm, G2:36.0±4.2; p=0.001). The baseline PSG showed differences between G1 and G2 in AHI (41.7±19.1vs.23.9±19.2;$p<0.001$) and N3 (14.0±7.4vs.19.0±9.8; $p<0.001$). The hematocrit (G1:40.9±8.8, G2:44.1±3.8;p=0.001) and creatinine (G1:0.7±0.1, G2:0.8±0.1;p=0.01) were higher in G2. The ISSL-24h (G1:1.4±1.6, G2:2.7±2.2;p=0.03), maximal volunteer ventilation (G1:105.1±26.6, G2:124.3±42.9;p=0.03) and FEV1/FVC% (G1:91.2±30.0, G2:99.5±11.0;p=0.01) were also different. The multiple regression showed that AHI, ISSL-24h, hematocrit, gender and FEV1/FVC% were independently associated to treatment with CPAP. Despite the low number of subjects in G1B group (N=2), we observed higher baseline IDATE-state/trace (G1A:37.1, G1B:59.1) and triglycerides (G1A:102.3, G1B:348.5).

Conclusion: Patients who complied with CPAP were more severe and had less slow wave sleep. Interestingly, patients who did not accept CPAP treatment were more acutely stressed as seen in the ISSL-24h scale, while those who discontinued CPAP presented higher values on the anxiety inventory. This study suggests that compliance and acceptance of CPAP is associated to multifactorial aspects including health and mental status.

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TARGETED HYPOGLOSSAL NEUROSTIMULATION (THN) FOR THE TREATMENT OF OBSTRUCTIVE SLEEP APNEA: SLEEP DATA FROM A PHASE 1 SAFETY AND EFFICACY STUDY

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Introduction and Objectives: Treatment of obstructive sleep apnea with CPAP is efficient but some patients are not compliant. Alternative treatments should be developed Objective: Describe the effects on sleep parameters of targeted hypoglossal neurostimulation for the treatment of OSA in a safety and efficacy study.

Materials and Methods: Eleven patients (one female) with moderate to severe OSA and non-compliant with CPAP therapy volunteered to participate in the study. Stimulators were implanted subcutaneously in the upper chest wall and a dedicated multi-contact electrode was tunneled subcutaneously to the main homolateral Hypoglossal nerve, in the submandibular triangle, unilaterally. The electrode's soft silicone cuff housing 6 independent contacts was rolled over the nerve. Patients remained in the ward overnight. Stimulation started 2 to 4 weeks after surgery; patients were titrated during wakefulness, according to tolerance and bulk tongue movement assessed during pharyngeal endoscopy. Full night Polysomnography (PSG) was performed immediately after, and stimulation was adjusted until correction of OSA or patients awakened. PSG was repeated after three months treatment. Paired t-test was used for analysis

Results: Mean age of the patients was 50+12 years (mean, SD), BMI 30.7+3.5 kg/m^2. After three months of daily use there were no significant changes in total sleep time (425.5+89.2 min to 429+66 min), stage 2 (64.7+8.1 to 67.7+12), deep stages (8.9% to 15.3%) non REM, or REM sleep (16.8%+4.4 to 15.3%+5.6). By contrast, sleep efficiency showed a tendency to increase (73.3%+13.8 to 80%+13; p=0.08), whereas stage 1 (9.8% to 6.4%; p = 0.01) and sleep fragmentation significantly decreased (MAI 38.5/hour to 21.1/hour (p = 0.005)). The mean AHI had decreased by 59%, from 47.4+16.9 to 19.4+12.6 per hour slept $p< 0.001$.

Conclusion: THN therapy does not impair sleep duration or continuity. It improves sleep quality by decreasing stage1 and sleep fragmentation and improving sleep efficiency.

VALIDATED QUESTIONNAIRES AND AN AMBULATORY MONITOR IN THE DIAGNOSIS OF OBSTRUCTIVE SLEEP APNEA

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Introduction and Objectives: Screening questionnaires have been validated in populations at risk for obstructive sleep apnea (OSA). Simplified ambulatory monitors have become accepted for confirmation of OSA in patients with a high pre-test probability. Advantages of an alternative algorithm to in-lab polysomnography (PSG) include timely access to diagnosis and reduced costs.
This study compared the diagnostic utility of three validated questionnaires and a Level III portable monitor (PM), in the diagnosis and exclusion of OSA.
Materials and Methods: One hundred and fifty patients recruited from the Kingston General Hospital Sleep Clinic completed (i) three validated questionnaires (Sleep Apnea Clinical Score, Stop-Bang Questionnaire, and Berlin Questionnaire], (ii) wore a Level III PM device (MediByte®, Braebon, Kanata), and (iii) underwent in-lab polysomnography. Downloaded Medibyte* data, including oximetry, nasal pressure airflow, and respiratory inductance plethysmography, were manually scored by an experienced scorer, blind to in-lab PSG results. Questionnaire and PM data were then compared with Level I in-laboratory overnight PSG.
Results: Of 150 patients recruited, data for 117 patients (77 M, 40 F), mean age 50 $\pm$ SD 12.6 years, mean BMI 31 $\pm$ SD 6.6 kg/m^2, is available. At a diagnostic threshold AHI of 10 (based on in-lab polysomnography) the PM had slightly lower sensitivity (79%) but greater specificity (88%) than any of the questionnaires. The sensitivity and specificity for each of the questionnaires was as follows: Sleep Apnea Clinical Score 89%, 52%; Stop-Bang 89%, 24%; Berlin 89%, 28%. For a diagnostic threshold AHI of 15, the sensitivity and specificity were as follows: MediByte 79%, 94%; Sleep Apnea Clinical Score 91%, 50%; Stop-Bang 91%, 28%; Berlin 91%, 28%.
Conclusion: Our findings underscore the importance of objective measurement of respiration in the assessment of OSA, rather than reliance on validated questionnaires.
Acknowledgements: This research was funded by the Innovation Fund, Ontario Ministry of Health and the WM Spear Foundation, Queen's University. The authors thank Braebon Medical Corporation for providing 3 MediByte® units.

DIFFERENCES BETWEEN INTERMITTENT USERS AND ADHERENT PATIENTS OF CPAP TREATMENT DURING THE INITIAL 6 MONTHS OF TREATMENT

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Introduction and Objectives: The night-to-night variability combined with the patterns of CPAP use suggest the existing of consistent and intermittent users.
This study aimed to identify differences between intermittent users and adherent patients of CPAP treatment at a first evaluation (1 to 2 months) and a second evaluation (3 to 6 months) during CPAP treatment.
Materials and Methods: 125 OSAS patients who received CPAP treatment at the sleep disordered breathing clinic of a university hospital (Mean age=53,2 SD= 9.83) participated in the study. Assessment took place at the beginning of treatment (1-2 months) during witch 63 patients were intermittent users (defined as CPAP use $\geq$4h/night and $<$90% of the total treatment days) and 54 adherent patients (defined as CPAP use $\geq$4h/night and $>$90% of the total treatment days). At the second evaluation (3-6 months) 75 patients were intermittent users and 50 adherent patients. All patients underwent a standardized protocol that included quality of life (SAQLI), illness perceptions (IPQ-b) and anxiety (HADS).
Results: The results for MANOVA tests revealed significant differences between intermittent and adherent OSAS patients. At 1-2 months assessment, intermittent CPAP users had significant levels of anxiety (F=8.61, $p<0.005$), higher impairment in emotional functioning (F=5.39, $p<0.05$), treatment side effects (F=9.74, $p<0.005$) and higher subjective somnolence (F=6.08, $p<0.05$) when compared with adherents. At 3- 6 months CPAP treatment, intermittent users were younger (F=5.10, $p<0.05$), presented more impairment in quality of life (total) (F=9.37, $p<0.005$) and perceived OSAS as a more threatening illness affecting their lives (F=8.66, $p<0.005$).
Conclusion: The results emphasize the need to include illness perceptions and address patient's anxiety during CPAP treatment in order to improve adherence and patients' quality of life.

SLEEP DISORDERED BREATHING AND COGNITION: THE MEDIATING ROLE OF WEIGHT

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Introduction and Objectives: Sleep disordered breathing has long been associated with a wide range of cognitive deficits. Alternatively, whilst confronted with an obesity epidemic, the validity of a straightforward association between overweight-obesity and increased prevalence of sleep disordered breathing remains pertinent, and well debated. A sleep disordered breathing mediation model was previously tested, and in order to improve our understanding of the cognition, sleep disordered breathing and obesity relationships we contrasted that model.
Materials and Methods: Children aged 6 to 10 years were recruited from the community, and underwent an overnight sleep study and physical examination of height and weight. The next morning a neuropsychological battery including the Differential Abilities Scale (DAS), assessing cognitive abilities, was administered. A recursive mediating model was fitted in a complete dataset of 351 children's verbal, nonverbal and spatial abilities. Indicators were for weight the Body Mass Index (BMI=weight/meters2) and for sleep disordered breathing the Apnea Hypopnea Index (AHI/hrTST).
Results: Mean age of the sample was 7.9$\pm$0.8 years and had a median AHI/hrTST of 0.8 (Q1: 0.3 and Q3: 1.7) and BMI of 17.5 (Q1: 15.6 and Q3: 20.8). Children's general cognitive abilities fell in normal range being 100.8$\pm$13.5 (Q1: 91 and Q3: 109). The model fit was very good: Chi-square(9) = 13.5, p=0.143 with RMSEA = 0.038 and AIC: 67.5. Sleep disordered breathing is predictive of weight problems (p=0.036), and weight problems ($p<0.001$) affected adversely cognitive abilities. The direct effect was -0.60 ($p<0.001$) whilst when mediated by sleep disordered breathing a 0.40 fold increased risk was found.
Conclusion: Poor cognitive outcomes in children with sleep disordered breathing is partially mediated by weight problems. Weight management of children with sleep disordered breathing should be part of treatment.

SLEEP DISORDERED BREATHING, OBJECTIVE SLEEP QUALITY AND INCIDENT CARDIOVASCULAR DISEASE IN OLDER MEN: THE MROS SLEEP STUDY

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Introduction and Objectives: Sleep disordered breathing (SDB) has been associated with cardiovascular outcomes, but these relationships among older adults remain unclear. We tested the association between SDB and other objectively measured sleep characteristics and incident cardiovascular outcomes in older men.
Materials and Methods: In-home polysomnography (PSG) was performed in 2,911 men, ages 67 and older. Incident cardiovascular events were adjudicated during 5.8 years of follow-up. Exposures included the apnea-hypopnea index (AHI: number of apneas and hypopneas with $\geq$ 3% oxygen desaturation per hour of sleep); oxygen desaturation index (ODI: number of oxygen desaturations of 3% or more per hour of sleep); percent time in each stage of sleep (REM and stages 1, 2, and 3/4); and arousal index (AI). The primary outcome (CVD) is a composite event. Secondary outcomes include incident coronary heart disease (CHD), stroke, and heart failure (HF). Multivariate analyses were adjusted for age, race, study site, body mass index, and lifestyle variables.
Results: There were 634 CVD, 433 CHD, 120 stroke, and 130 HF events confirmed. There were no significant associations between sleep exposures and CVD or CHD. Those in the highest quartile of ODI had nearly a 2-fold increase in risk of HF (hazard ratio [HR]=1.91; 1.07 – 3.39) compared to those in the lowest quartile. AHI $\geq$ 15 was also associated with greater

risk of HF (HR=1.50; 1.04-2.16). However, these associations were no longer significant after excluding men with self-reported history of HF. Older men in the highest quartile of %REM sleep had significantly lower risk of stroke, even after excluding men with history of stroke.
Conclusion: SDB is associated with incident HF, but not after excluding those with history of HF. Possible explanations are reverse causality or earlier susceptibility to HF among those with SDB. High %REM sleep is associated with decreased risk of stroke.
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J: Sleep Deprivation

NEW DISCOVERIES IN THE IN VIVO INFLUENCE OF CORTICOTHALAMIC FEEDBACK IN SLEEP SPINDLES

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Introduction and Objectives: Sleep spindles have been tied to memory consolidation. Emerging research helps us to better understand the underlying mechanisms for spindle oscillations. Current evidence from thalamic slice experiments supports a mechanism for termination mediated by upregulation of the hyperpolarization activated depolarizing current (Ih) dependent on intracellular calcium concentration. In this study, we use an unprecedented combination of in vivo and modeling experiments and find significant and compelling evidence that cortical feedback indeed plays an active role in initiating and terminating spindles by desynchronizing thalamocortical neurons - effectively controlling the oscillation duration.
Materials and Methods: Electrophysiological experiments were conducted in cats (n=5) under general anaesthesia. We performed juxtacellular recordings in motor and somatosensory areas of the cortex. Also, we carried out simultaneous dual intracellular recordings (in parallel with local field potential recordings) from cortical (motor cortex) and thalamic (VL nucleus) recordings. Furthermore, we constructed a biologically realistic neuronal network of the thalamocortical loop to investigate the experimental evidence, modeling thalamocortical, reticular, pyramidal, and inhibitory interneuron populations, with each neuron embedded with specific ion channels following Hodgkin-Huxley kinetics. We also used models for AMPA, NMDA, GABAa, GABAb synaptic receptors. The spatial afferent pattern to these neurons was stochastically distributed as anatomically observed.
Results: The primary mechanism for spindle termination was desynchronization of firing between thalamic and cortical neurons leading to cortical spiking after rebound burst in the thalamus, which prevented T-channels de-inactivation and promoted spindle termination. Cortical feedback also caused spindle initiation through the summation of mini-EPSPs that eventually recruited reticular neurons.
Conclusion: The cortical feedback plays an unexpected active role in the mechanism of spindle generation. By acting as an initiation and termination mechanism, the cortex actively controls the duration of sleep spindles in vivo, which sharply contrasts with the view held so far that this sleep rhythm was purely controlled by intrinsic thalamic properties.

PARADOXICAL SLEEP DEPRIVATION POTENTIATES THE DEVELOPMENT OF ORAL DYSKINESIA IN MICE: ROLE OF OXIDATIVE STRESS

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Introduction and Objectives: The pathophysiology of tardive dyskinesia is related to nigrostriatal dopaminergic supersensitivity and an increase in oxidative stress. Our aim was to investigate if the effects of sleep deprivation (SD) on the development of reserpine-induced oral dyskinesia in mice (an animal model of tardive dyskinesia) would be involved with dopaminergic supersensitivity and striatal oxidative.
Materials and Methods: Adult male mice were treated with two injections of saline (SAL) or of reserpine (RES) 0.25 mg/kg, separated by 48h. After the first injection, in the next 96h they were submitted either to 1) SD with the method of multiple platforms in a water tank (SAL-SD and RES-SD groups), 2) stress control when kept in their home-cages, but daily exposed to the tank (SAL-ST and RES-ST groups), or 3) control when maintained in their home-cages (SAL-CTRL and RES-CTRL groups). Then animals were taken to wire mesh cages for orofacial dyskinesia quantification. Later, they were observed for stereotyped behavior after treatment with 1.5 mg/kg of apomorphine. In a second experiment, animals were euthanized and striatal catalase was quantified.
Results: In experiment 1, oral dyskinesia was significantly higher in both RES+ST and RES+SD compared to their reference groups (SAL+ST and SAL+SD), whereas RES+SD differed from all groups [$F(5,77)=6.77$, $p<0.0001$]. Apomorphine-induced stereotyped behavior did not differ among groups. In experiment 2, RES+SD presented a decrease of striatal catalase activity compared to SAL+CTRL and to SAL+SD groups [$F(5,56)=2.86$, $p<0.05$].
Conclusion: Our results show that SD potentiates the development of reserpine-induced oral dyskinesia. This potentiation does not seem to be related to nigrostriatal dopaminergic supersensitivity, because apomorphine-induced stereotyped behavior was not modified. Moreover, increased striatal oxidative stress was suggested by a decrease in striatal catalase activity in mice sleep deprived during reserpine treatment.
Acknowledgements: This study was supported by CEPID-FAPESP/AFIP

THE ASSOCIATION BETWEEN SHORT SLEEP DURATION AND WEIGHT GAIN IS DEPENDENT ON DISINHIBITED EATING BEHAVIOR IN ADULTS

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Introduction and Objectives: Little is known about the possible mechanisms underpinning the association between short sleep duration and weight gain. The objective of this study was to investigate whether the relationship between short sleep duration and subsequent body weight gain is influenced by disinhibited eating behavior.
Materials and Methods: Two hundred seventy-six adults aged 21 to 64 years from the Quebec Family Study were involved in this 6-year longitudinal study. Body composition measurements, self-reported sleep duration, and disinhibition eating behavior trait (Three-Factor Eating Questionnaire) were determined at both baseline and after 6 years. For each sleep duration group [short- up to 6 h), average- (7-8 h), and long- 9 h or more) duration sleepers], differences in weight gain and waist circumference were tested by comparing the lowest (score no more than 3) versus the highest (score 6 or more) disinhibition eating behavior tertiles using analysis of covariance, with adjustment for potential confounding factors.
Results: Individuals having both short sleep duration and high disinhibition eating behavior were more likely to gain weight and increase their abdominal circumference over time ($P<0.05$); however, short-duration sleepers having a low disinhibition eating behavior trait were not more likely to increase their adiposity indicators than average-duration sleepers. Over the 6-year follow-up period, the incidence of overweight/obesity for short-duration sleepers with a high disinhibition eating behavior trait was 2.5 times more frequent than for short-duration sleepers with a low disinhibition eating behavior trait. Energy intake was significantly higher in short-duration sleepers with a high disinhibition eating behavior trait ($P<0.05$ versus all other groups).
Conclusion: We observed that having a high disinhibition eating behavior trait significantly increases the risk of overeating and gaining weight in adults characterized by short sleep duration. This observation is novel and might explain the inter-individual differences in weight gain associated with short sleep duration.
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SHORT-TERM PARTIAL SLEEP DEPRIVATION: EFFECTS ON EMOTION REGULATION OF HEALTHY ADULTS

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Introduction and Objectives: Previous research has shown that sleep deprivation has negative effects on memory, cognitive, and physiological function. Sleep-deprived people also often show signs of emotionality. This study investigated risk posed by short-term partial sleep deprivation on the emotional regulation of healthy adults.
Materials and Methods: We randomized 80 adults, ages 18-68, into sleep deprivation (3-nights with 5-hours in bed) and a control group. We used experimental emotion elicitation to examine group differences dependent on sleep conditions. We elicited negative emotions with music (MCI), visualization, and pictures (IAPS). We measured emotion regulation by levels of positive and negative emotion and affect; scores on discrete emotions (PANAS-X); levels of arousal, pleasure, emotion dominance (SAM, Affect Grid). We assessed within and between group differences with MANOVA, and group differences on discrete emotions with t-tests.
Results: Following sleep-deprivation, people scored significantly lower on arousal, positive emotionality and affect compared to controls. In addition, they exhibited a negativity bias on discrete emotions, scoring positive (e.g., delighted, joyful) and neutral items (e.g., concentrating, attentive) lower and negative items (e.g., irritable, hostile) higher than controls. After emotion elicitation, both groups significantly reported increased negative emotion, arousal, displeasure, emotion dominance, and reduced positive emotion. The only significant differences between groups were on discrete emotions. The sleep-deprived group reported feeling significantly less fearless, more sluggish, tired, sleepy, and drowsy.
Conclusion: Sleep-deprivation appears to pose risk to emotion regulation through reductions in positive emotionality and affect. This study supports prior research showing a negativity bias following sleep deprivation with participants scoring lower on positive and neutral items and higher on negative items. The results of this study provide an analog for how people with long-term sleep problems may be at increased risk for mood related disorders.
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ASSOCIATION BETWEEN SLEEP HOMEOSTASIS AND A SYNAPTIC ADHESION MOLECULE

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Introduction and Objectives: Sleep need builds up during wakefulness and decays during sleep and this has been linked to changes in synaptic strength. Accordingly, sleep deprivation was shown to decrease NMDA receptors (NMDAr) functioning in different brain areas. NMDAr functioning is regulated by synaptic adhesion molecules (SAM), and one of these was shown to determine NMDAr synaptic localization. Here, we assessed the effect of sleep pressure on the expression of this SAM and its role in sleep regulation.
Materials and Methods: 1) Male mice from 3 inbred strains were submitted or not to a 6h sleep deprivation (SD) by gentle handling starting at ZT0 (Zeitgeber time 0: lights on), and sacrificed at ZT6 for brain sampling. Total RNA was extracted and expression levels measured by microarray or qPCR. 2) AKR/J male mice were submitted to a 6h SD at ZT0, followed by protein extraction of brain cortical tissue and Western blot. 3) The EEG of mutant male mice not expressing the targeted SAM was recorded during 24h of baseline, during a 6h SD starting at ZT0 and 18h of recovery.
Results: We observed that the mRNA expression of the targeted SAM was consistently decreased by SD in all inbred strains, whereas the SD-dependent decrease in its protein level was not significant for total cortical protein samples. Preliminary observations indicate that mice homozygote for the SAM mutation are much more difficult to keep awake during SD. Also, mutant and heterozygote mice had increased non-rapid eye movement sleep time during baseline compared to wild-type litter mates. A similar trend was observed for recovery.
Conclusion: Additional analyses are underway to assess the effect of this SAM on the dynamics of EEG markers of sleep pressure. Our preliminary data suggest a role for this SAM in sleep regulation.
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NIGHT-WORK SHIFTS AND INFLAMMATORY MARKERS

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Introduction and Objectives: There are some certain side effects for shift workers. Sleep deprivation has been shown to be associated with an elevation in inflammatory markers such as IL-6, TNF-α and CRP; and also inflammation is associated with increased risk of cardiovascular disorders, inflammatory disorders, cerebrovascular disorders, and mortality which is seen in shift workers too. The purpose of the present study was investigation of the relationship between night work and inflammatory markers.
Materials and Methods: After selecting 50 workers according to inclusion and exclusion criteria, we designed a cross over study and a specific shift schedule for them. They were divided randomly to 2 groups. Group 1 (25 persons) went on a schedule of 3 days as day-worker, one day off, and 3 days as night-worker. Group 2 were vice versa, 3 days as night-worker, one day off, and 3 days as day-worker.(cross over) Blood samples were obtained between 7 and 8 AM after the periods of day-work and night-work. IL6, TNF-α and CRP were assayed by ELISA, and WBC was measured by cell counter H1.
Results: Night-work increased IL6, WBC, Neutrophils, Lymphocytes significantly, compared with day-work. TNF-α was increased but it was not statistically significant, and also changes in monocyte count was not significant.
Conclusion: This study showed increased inflammatory markers after night work, which have been reported in some previous studies on sleep deprivation. No significant changes in Monocyte count were observed. The results showed the elevation in blood levels of inflammatory markers is due to increase in gene expression, not monocyte count. These results support the hypothesis that increase in inflammatory markers may have a relationship with night work side effects.

MANIPULATING SLEEP DURATION ALTERS COGNITIVE AND EMOTIONAL FUNCTIONING IN CHILDREN

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Introduction and Objectives: Daytime consequences of sleep loss have been well documented in adults, but the pediatric literature includes mostly correlational studies, with few well-controlled, experimental studies. Some studies manipulated sleep experimentally in school-aged children to examine effects on cognitive functioning, but none has examined effects on emotional functioning.
Materials and Methods: In this study, thirty 8-12 year-old children wore actigraphs for 3 weeks. During the baseline week, actigraphic data were used to estimate the child's typical daily sleep duration. During the second week, the child was randomly assigned to go to bed either one hour earlier (sleep optimization) or one hour later (sleep restriction) than their typical bedtime. Each child then completed the opposite schedule during the third week of the study. After each of the 3 weeks, cognitive and emotional functioning were assessed using both objective and subjective measures.
Results: A paired samples t-test revealed that the sleep manipulation was effective; the children slept longer in the sleep-optimized ($M=9.29$, $SD=0.61$) versus -restricted ($M=8.06$, $SD=0.67$) condition ($t(29)=11.51$, $p<0.001$). MANOVA revealed significant differences in performance between the sleep conditions ($F(1, 29)=4.65$, $p=0.003$), which authorized running paired samples t-tests. Results revealed that when sleep was restricted, compared to optimized, children showed poorer performance on verbal ($t(29)=2.73$, $p=0.011$) and visual ($t(29)=2.20$, $p=0.036$) memory tasks and expressed fewer positive emotions ($t(29)=2.05$, $p=0.049$) on an affective response task. Measures of parent-reported attention ($t(29)=4.02$, $p<0.001$) and emotion

regulation (t(29)=2.48, p=0.019) were also worse under sleep-restricted versus -optimized conditions. There were no significant differences in measures of attention or emotion regulation as self-reported by children.
Conclusion: These results suggest that even a modest degree of chronic sleep restriction can have negative consequences for children's daytime functioning. These findings support emphasizing the importance of promoting healthy sleep habits for children, and they have implications for understanding how inadequate sleep can affect cognitive and emotional development.

L: Restless Legs Syndrome (RLS) and Movement Disorders in Sleep

IRON DEFICIENT ANEMIA POPULATION: PRELIMINARY REPORT ON PREVALENCE AND CHARACTERISTICS OF RESTLESS LEGS SYNDROME

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Introduction and Objectives: Iron deficiency plays a major role in Restless Legs Syndrome (RLS) and in two small studies has been reported to occur for about 40% of the patients with iron deficiency anemia (IDA). This study documents prevalence, severity and morbidity of RLS in a clinical IDA population referred for iron treatment. It also contrasts the iron and IDA morbidity (sleep and energy) for those with and without IDA.
Materials and Methods: All patients referred for treatment of IDA at a large clinical practice completed clinical forms including the CHRLSq-13 (validated for RLS diagnosis) and questions about sleep and energy.
Results: Preliminary data from 38 consecutive cases included 15 (38%) with definite RLS, and 13 (34%) not RLS. Ten reported some but not all RLS symptoms. Definite RLS compared to not RLS were younger (avr±SD: 47±12.6 vs. 62±19.2, t=2.3, p=0.03), and had higher EPO (avr±SD 125.7±73.9 vs. 57.1±48.7, t=2.1, p=0.058), greater difficulty returning to sleep (mean rank 10-point scale 7.5 vs. 3, U=0, p=0.005) and shorter total sleep times (avr±SD hours 6.0±0.8 vs. 7.4±0.5). There were no other significant differences. Definite RLS reported symptoms occurring more than twice a week, 66% reported daily occurrence. The symptoms were moderate to severely distressing for 73%.
Conclusion: RLS occurs commonly with IDA (39%) causing moderate to severe distress in 28% of the IDA population. RLS was associated with shorter sleep and more difficulty returning to sleep. These patients may benefit from RLS treatments, but none were being treated. The iron status in general did not differ between RLS and not RLS except for an elevated EPO possibly indicating greater hypoxic pathway activation for the RLS patients.

THALAMO-CORTICAL AND SUBCORTICAL CONNECTIVITY IN RESTLESS LEGS SYNDROME: A RESTING STATE CONNECTIVITY STUDY USING FMRI

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Introduction and Objectives: There have been few fMRI studies of RLS. We conducted a resting state connectivity study using fMRI to evaluate the functional connectivity in RLS.
Materials and Methods: Resting state fMRIs were obtained from 15 idiopathic RLS patients not on RLS medications (10 female; mean age ± sd 53.27±9.94, 10 (67%) female) and 13 controls (mean age ± sd 52.38±9.06, 8 (61.5%) female), both during the night when RLS symptoms are expressed and in the morning when RLS symptoms are generally absent. Resting state connectivity was measured by a seed based method using AFNI software. Bilateral thalamus (ventral posterolateral nucleus) were selected as a seed. Connectivity characteristics of RLS patients with and without symptoms were compared to controls.
Results: RLS Patients showed higher connectivity than controls in the thalamus, basal ganglia and red nucleus regardless of symptom period (night or morning), while less connectivity was observed in the parietal lobe, frontal and the temporal gyrus. The connectivity of the nigrostriatal dopaminergic pathway was increased.
Conclusion: RLS patients may have hyper-connections among dopaminergic motor-control circuits, but also hypo-connections between sensory integration areas in cortex. This is consistent with putative dopamine dysfunction in RLS patients and could explain why RLS patients show unconscious sensations that are hard to describe. The results indicate RLS patients may have deficits in controlling and managing sensory information.
Acknowledgements: Many thanks to Dr. Richard P. Allen and Christopher J. Earley, who helped our study.

BEHAVIORAL CHARACTERIZATION OF BTBD9 KNOCKOUT MICE - A POTENTIAL MODEL OF RESTLESS LEGS SYNDROME

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Introduction and Objectives: Restless Legs Syndrome (RLS) is a disorder that is manifested at rest with unpleasant sensations deep inside the legs that are relieved partially with movement. Family and twin studies have strongly support a genetic contribution. Two independent studies published recently suggest that the BTBD9 gene plays a role in RLS. The goal of this project is to understand the function of BTBD9 protein and model RLS in mice.
Materials and Methods: We have generated a knockout of the Btbd9 gene, the mouse homolog of the BTBD9 gene, using a gene-trap. Furthermore, we have characterized the Btbd9 knockout mice using an array of behavioral and physiological experiments, including open field observation for total activity, wheel running for measurement of voluntary activity across a 24 hour period, tail flick for sensation, polysomnography for sleep analysis, and serum iron analysis.
Results: In heterozygous interbreeding Btbd9 knockout mice were not produced as predicted by Mendelian ratio suggesting the knockout is partially lethal. The adult Btbd9 knockout mice showed several interesting phenotypes including alterations in pain sensitivity, iron metabolism, sleep pattern, and open field activity.
Conclusion: The KO mice hold the promise to be the first mammalian genetic model of RLS having several key characteristic of an RLS phenotype in mouse. Experiments will be conducted in the future to test the response of these mice to dopaminergic agonist, which are common treatments for restless legs syndrome patients.
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RELATIONSHIP BETWEEN INTERLEUKIN, IRON LEVELS AND RESTLESS LEG SYNDROME IN MARATHON RUNNERS

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Introduction and Objectives: Introduction Long distance street running is emerging as a popular sport in Western industrialized countries. Hours after an inflammatory stimulus, hepcidin levels greatly increase, and studies indicate that hepcidin inhibits intestinal iron absorption, placental iron transport and release of recycled iron from macrophages, decreasing the delivery of iron to maturing erythrocytes in the bone marrow. The acute induction of hepticidin is mediated in large part by interleukin-6 (IL-6). Restless Legs Syndrome (RLS) is a sensorimotor disorder and studies have indicated that low brain iron concentrations and dysfunction of iron metabolism and intracellular iron may play key role in the pathogenesis of RLS. Objective Our goal was to describe iron and IL-6 concentrations in RLS marathon runners vs no RLS marathon runners and its association with RLS.
Materials and Methods: Participants included in this study were participating in the São Paulo Marathon. We investigated 33 recreational runners who finished the marathon (42.195Km) in less than 4 h. We collected venous

blood basal, immediate and post 72h and measured IL-6 and iron levels. The researchers applied The International RLS Study Group (IRLSG) four criteria to diagnosis RLS and questions about physical activity (marathon, half-marathon, running, walking, aerobic, swimming and bike).
Results: IL-6 correlated positively with RLS. After the marathon, IL-6 showed slight increase (basal=16.46; Pos=43.93), not returning to baseline (72h=52.95). There were no significant associations between iron levels (basal=97.12 SD=35.79; post=109.62 (SD=34.15); 72h=86.70 (SD=26.83) and RLS.
Conclusion: IL-6 more than other cytokine is produced in large amounts in response to exercise and declined 72h afterward. The retriever kinetics of IL-6 is important for the recovery process of an athlete. Damage of this pattern may be associated with an altered pattern of sleep and could be responsible for the increased number of runners with RLS in our sample. This indicates that IL-6 may represent an important link with RLS.
Acknowledgements: The authors gratefully acknowledge the athletes for their patience as well as Gianni M.S. dos Santos for help with statistic analysis.

RELATIONSHIP BETWEEN CLINICALLY SIGNIFICANT AUGMENTATION OF RESTLESS LEGS SYNDROME (RLS) AND DOSAGE OF ROTIGOTINE TRANSDERMAL SYSTEM: POST HOC ANALYSIS OF A 5-YEAR PROSPECTIVE, MULTINATIONAL, OPEN-LABEL STUDY

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Introduction and Objectives: A 5-year study showed sustained improvement in RLS symptoms with optimal-dose rotigotine (0.5-4 mg/24h). However, the EMA-approved dose range is 1-3 mg/24h. The relationship between rotigotine dose and clinically significant augmentation was evaluated to provide additional information on dosing for optimal long-term RLS management.
Materials and Methods: SP710 (NCT00498186) was a 5-year, prospective, open-label follow-up of a placebo-controlled trial with rotigotine transdermal system. Patients were titrated to optimal rotigotine dose (0.5-4.0 mg/24h) and periodically evaluated for safety and efficacy. A computerized algorithm pre-selected patients who either met the Max Planck Institute (MPI) diagnostic criteria for augmentation (García-Borreguero et al. Sleep Med. 2007;8:520-30) or had discontinued the study following loss of efficacy. These cases were examined by an international expert panel for definite confirmation and evaluation of clinical significance.
Results: Of 295 patients enrolled, 290 entered open-label maintenance and 126 (43%) completed the 5-year follow-up. In 44% of patients the modal (most frequently applied) dose during open-label maintenance was 4 mg/24h. In 39 (39/295 [13.2%]) patients augmentation was confirmed as clinically significant; 15 (15/295 [5.1%]) were taking EMA-approved doses (1-3 mg/24h). The first clinically significant episode occurred more frequently when patients were taking higher doses (4 mg/24h [24 cases], 3 mg/24h [7 cases], 2 mg/24h [8 cases]). The majority of patients who withdrew due to clinically significant augmentation, as assessed by the expert panel, did so while on 4 mg/24h (8 patients; 3 mg/24h [3 patients], 2 mg/24h [1 patient]).
Conclusion: These data represent the first long-term assessment of augmentation outcomes by dose of any RLS treatment. Long-term risk of clinically significant augmentation increased when rotigotine was titrated above 1 mg/24h, with no further increase observed until dose reached 4 mg/24h. These data suggest that the low incidence of augmentation with rotigotine can be further mitigated by maintaining RLS patients within the recommended dose range.
Acknowledgements: This study was supported by UCB Pharma SA, delegated by Schwarz Pharma Ltd, Ireland. K. Moran (UCB Pharma Inc) is acknowledged for her contribution to the development of this abstract

IS RESTLESS LEGS SYNDROME AN IMPORTANT PREDICTOR OF SUBCORTICAL STROKE? – A PROSPECTIVE STUDY ON 117 STROKE PATIENTS

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Introduction and Objectives: One epidemiological study suggests the possibility that RLS may also lead to stroke. The objective of this study was to assess the prevalence of RLS among patients with stroke and examine the anatomical correlation reported in the few studies published.
Materials and Methods: We administered a pre-structured sleep questionnaire to consecutive stroke patients seen in our Neurology services over 1 ½ years. Unconscious (Glasgow coma scale <15) or aphasic, renal impaired or neuropathic patients were excluded. Diagnosis of RLS was established by the international RLS study group (IRLSSG) criteria and polysomnography was conducted.
Results: Out of 117 stroke patients, 14 (11.96%) were identified to fulfill IRLSSG diagnostic criteria for RLS, which had existed for an average of 60 + 40 months prior to stroke. The mean age of onset was 51 (±16.49). Eleven (78%) had the RLS symptoms corresponding to the hemisphere involved by the stroke (4 with unilateral, and 7 others with grossly asymmetrical RLS). Nine patients had basal ganglia strokes (3 hemorrhages, 6 infarcts), one with internal capsule infarct, 2 thalamic infarct, 1 cerebellar infarct and had a parenchymal hematoma. On PSG only one patient had periodic limb movements, with an index of 16.4 and 7 had obstructive sleep apnea (AHI >5). Nerve conduction was normal in 13/14 patients.
Conclusion: Restless legs syndrome, especially unilateral or asymmetrical might commonly pre-exist in patients presenting with subcortical stroke. The common laterality may suggest an important predictive value for RLS and may form an important point for future research.

RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED STUDY ON THE EFFICACY AND SAFETY OF GABAPENTIN ENACARBIL IN JAPANESE PATIENTS WITH PRIMARY RESTLESS LEGS SYNDROME

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Introduction and Objectives: This randomized, double-blind, placebo-controlled study was designed to demonstrate the efficacy and safety of gabapentin enacarbil, a gabapentin pro-drug, for patients with moderate to severe primary Restless Legs Syndrome (RLS).
Materials and Methods: A total of 469 Japanese adult patients who met the study criteria initially received daily doses of 600 mg/day gabapentin enacarbil or placebo for three days, and thereafter were maintained with 600, 900, or 1200 mg/day gabapentin enacarbil or placebo until the end of the trial period (12 weeks). Efficacy evaluations included the International RLS Study Group Rating Scale (IRLS) as primary endpoint, the investigator-rated Clinical Global Impression of Improvement (CGI), and the patient-rated CGI as secondary endpoints. Safety was documented by Adverse Events (AEs) reported in >5% of the studied patients.
Results: Treatment with 1200 mg/day of gabapentin enacarbil was associated with a statistically significant improvement in the IRLS total score compared to placebo based on the primary analysis by last observation carried forward (LOCF). Statistically significant improvements over placebo were also observed for each of the 600, 900, and 1200 mg/day dosing cohorts on both the investigator-rated and patient-rated CGI. Mixed-effect Model Repeated Measures (MMRM) approach was also applied in order to minimize the bias of LOCF, and the analysis revealed that treatment with 600, 900, or 1200 mg/day of gabapentin enacarbil was associated with a statistically significant improvement in the IRLS total score compared to placebo. The most frequent AEs were somnolence and dizziness, but there were no serious AEs during the study period.
Conclusion: Gabapentin enacarbil is effective and well tolerated for the treatment of RLS.

IRON DEFICIENCY PRODUCES PERIODIC LEG MOVEMENTS DURING WAKE AND SLEEP IN RATS

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Introduction and Objectives: Restless legs syndrome (RLS) appears closely related to iron deficiency (ID). ID rodents have been used as a biological model to explore the neurobiology of RLS. A critical question we address here for the first time is whether ID in the rodent also produces the motor sign for RLS, i.e. periodic leg movements (PLM) in wake and sleep.
Materials and Methods: ID rats (n=2) were developed by feeding the weanling (21-day old) pups with a low iron diet (4-ppm) for 2 months. Electrodes were implanted for sleep recording. After recording sleep parameters for 4-days, ID rats were then given the regular diet (iron, 35-ppm) and sleep recordings were conducted for an additional 3 days a week for 4 weeks. Control rats (n=5) were fed regular diet throughout the experiment. The index of PLM was calculated based on the 24-h recording.
Results: We found that ID rats had lower hematocrit levels than control rats (normal rats: 47.1±0.2; ID rats: 25.6±1.4). We also found that ID rats have less sleep time (min/24h; SWS: control rats: 714.1±43.49, ID rats: 608.3±146.59; REM: control rats: 106.5±5.69, ID rats: 71.9±12.74) and higher occurrence of PLM in wake (PLMWI, control rats: 0, ID rats: 121.1±34.22) and in SWS (PLMSI, control rats: 1.8±1.66, ID rats: 58.6±7.82) than control rats. Hematocrit levels (47.2±0.1), sleep time (min/24h; SWS: 644.2±112.29, REM: 112.5±31.73), and motor activity (PLMWI: 11.0±8.41, PLMSI: 6.7±4.49) were improved in ID rats by week 4 of iron replacement.
Conclusion: Reduced sleep time and PLM in wake and SWS seen in our ID rats resembles that of RLS patients. The ID rat can serve as an animal model of RLS. This model will enable CNS evaluations during PLM to better understand the causes of PLM and RLS and facilitate the testing of treatments for these diseases.
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ARE RESTLESS LEGS SYNDROME AND PERIODIC LEG MOVEMENTS DURING SLEEP ASSOCIATED WITH CARDIOVASCULAR ABNORMALITIES?

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Introduction and Objectives: Patients with restless legs syndrome (RLS) show a high prevalence of periodic leg movements during sleep (PLMS). Significant increases of systolic and diastolic blood pressure (SBP, DBP) were described in association with PLMS, whereas epidemiological studies showed an association between RLS and cardiovascular diseases. However the relationship between RLS/PLMS and cardiovascular function has been poorly investigated. The aim of the present study was to assess whether patients with RLS and/or PLMS have cardiovascular abnormalities, compared with control subjects.
Materials and Methods: We recruited 16 RLS patients (12W/4M; 44.2±8.3 years), 11 controls without PLMS (9W/2M; 42.7±8.8 years) and 11 controls with PLMS (5W/6M; 53.4±5.6 years). Subjects had normal BP at rest and were screened for hypertension and risk factors for cardiovascular diseases. Standard PSG and BP were recorded during 24 hours to assess nocturnal BP dipping ((night-day)/dayX100)). Intima–media thickness (IMT) of the carotid artery and flow-mediated dilation (FMD) at the brachial artery were also measured. The 3 groups were compared on cardiovascular measures by one-way ANOVAs. Relationships between PSG measures (sleep efficiency, total sleep time, PLMS index) and cardiovascular measures were assessed in all 38 subjects by Pearson correlation coefficients.
Results: No between-group differences were observed on SBP and DBP dipping, IMT or FMD. PLMS index was not correlated to any cardiovascular measure. The only significant correlations observed were between nocturnal BP dipping and total sleep time (SBP: r= -0.34;p=0.04; DBP: r= -0.41;p=0.01) and sleep efficiency (SBP trend: r= -0.29;p=0.08; DBP: r= -0.37;p=0.02).
Conclusion: These results suggest that in a population carefully screened for cardiovascular diseases, RLS and PLMS are not associated with cardiovascular abnormalities. However, poor sleep is associated with a lack of nocturnal BP dipping.
Acknowledgements: RLS patients and controls with PLMS were recorded in a pilot study funded by Boehringer Ingelheim.

EXOME SEQUENCING OF TWO INDIVIDUALS WITH EARLY ONSET FAMILIAL EKBOM SYNDROME

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Introduction and Objectives: Familial Ekbom Syndrome, or Familial Restless Legs Syndrome (FRLS), is a heterogeneous genetic disorder with multiple risk loci (RLS1-7). Our objective was to search for the gene(s) responsible in an early onset, autosomal dominant FRLS in a large Utah family.
Materials and Methods: DNA samples from 91 individuals of Kindred 7150 have been archived; 33 individuals underwent additional phenotyping, including survey, neurologic exam, lab testing for secondary causes (iron deficiency, diabetes, thyroid function, B12 deficiency). Two individuals meeting early onset, strict criteria for FRLS were selected for exome sequencing. DNA from the proband (onset age 9) and great niece (onset age 14) underwent Agilent Illumina 50 Mb whole exome capture (50 bp paired end, including intron/exon boundaries) (by Hudson Alpha, AL). Sequences were aligned using BWA and NovoAlign (reference NCBI36/hg18). Functional candidate variants were identified by ANNOVAR program (www.openbioinformatics.org/annovar/) and manually reviewed in IGV 1.5 for sequence quality. Expression profiles and gene function were searched using NCBI (www.ncbi.nlm.nih.gov) and UCSC Genome Browsers (www.genome.ucsc.edu/). LightScanner (Idaho Technologies, ID) melt curve screening of 3 K7150 affected, 2 K7150 unaffected individuals, and 1 unrelated unaffected individual are ongoing for molecular validation of sequence variants. SNPs of interest will be sequenced for confirmation and tested in the entire kindred.
Results: Exome capture produced 1x coverage of 97% of the exome; 30x coverage was 74%. Only 116 functional candidates identified by ANNOVAR were shared by both individuals: 87 heterozygous and 27 homozygous. There were 52 nonsynonymous, 1 synonymous, 50 indel, 8 splice site, and 2 missense mutations detected. None of the reported RLS loci (RLS1-RLS7), SNPs (Winkelmann 2007), MAOa or NOS1 were among the mutations detected by exome sequencing in this kindred.
Conclusion: FRLS is a genetically heterogeneous disorder - this family may have a unique or private mutation.
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IRON INFUSION IN RESTLESS LEGS SYNDROME IN THE THIRD TRIMESTER OF PREGNANCY

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Introduction and Objectives: Restless legs syndrome (RLS) affects around 25% of women during pregnancy. No safe treatment options are available. Ferric carboxymaltose (Ferinject®) is approved in Switzerland for treatment of iron-deficiency anemia in pregnancy. The objective of this open-label non-controlled exploratory double centre study is to assess the effect of an infusion of Ferinject® in pregnant women with RLS and iron deficiency.
Materials and Methods: Pregnant women in the third trimester of pregnancy with moderate-severe RLS (IRLS $>$ 20) with iron deficiency (Ferritin $<$35μg/l) or anemia (Hb $<$11g/dl) can be included in this study. Depending on Hb, iron substitution is performed with an infusion of 500–900mg of ferric carboxymaltose. Assessment of treatment effects is done by questionnaires (international RLS Study Group questionnaire (IRLS), fatigue severity scale, Epworth sleepiness scale, Pittsburgh sleep quality index), blood tests (iron, Ferritin, CRP) at the screening visit, 28 days after therapy, as well as 2 weeks and 6 weeks after ferric carboxymaltose delivery. Foot actigraphy is additionally performed 1 week before and 1 week after the treatment.
Results: So far 11 patients were included. All but one patient reported from the first night following a marked decrease in RLS. Four weeks after treat-

ment the RLS score was reduced from 25±5 to 7±6 ($p<0.01$). A reduction in PLMS was also documented in 7 out of 11 patients (from 34±22 to 25±19) ($p<0.02$). Ferritin levels increased from 16±10μg/l to 75±50μg/l. Ferric carboxymaltose was well tolerated without severe adverse.
Conclusion: Preliminary results of this ongoing study suggest that infusion of ferric carboxymaltose is (rapidly) effective in improving moderate-severe RLS in pregnant women with iron deficiency or anemia.

IV IRON ISOMALTOSIDE INCREASES TOTAL VENTRAL MIDBRAIN (VMB) IRON IN THE IRON-DEPRIVED MURINE MODEL OF RLS

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Introduction and Objectives: Brain iron status has been closely linked to RLS. IV iron treatment has been shown to reduce RLS symptoms presumably by iron transport across the blood brain barrier. But the extent if any of brain iron changes after IV iron has never before been evaluated.
Materials and Methods: Forty female strain 40 mice on a low iron diet for 100 days post weaning were divided into 4 groups for IV iron (1,000 mg/kg of iron isomaltoside (Monofer, Pharmacosmos) vs. saline sacrificed at 3 or 10 days post injection. Microdialysis was used to assess free iron in the VMB from 1 day before to 3 days after injection for the group sacrificed 3-days post injection.
Results: Free iron in VMB (Ventral midbrain) increases rapidly after injection to a peak level at about 6 hours after injection and then decreases to normal by 12 – 14 hours after injection. Total iron determined by atomic absorption was increased at 3-days post treatment for the VMB and the NA (nucleus accumbens) but not for other areas including pons, striatum, pre-frontal cortex and cerebellum. At 10-days post treatment the total iron remained high for the VMB and NA but was now also increased for the pons without changes in other areas. There were no post-injection changes in VMB ferritin or transferrin receptor. The IV iron normalized the hemoglobin values at 3 and 10 days after injection.
Conclusion: IV iron isomaltoside increases total VMB iron, the area associated with decreases in RLS. Other studies indicate this would normalize the iron-deficiency changes in striatal dopamine levels. Proteins binding the iron remain to be determined. Regional regulation of iron uptake shows a complex pattern with an interesting uptake in the NA and a delayed uptake in the PONS of uncertain significance.
Acknowledgements: Research supported by an unrestricted grant from Pharmacosmos

M: Psychiatric Disorders Affecting Sleep/Waking

QUANTITATIVE EEG IN REM SLEEP AND NREM SLEEP IN COMBAT OEF/OIF VETERANS

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Introduction and Objectives: Sleep disturbances are a core feature of post-traumatic stress disorder (PTSD)and have been associated with the onset and persistence of this pervasive disorder. In this study, we used quantitative EEG to compare the sleep of recent combat veterans with and without PTSD. We hypothesized that PTSD would be associated with greater beta activity and lower slow-wave activity during REM and NREM sleep.
Materials and Methods: Twenty-nine non-medicated combat-exposed veterans from recent conflicts (M age = 28.4±4.3 years) were recruited from three studies of sleep in veterans. Sixteen met diagnostic criteria for PTSD, 13 did not. EEG power from 0.5-50 Hz was computed on artifact-free 4-second epochs for both REM and NREM sleep. Using test and repeated measures mixed-effects models, we compared groups on EEG power bands for the whole night, and across the first 4 periods of REM or NREM sleep, respectively.
Results: Groups did not differ on whole-night total power. During REM sleep, there was a significant interaction between PTSD diagnosis and sleep period over the course of the night for delta power ($F(3,27)=4.47$, $p<0.02$), but no difference was found for beta power. No significant group by period interaction was observed during NREM sleep for beta or delta power. Of note, group by sleep period interactions were observed for sigma power during both REM sleep and NREM sleep ($F(3,27)=6.54$, $p<0.002$ and $F(3,27)=4.21$, $p<0.02$, respectively) and for theta power during REM ($F(3,27)=4.12$, $p<0.02$).
Conclusion: Contrary to our hypothesis, veterans with PTSD did not exhibit the expected global pattern of heightened arousal during REM and NREM sleep compared to veterans without PTSD. Exploratory analyses suggest that the pattern across the night of activity in the delta, theta, and sigma bands is different between the PTSD and non-PTSD groups. These changes may relate to altered information processing and integration.
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ATYPICAL TOPOGRAPHICAL DISTRIBUTION AND DENSITY OF K-COMPLEXES: A POSSIBLE CAUSE OF POOR SLEEP IN AUTISM

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Introduction and Objectives: Sleep EEG recording of adults with Autism Spectrum Disorders (ASD) show signs of altered sleep, resembling insomnia. K-complexes are sleep EEG phasic events, mainly prevalent during stage 2, and are thought to reflect brain mechanisms involved in sleep protection. K-complexes can be used as EEG markers to quantify sleep maintenance capacity. To evaluate the sleep maintenance capacity of autistic adults through the quantification and scalp distribution of K-complexes, using a full EEG montage.
Materials and Methods: Sixteen autistic adults (ASD; 22.1±1.3 years) and normal IQ and a comparison group of 18 typically developed participants (TD; 21.1±1.0 years) were recorded for two consecutive nights. Stage 2 K-complexes were visually identified and quantified for 14 recording electrodes according to the following criteria: a negative-going biphasic wave, lasting 0.5 to 1.5 seconds, with an amplitude of at least 75 μV. Spectral analysis (0.5-30.0 Hz) of the EEG 2 seconds before and after K-complexes was performed and spectral power was calculated.
Results: The ASD group generated less K-complexes per hour of stage 2 over all recording sites compared to the TD group but a significant difference was reached only over parietal cortex bilaterally (P3 electrode: ASD = 49.6±6.5 vs. TD = 75.9±10.2, $p<0.05$; P4 electrode: ASD = 44.8±6.0 vs. TD = 78.8±9.8, $p<0.01$). Preliminary analysis of EEG spectral power showed a significant increase in relative delta activity after vs. before K-complexes in TD participants.
Conclusion: 1) The decrease density of K-complexes in ASD adults suggest that neural substrates of sleep stage 2 K-complexes are atypical. 2) Impairment of this cortical sleep protective mechanism may be responsible for fragmented sleep in ASD. 3) The analysis of EEG activity in the TD group shows that K-complexes are indeed followed by cortical hyperpolarization, a sleep protective mechanism that will be assessed in further analyses in the ASD group.
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SELF-REPORTED SLEEP PROPLEMS AND NEUROPSYCHOLOGICAL PERFORMANCE IN ADHD

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Introduction and Objectives: To explore the impact of self-reported sleep problems (disturbed sleep and hypersomnia/sleepiness) on neuropsychological performance in subjects with ADHD without a diagnosed sleep disorder.
Materials and Methods: Retrospective chart review of 607 adults and adolescents (15-73 years, 229 females, 378 males) with diagnosed ADHD (Inattentive Type) and without diagnosed sleep disorder or brain injury/insult. Neuropsychological tests used the Trail Making Tests, the Stroop test and the SDMT-W. Self-reported problems initiating or maintaining sleep

(sleep disturbance) and hypersomnia or sleepiness were extracted from the Personal History Checklist for Adults. Univariate ANOVAs were used to assess the effect of sleep problems while controlling for age, sex, depression, anxiety, and pre-morbid intelligence level (NART-R).
Results: Self-reported sleep problems had no influence on performance in the Trails Making-B, Stroop test or SDMT-W. Subjects with self-reported problems initiating or maintaining sleep performed worse on the Trail Making-A ($F(1,601)=8.77$, $p=0.003$).
Conclusion: Self-reported sleep problems in ADHD had an impact only on a speeded sequencing measure. There was no impact seen on a measure of whole brain functioning that is also dependent upon speed. Similarly, there was no influence seen on a task of divided attention measuring distractibility or a task of cognitive flexibility that assesses executive function when controlling for age, gender, depression, anxiety and pre-morbid intelligence. While we have found that more ADHD subjects report sleep problems, these problems were found to influence performance on only one of the test measures assessed, which is a task highly dependent upon speed.
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INSOMNIA AND DAYTIME SLEEPINESS ARE RISK FACTORS FOR DEPRESSIVE SYMPTOMS IN THE ELDERLY

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Introduction and Objectives: Some studies reported that insomnia and excessive daytime sleepiness (EDS) may predict depression in adults. However, none of them have examined these associations specifically in community-dwelling elderly taking into account insomnia symptoms, EDS, and sleep medication.
Materials and Methods: Analyses were carried out on 3824 subjects aged above 65 years randomly recruited from 3 French cities and free of depressive symptoms at baseline. Questionnaires were used to evaluate insomnia symptoms, EDS and sleep medication at baseline. Depressive symptoms (DEP-s) were assessed using the Center for Epidemiologic Studies–Depression scale at baseline, at 2- and 4-year follow-up. Logistic regression models controlling for potential confounders were generated to determine whether sleep disturbances were associated with depressive symptoms and to determine the effect of individual insomnia symptoms.
Results: Insomnia symptoms and EDS increased independently the risk of incident DEP-s (Odds Ratio (OR) = 1.23, 95% Confidence Interval (CI) = 1.01-1.49 and OR = 2.05, 95% CI = 1.30-3.23, respectively). Poor sleep quality, difficulty in initiating and in maintaining sleep but not early morning awakening were identified as risk factors of DEP-s, with risk increasing with the frequency of IS. Prescribed sleep medication was also a risk factor for DEP-s independently of insomnia symptoms (OR = 1.62, 95% CI = 1.26-2.09).
Conclusion: Insomnia symptoms, EDS and the use of medication increase independently the risk of subsequent depression in elderly. Physicians should carefully consider sleep disorders or durable prescription of sleep medications to prevent late depression.
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N: Narcolepsy

NEURAL SUBSTRATES OF AWAKENING PROBED WITH GENETICALLY TARGETED OPTICAL CONTROL OF HYPOCRETIN NEURONS

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Introduction and Objectives: The neural underpinnings of sleep involve interactions between sleep promoting areas such as the anterior hypothalamus, and arousal systems located in the posterior hypothalamus, the basal forebrain and the brainstem. Hypocretin (Hcrt, also known as Orexin or Ox)-producing neurons in the lateral hypothalamus (LH) are important for arousal stability too since loss of Hcrt function has been linked to narcolepsy. However, it is unknown if electrical activity arising from Hcrt neurons is sufficient to drive awakening from sleep states, or is simply correlated.
Materials and Methods: Here we directly probed the impact of Hcrt neuron activity on sleep-wake transitions with in vivo optogenetics. We genetically targeted the expression of the light activated protein Channelrhodopsin-2 (ChR2) to Hcrt cells and used an optical fiber to deliver light deep in the brain, directly into the LH, of freely-moving mice. We further tested whether Hcrt-mediated sleep-to-wake transitions are affected by light/dark period and sleep pressure.
Results: We found that direct, selective photostimulation of Hcrt neurons increased the probability of transition to wakefulness from either Slow Wave Sleep (SWS) or Rapid-Eye Movement (REM) sleep. Interestingly, photostimulation using 5-30 Hz light pulse trains reduced latency to wakefulness, whereas 1 Hz trains did not. We found that optically induced SWS and REM sleep-to-wake transitions were blocked by Hcrt receptor antagonists and increasing sleep pressure.
Conclusion: These results demonstrated that in vivo optical activation of Hcrt neurons genetically targeted with ChR2 was sufficient to increase the probability of an awakening event during both slow-wave sleep and rapid eye movement sleep. Importantly, these experiments establish a causal relationship between frequency-dependent activity of genetically defined Hcrt neurons, and a specific sleep-wake behavior central to clinical conditions and neurobehavioral physiology.
Acknowledgements: FRS-FNRS, NARSAD, NIH, NIDA.

POSTPRANDIAL BLOOD GLUCOSE CONCENTRATIONS ARE INCREASED IN PATIENTS WITH NARCOLEPSY WITH CATAPLEXY AS COMPARED WITH HEALTHY CONTROLS

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Introduction and Objectives: Narcolepsy is caused by deficient orexin A signaling and is associated with obesity and an increased risk of diabetes mellitus. Accordingly, orexin A has been shown to be involved not only in sleep regulation but also in energy homeostasis. We characterized the glucoregulatory response to ad libitum food intake in patients with narcolepsy with cataplexy (N) compared to healthy control subjects (C).
Materials and Methods: We assessed the effect of food intake on blood glucose levels in 8 patients with N and 8 gender-, age- and BMI-matched C. After a nocturnal fast of 12 hours, subjects were offered a 30 minute ad libitum breakfast. In blood samples drawn before and after food intake, blood glucose and insulin concentrations were determined. Measures of insulin resistance (HOMA and QUICKI) were calculated. Group differences were tested with a paired Wilcoxon test. Results are given as means $\pm$ standard deviation.
Results: There was no difference in fasting QUICKI ($p=0.263$) and fasting HOMA ($p=0.263$). Total food intake (N vs. C, 812.0 ± 263.2 vs. 992.8 ± 251.3 kcal; $p=0.123$) and carbohydrate intake (349.9 ± 158.3 vs. 455.4 ± 166.6 kcal; $p=0.161$) was non-significantly reduced in N. In contrast, patients showed increased postprandial blood glucose concentrations (133 ± 21mg/dl) in comparison to C (106 ± 9 mg/dl; $p=0.036$), while postprandial insulin concentrations (64 ± 34 vs. 41 ± 15 uU/ml; $p=0.161$) did not differ significantly.
Conclusion: Our results indicate an elevation in postprandial blood glucose concentrations in N vs. C against the background of unchanged postprandial insulin levels and comparable measures of insulin sensitivity. These findings provide evidence for a disturbed regulation of glucose metabolism in narcolepsy with cataplexy that may be due to deficient orexin A signaling. Further studies are necessary to verify this assumption.
Acknowledgements: Supported by the Deutsche Forschungsgemeinschaft (SFB 654).

EXECUTIVE FUNCTIONS IN NARCOLEPSY

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Introduction and Objectives: The objective of the present study was to

characterize executive functions in drug-free patients with narcolepsy-cataplexy (NC) and to determine whether the executive deficits observed in patients with NC are specific to the disease itself through hypocretin deficiency or whether they reflect performance changes due to the severity of excessive daytime sleepiness.
Materials and Methods: Twenty-two subjects with NC, 22 with narcolepsy without cataplexy (NwC) matched for age, gender, intellectual level, objective daytime sleepiness, and number of sleep onset REM periods (SOREMPs), and 32 healthy controls matched for sex, age, and intellectual level. Participants underwent a standardized interview, completed questionnaires (depressive symptoms and self-reported cognitive complaint), and neuropsychological tests (alertness and executive processes: updating, inhibition, and shifting). All patients and 18 controls underwent a polysomnography followed by multiple sleep latency tests (MSLT), with neuropsychological evaluation performed the same day.
Results: Irrespective of diagnosis, patients reported higher cognitive complaints associated with the intensity of depressive symptoms. NC performed slower and more variably on simple reaction time tasks than NwC, who were similar to controls. This general cognitive slowing was related to the severity of objective sleepiness in NC. NC and NwC performed slower, reacted more variably, and made more errors than controls on all executive functioning tests. Individual profile analyses pinpointed a clear heterogeneity of the severity of executive deficit related to objective sleepiness, greater number of SOREMPs, and lower intelligence quotient. The nature and severity of executive deficits were unrelated to NC and NwC diagnosis.
Conclusion: We demonstrated that drug-free patients with NC and NwC presented large cognitive complaints associated with higher intensity of depressive symptoms, and altered executive functioning which may be explained by the severity of objective sleepiness and global intellectual level.

LONG TERM USE OF SODIUM OXYBATE IN THE TREATMENT OF CHILDHOOD NARCOLEPSY-CATAPLEXY

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Introduction and Objectives: To evaluate the long term efficacy, adverse effects and discontinuation rates for sodium oxybate (gamma hydroxybutyrate) used in the off-label treatment of childhood narcolepsy-cataplexy.
Materials and Methods: A retrospective chart review was conducted at a multidisciplinary sleep center. This report expands on our previously reported experience in eight patients on sodium oxybate (SO) for pediatric narcolepsy-cataplexy. The current series includes fifteen patients diagnosed with severe narcolepsy-cataplexy before the age of 18 years based on clinical history and objective testing.
Results: Subjects were followed for 3-90 (mean 33) months, while being maintained on additional medications for sleepiness (n=14) and/or cataplexy (n=6). Sleepiness improved with the addition of SO in 13 patients; median Epworth Sleepiness Scores fell from 18 to 12 (n=10, p=0.01) where this information was available. Cataplexy episodes decreased from a median of 38 to <1/week post treatment (n=14, p<0.001). Cataplexy severity, measured on an arbitrary scale, fell from median of 3 (severe) to 1 (mild) (n=15, p<0.001). Adverse effects occurred in 6/15 (40%) individuals; 2/15 patients (13%) discontinued SO, one due to insurance reasons and the other due to constipation and dissociative feelings. A third patient stopped the medication temporarily due to body aches and dizziness. Side effects in three other patients included tremor, blurry vision, nightmares and night awakenings. Improvement in social/academic spheres was noted in 11/15 (73%) subjects after commencement of SO. Median BMI was 23 before and after treatment (p=0.92). The mean dose was 5 (±2) grams. Dose escalation owing to development of tolerance was not noted.
Conclusion: Sodium oxybate remains effective in alleviating sleepiness and cataplexy over the long term in children with narcolepsy-cataplexy. It is relatively well tolerated with fairly low discontinuation rates and no development of tolerance.

CLINICAL DIFFERENCES BETWEEN CHILDHOOD AND ADULTHOOD NARCOLEPSY

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Introduction and Objectives: Diagnosis of childhood narcolepsy is frequently delayed. Our study can help to clarify the reasons.
Materials and Methods: Over the past decade, 148 narcoleptic patients (66 men, 82 women) underwent clinical face-to face interview, HLA-DQB1*0602 typing, nocturnal polysomnography (PSG) followed by multiple sleep latency test (MSLT) and filled-in Epworth Sleepiness Scale (ESS). The group was divided into childhood and adolescent cases (31 patients) examined before turning 18 years (mean age 15.3±3.3 years, age of the first symptom 13.4±3.8 years), and adult cases (117 patients) whose diagnosis was estimated later (mean age 47.6±17.2 years, age of the first symptom 23.0±12.4 years). For statistic evaluation chi-square, Fisher's and two sample t-tests were used.
Results: Narcolepsy-cataplexy (N-C) was found in 93 adult patients (79.5%) compared with 16 pediatric patients (51.6%), p<0.01. No difference was found in the presence of hypnagogic/hypnopompic hallucinations and sleep paralysis. Adult patients had more sleep comorbidities: sleep apnea syndrome (p<0.01), periodic limb movements (p<0.05), restless leg syndrome (p<0.05) and a mildly, but non-significantly REM behavior disorder. No differences were found in the sleep latency and number of SOREMs tested by MSLT or in ESS. While N-C groups showed equal results in HLA-DQB1*0602 positive cases (93.7 versus 92.6%), narcolepsy without cataplexy (Nw/oC) had many more positive cases in childhood (78.6 versus 52.9%), p<0.001, suggesting a possible later appearance of cataplexy in children. In both groups, the body mass index (BMI) was higher in N-C cases than in Nw/oC (p<0.01).
Conclusion: The nearly 50% absence of cataplexy as the main distinctive feature of childhood narcolepsy can explain the diagnostic delay if cataplexy is taken as the salient clinical symptom.
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THE EFFECT OF INTRANASAL HYPOCRETIN-1 ON GLUCOSE TOLERANCE IN NORMAL WEIGHTED AND OBESE NARCOLEPSY PATIENTS

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Introduction and Objectives: Narcolepsy is an intrinsic sleep disorder typically caused by a deficiency of hypocretin-1, also called orexin-A. Hypocretin-1 is essentially involved in not only sleep regulation, but also energy homeostasis. There is evidence that its absence might lead to obesity and a diabetogenic state. Aim of this study was to investigate the effect of intranasal hypocretin-1 on oral glucose tolerance in patients with narcolepsy with cataplexy with normal weight and obesity.
Materials and Methods: We investigated, in a double blind, placebo-controlled experiment, the effect of hypocretin-1 on glucose tolerance in 12 patients with narcolepsy with cataplexy. All patients received in randomized order hypocretin-1 and placebo intranasally with an interval of approximately two weeks. Immediately after substance administration the participants were subjected to a standard procedure oral glucose tolerance test (OGT; administration of 75 g glucose in solution, measurement of blood glucose before and 30, 60, 90 and 120 minutes after glucose intake). Patients were divided into a group with normal weight (n=5, BMI<26) and with obesity (n=7, BMI≥26).
Results: In addition to the expected main effect of body weight on the blood glucose level in every measuring time, an ANOVA showed a significant interaction effect of body weight and substance on glucose in the OGT (p=0.039). Post hoc t-tests show a significantly increased blood glucose level in OGT in obese narcoleptics 90 minutes after hypocretin-1 and glucose administration (M=160.43, SD=34.34) compared to the placebo condition (M=125.86, SD=20.47; p=0.021), whereas in the normal weight group no differences were detectable (placebo: M=122.60, SD=21.48; hypocretin-1: M=110.20, SD=21.32; p=0.220).
Conclusion: Our results indicate that exogenous hypocretin-1 has an im-

pact on oral glucose tolerance in obese but not normal weight patients with narcolepsy. Further studies are necessary to elucidate the underlying mechanisms.
Acknowledgements: This study was supported by the Deutsche Forschungsgemeinschaft (DFG, SFB 654).

O: Other

THE AUSTRALIAN CENTRE FOR EDUCATION IN SLEEP (ACES) PROGRAM: SLEEP EDUCATION TRIALS FOR MIDDLE SCHOOL STUDENTS IN AUSTRALIA AND NEW ZEALAND

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Introduction and Objectives: Sleep duration and quality is associated with a range of neuropsychological and psychosocial outcomes in adolescents. Sleep education programs, although few, have endeavoured with varying success to educate adolescents through school based programs, to increase sleep knowledge and duration. The Australian Centre for Education in Sleep (ACES) has developed and trialled a sleep education program for adolescents. This paper presents data from three trials of the same ACES programs.
Materials and Methods: ACES sleep education was delivered to 69 Australian adolescents (mean age 15.2 y) and 29 New Zealand adolescents (mean age 14.8y). The Australian trials were cross sectional designs, the NZ trial a randomised control trial. The ACES high school program of 4 x 50 minutes classroom sessions, with accompanying student workbook resource were used.
Results: Where sleep knowledge was evaluated (Australian trials), significant improvements were shown in all trials (All $p < 0.005$). Where sleep duration was assessed (New Zealand trial) significant improvements were found in weekend sleep duration [$F(1, 27)=4.26$, $p=0.04$). Qualitative evaluation suggested that both students and teachers thought the program was feasible, interesting, and educational.
Conclusion: Findings suggest that ACES sleep education programmes can improve both sleep knowledge and sleep duration in adolescents. Future directions, how to improve the programme and how to optimise the potential that sleep knowledge attained during the ACES program, equates to actual behaviour change is discussed. This study provides encouraging signs that adolescents can improve their sleep which bodes well for sleep-related health and psycho-social issues.

SLEEP BRUXISM AND HEADACHE IN ADOLESCENTS

Maria Clotilde Carra, Gilles Lavigne, Pierre Rompré, Gilles Lavigne. *University of Montreal, Canada*

Introduction and Objectives: Sleep bruxism (SB) is a sleep-related movement disorder with a high prevalence in pediatrics. It is frequently reported in association with other sleep disorders (e.g. sleep disordered breathing, SDB) and daytime complaints (e.g. headache, jaw muscle pain). Moreover, recent data in a pediatric orthodontic population reported a higher frequency of SB in children and adolescents with retrognathia, a recognized risk factor for the development of SDB. Recently it has been questioned whether SB is actually a "protective" mechanism that develops in an effort to maintain or restore upper airway patency during sleep. This study aimed at investigating the relationship between SB and headache in adolescents, prior orthodontic treatment.
Materials and Methods: Twelve adolescents (mean age 15.3 ± 0.66) with no previous orthodondic treatments were selected based on reports of SB, snoring, and frequent headaches. Participants underwent 4 non-consecutive ambulatory polysomnographic recordings for data collection of sleep and respiratory parameters at baseline, as well as when a mandibular advancement appliance (MAA) was worn during sleep. The MAA was used in 3 different positions (A-free splints; B-central occlusion; C-50% advancement), each in a randomized order (A-B-C or B-C-A) with a wash out period between each position.
Results: Overall, sleep variables were not different between the 4 nights. SB index (episodes/h of sleep) was reduced with the MAA, up to 71% decrease in the advanced position ($p=0.009$; ANOVA). Headache intensity was decrease by 57%, reaching significant values only with the MAA in central occlusion ($p=0.04$) and advanced ($p=0.05$) positions.
Conclusion: SB is frequently associated with frequent headaches, especially in the morning. Short-term treatments with a MAA reduced both SB and headaches in adolescents. However, the interaction between SB and headaches, and the assessment of long-term efficacy and safety of using a MAA need further investigations.
Acknowledgements: The study was supported by the Canadian Institutes of Health Research (CIHR grant MOP-11701), the Ministère de l'Éducation, du Loisir et du Sport du Quebec (scholarship for M.C.Carra) and ResMed-ORM (for the oral appliances).

POWER NAPS IN NIGHT TIME DRIVING: FIRST RESULTS OF AN INVESTIGATION UNDER NATURAL CONDITIONS

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Introduction and Objectives: Several studies have shown the restorative effect of power naps on performance and wakefulness. A power nap is a short sleep (< 30 minutes), which terminates before the occurrence of deep sleep (N3) to avoid sleep inertia. Investigations on sleep breaks during night-time driving when sleep pressure is high (between 03:00 and 06:00 a.m.) are rare. Thus, the aim of the present study was to examine the impact of a short power break on nocturnal driving behaviour.
Materials and Methods: Participants were driving their own cars at a driving test center between 02:00 and 04:00 a.m. After one and a half hours all drivers had the possibility of taking a 30-minutes break, during which they could take a nap. Afterwards all participants had to drive for another 30 minutes. Power naps were polygraphically recorded. Before and after night-time driving all participants performed tests assessing alertness, concentration, psychomotoric performance, mental state and sleepiness.
Results: Polygraphic recordings were performed in 20 out of 28 drivers (11 women). Objective analysis: 12 participants (63%) fell asleep (6 women) with a mean sleep latency of 10 minutes. The naps of two participants were characterized by only sleep stage N1, those of eight participants by sleep stage N2 and two naps by sleep stage N3. Subjective ratings: Most of the drivers (89%) subjectively fell asleep, only three participants stated that they didn't. No significant differences were found between the drivers who slept in the break and those who did not (n= 7).
Conclusion: According to these first analyses of PSGs a power nap during night-time driving seems advisable. However, the duration of nocturnal naps must be limited to a maximum of 20 minutes.
Acknowledgements: This study was funded by ASFINAG and realised with the technical assistance of B.E.S.T.-medical Dr. Grossegger and SOMNOmedics.

IMPORTANCE OF THE SLEEPINESS AND FATIGUE PREVENTION FOR REDUCING OCCUPATIONAL ACCIDENTS IN A BRAZILIAN MINING COMPANY

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Introduction and Objectives: Due to the significant number of incidents and near misses involving sleepiness and fatigue in mine operations, it is crucial that the mining companies implement a preventive program for reducing the risks of occupational accidents involving sleepiness and fatigue. The aim of this article is to describe a program implemented in the year of 2009 in the "Mineração Rio do Norte" which is a mining company located in Brazil specialized in aluminum extraction.
Materials and Methods: A specialized multidisciplinary team conducted an initial diagnosis to determine the critical points and establish priorities and necessities. The employees were evaluated through Morningness–Eveningness Questionnaires (MEQs), alertness and attention tests, the Epworth Sleepiness Scale and then were submitted to polysomnography. Those individuals who had problems indicated by these assessments were

evaluated clinically by a doctor specialized in Sleep Medicine and a dentist. Also, other preventive measures were adopted such as: development of Stimulation Rooms; evaluation of the nutritional content of the meals; educational lectures; visits to home and living quarters.
Results: From January to December of 2009, 281 employees were clinically evaluated, and 132 (47%) of them showed some form of sleep disorder that needed some kind of intervention. Out of these, 64 presented clinical symptoms of sleep apnea. In all, 39 patients were prescribed intra-oral devices and 13 were prescribed the use of CPAP. The final result was as follows: equipment down time due to drowsiness-related incidents/accidents: 2008 – 7,160 and 2009 – 458; unmet production due to drowsiness-related incidents/accidents: 2008 - 224,702 tons and 2009 - 13,737 tons.
Conclusion: In general, every excessive sleepiness and fatigue management program has some challenges, however, understanding the need for a scientific approach to the problem helps the program to achieve its objectives of reducing costs and saving lives.
Acknowledgements: Barros, S; Vieira, FS; Mendonça, P

SLEEP DURATION DOES NOT PREDICT MAJOR ADVERSE CARDIAC EVENTS IN THE SWEDISH NATIONAL MARCH COHORT STUDY

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Introduction and Objectives: Experimental research suggests that sleep deprivation may alter physiological factors associated with an increased risk for cardiovascular diseases (CVDs). Prior observational studies examining the effects of sleep duration have focused on narrowly defined CVD outcomes, such as myocardial infarction or stroke only. A more comprehensive measure of CVDs is lacking. Therefore, we examined the relationship between sleep duration and Major Adverse Cardiac Events (MACE).
Materials and Methods: In 1997, 39,047 Swedish residents (women: 64%, age: 18-94 years) were enrolled in the National March cohort study and asked to self-report their habitual sleep duration in a questionnaire. They were followed-up over approximately 7 years to study incidents of MACE. Events were defined as death from all CVDs, nonfatal myocardial infarction, stroke, or heart failure. The relationship between sleep duration and MACE was analyzed using Cox proportional hazards models.
Results: A total of 1,730 events were observed during a median follow-up period of 7.25 years. We found 665 nonfatal myocardial infarctions, 641 nonfatal strokes, 212 nonfatal heart failures, and 198 deaths from all CVDs. Age- and sex-adjusted hazard ratios (95% confidence intervals) of MACE (with 7 hours of sleep/day as the reference group) for individuals reporting $\leq$5, 6, and $\geq$ 8 hours of sleep were 1.24 (1.05-1.47), 1.03 (0.91-1.16), and 1.09 (0.97-1.23), respectively. Adjusting for BMI and physical activity did not change the hazard ratios. When adjusting for additional confounders, e.g., depressive symptoms, sleep apnea, and smoking, the association between $\leq$5h of sleep and MACE was attenuated (HR: 1.22, 95% CI: 0.98-1.52).
Conclusion: Sleep duration was not associated with the risk of Major Adverse Cardiac Events. Sleep duration, however, may not in itself explain the effects of inadequate sleep on cardiovascular diseases. Yet, it may serve as an essential component in the understanding of cardiovascular diseases.

EFFECT OF PREGABALIN ON QUANTITATIVE ELECTROENCEPHALOGRAPHY (QEEG) DURING NON-REM SLEEP IN PATIENTS WITH FIBROMYALGIA AND SLEEP MAINTENANCE DIFFICULTIES

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Introduction and Objectives: Alpha-delta sleep, which is characterized by increased fast (alpha and beta) EEG signals during Non Rapid Eye Movement (NREM) sleep and particularly during Slow Wave Sleep (SWS), has been reported previously in fibromyalgia patients. Pregabalin, approved in the US for the treatment of fibromyalgia, has been seen to increase the duration of SWS but modulation of the EEG has not been previously investigated. This analysis sought to explore the effect of pregabalin during NREM sleep in fibromyalgia patients.
Materials and Methods: 119 patients with an ACR-diagnosis for fibromyalgia and sleep maintenance difficulties were randomized to receive pregabalin (150-450 mg/d) and placebo in a double-blind, 2-period crossover study (4 weeks treatment per period). Polysomnography (PSG), incorporating EEG, was performed during 2 consecutive nights at the end of Period 1 and 2. EEG spectral power during NREM sleep was evaluated in 109 patients across both nights using Fourier transform-based techniques. The average power from the standard 6 PSG electrodes was analyzed in the delta (0.5-4.76 Hz), alpha (8.0-11.76 Hz), and beta (12.0-35.76 Hz) EEG bands.
Results: Data were collected from 108 patients when on pregabalin (99.1%) and 109 (100%) on placebo. Treatment with pregabalin vs. placebo decreased the relative alpha band EEG power during NREM sleep (0.053 ± 0.003 vs. 0.058 ± 0.003; $P<0.002$), decreased the relative beta band EEG power (0.047 ± 0.003 vs. 0.053 ± 0.003; $P<0.006$), and increased the relative delta band EEG power (0.815 ± 0.007 vs. 0.804 ± 0.007; $P<0.02$).
Conclusion: In fibromyalgia patients treated with pregabalin, relative fast EEG activity was reduced and slow activity was enhanced during NREM sleep. The percentage decreases in alpha and beta band relative power (8.6% and 11.3%, respectively) were larger than the percentage increase in the delta band relative power (1.0%), implying specific drug modulation of the higher EEG frequencies.
Acknowledgements: Supported by Pfizer Inc.

POSTER PRESENTATIONS

Monday, September 12, 2011

A: Aging and Developmental Issues

M-A-001 A CRITICAL REVIEW OF NON-PHARMACOLOGICAL SLEEP INTERVENTIONS FOR PERSONS WITH DEMENTIA

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Introduction and Objectives: Rationale: Disordered sleep in persons with dementia is a contributing factor for cognitive, emotional and psycho-social dysfunction, risk taking behaviors and a range of other health problems (Ancoli-Israel, 2009; Bloom et al., 2009). The relationship between disordered sleep and decreased cognitive and physical functioning, substance misuse, and a number of mental health problems is highly relevant to occupational therapy (OT). Research also now suggests that this may be a bi-directional relationship. This exciting proposition means that interventions for disordered sleep may reduce the risk for, or lessen the severity of, cognitive disorders like dementia, other mental and physical health problems, and facilitate continued independent community living (Bloom et al., 2009). However, the evidence-base for non-pharmacological interventions (NPI) has not yet been evaluated, synthesized, and clearly presented in the literature. As such, rehabilitation therapists lack the information required to guide practice. Objective: To evaluate the quality of evidence for NPIs to improve restorative sleep in persons with dementia.
Materials and Methods: Approach: A Critical Review based on the McMaster Protocols (Law & MacDermid, 2008) of published research has been undertaken and will be completed by May 2011.
Results: Preliminary findings indicate a range of intervention techniques within the scope of rehabilitation therapists' practice. A sleep health literacy website for caregivers of persons with dementia has been developed as a knowledge translation vehicle. The website (www.sleep-dementia-resources.ualberta.ca) will provide evidence-based information about practical, non-pharmacological sleep interventions for persons with dementia.
Conclusion: Implications: The results of this Critical Review will provide best-practice information for therapists and other front line healthcare providers working with persons who have dementia. Additionally the findings will provide guidance to focus future activity in this under-addressed but high need area of disordered sleep and dementia management research.
Acknowledgements: This research was funded by the Canadian Dementia Knowledge Translation Network (www.lifeandminds.ca)

M-A-002 A LONGITUDINAL EVALUATION OF SLEEP DURATION AND QUALITY AS A FUNCTION OF ATTACHMENT STYLE IN CHILDREN

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Introduction and Objectives: As bedtime involves a separation from the mother, attachment style appears to be an important factor in the establishment of the sleep-wake cycle during infancy. A few studies found an association between sleep patterns and attachment, reporting more sleep problems in insecure infants. The aim of the present study was to evaluate sleep duration and quality in children with a secure or insecure attachment style at different stages of development.
Materials and Methods: These data are part of the MAVAN study (Maternal Adversity, Vulnerability and Neurodevelopment) a longitudinal study aimed to measure the effects of the environment on infant development. Attachment was assessed with the Strange Situation procedure at 36 months (n=63; secure=45, insecure=18). Sleep duration and quality were based on maternal reports at 6, 12, 24 and 36 months (nocturnal sleep duration, number of awakenings per night, sleep latency and bedtime). Sleep variables were compared with two-way ANOVAs with one independent factor (secure versus insecure attachment) and one repeated measure (age).
Results: We found a significant interaction between attachment and age (p=0.02) on nocturnal sleep duration. At 6 months, insecure children slept one hour less than secure children (9.5±2.3 vs 10.5±1.1 hours; p=0.02). A main effect of attachment (p=0.008) on the number of awakenings was observed, indicating that insecure children had more awakenings during the night than secure children (1.4±0.9 vs 0.7±0.7). A main effect of attachment on bedtime (p=0.03) showed that insecure children were going to bed later than secure children. Finally, sleep latency was longer for insecure children than secure children, but this difference failed to reach the significance level.
Conclusion: These results show that children with insecure attachment sleep less during the night, have more awakenings and go to bed later. A secure attachment appears as a key factor in the establishment of children's sleep pattern.

M-A-003 A LONGITUDINAL STUDY OF FEEDING METHODS AND SLEEP PATTERNS AMONG CHINESE INFANTS IN THE FIRST 4 MONTHS OF LIFE

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Introduction and Objectives: Many studies regarding the relationship of infant feeding methods to maternal sleep have been conducted, whereas few have focused on the impact of feeding methods on infant sleep patterns. The purpose of this study was to longitudinally explore infants' sleep patterns differences related to feeding methods under 4 months of age.
Materials and Methods: 524 healthy term infants from 9 urban districts were recruited in this study. 24-hour sleep diaries recording infants' sleeping and feeding status were administered in the following occasions, i.e., Day 2-4 after birth, the first 3 consecutive days every week at 2-4 weeks of age, and the first 7 consecutive days every month at 2-12 months old. Differences in infants' sleep variables (day, night, and 24-hour sleep percentages, numbers of naps and nighttime awakenings, and nocturnal longest sleep time) by feeding types were determined by using general linear model (GLM) analyses.
Results: In the first 4 months of age, there were 47.4-63.2% of infants reported to be breastfed, 12.0-27.3% for partial breastfed, and 22.1-28.9% for formula-fed. As shown by GLM analysis, percentages of sleeping time during daytime and 24-hour, as well as frequency of nighttime awakening, differed significantly by feeding methods, yet this was not observed in the rest parameters. Compared with breastfed babies, after controlling for age effect, the means of partial breastfed infants have 4.2% and 1.6% less percentage time of sleep in daytime and 24-hour day, but no significant differences were found in formula-fed infants. Formula-fed (1.5±0.0) babies showed fewer nocturnal awakenings in contrast to breastfed babies (1.6±0.0), whereas no differences existed between partial breastfed and breastfed infants.
Conclusion: Partial breastfeeding is suspected to decrease infant's sleep time and increase night awakenings. The difference in frequency of night awakenings between formula-fed and breastfed infants seemed to be demonstrated, which was inconsistent with the results from majority previous studies.

M-A-004 AGING, SLEEP SPINDLES AND DECLARATIVE MEMORY

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Introduction and Objectives: Previous studies, mostly involving young adults, have demonstrated a link between sleep spindles and memory consolidation. The purpose of this study was to examine changes in spindle density following a declarative learning task in young and older adults.
Materials and Methods: There were 4 young female (20-21 yrs) and 4 older female participants (60-75 yrs). Participants underwent polysomnographic recording for three consecutive nights in the sleep lab; the data reported here are from the second (Baseline) and third (Post-Acquisition) nights only. Stage 2 spindle densities were computed from the Fz, Cz, and Pz electrode sites, and for the whole spindle frequency band (12-16Hz) as well as for slow (12-14Hz) and fast (14-16Hz) spindles. 2 (Group: Young, Older) x 2 (Night:

Baseline, Post-Acquisition) mixed ANOVAs were computed for each spindle type and electrode site. On the third evening, participants learned 15 word pairs (the A-B list). The next morning, participants learned word pairs that comprised the same first word as before but a new associate word (the A-C list). Following a 15-minute delay, participants were shown the A-words and asked to recall the corresponding B- and C-words.
Results: As expected, the density values of all spindle types (whole, slow, and fast) were significantly greater at the Fz and Cz sites in young rather than in older adults, $p<0.05$ for all. The main effect of night for fast spindles at Pz approached significance, $F(1,5)=5.39$, $p=0.059$: spindle density increased in both age groups following learning. The young adults recalled more B-words than the older adults, $t(6)=2.40$, $p=0.053$.
Conclusion: Although preliminary, the present findings suggest that the density of fast spindles at Pz increases following learning in both young and older adults.
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M-A-005 ASSOCIATIONS BETWEEN PHYSICAL ACTIVITY AND SLEEP IN YOUNG AND OLDER ADULTS

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Introduction and Objectives: Several epidemiological studies have suggested an association between self-reported physical activity levels and subjective sleep measures. Conversely, interventional studies using acute physical training have provided inconsistent results. To our knowledge, the possible association between habitual physical activity levels and sleep-wake patterns has not been investigated with objective measures. The current study aimed to assess this association with ambulatory monitors and to identify whether polysomnographic sleep variables correlate with physical activity levels in young and older adults.
Materials and Methods: Twelve young healthy adults underwent 5 to 9 days and nights of continuous actigraphy monitoring, wearing two actimeters simultaneously to measure active energy expenditure (EE) during the main wake episode and rest efficiency during nocturnal rest episodes. A second sample of 11 young and 12 older adults wore an EE monitor for 7 days before a polysomnographic recording night. Two-tailed Pearson correlations were conducted between EE and ambulatory/sleep variables. Significance threshold was set at $p\leq0.05$.
Results: EE in the vigorous activity class ($r=0.64$, $p=0.03$) and the time spent in the vigorous activity class ($r=0.67$, $p=0.02$) correlated significantly with rest efficiency measured with ambulatory sleep monitoring. Polysomnographic data showed that, in young adults, EE parameters reflecting sustained activity correlated with REM sleep ($r=0.61$, $p\leq0.04$). In older adults, locomotion cadence correlated with sleep efficiency ($r=0.58$, $p<0.05$) and slow wave sleep ($r=0.60$, $p=0.04$).
Conclusion: These objective measures indicate that physical activity levels during the day are associated with more consolidated sleep during the night. Furthermore, in the elderly, daily locomotion activity is linked with deeper sleep. Compared to acute interventions, habitual physical activity patterns integrated over long periods may facilitate sleep promotion mechanisms. This provides empiric data for the therapeutic use of physical activity to improve sleep.

M-A-006 CHANGES IN THE DURATION OF SLOW (11 – 13.5HZ) AND FAST (13.51 – 16HZ) SPINDLES IN ADOLESCENTS

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Introduction and Objectives: Spindle durations were compared in younger and older adolescents.
Materials and Methods: Thirty-three adolescents (17 female) between the ages of 12 and 18 years were sleep EEG recorded (C3, C4, FZ, PZ) for two consecutive nights at home using a portable monitoring system. Slow (11–13.5Hz) and fast (13.51–16Hz) spindles were counted in Stage 2 sleep using PRANA software. The EEG was filtered for frequencies between 11 and 18.5 Hz for duration analysis. Thirty spindles were randomly chosen from Stage 2, 15 in the first half of the night and 15 from the second half.
Results: A 2 (age: younger, older) x 4 (electrode location: C3, C4, FZ, PZ) ANOVA on slow spindle duration showed a main effect of age [$F(1,28) = 6.88$, $p=0.014$], and a main effect of location on duration [$F(3,84] = 7.07$, $p<0.001$]. Tukey post hocs showed that younger adolescents (M = 1.82 sec) had significantly longer slow spindles than older adolescents (M = 1.66 sec). Also, spindles at PZ (M = 1.81) were significantly longer than at all other locations. A 2 (age: younger, older) x 4 (C3, C4, FZ, CZ) ANOVA on fast spindle duration showed a main effect of location on duration [$F(3,84] = 48.617$, $p<0.00001$]. A Tukey post hoc showed that spindles at PZ (M = 1.57 sec) were significantly longer than at all other locations; fast spindles at FZ (M = 1.38 sec) were also significantly shorter than fast spindles at C4 (M = 1.44 sec).
Conclusion: Younger adolescents exhibit longer slow spindles than older adolescents, suggesting a developmental trend. Both fast and slow spindles are longest in the parietal region.

M-A-007 CHILD AND ADOLESCENT SLEEP CHECKLIST (CASC): DEVELOPMENT AND VALIDATION OF A CHILD SLEEP SCREENING QUESTIONNAIRE

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Introduction and Objectives: Assessment of sleep using a single questionnaire for children with a wide range of ages requires special considerations as characteristics of sleep change dramatically both in quality and in quantity during childhood. The aim of this study was to develop a child sleep screening questionnaire: Child and Adolescent Sleep Checklist (CASC) for the screening of sleep problems among children and adolescents.
Materials and Methods: CASC consisted of 36 questions commonly used from infants up to high-school students. CASC has three versions; for caregivers (common for all age groups), for elementary school children (2-11 years of age), and for high-school students (12-18 years of age). 53 children (29 community sample and 24 clinical sample) were recruited for the validation study of CASC. Subjects were asked to answer CASC twice with 2 weeks interval, and the responses were compared. CASC sleep problem scores were also compared with other sleep questionnaires.
Results: CASC sleep problem score showed good correlation between the first and second responses ($r=0.787$, $p<0.001$). Parental reports (preschoolers and elementary school children, n=26) were compared with Childrens' Sleep Habits Questionnaire (CSHQ), and the CASC sleep problem scores showed good correlation with CSHQ total scores ($r=0.770$, $p<0.001$). Self reports (high school students, n=19) were compared with Pittsburgh Sleep Quality Index (PSQI) and CASC sleep problem scores showed good correlation with PSQI scores ($r=0.599$, $p=0.007$).
Conclusion: CASC has its advantage in making cross sectional screening of sleep problems in wide range of ages by using both parental and self report. CASC can be especially useful in interventional or cohort study as this questionnaire allows to use same question items throughout the study period.

M-A-008 DEVELOPMENT OF SLEEP PATTERNS IN CHINESE INFANTS DURING THE FIRST 12 MONTHS OF LIFE

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Introduction and Objectives: This longitudinal research aimed to describe the developmental characteristics of infants' sleep patterns in household environments during the first 12 months of life.
Materials and Methods: 524 healthy term infants from 9 urban districts were enrolled in the study. 24-hour sleep diaries were administered in the following occasions: Day 2-4 after birth, the first 3 consecutive days every week at 2-4 weeks of age, and the first 7 consecutive days every month at 2-12 months old. The age-dependent distribution of sleep variables were analyzed with repeated measures data analysis of variance, and the 1st,

10th, 50th, 90th, 99th centile curves of sleep time over 24h was constructed by polynomial models.
Results: Infant daytime sleep changed significantly at 0-2, 3-4, 5-6, and 8-9 months after birth. The mean percentage of daytime sleep decreased from 82.4% at Day 2 to 62.8%, 56.6%, 48.2%, 42.7%, 35.7% at 1, 2, 4, 6 and 9 months of age. Also, the mean number of naps reduced from 3.7 to 2 across the first year. The nighttime sleep percentage increased significantly at 4 and 9 months of age, from 55.8% on Day 2 to 64.3% and 71.2% at 4 and 9 months old. The nocturnal longest sleep duration extended from 3.9 hours at 1 month to 4.6, 6.3 and 7.5 hours at 2, 4 and 9 months old. After 6 months, nighttime awakening frequency was less than 0.5. In general, a downward trend with age was shown in 24-hour sleep time, from 69.1% on Day 2 to 59.9% at 1 month old. This was followed by monthly 1% -2% decline till 5 months old, and since then the changes were no longer significant up to 12 months of age.
Conclusion: First six months and 8-9 months after birth were the critical periods for infant sleep development.

M-A-009 EFFECTS OF HYPNOTICS ON SLEEP AND VIGILANCE IN ELDERLY PEOPLE

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Introduction and Objectives: Among common health complaints, sleep disorders are the most frequent and tend to increase with aging. Hypnotic drugs are often used as solution to insomnia because of their positive effects on sleep. However, hypnotic drugs can also be associated with cognitive impairments, especially in elderly people. This study examined the effects of hypnotic drugs on subjective and objective sleep measures and also on vigilance.
Materials and Methods: Eighteen participants with a mean age of 69.3 years old (SD=6.8) complaining of sleep maintenance insomnia (9 hypnotics users, 9 non-users) were matched for age and gender. Participants had to sleep 3 consecutive nights in laboratory for polysomnographic (PSG) recording and complete a sleep diary. Vigilance was evaluated upon awakening in the morning using an event-related potentials (ERPs) oddball paradigm.
Results: Group comparison revealed no significant difference between them in PSG measures except in the percentage of time spent awake during the night which was lower for hypnotics users compared to non-users (11.6% vs 23.4%, $p<0.05$). While the subjective evaluation of sleep efficiency for the third night in laboratory was similar for both groups (hypnotics users = 72.4% and non-users = 73.5%) there was a significant difference ($p<0.05$) between their perception and the PSG measures which showed a higher efficiency for hypnotics users (82.6%) compared to non-users (74.3%). At the vigilance task, hypnotics users showed a significantly longer latency to the P3 component than the non-users ($p<0.05$).
Conclusion: As expected, hypnotics uptake provoked a decrease of wakefulness during the night. However, users still underestimate these effects since subjective evaluation of sleep efficiency was much lower than what PSG revealed. Moreover, the use of hypnotic drugs in these elderly individuals did also affect the information processing underlying the act of decision making as measured by the P3 component of the ERP task in the morning.

M-A-010 HOW DO QUEBEC PARENTS ORGANIZE THEIR CHILDREN'S SLEEP AND WHAT MEANING DO THEY GIVE TO IT?

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Introduction and Objectives: Research on children sleep is attracting growing interest with the recognition that several sleep disorders are particularly prevalent in this age group (Tse & Hall, 2007). Parenting styles with regard to sleep in children vary within and between cultures and are influenced by parents' representations about the child's general development (Stork, 2000). This study explores the sociocultural aspects of parents' perceptions and interventions in the sleep arrangements of their children in Quebec/Canada.
Materials and Methods: A structured interview divided into four main themes (place for sleeping/night feeding/sleep routines/difficulties associated with sleep) was used. Parents of children aged two years old or younger from Quebec and with no immigration history in the family were included. One-hundred-ninety-seven parents, mainly from Quebec City area and the surrounding areas, were interviewed (79 responded as a couple). A frequency statistics analysis to unveil parents' behavior patterns in organizing children sleep, and a content analysis based on the Merleau-Ponty's phenomenology method to find the meaning associated with these parents' behavior patterns, were conducted.
Results: Eighty-six percent of children had been sleeping in their own bedroom since birth or by 6 months of age, regardless of socioeconomic status. Most parents accepted and/or sought advice regarding their children sleep mainly from relatives. However, they reported that their final decision was guided by their "intuition" and children's needs. Furthermore, they prefered to portray themselves as autodidactic, self-reliant, and independent.
Conclusion: Quebec parenting organization regarding children's sleep confirms a strong behavior trend in North-America, in which separating the child from the parents is a common practice (Morelli et al., 1992). Furthermore, it is consistent with the early individuation and the autonomy enhancement, which is characteristic of individualistic societies. This highlights the need Quebec parents feel for compliance with the cultural norm of the society in which they are born, live, and raise their children.

M-A-011 MORNING BLOOD TESTOSTERONE LEVELS ARE ASSOCIATED WITH SLOW WAVES IN MIDDLE-AGED MEN

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Introduction and Objectives: Starting in the thirities, testosterone levels in men generally decreased at a rate of 1 to 2% per year. Aging is also associated with detrimental effects on sleep architecture. Since it appears that there are both an age and testosterone-related sleep deterioration occurring at about the same period in men's life, this study aimed to evaluate the association between morning blood testosterone levels and sleep among young and middle aged men.
Materials and Methods: Laboratory polysomnographic (PSG) nocturnal sleep recordings of 72 healthy men without sleep complaints were used in the analysis. 48 were young men (mean = 23.3 y, SD =2.6) and 24 were middle aged (mean = 53.3 y, SD = 5.9). Spectral analysis (1 Hz frequency bins from 1 to 32 Hz) and automatic slow oscillation (SO) detection were performed on artefact-free NREM sleep from C3 (linked-ear). SO density was defined as number of SO per minute of NREM sleep. Blood testosterone levels were evaluated in the morning after PSG recording. Partial correlations controlled for age were calculated between testosterone levels and sleep variables in both groups separately.
Results: Partial correlations controlled for age revealed that in the middle-aged group only, higher testosterone levels were related to a larger amount of slow wave sleep ($r=0.45$, $p< 0.05$), measured by the percentage of stages 3 and 4 combined. Spectral analysis revealed a positive association between testosterone levels and total spectral power between 1-2 and 2-3 Hz (respectively $r=0.41$, $p<0.05$ and $r=0.44$, $p<0.05$) in the middle-aged group only. Furthermore, higher testosterone levels were associated with higher SO density within middle-aged subjects ($r=0.41$, $p<0.05$). No relationship was found between testosterone levels and sleep variables in the young group.
Conclusion: We propose that, in middle-aged men, testosterone levels could act as a modulating factor of slow wave sleep by potentially protecting older men with higher testosterone levels against age-related deep sleep loss.

M-A-012 NORMATIVE VALUES OF POLYSOMNOGRAPHIC PARAMETERS IN CHILDHOOD

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Introduction and Objectives: To define normal values for polysomnographic sleep parameters in the age from 1 year to 18 years of age and to investigate how sleep is affected by age, stage of maturation and gender.
Materials and Methods: In a prospective study, single night polysomnography was performed at the subjects' habitual bedtimes in 16 German sleep labs according to the same standards. The examinations were conducted in accordance with AASM rules for technical performance and scoring of sleep.

209 healthy German children of Caucasian ancestry were grouped by gender (112 females, 97 males), age and Tanner stage. There were 8 groups: (1) 1 year old n=22; (2) 2 to 3 years old n=23; (3) 4 to 5 years old n=25; (4) 6 to 12 years old, including Tanner 1 n=34; (5) Tanner 2 n=33; (6) Tanner 3 n=23; (7) Tanner 4 n=24 and (8) Tanner 5 n=25. Sleep was staged in accordance with AASM rules. Visual scoring of polysomnography was performed by one observer, to exclude inter-rater variabiltity.
Results: There is a strong age dependency of sleep parameters. Only sleep latency, % N1/TST, number of hyponeas, mean duration of apneas and arousal index are not age dependent. Awakening index, R latency, sleep efficiency, % N2/TST, mean sleep cycle duration and number of stage shifts increase with age, the other sleep architecture parameters decrease. There is no sex difference of all parameters beside mean heart rate and arousal index.
Conclusion: This study presents normal values of polysomnographic parameters considering AASM rules in the range from 1 year of age to 18 years of age in large and representative groups. As shown by age dependence of the parameters, it is helpful to consider more precisely the age of pediatric patients in describing deviations from normal measures.
Acknowledgements: Scholle, S. Zentrum für Schlaf- und Beatmungsmedizin, Robert-Koch-Krankenhaus Apolda GmbH, Apolda, Germany

M-A-013 OVERESTIMATION OF CHILDREN'S SLEEP QUALITY BY MOTHERS OF INSECURE-AVOIDANT CHILDREN

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Introduction and Objectives: It has been suggested that felt security is a prerequisite to good sleep in children. Attachment theory offers a well-defined framework for investigating security in the parent-child relationship. Studies that have investigated child sleep in relation to attachment have yielded inconsistent findings, possibly due to methodological differences in sleep assessments (actigraphy versus mother reports). The objective of this study was to investigate the relation between child attachment and sleep quality using both actigraphy and maternal reports.
Materials and Methods: Fifty-two children (23 boys) aged 25 to 48 months taking part in a broader longitudinal study wore an actigraph (Mini-Mitter; Respironics, Oregon) for a 72-hour period. Data were analyzed using a high (80) sensitivity threshold. Then, nocturnal wake periods were smoothed following a validated procedure for reducing wake bouts/duration, artificially inflated by high motor activity in young children's sleep. A sleep diary was completed by mothers during actigraphic data collection. Attachment security was assessed (n=36) when children were 18 months with the Strange Situation procedure, which consists of a series of separations and reunions designed to trigger child attachment behaviours. Expert coders rated child behaviour on four scales (avoidance, proximity seeking, contact maintenance, resistance).
Results: Actigaphy-derived sleep parameters were unrelated to attachment scores. However, better sleep (longer sleep duration, greater sleep efficiency) according to maternal reports was associated with more avoidance during the Strange Situation ($r(36)=0.46$ and 0.51, $p<0.01$). Overestimation of sleep quality by the mother (mother reports – actigraphy values) with respect to wake duration and sleep efficiency was related to increased child avoidance ($r(36)=0.39$ and 0.35, $p<0.05$).
Conclusion: Mothers of avoidant children may be unreliable observers of their child's sleep quality, possibly because avoidant children do not manifest their distress at night. The present results suggest that parental reports of child sleep might be systematically biased in certain subgroups of the population.

M-A-014 PERCEPTION OF SLEEP QUALITY AND SEVERITY OF SYMPTOMS IN THE ELDERLY POPULATION IN QUÉBEC

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Introduction and Objectives: As sleep modifications appears normally within the senescence process, primary sleep disorders and mental health problems also contributes to decrease its quality resulting of more sleep complaints with aging. The goal of the present study was to estimate the prevalence of sleep complaints and its relation to psychological distress in the elderly population of Québec.
Materials and Methods: Participants were 2663 adults with a mean age of 74 (SD=6.1) (40.9% men, 59.1% women) selected from a probabilistic sample composed of aging individuals living at home in the province of Québec. The inclusion criteria's were: being older than 65 years old, understanding and speaking French and having no diagnostic of cognitive disorders. The interview was held at the residence of the participants and had an average length of 90 minutes. The DIS (Diagnostic Interview Schedule) was used to evaluate the presence of depression or anxiety symptoms in the last 12 months whereas the PSQI was used to measure sleep quality (Buysse, 1989).
Results: While more than 40% of the participants had a score higher than 5 on the PSQI, 9.4% of those met the criteria of a probable diagnostic of anxiety or affective disorders and 15% met the diagnosis of insomnia according to the DSM-IV. Mean score on the PSQI was significantly higher ($p<0.05$) for the participants with a mental health problem (7.2) compare for those without a diagnostic (5.0). Use of hypnotics was also significantly more frequent (37% vs 17%) in participants meeting a diagnostic of mental health. A multiple regression revealed that the factors related to mood state, anxiety, use of hypnotics, sex and age contributed to explain 33.6% of the variance.
Conclusion: The prevalence of sleep complaints is high in the elderly population and the severity of symptoms increases with the co-occurrence of mental health problems.
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M-A-015 RISK FACTORS INFLUENCING SLEEP QUALITY IN ELDERLY PATIENTS WITH DIABETES MELLITUS, HYPERTENSION AND HYPERLIPIDEMIA

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Introduction and Objectives: The elderly are known to have poor quality sleep. In individuals with diabetes mellitus, hypertension and hyperlipidaemia, this might be a result of obstructive sleep apnoea, which they are more susceptible to developing. The objective of this study was to evaluate the various demographic factors, co-morbidities (other than diabetes, hypertension and hyperlipidaemia), and lifestyle factors so as to identify risk factors and protective factors of poor sleep quality.
Materials and Methods: This cross-sectional study was conducted in the primary healthcare setting (Outram polyclinic) in Singapore. Individuals aged 65 and above who had at least one of the three co-morbidities were identified. The responders' sleep quality were then assessed with the Pittsburgh Sleep Quality Index (PSQI) questionnaire. Additional information on demographics, co-morbidities and lifestyle practices were collected. The study population was then divided into those with good quality sleep and those with poor quality sleep, based on the PSQI score. We then applied univariate, bivariate and multivariate analyses on the risk factors and protective factors studied.
Results: 199 patients out of the 226 patients identified responded to the questionnaire, obtaining a response rate of 88.1%. Using cox regression analysis, nocturia (prevalence rate ratio 1.542, 95% confidence interval 1.056 – 2.251) was found to be associated with an increased risk of poor sleep quality.
Conclusion: Nocturia is a prevalent problem in the geriatric population and it has been found to be associated with poor sleep quality in our study. Hence it is imperative to address this issue, whether by means of lifestyle modification or good control of co-morbidities, especially diabetes.
Acknowledgements: We would like to thank Dr Daniel J. Buysse for permission to use the Pittsburgh Sleep Quality Index questionnaire in our study.

M-A-016 SLEEP PATTERNS AND THEIR SOCIODEMOGRAPHIC AND MENTAL HEALTH CORRELATES IN A NATIONALLY REPRESENTATIVE SAMPLE OF U.S. ADOLESCENTS

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Introduction and Objectives: Insufficient sleep is associated with a broad

range of adverse consequences in adolescents, including mood disturbances, inattention, daytime sleepiness and poor school performance. However, few studies have provided normative data on sleep patterns in a large and nationally representative sample that also included information on sociodemographic and health correlates. The goal of this presentation is to describe the patterns of sleep duration and its sociodemographic and mental health correlates in a nationally representative sample of U.S. adolescents.
Materials and Methods: The National Comorbidity Survey Adolescent Supplement (NCS-A) is a nationally representative, survey of adolescents aged 13 to 18 years in the U.S. Information on sociodemographic factors, physical health, mental health disorders and sleep patterns (weekday and weekend) was collected via a direct interview with adolescents and a parental questionnaire about adolescent health.
Results: The average sleep duration decreased with increasing age for both weekdays and weekends. Females had shorter weekday but not weekend sleep duration than males. Black youth had significantly less sleep duration on both weekends and week days than white and Hispanic youth. In terms of mental health, short sleep duration was significantly associated with mood and behavior disorders. Weekend bedtime and weekend bedtime delay were strongly associated with mood disorders and substance use disorders, with adjusted odds ratios approximating 10 for those at the extreme levels of weekend bedtime (later than 3 am) and weekend delay (greater than 4 hour difference from usual weekday bedtime).
Conclusion: These findings reveal that a substantial proportion of adolescents in the U.S., particularly females and black youth, have short sleep duration. The substantial increase in short sleep duration and weekend sleep time delay across adolescence and their associations with mental disorders raises serious public health concern and warrants further study into mechanisms and targets for prevention.
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M-A-017 SUBJECTIVE AND OBJECTIVE MEASURES OF SLEEP IN HEALTHY OLDER ADULTS

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Introduction and Objectives: Although subjective sleep quality is known to decline with age, the relationship between subjective and objective measures of sleep perception has not been thoroughly examined to date. Most current research focuses on sleep in older adults with other medical conditions. The objective of this study was to examine the association between actual (objectively estimated) and perceived (subjectively estimated) sleep characteristics among a sample of healthy older adults.
Materials and Methods: Ten older adults' (adults: 60-82yr, 5 females) subjective sleep [Epworth Sleepiness Scale, Pittsburgh Sleep Quality Index, daily log] and objective actigraphy were collected over a 7-day period. Global means and standard deviations were calculated across the 7-day period. Bivariate correlations were calculated for all variables of interest.
Results: Subjective sleep latency correlated significantly with variability (standard deviation) of sleep efficiency (r=-0.68, P=0.03). Subjective sleep duration correlated significantly with mean sleep efficiency (r=0.77, P=0.01), mean wake after sleep onset (r=-0.66, P=0.04), and mean number of awakenings (r=-0.68, P=0.03). Subjective habitual sleep efficiency significantly correlated with mean total sleep time (r=-0.73, P=0.02), mean sleep efficiency (r=-0.67, P=0.04), and mean wake after sleep onset (r=0.64, P=0.04).
Conclusion: Overall, we found a number of interesting correlations between subjective and objective sleep measures. These results also suggest that it is important to look at measures of central tendency and variability when examining the associations between subjective and objective measures of sleep quality. Perceived sleep onset latency is related to an individual's variability in night-to-night sleep quality. Perceived sleep duration is related to an individual's overall sleep quality, time awake after sleep onset and average number of awakenings. Perceived habitual sleep efficiency is related to an individual's average amount of sleep, overall sleep quality and time awake after sleep onset.
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M-A-018 WHERE PARENTS TURN FOR HELP FOR PRESCHOOL-AGE CHILDREN WITH SLEEP PROBLEMS

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Introduction and Objectives: Sleep problems are common amongst preschool-age children. However, little is known about where parents turn for help, or the type of help received. This study aimed to document where parents turn to for help their preschool-age children with sleep problems.
Materials and Methods: Secondary analyses of data from a randomized clinical trial were conducted. The intervention group received a booklet with two calls from a telephone coach over a 6-week treatment period along with usual care. Parents (N=146; 94% birth mothers) with concerns about their 2-to-5 year old's sleep or bedtime behavior were recruited at a routine appointment with a family physician (FP) from 24 practices in Southwestern Ontario, Canada. Parents reported help received from (a) FPs and other professionals/ agencies, (b) informal help (e.g., family) and use of self-help (e.g., books, Internet) during 2-months pre-, and 8-months post-randomization.
Results: Help received rarely differed between the treatment and usual care groups. In the 2 months before randomization, 10% of parents in the intervention group and 13% in usual care had one or more visits with their FP related to their child's sleep issues. During the entire study period, FPs commonly gave advice (3% intervention; 8% usual care) and suggested prescriptions and/or referrals for 3-4% of children. Across groups and time, 4-11% of parents sought help from other professionals/agencies, and many parents asked friends/family for advice (47-65% across groups and time periods) or used self-help (text resources - 41-67%, internet - 16-24%). After randomization, self-help increased in both groups ($p<0.05$).
Conclusion: Many parents of preschool-age children with sleep problems access informal help and use self-help resources, but few receive professional help. When they do, FPs are a common place to turn for help. Interventions that are easily accessible and complement help provided in primary care are needed.
Acknowledgements: Supported by a grant from the Canadian Institutes of Health Research.

B: Chronobiology/Circadian Disorders

M-B-019 A TYPICAL CASE OF ASYNCHRONIZATION

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Introduction and Objectives: In Japan, more than half of students complained of daytime sleepiness, while about one quarter of junior high and high school students suffer from insomnia. Most of these youngsters might be diagnosed as having behavioral-induced insufficient sleep syndrome due to inadequate sleep hygiene. If this diagnosis is correct, they must be cured easily by following adequate sleep hygiene. However, this therapeutic approach often fails. To explain the reason for this failure, a new clinical entity - asynchronization - was proposed. Here I reported a typical patient with asynchronization.
Case Report: A 14-year-old girl visited my clinic because of difficulty in waking-up in the morning. She complained of both insomnia during the night and hypersomnia during the daytime. Her sleep duration varies markedly day by day. Some days she had only 1 or 2 hours sleep, while she slept more than 12 or 13 hours on the other day. In addition to instructions on regular meals, exercise during the daytime, and to avoid excessive media exposure, zolpidem was prescribed. However, her irregular rhythm has remained unchanged. To avoid missing regular examinations, she sometimes was admitted to our hospital. During the admission, she can manage to go to school in the morning, however, she returned to her irregular rhythm after going back to her home. She has exhibited this pattern for four years.
Conclusion: According to the current criteria, patients with circadian rhythm sleep disorder of both delayed sleep phase and irregular sleep-wake types should reveal normal age defined sleep duration. I failed to diagnose

this girl as having circadian rhythm sleep disorder. The major triggers for asynchronization are hypothesized to be a combination of light exposure during the night, as well as a lack of light exposure in the morning. Presumable diagnostic criteria would be proposed.

M-B-020 ACADEMIC MOTIVATION PLAYS A KEY ROLE ON IRREGULAR SLEEP SCHEDULE IN SENIOR HIGH SCHOOL STUDENTS DURING LONG VACATION

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Introduction and Objectives: It is not uncommon that teenagers get insufficient sleep during the school term due to early class schedule. Therefore, they typically extend sleep duration on non-school days. This practice might lead to a delay of circadian phase. Consequently, it usually needs a great effort to accommodate the intrinsic circadian rhythm to the school schedule after the end of a long vacation. The current study explored the factors that are associated with irregularity of sleep schedule among senior high school students during long vacation.
Materials and Methods: A questionnaire regarding sleep pattern, sleep quality, achievement motivation, parent's supervisory behavior, and the Morningness-Eveningness preference were administered to 608 students from the 10th grade to 12th grade. The participants were recruited from senior high schools in Taipei using stratified cluster sampling method. There were 510 valid questionnaires obtained.
Results: Academic motivation ($r= -0.150$, $p=0.001$) and the discrepancy in bed time ($r=0.235$, $p<0.001$) between school day and holiday were significantly correlated to difficulty in falling asleep when students went back to school. Moreover, academic motivation significantly correlated with discrepancy in bedtime ($r= -0.237$, $p=0.001$) and rise-time ($r= -0.167$, $p<0.001$) between school day and holiday sleep. One-way ANOVA revealed low academic motivation groups went to bed ($F=14.6$, $p<0.001$) and woke up ($F=6.12$, $p=0.002$) significantly later than average and high academic motivation groups on holiday but not during school days.
Conclusion: The current study found that academic motivation, rather than circadian preference, correlate more with the discrepancy of sleep schedule between school and non-school days. In addition to the effect of physiological factor (circadian preference) that was well-established in previous studies, psychological factor (achievement motivation) might have significant impact on sleep during the transition from vacation schedule to school schedule among senior high school students.

M-B-021 AFTERNOON "NAP ZONE" REFLECTS THE REVERSAL OF PROCESS-S BY A LIGHT-SENSITIVE CIRCADIAN AROUSAL SYSTEM

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Introduction and Objectives: Objective was to test the hypothesis (Broughton 1998) that the afternoon nap zone represents the time when the increasing sleep tendency after morning awakening (process-S) is reversed by a light-sensitive circadian arousal system (process-C).
Materials and Methods: Eight normal males, 20-30 years, were monitored under low ambient light (150 lux). Night sleep was from 2300-0600h. PSG monitoring included EEG, submental EMG and core body temperature recorded by an Oxford Medilog 9000 system and Minilogger temperature recorder with rectal probe. Following a baseline 24-hour day, bright light stimulation (10,000 lux) was given on two consecutive days either in the evening (2000-2200h) or the morning (0600-0800h) in counterbalanced fashion. Other than during bright light stimulation, the level of daytime alertness/arousal was assessed every 60 min by quantified EEG followed by a 10-minute simple reaction time test.
Results: In the baseline condition both the Q-EEG and performance measures confirmed a transient afternoon period of decreased alertness indexed by greater spectral EEG power (theta and delta bands) plus a period of most variable RTs. Evening light stimulation significantly delayed the core body temperature nadir (mean delay of 1hr 46 min, $p<0.001$), and morning light stimulation advanced it (mean 53 min, $p<0.01$). Evening bright light produced an equivalent delay in both the Q-EEG and performance nap zone measures; and morning bright light produced a phase advance of these measures.
Conclusion: That both the Q-EEG and performance parameters of the transient afternoon nap zone can be phase delayed by evening and phase advanced by morning bright light supports the proposed mechanism of the the nap zone. The results also confirm the existence in man of a light-sensitive active circadian arousal system similar to that described by Edgar et al. (1993) in sub-human primates.
Acknowledgements: Supported by a grant from the Canadian Institutes for Health Research (to RB)

M-B-022 ANALYSIS OF STRESS AND CHRONOTYPE FOR STUDENTS, RELATION TO DAY AND NIGHT SHIFT

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Introduction and Objectives: There is a strong tendency in modern times for increasing time and demand of studying and working. Night shift is a reality in favor of the people who seek qualifications and who have a desire to occupy a better position in the labor market. So there was interest in investigating stress and its relation to diurnal preference in this population that presents favorable conditions for the proposed type of study.
Materials and Methods: This study analyzed the presence of Stress and Chronotype among college students in the University Center Herminio Ometto, UNIARARAS Two questionnaires were used: the Identification of Chronotype and the Inventory of Stress' Symptoms of Lipp (ISSL), by considering a total of (n = 116) with a mean age of 24.11.
Results: The chronotypes were classified as the following ones: the Morning Ones 14.7% (n = 17), the Evening Ones 26.7% (n = 31) and 56.9% (n = 66) as the Indifferent Ones. The results showed statistically significant data (Fisher exact test) for the variables "work" and "stages of stress" with higher frequency of "alert" 7.04% (n = 5) and "nearly exhaust/exhaust" 16.9% (n = 12) among the students that work and higher frequency of "non stress" 32.56% (n = 14) and "resistance" 62.79% (n = 27) among those students that do not work. It was concluded that 56.9% (n = 66) of these students are at the stage of resistance and 53.4% (n = 62) present more exacerbating psychological symptoms.
Conclusion: The results show that the psychological symptoms of stress prevailing in different chronotypes. The stages of alert and near-exhaustion and depletion shows significant results among students who study and work. The information collected in this study cam be used for developing thoughts on favorable conditions for students who work and study in different shifts.

M-B-023 ARMODAFINIL FOR THE TREATMENT OF EXCESSIVE SLEEPINESS ASSOCIATED WITH SHIFT WORK DISORDER: EFFECT ON PATIENT-REPORTED FUNCTIONAL IMPAIRMENT, TREATMENT SATISFACTION, AND QUALITY OF LIFE

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Introduction and Objectives: Patients with shift work disorder (SWD) have excessive sleepiness and/or insomnia and exhibit functional impairment at work and in their personal lives. The current study examined whether armodafinil improved patient-reported functioning and quality of life in patients with SWD and whether patients were satisfied with this treatment.
Materials and Methods: This was a 6-week randomized, double blind, multi-center study in which patients received 150 mg armodafinil or placebo on nights worked. Patients with diagnosed SWD, worked at least five 6-12 hour night shifts per month, had late shift sleepiness (0400 to 0800), and clinician-rated functional impairment. Patients were administered the Sheehan Disability Scale-Modified [SDS-M]), Treatment Satisfaction Questionnaire for Medication [TSQM], and Functional Outcomes of Sleep Questionnaire [FOSQ-10]. Final visit data included using last observation carried forward. Tolerability was assessed.
Results: A similar proportion of patients in both groups completed the study (82% armodafinil [N=158]; 88% placebo [N=167]). The armodafinil group showed greater improvement in composite SDS-M scores at final visit (-6.8 vs. -4.5; $p=0.0027$). Also, more armodafinil patients were satisfied with their treatment based on composite TSQM score (61% vs. 46%; $p<0.0001$). The armodafinil group showed a greater improvement in total FOSQ-Q score

at final visit (+3.4 vs. +2.7; p=0.0775), although a statistically significant difference was only observed in the completer population at Week 6 (+3.6 vs. +2.7; p=0.0351). Headache and nausea were the most common adverse events and no serious events were observed with armodafinil treatment.
Conclusion: Consistent with previous findings, patients receiving armodafinil had greater improvements in functional impairment. Additionally, more patients receiving armodafinil were satisfied with treatment than those who received placebo and quality of life was only significantly improved in armodafinil patients who completed the study. Adverse events with armodafinil were similar to those observed in a previous SWD study with armodafinil.
Acknowledgements: This research was sponsored by Cephalon, Inc., Frazer, PA.

M-B-024 CIRCADIAN VARIATION OF HEART RATE DURING DIFFERENT SLEEP STAGES

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Introduction and Objectives: Using forced desynchrony and constant routine protocols, heart rate (HR) has been shown to be influenced by the circadian system during wakefulness. Whereas it is often favorable to exclude sleep as a masking variable while studying circadian rhythms, the circadian variation of HR during sleep is an important process to understand. Therefore, we utilized a 72-hour ultradian sleep-wake cycle (USW) procedure to determine if HR maintains a measurable circadian rhythm during non-REM sleep.
Materials and Methods: Nine healthy participants (7 men, 2 women; mean age ± SD: 26.5±4.8 years) entered a time isolation suite to undergo a 72-hour USW consisting of 36 cycles of alternating 60-minute wake and 60-minute nap episodes. The USW procedure required that participants maintain a semi-recumbent position with low activity levels in dim light (<10 lux) during wake episodes or in total darkness during nap opportunities. Participants received iso-caloric snacks every 2 hours. HR (200 Hz) and core body temperature (CBT; 4x/min) were recorded. Sleep was polysomnographically recorded, and scored according to standard criteria. HR data were binned according to circadian phase (30° bins relative to CBT minimum) and sleep stage.
Results: RR intervals were progressively longer with deeper sleep stages. A significant circadian rhythm was observed for RR intervals during wake after lights out (WALO), stage 1, stage 2 and slow wave sleep (SWS; $p \leq 0.0011$). Circadian amplitude of RR intervals was significantly increased during WALO compared to other sleep stages. Circadian phase of RR interval during stage 1, stage 2 and SWS were significantly advanced (2.5 hours) compared to WALO ($p \leq 0.0145$).
Conclusion: The circadian variation of HR is preserved and measurable during sleep. Surprisingly, circadian phase was advanced when RR intervals were measured during non-REM sleep compared to WALO. This observation suggests an interaction between the circadian and sleep systems.
Acknowledgements: Canadian Institutes of Health Research (CIHR), Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST) and Fond de la Recherche en Santé du Québec (FRSQ)

M-B-025 CIRCADIAN VARIATION OF PLASMA MELATONIN ACROSS THE MENSTRUAL CYCLE IN WOMEN WITH PREMENSTRUAL DYSPHORIC DISORDER

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Introduction and Objectives: Women with premenstrual dysphoric disorder (PMDD) experience severe mood deterioration and possibly altered circadian rhythms during the symptomatic luteal phase (LP) of their menstrual cycles. Disturbed circadian rhythms may be involved in the development of these clinical mood states. Our aim was to conduct a chronobiological characterization of melatonin secretion in PMDD women during their asymptomatic follicular phase (FP) and symptomatic LP, and compare it to that of healthy women.
Materials and Methods: Participants included six women meeting DSM-IV criteria for PMDD diagnosis, based on at least 2 months of prospectively rated daily mood assessment and psychiatric evaluations, and five age-matched controls with no evidence of menstrual-related mood disorders. All participants entered the laboratory for two 24-hour visits, scheduled during FP and LP. Laboratory procedures were conducted under constant posture (CP) conditions, which included dim ambient light (<10 lux), small iso-caloric snacks (1x/hour), semi-recumbent posture, time-isolation, and an 8-hour nocturnal sleep episode in complete darkness. Measures included visual analogue scales for mood assessments, plasma ovarian hormones, and 24-hour plasma melatonin.
Results: Mood significantly worsened during LP in PMDD compared to their own FP value and controls. Progesterone was significantly increased during LP compared to FP, with no between-group differences. Compared to controls, PMDD women had significantly decreased plasma melatonin throughout the nocturnal secretion period, and reduced amplitude of secretion during LP. The timing of the circadian melatonin profile was found to be unchanged between menstrual phases and groups.
Conclusion: PMDD women, who experience worsened mood during LP, also show affected circadian melatonin rhythms, with reduced nocturnal secretion and lower amplitude during the symptomatic phase compared to controls. These alterations in melatonin may be related to a disrupted serotonergic system. Current findings may be useful in the development and application of novel chronotherapies targeting mood disturbances within females.
Acknowledgements: Research was supported by the Canadian Institute of Health Research (CIHR). AS is supported by a McGill University Faculty of Medicine fellowship.

M-B-026 CORRELATION OF AGE AND MOOD DISORDER QUESTIONNAIRE (MDQ) SCORE WITH MORNINGNESS-EVENINGNESS QUESTIONNAIRE (MEQ) SCORE IN PATIENTS WITH BIPOLAR DISORDER

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Introduction and Objectives: Circadian rhythm disturbances have been implicated in etiopathogenesis of bipolar disorder. Chronotype is an important concept in field of sleep medicine. The chronotype of an individual is indicative of his/her predilection for an "early bird" or "night owl" circadian preference, which correlates with physiological measures of circadian phase like core body temperature minimum. There is paucity of literature on circadian preference in bipolar patients. This study aimed at investigating if the Horne-Ostberg Morningness-eveningness Questionnaire (MEQ) Score has any correlation with the Mood Disorder Questionnaire (MDQ) Score and age.
Materials and Methods: Adult inpatients with a well established diagnosis of Bipolar disorder (type I, II and NOS) were identified over a period of 5 months and recruited into an IRB approved study. Patients with pregnancy, cognitive impairment, affective instability impairing questionnaire completion and age <18 years were excluded. A total of 43 consecutive patients were eligible for analyses. Chronotype preferences were assessed with the MEQ. MEQ scores >58 correlate with morningness, and <42 correlate with eveningness. Scores outside of these ranges indicate neutral preference. Out of 43 patients, 40 also completed the MDQ, a screening instrument for bipolar disorder.
Results: Out of 43 patients, based on MEQ scores, 11 (25.6%) were evening-types, 24 (55.8%) were neither-types and 8 (18.6%) were morning-types. In our study population, the MEQ Score frequency formed a normal "bell-shaped" distribution curve. On bivariate analyses, MEQ score was not found to have any correlation with MDQ score (Spearman coefficient, rho (P) = 0.06, p-value= 0.7). A modest but statistically significant correlation was found between age and MEQ score (Spearman coefficient, rho (P) = 0.31, p-value= 0.04).
Conclusion: MDQ score does not correlate with MEQ score. Statistically significant correlation of age with MEQ suggests that morningness tends to increase with age in bipolar patients as in healthy individuals without bipolar disorder.

M-B-027 DOES TIME OF TESTING AFFECT EMOTION PERCEPTION?

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Introduction and Objectives: Vigilance and mood are known to be affected by sleep, with circadian phase modulating performance and affective experience. These are also affected by sleep loss, with increased lability to emotional images. Time of testing could therefore affect emotion task performance. The perception of emotion from faces has special significance, as faces can be used to communicate information like threat and danger.
Materials and Methods: In a first study, participants (n=55, mean age 25, 43 females) completed an emotion recognition task. Normal sleepers and poor sleepers were identified, and two time of day groups were created. In a follow-up study designed to control for time since awakening, good sleepers (n=36, mean age = 22, 25 females) were asked to categorize emotional faces and images as angry, fearful, happy or sad. Performance was assessed at 3, 6, 9, or 12 hours since waking, based on sleep diary responses.
Results: Pilot data indicated a significant interaction of emotion, time of day and sleep group ($P<0.05$). Follow up tests showed normal sleepers were less sensitive to angry and fearful faces after 3pm (for both, $P<0.05$). Results from the current study indicate that participants tested at 12 hours are more sensitive towards happy facial expressions than those tested at 3 hours ($P<0.05$). Participants tested at 9 and 12 hours could also be more sensitive towards angry facial expressions than those tested at 6 hours (for both, $P<0.1$). Ongoing work aims to clarify these effects.
Conclusion: These results indicate that time of day could affect sensitivity towards angry faces in particular, suggesting that sensitivity towards different emotions varies over the course of the day. This finding adds to the literature linking sleep and emotion, and learning how sleep and emotion perception are linked may help inform models of insomnia development.
Acknowledgements: This research was supported by an ESRC studentship to L. Beattie, an EPS research bursary to M. Bindemann and N. Forsberg, and a Carnegie Trust vacation scholarship to M. Holm.

M-B-028 EXCESSIVE SLEEPINESS AND PERCEIVED HEALTH IN SHIFT WORKERS

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Introduction and Objectives: Few studies to date have assessed the impact of sleepiness on physical and psychological health in shift workers. This study examines the influence of sleepiness on perceived health and psychological variables in day, shift, and night workers.
Materials and Methods: 276 adults (55% women; mean age = 41.8) including 27 night workers, 111 rotating night shift workers, and 138 day workers were selected from an epidemiological study. All participants were classified according to presence or absence of excessive daytime sleepiness (ES) as defined by an Epworth Sleepiness Scale score higher than 10. Each rotating shift or night worker was paired with a day worker based on gender, age, income, and ES. Only participants who reported working the preceding week were included. Participants completed self-report questionnaires about sleep and psychological variables.
Results: Workers with ES showed higher fatigue ($F(1,269) = 7.8$, $p=0.006$), more role limitations due to physical health ($F(1,267) = 5.5$, $p=0.02$) and poorer functioning ($F(1,266) = 7.5$, $p=0.008$) independently of work schedule. Interactions between work schedule and sleepiness were significant for sleep quality ($F(2,270) = 3.5$, $p=0.03$), fatigue ($F(2,269) = 4.2$, $p=0.02$), and health-related impairments of activity ($F(2,269) = 3.9$, $p=0.02$), suggesting that shift workers with ES are more severely impaired on these three variables. Significant interactions were also found for insomnia and dysfunctional beliefs and attitudes about sleep. These results suggest that in rotating shift and day workers, but not in night workers, ES is associated with more severe insomnia and endorsement of dysfunctional beliefs.
Conclusion: Excessive sleepiness seems to negatively impact fatigue and quality of life, and some negative consequences of excessive sleepiness were more pronounced in rotating shift workers. Taken together, these results underline the clinical importance of addressing excessive sleepiness particularly in the context of rotating shift work.
Acknowledgements: This research was supported by the Canadian Institutes of Health Research (MT42504).

M-B-029 EXCESSIVE TIME SPENT IN BED AND IRREGULAR SLEEP PATTERN IN SHIFT WORK SLEEP DISORDER SUFFERERS AND GOOD SLEEPERS

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Introduction and Objectives: Few studies address psychosocial variables involved in shift work sleep disorder (SWSD) despite its important consequences on well-being. While it is accepted that excessive time in bed and irregular sleep schedules contribute to maintain insomnia, nothing is known about the contribution of similar behaviours on SWSD's course. The present study examines excessive time in bed and sleep schedule in both good sleepers and SWSD sufferers who work on night shift.
Materials and Methods: The sample included 21 participants (mean age: 36 years old; 85% women), 15 with SWSD and six good sleepers. Participants wore an actigraph during two weeks. Sleep variables were calculated using the main diurnal sleep period from the actigraph's report. An average sleep efficiency (SE) was calculated for each participant in order to assess excessive time spent in bed. The irregularity in sleep pattern was based on the standard deviation of differences in times to go to bed (SD-TB) for each sleep period and the standard deviation between total sleep time (SD-TST) for each sleep period.
Results: Mean total sleep time was 288,4 minutes for SWSD group and 375,2 minutes for good sleepers. Mean total wake time was about 50 minutes for both groups. A Mann-Withney test showed no difference between subjects with SWSD and good sleepers for sleep efficiency (SE) ($Z = -0.585$, $p = 0.569$), standard deviation of differences in times to go to bed (SD-TB) ($Z = -0,389$, $p = 0.733$) and the standard deviation between total sleep time (SD-TST) ($Z = -0,156$, $p = 0.876$).
Conclusion: Sleeping during the day, while personal and familial activities may be more appealing can restrain participants from spending excessive time in bed. Behaviours such as those related to sleep hygiene should be further investigated. Dysfunctional thinking about sleep should be assessed to draw a complete picture of SWSD.

M-B-030 FACTORS ASSOCIATED WITH DIFFICULTY IN READJUSTMENT OF SLEEP-WAKE SCHEDULE AFTER LONG-VACATION IN COLLEGE STUDENTS

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Introduction and Objectives: College students tend to have irregular sleep patterns due to academic and social reasons, and developmental changes of endogenous circadian rhythms. Previous studies showed that the average sleep time for college students on weekdays is short, and they tend to increase sleep period on weekends and during vacation to make up for the sleep loss. Therefore, some students may have difficulty readjusting to school schedule after a long vacation. The purpose of the study was to explore the association between circadian preference, Internet usage, parents' supervisory behavior, stress and sleep quality in the first week of a new term.
Materials and Methods: 824 college students in Taiwan participated in the study. Those with psychiatric and sleep disturbances history were excluded. They had to fill out a package of questionnaires, including questions regarding sleep pattern (on weekdays, weekends, and summer vacation), Morningness-Eveningness questionnaire (ME), Chinese Internet Addiction Scale-Revised (CIAS-R), parent's supervisory behavior (PSB) and Ford Insomnia Response to Stress Test (FIRST). 370 valid questionnaires were obtained. Pearson's correlation and stepwise linear regression were used to examine the relationship among the variables.
Results: Difficulty falling asleep was found to correlate with CIAS-R ($r=0.245$, $p<0.001$), FIRST ($r=0.316$, $p<0.001$), PSB ($r= -0.109$, $p<0.001$)and ME ($r=0.199$, $p<0.001$); difficulty waking up was associated with ME ($r=0.317$, $p<0.001$) and CIAS-R ($r=0.213$, $p<0.001$). Moreover, PSB ($\beta=0.243$, $p=0.007$) and FIRST ($\beta=0.207$, $p=0.028$) can significantly predict difficulty falling asleep; ME ($\beta=0.413$, $p<0.001$) and CIAS-R ($\beta=0.409$, $p<0.001$) can significantly predict difficulty waking up.
Conclusion: The current study found two factors that were associated with difficulty readjusting to school schedule after a long vacation: 1) sleep

related behaviors such as Internet usage and parent's supervisory behavior, and 2) individual traits including circadian preference and stressful life event before bed. These measures can be applied as a screening tool to identify students who are at a higher risk for sleep problem and then provide sleep hygiene education.

M-B-031 INFLUENCE OF NAP OPPORTUNITY TIMING ON HEART RATE VARIABILITY

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Introduction and Objectives: Most shift workers do not completely adapt to their atypical schedules, leading to a misalignment between circadian physiology and their sleep behaviors. Because shift workers sleep during the daytime and experience a higher risk of cardiovascular events, we aimed to explore how heart modulation varies with sleep timing across the day.
Materials and Methods: After 3 consecutive weeks of a regular sleep-wake schedule, 9 healthy subjects (mean age ± SD: 26.3±4.6 years) entered the laboratory for an 8-hour baseline night of sleep. Upon awakening, they underwent a 72-hour ultradian sleep-wake cycle (USW) procedure consisting of 60-minutes wake episodes in dim light (<10 lux) alternating with 60-minute nap opportunities in total darkness. Participants were kept in time isolation suites, maintained semi-recumbent position and were served iso-caloric snacks throughout the procedure. Heart rate was monitored (200Hz) and RR intervals, high and low frequencies (HF, LF), and the LF:HF ratio were calculated. Data were binned according to circadian phase (30° bins) and time since lights out (10-minute bins).
Results: Nap opportunities scheduled during the habitual night (i.e. between 300° to 60°) were associated with rapid increases in RR interval (+10%) and HF power (+37%) within 10 minutes after lights out, whereas changes were more progressive when nap opportunities were scheduled during the day (i.e. between 90° and 240°). Similarly, sudden decreases in LF power (-16%) and the LF:HF ratio (-47%) were associated with nap opportunities scheduled during the habitual night, whereas changes were slower for nap opportunities scheduled during the habitual day. Moreover, RR interval and HF power recorded at the end of daytime nap opportunities were lower than those obtained 10 minutes after lights-out during nighttime nap opportunities.
Conclusion: Our results suggest that naps during habitual night could be more beneficial than those during habitual day. These observations have implications for night shift workers.
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M-B-032 MORNINGESS-EVENINGNESS AND MENSTRUAL DISTRESS MEDIATING THE EFFECTS OF SHIFT PATTERN ON SLEEP HYGIENE PRACTICE

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Introduction and Objectives: Morningness-eveningness has influence on habitual sleep patterns and women with menstrual-related problems reported more frequently smoking and drinking heavily. However, the relationship among circadian type, menstrual distress, and sleep hygiene remain unknown for nurses under shift work system. This study was to investigate whether morningness-eveningness and menstrual distress would statistically explain the relationship between shift patterns and sleep hygiene practice, but not to sleep hygiene awareness.
Materials and Methods: The present study included 339 female nurses between the ages of 20-51. Nurses completed the questionnaires including the Chinese versions of the Sleep Hygiene Awareness and Practice Scale (SHAPS), Morningness-Eveningness Questionnaire (MEQ), and the Chinese versions of Short-Form Menstrual Distress Questionnaire (MDQ-SF).
Results: The mediation regression and path analysis was conducted. The present study provided one appropriated path model to indicate that the morningness-eveningess and menstrual distress mediating the effects of shift pattern on sleep hygiene. Our results also addressed sleep hygiene awareness is not directly associated with sleep hygiene practice.
Conclusion: This study provided one appropriate path model to suggest circadian type is important in predicting sleep hygiene practice for nurses.

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M-B-033 PRESERVED CIRCADIAN RHYTHM DESPITE OF D2 ANTAGONIST RACLOPRIDE-RELATED MOTOR ACTIVITY SHIFTS

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Introduction and Objectives: Both disturbed night sleep and daytime sleepiness are associated with – especially advanced – Parkinson's Disease (PD). This raises the question of a disturbance of the circadian rhythm, e.g. by decreased dopaminergic signaling. The aim of this study was to assess the effect of the preferential dopamine D2 receptor antagonist raclopride on the circadian activity pattern in a running wheel mouse model.
Materials and Methods: The experiment was conducted on 3 groups of C57/Bl6 mice (each group n=6). All animals were housed in single cages and had continuous and voluntary access to a running wheel. Running wheel revolutions were recorded and the distance run was calculated by an automated software. The mice were injected intraperitoneally with different doses of raclopride (1,5 or 3 mg/kg) or vehicle on three consecutive days prior to the active period and the effect on wheel running behavior was assessed.
Results: Raclopride led to a dose-dependent shift of the activity peak to later time-points within the activity phase. Interestingly, the mice compensated the lower running distance during the early active period by an increased running wheel usage in the second half of the night. Thus, the overall distance run during the night remained unchanged in all groups. As well, the active period itself remained unchanged, as activity was not postponed into the resting period.
Conclusion: In our mouse model, acute D2 antagonism did not lead to a disturbance of the circadian rhythm as the general timing and duration of the activity phase remained unchanged. The observed altered distribution of running wheel activity within the active phase can most probably be explained by both altered motivation and pharmacogenic hypokinesis. Future studies should address the effect of chronic dopaminergic deficits on circadian activity levels.

M-B-034 SEX DIFFERENCES IN THE CIRCADIAN VARIATION OF BODY TEMPERATURE

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Introduction and Objectives: Studies have shown that body temperature is influenced by various parameters including metabolic rate and subcutaneous blood flow, which is related to heat loss at the extremities. Interestingly, sex differences and circadian variations were found in both metabolic rate and the subcutaneous blood flow. The aim of the present study is to examine sex differences in the circadian variation of body temperature regulation.
Materials and Methods: After two consecutive weeks of a regular sleep-wake schedule, 10 healthy men (mean age ± SD: 25.77±4.48 years) and 10 healthy women in their mid-follicular phase (26.01±3.06 years) entered the laboratory to participate in a 72-hour ultradian sleep-wake cycle (USW) procedure. During the USW, participants alternated between 60-minute wake episodes in dim light (<10 lux) and 60-minute nap episodes in total darkness. Throughout the procedure, participants remained in time-isolation, maintained a semi-recumbent position, and were served iso-caloric snacks (1x/2 hours). Measures included core body temperature (CBT), distal skin temperature (DT), and a calculated distal-core temperature gradient (DCG). Data were binned according to circadian phase (30° bins).
Results: Neither significant interactions nor main effects of sex were found for CBT. As for DT, the main effect of sex approached, but did not reach, significance ($p=0.056$), with males having lower values compared to females. DCG showed a main effect of sex, with women having significantly higher values than men ($p<0.05$) throughout all circadian phases.

Conclusion: Parameters that could affect body temperature, such as activity level, food intake, and posture were controlled for by using the USW procedure. Women presented higher DCG throughout circadian phases even though statistical tests showed that both CBT and DT were comparable to men. Our results suggest a sex difference in thermoregulatory mechanisms.
Acknowledgements: Research was supported by the Canadian Institute of Health Research (CIHR). AS is supported by a McGill University Faculty of Medicine fellowship. PB is supported by a fellowship from Institut de recherche Robert-Sauvé en santé et en sécurité du travail

M-B-035 SLEEP IN MT2 MELATONIN RECEPTOR KNOCKOUT MICE

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Introduction and Objectives: Melatonin (MLT) is implicated in the regulation of sleep and circadian rhythms. The physiological actions of MLT in the brain are mediated by two high-affinity G-protein-coupled receptors, denoted MT1 and MT2, whose respective roles in sleep regulation remain to be defined. Here we performed a 24 h polisomnographic study in MT2 melatonin receptor knockout mice with the aim to fill the gap in knowledge on the involvement of melatonin receptors in the control and promotion of sleep.
Materials and Methods: These experiments were carried out in adult male C3H/He wildtype mice (WT), and mice of the same genetic background lacking the MT2 receptor (MT2KO). Electroencephalogram/Electromyogram (EEG/EMG) recordings were performed across 24 h in animal kept under 12:12 h light/dark cycle. EEG/EMG signals were digitized using a CED 1401 Plus interface and analyzed using Spike2 software (CED, Cambridge, UK) according to the classical vigilance states: Non Rapid Eye Movement Sleep (NREMS), Rapid Eye Movement Sleep (REMS), and wakefulness.
Results: The analysis on NREMS showed a significant interaction between mice strain and phase of the day (Two-way ANOVA, $F(1,16)=4.73, p=0.04$). Student-Newman-Keuls Post-hoc test (SNK) indicated that during the light phase, NREMS duration was significantly lower in MT2KO mice, compared to WT ($p=0.01$). During the dark phase NREMS was significantly lower than the light phase for both strains. Two-way ANOVA on REMS showed a significant difference for phase of the day ($F(1,16)=18.52, p=0.001$) but no for strain ($F(1,16)=0.6, p=0.4$). SNK analysis indicated that REMS was significantly lower during the dark phase for both WT and MT2KO mice.
Conclusion: The lack of MT2 receptor significantly affects NREMS, suggesting that the MT2 receptor play a key role in sleep-wake regulation by controlling NREMS duration without affecting REMS.
Acknowledgements: Funding Support: CIHR; #PPP-81421; #PP2-90159 to G.G., MUHC Postdoc fellowship to S.C., and CONACYT (Mexico government) fellowship to R.O.S.

M-B-036 SLEEP-WAKE SCHEDULES AND SUBJECTIVE SLEEP QUALITY OF GEORGIAN UNIVERSITY STUDENTS

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Introduction and Objectives: Problems in sleeping are widely prevalent in modern society and are often one of the presenting complaints of university students worldwide. There is very little known, however, about sleep habits and schedules of Georgian university students. We therefore conducted a questionnaire-based study in the Ilia State University, Tbilisi.
Materials and Methods: 102 undergraduate students (68 males, 34 females) between the ages of 19-21 years completed comprehensive self-response questionnaire on sleep-wake patterns on weekdays and weekends, sleep duration needs, nocturnal sleep complaints and daytime sleepiness over the previous month.
Results: Most of the students (70.7%) sleep for 6-8 h on weekdays. These subjects went to bed on an average at 24:30 h; get-up time was 07:30 h (on an average). Time in bed (TIB) increased to 9-11 h on weekend days. Females reported spending a longer TIB compared to males on weekend. "Sleep Initiation Difficulty" was identified as most prevalent sleep complaint. Of the students, 74.6% usually fell asleep within 10-20 min; 25.4% reported taking at least 50 min to fall asleep. 2.4% of males and 4.5% of females took a nap (1.5 h in average). The complaints for nocturnal awakenings and early morning awakenings were reported by less than 12% of the responders. The majority of the students (70% of both sexes) felt that their sleep is insufficient; however, these students had no response on the question "What is a cause for your insufficient sleep". 3.2% of the sample reported excessive daytime sleepiness.
Conclusion: Male and female Georgian university students are getting insufficient sleep on weekday nights and are trying to satisfy the need for sleep during the weekend. They do not follow a regular routine both during the day and bedtime. It would be reasonable to provide Georgian university students with a special course on sound sleep significance for mental and physical health in relation to lifestyle.

M-B-037 STUDY OF CIRCADIAN VARIABILITY OF BODY TEMPERATURE AND SLEEP-WAKE CYCLE OF THE STUDENT NIGHT SHIFT WORKERS

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Introduction and Objectives: Currently there has been a growing interest in health in the developing research on sleep disturbances of the worker who wakes up too early or works at night. Considering this, we developed an interest in analyzing the patterns of sleep - wake cycle and circadian variation of body temperature in nursing night shift workers who study during the day.
Materials and Methods: Data was collected during 30 days in two terms (school term and school holidays), between nursing technicians of night shift, daytime students. We used the MEQ of Horne and Ostberg, Epworth Sleepiness Questionnaire, Sleep Log and a thermistor for verification of wrist temperature every 30 minutes.
Results: 27 individuals participated in the survey, and as for sleep, it was found they had, on average, 3 hours less on days on duty in the school term, compared to days-off; 66.7% had scores higher than 9.0 on the ESS, which features excessive daytime sleepiness. We observed phase relation between the acrophase and the half-sleep phase, in the morning subjects in the school term on working days ($r=0.8244$), and on vacation on working days ($r=0.8843$) and on vacation on days-off ($r=0.6004$). There were significant differences in the time that the acrophase occurred, when comparing the school term on days-off and days of work ($p<0.0001$)and days-off on school vacation with working days on school vacation ($p<0.0001$).
Conclusion: It can be observed in the thermogram, the temperature variation over the day, and on days-off the highest temperatures are in the early evening and early hours on working-days the temperature tends to rise late, close to noon, which shows that in this sample, even with routine shifts on alternate days, the temperature rhythm of the wrist accompanies the sleep-wake cycle.

M-B-038 STUDY OF MEMORY, ATTENTION AND SLEEP-WAKE CYCLE OF THE NURSING STAFF IN DIFFERENT WORK SHIFTS

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Introduction and Objectives: The shift work can affect sleep and cognitive functions such as attention and short-term memory. Objectives: Evaluate the effect of shift work on cognitive functions, short-term memory and attention, through the sleep-wake study cycle and chronotype nursing.
Materials and Methods: The study was approved by the State University of Campinas Research Ethics Committee. A nursing group from a hospital in inner Minas Gerais state distributed by professional categories such as: nurses, technicians and nursing assistants participated working in a 12-36 hour resting shifts, n=109 (88 women and 21 men), average age 34, distributed on day shift (n = 68) and night shift (n = 41). Instruments: identification sheet, sleep diary, Questionnaire of Horne & Östberg, WAIS III (subtest Digit Span and Digit Symbol). Statistical analysis set the significance level at 5%.
Results: The sleep quality in the day shift: 7.4 (2.2), night shift: 4.9 (2.6). Sleep time in day shift 07h07m (01h30m), night shift 12h31m (01h59m), nap time: 80.4 minutes the night shift, day shift 73.4 minutes. Most chronotypes was classified as indifferent. The Digit Symbol was better: if you do not have children ($p = 0.0021$), if studying ($p = 0.0154$) (Mann-Whitney's test), number of children ($p = 0.0104$, Kruskal-Wallis's test), age ($p < 0.0001$), Digit Symbol and professional groups, $p = <0.001$ (Kurskal-Wallis's test), nurses and nursing assistants, $p = 0.001$, and technical and nursing assistant, $p = 0.0001$ (Mann-Whitney's test). Digit Span and other work variable, $p = 0.0314$ (Mann-Whitney's test).

Conclusion: The sleep quality of those who work day shift is better and the ones who work night shift sleep and nap more. The attention measured by Digit Symbol showed the influence of age, family and study while in Digit Span short-term memory retention improved in those who work more.
Acknowledgements: Coordination for the Improvement of the Higher Level Personnel - CAPES

M-B-039 STUDY OF VARIABILITY CIRCADIAN BODY TEMPERATURE AND SLEEP-WAKE CYCLE OF THE STUDENT NIGHT SHIFT WORKERS

Luciane Carmona. *UNICAMP, Brazil*

Introduction and Objectives: Currently there has been growing interest in health in developing research on sleep disturbances of the worker who wakes up too early or working at night. Thus, there developed an interest in analyzing the patterns of sleep–wake cycle and circadian variation of body temperature in night shift workers of nursing who studies during the day.
Materials and Methods: Data were collected during 30 days in two periods (and school holidays), among nursing works of night shift, daytime students. Used the Questionnaire for Individuals Morning and Evening (HO) and Journal of Sleep and a thermistor for verification wrist temperature every 30 minutes, which is characterized as a safe measurement of temperature, related to the circadian rhythm.
Results: 17 subjects participated in the survey, with a mean age of 28 years. As for sleep, it was found they had less after 2:56 pm for days on duty in the school year, compared to rest days. It was possible to observe a uniform phase shift in temperature in all subjects according to the presence of night work or not. Individuals have routines that alternate due to workload, which is 12 hours per 36 hours rest. The phase relation between the acrophase and the half-sleep phase was observed. There were significant differences in the time that the acrophase occurred, when comparing the school year without work and school to work and work-free vacation with work.
Conclusion: It was believed that would not be possible to identify the temperature rhythm in most subjects, and if that were possible it would be of low amplitude and low significance. These did not happen. It was observed that the wrist temperature shifted, on average every 24 hours, trying to maintain a phase relationship with the sleep-wake cycle, and consequently with the work schedule.
Acknowledgements: We thank CAPES for a PhD scholarship.

M-B-040 SUBJECTIVE SLEEP QUALITY (SSQ) AND SLEEP HABITS (SH) IN PATIENTS WITH DELAYED SLEEP PHASE DISORDER

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Introduction and Objectives: Delayed Sleep Phase Disorder (DSPD) is mainly characterized by habitual sleep-wake times which are delayed usually more than 2 hours, according to conventional or socially acceptable times; it has been reported that patients complain of difficulty in falling asleep, but once sleep is set, it is reported as normal. The aim was to describe SSQ and SH in the studied sample.
Materials and Methods: With a structured clinical interview, Athens Insomnia Scale (AIS) and Epworth Sleepiness Scale (ESS) we studied 30 patients (mean age of 21.3 $\pm$ s.d. 2.68 years old, men = 76.7%) whose met DSPD criteria according to ICSD-II; the aim was to describe SSQ and SH in the studied sample.
Results: In our sample, the patients reported remaining in bed from 3:00 hrs. through noon. Regarding SSQ, we identified an increase in subjective sleep latency (92.5 min), number of awakenings (2.5 events per night) and premature awakenings (4 events per week); as well as decrease in subjective sleep time (5.9 hours) and insufficient sleep quality (5.1/10). In spite of these data, ESS and AIS were within normal range (6.43 and 5.7 respectively). Related to SH we observed that 83% daily used caffeinated drinks, 26.7% had alcohol and 6.7% tobacco abuse, 76.7% watched TV or had computer activities lying down in bed before sleep onset and 86.7% used mobile phone during the night while remaining awake. The patients reported taking 2 naps per week, performed athletic activity 5.5 days per week and 20% of them reported psychological stress.
Conclusion: The presence of inadequate sleep hygiene and low sleep quality (with no pathological level of sleepiness and insomnia), generates doubts about a unique Delayed Sleep Phase Diagnosis as has been proposed in ICSD-II; therefore, further research about DSPD subtypes such as secondary to Inadequate Sleep Hygiene should be important.

M-B-041 THE ASSOCIATION OF SLEEPINESS AND DIURNAL PREFERENCE WITH SALIVARY AMYLASE ACTIVITY

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Introduction and Objectives: Salivary amylase activity has been associated with extended waking periods and homeostatic sleep drive in both humans and flies (Seugnet et al, 2006). The present study investigated the effectiveness of salivary amylase activity as a biomarker of sleepiness and explored the association of amylase with diurnal preference.
Materials and Methods: Visitors (18 years old and over) to the Glasgow Science Centre were asked to participate in the study regardless of country of origin. Consented participants (n=1,138; 526 males and 614 females) completed a computer-based version of the Horne-Ostberg diurnal preference questionnaire and a short questionnaire about their sleep duration and quality for the previous night. Additionally, they completed the Stanford Sleepiness Scale and were also asked to give a saliva sample for amylase activity analysis.
Results: Amylase activity was not found to be associated with sleepiness ($r=0.03$, $P>0.05$). Diurnal preference was associated with both age ($r=0.47$, $P<0.05$) and with the participants' subjective reports of time since wake for the day of testing ($r=0.25$, $P<0.01$). Examined independently, participants that reported an extreme evening diurnal preference were found to have significantly lower ($P<0.05$) levels of amylase compared to all other groups.
Conclusion: Salivary amylase was not found to be associated with state specific measures of sleepiness. A marked variation in salivary amylase activity was found for individuals with extreme evening preference.
Acknowledgements: Supported by Wellcome Trust Public Engagement Award (087978/Z/08/Z)

M-B-042 THE EFFECT OF ARMODAFINIL ON LATE-IN-SHIFT CLINICAL CONDITION AND EXCESSIVE SLEEPINESS AS WELL AS OVERALL DAILY FUNCTIONING IN PATIENTS WITH SHIFT WORK DISORDER: A RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED STUDY

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Introduction and Objectives: For patients with shift work disorder (SWD), the impact of excessive sleepiness is most profound at the end of the night shift and morning commute home. This study examined whether armodafinil improved clinical condition and wakefulness late in the night shift. Patient functioning was also examined.
Materials and Methods: Patients received 150 mg armodafinil or placebo on nights worked in this 6-week multi-center study. Patients with SWD (DSM-IV and ICSD-2 criteria), who worked at least five 6-12 hour night shifts a month, had mean Karolinska Sleepiness Scale (KSS) score >6, and Global Assessment of Functioning (GAF) score <70 were included. The primary efficacy assessment was improvement in Clinical Global Impression-Change (CGI-C) related to excessive sleepiness late in the shift, including the commute home (0400 to 0800) at final visit. Secondary efficacy assessments included mean change in GAF and late shift KSS from baseline to final visit. Final visit data included last observation carried forward. Tolerability was assessed.
Results: A total of 383 patients were enrolled and a similar proportion of patients in both groups completed the study (82% armodafinil; 88% placebo). At the final visit, more armodafinil-treated patients demonstrated improved late-in-shift CGI-C scores versus placebo (77% vs. 57%; $p<0.0001$). Armodafinil-treated patients also had a greater mean change in GAF (+9.5 vs. +5.2; $p<0.0001$) and late-in-shift KSS (-2.8 vs. -1.8; $p<0.0001$) versus placebo. Common adverse events were headache and nausea with no serious events observed with armodafinil.

Conclusion: To our knowledge, this is the largest interventional trial that has ever been conducted in SWD. Armodafinil significantly improved late-in-shift clinical condition during the critical circadian nadir period of 0400 to 0800 in patients with SWD. Armodafinil improved patient functioning and reduced late shift sleepiness. Adverse events were similar to those observed in a previous SWD study with armodafinil.
Acknowledgements: This research was sponsored by Cephalon, Inc., Frazer, PA.

M-B-043 THE "FORBIDDEN ZONE FOR SLEEP" MIGHT BE CAUSED BY THE EVENING THYROTROPIN SURGE AND ITS BIOLOGICAL PURPOSE IS TO ENHANCE SURVIVAL: A HYPOTHESIS

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Introduction and Objectives: For normal subjects, propensity for daytime sleep (SP) varies, being high in mid- afternoon and lower two or three hours before overnight sleep onset. This lowering of SP in the early evening is termed "forbidden zone for sleep" (SFZ). During the day, thyrotropin levels (TL) oscillate: lower levels during afternoon and higher levels during the early evening. The steep increase of TL in the evening is called "thyrotropin-evening surge" (TES), with the higher levels just before sleep onset. Thereafter, TL decrease reaching their low daytime levels. Considering the role of thyroid in alertness, this negative correlation between TL and SP is not a coincidence. Assuming that the circadian rhythms (CR) of any species are turned to facilitate survival, we propose that the SFZ enhances survival. Humans rely mainly on vision to interact with environment; when night came, men were more vulnerable than during day-light. To enhance survival, it was necessary for evolution to create a physiological condition that kept us alert if we were caught by the night. FSZ is the evolution's solution that increased our survival in the evening. FSZ enhances the sharpness of all human's senses which helps to counteract the weakening of the sight sense due to diminished daylight. Objectives: To posit that this increase in our general performance capacity, synchronized with the early evening, is secondary to the TES.
Materials and Methods: Medical literature pertinent to the theme. Logical reasoning applied on data pertinent to the theme.
Results: The forbidden zone for sleep is caused by the Thyrotropin-evening surge.
Conclusion: During mankind evolution, SFZ enhanced our survival.
Acknowledgements: We are much indebted to Prof Mônica Andersen, of Universidade Federal Paulista, São Paulo, Brasil, for her helpful critique of this manuscript and kind attention.

M-B-044 THE PREVALENCE AND PATTERNS OF SLEEP DISORDERS AND CIRCADIAN RHYTHM DISRUPTIONS IN CHILDREN AND ADOLESCENTS WITH FETAL ALCOHOL SPECTRUM DISORDERS (FASD)

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Introduction and Objectives: Sleep disorders have been poorly described in children and adolescents diagnosed with FASD. The objective of this study is to describe the sleep and circadian rhythm characteristics of children with FASD using overnight polysomnography, sleep questionnaires, and the Dim Light Melatonin Onset (DLMO) test. To our knowledge, no comprehensive study of this nature has been conducted.
Materials and Methods: Children aged 6-18 years diagnosed with Fetal Alcohol Spectrum Disorder (FASD) were recruited from various FASD clinics to the Youthdale Child and Adolescent Sleep Centre in Toronto. After a medical consultation, each participant had 1 night of overnight polysomnography, as well as an additional night of DLMO. Participants completed various sleep, alertness, and mood questionnaires. The results of the polysomnography, subjective questionnaire data, and DLMO were analyzed using SPSS.
Results: Descriptive pilot data shows the mean percentage values for stage 4 slow wave sleep (SWS) were slightly elevated compared to the normative values. The onset of REM sleep was slightly delayed. Mean percentage values of wakefulness were also increased, suggesting increased sleep fragmentation during the night. The DLMO results obtained to date in this group are abnormal of typical melatonin secretion profiles.
Conclusion: Polysomnographic analysis provided evidence for disrupted sleep patterns in children with FASD including decreased sleep efficiency, increased night awakenings, increased sleep fragmentation, and decreased REM sleep. Abnormal DLMO results suggest possible deregulation of circadian rhythms, specifically with the secretion of the hormone, melatonin. The increased prevalence of sleep and circadian disturbances in this population suggests the need for a more proactive approach to sleep.

C: Excessive Daytime Sleepiness (not Narcolepsy or other sleep disorder)

M-C-045 COMPARATIVE UTILITY OF NEW PICTORIAL EPWORTH SLEEPINESS SCALE (ESS) QUESTIONNAIRE AND TRADITIONAL WORDED ESS QUESTIONNAIRE

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Introduction and Objectives: To Assess the Utility of a New Pictorial Epworth Sleepiness Scale (ESS) Questionnaire versus the Traditional Worded ESS Questionnaire in a Local Population.
Materials and Methods: Patients attending Sleep Disorders and ENT clinics in a public tertiary hospital were asked to complete the Pictorial ESS (pESS) and worded ESS (wESS) consecutively; in the following week, a different group of patients were asked with reverse order of ESS. Patients rated the ease of completion on a scale from 1 (easiest) to 10 (hardest) and indicate their questionnaire preference. Main language of communication, educational level and help needed (indicated as Yes when there were two or more questions asked pertaining to each ESS) were also compiled.
Results: 124 responses (83 males and 41 females) were collected. Median age was 46 years old, racial profile was similar to the national level and 71% had at least tertiary education. Average score of the ease of completion for the pESS was 1.97 and 2.73 for wESS. A slim majority of patients with pre-tertiary education (50% vs 44%) preferred the pESS. Among patients with tertiary education, the wESS was preferred (57% vs 42%). However, these differences were not statistically significant. There was no significant difference in preference for either questionnaire based on whether the main language of communication was English or not. Patients with pre-tertiary education needed more help with wESS (70% vs 30%, p0.002), but the same proportion of these patients needed help with the pESS as well.
Conclusion: The pESS was preferred by patients with pre-tertiary education. Generally, pESS was perceived to be easier than wESS, however the proportion of patients needing help with either questionnaire was the same. Interpretation of pictorial images in the pESS may be subjected to same cultural limitations as the traditional wESS.

M-C-046 KLEINE-LEVIN SYNDROME: A 18F-FDG PET/CTSTUDY

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Introduction and Objectives: Kleine–Levin syndrome (KLS) is a rare disorder characterized by recurrent episodes of hypersomnia, cognitive and behavioral disturbances. Etiology and pathogenesis underlying KLS remains enigmatic, and functional imaging studies have been inconsistently reported.
Materials and Methods: We performed 18F-FDG PET/CT in two patients (a 17 years-old man and 18 years-old woman, right-handed, with typical clinical presentation, fulfilling the International Classification of Sleep Disorders II revised criteria of KLS), while symptom free and during an acute KLS episode. Exams were performed during quiet wakefulness, under EEG monitoring. Increases and decreases in brain glucose metabolism were determined during symptomatic period, in comparison to asymptomatic period using a 5%-threshold. Concordant changes separately found in each patient are presented.

Results: While symptomatic, patients exhibited significant decreases in metabolism in the orbitofrontal and frontal parasagittal areas, and occipitally, while increase in metabolic activity was observed in the premotor cortex particularly on the dominant side, as compared to the asymptomatic period. Striatal and diencephalic areas had unchanged metabolic rates.
Conclusion: This is, to the best of our knowledge, the first 18F-FDG PET study in KLS investigating variations in cerebral glucose metabolism according to the presence of symptoms. During the symptomatic period, focal brain metabolic changes were observed in frontal, occipital and left premotor cortex, but no variations were seen in diencephalic regions. We hypothesize that areas of decreased metabolism may correlate with motivational and perceptive symptoms, while regions of increased metabolism could reflect a tentative of recruitment of compensatory mechanisms. Further studies are necessary to confirm these hypotheses.

M-C-047 LEVELS OF SLEEPINESS AND SLEEP PATTERNS OF NIGHT NURSING STUDENT WORKER

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Introduction and Objectives: Due to the increasing industrialization of society, night work has become increasingly common. Nurses provide care in a 24 hour work setting and so are frequently shift workers. This routine can have pronounced negative effects on sleep, performance and health. The aim of this study was to investigate levels of sleepiness and sleep patterns of student nurses who are night shift workers.
Materials and Methods: 10 subjects participated in the survey for 30 days, divided into two periods (holidays and school) by completing a sleep diary and Epworth Sleepiness Scale.
Results: Most students were female (n = 7) with a mean age of 29.6 years, while men have a longer sleep duration (402.8 min) compared to females (376.5 min). Results showed: sleeping longer on vacation when compared to school period (408.8 x 358.7 min, p = 0.0187); on non-working days (453.7 x 273.9 min, p = <0, 0001),; and did not sleep in the days immediately after the night shift (424.5 x 292.2, p = <0.0001). Results also showed increased perception of well-being on days when there was no nap (p = 0.0013) and nocturnal sleep after the holiday period (p = 0.0206). Regarding the levels of sleepiness, excessive daytime sleepiness has been identified, mainly in post-shift days, which was statistically significant (p = 0.0002).
Conclusion: The data corroborate with other research and lead us to conclude that the night worker suffers from sleep deprivation because their working hours causes increased waking hours, especially in females. Impairing the quality of sleep and causing high levels of sleepiness during the class period, may damage health and expose the subject to the risk of accident, especially when traveling from one place to another and also impact school performance.
Acknowledgements: Thanks for the Coordination of Improvement of Higher Education Personnel

M-C-048 SLEEP AND WAKING PATTERNS IN PROFESSIONAL DRIVERS IN CHILE

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Introduction and Objectives: In the last 10 years there is an increasing number of accidents with high casualties on Chilean highways. Most of the accidents involve bus and truck drivers. The objective of this study was to evaluate and assess the sleep and waking characteristics of a professional drivers cohort.
Materials and Methods: We studied a sample of professional drivers of a bus company that has more that 3000 professional drivers. From that we successfully studied 300 drivers. The company has all the Psychomotor skills technology to asses drivers. We applied an interview with items of general health, sleep habits, morphological data. We applied the Epworth test modified by Rosenthal. In 30% of the people (100) we performed PSG. We studied the drivers schedules, distance driven, rest time, and accident rate.
Results: The mean age was 35 years (25-60). 3% were Diabetics under treatment. 5% were on treatment for high blood pressure. 50% were overweight, and 30% were obese. The Epworth test showed a high index, specially at mid day and in the evening.The apnea and snoring test shows high probability of that condition. The PSG showed in 50% of the persons snoring and in 20% apneas (moderates) The Psychomotor tests, trial making A and B were slightly slowed specially after 4 hours drive.
Conclusion: The Chilean professional drivers licence don't have any question or examination about sleep and wakefulness condition. The interest of this study was to show that a high number of professional drivers, working in a Bus company, have a high sleepiness index, snoring and apneas. As well as a high percentage was overweight or obese. We conclude that it is very important to asses professional drivers in the sleep and waking studies.

E: Neurological Sleep Disorders Affecting Sleep/Waking

M-E-049 AGRYPNIA EXCITATA: POLYSOMNOGRAPHIC FINDINGS IN LIMBIC AUTOINMUNE ENCEPHALOPATHY (LAE) AND FATAL FAMILIAL INSOMNIA (FFI)

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Introduction and Objectives: "Agrypnia Excitata" is a term coined originally by Lugaresi and Provini (Sleep Medicine Reviews 2001) to describe a syndrome caused by a dysfunction in thalamolimbic circuits producing severe insomnia, mental confusion, dream enactment, motor and autonomic activation. Of conceptual importance for the understanding of the neurophysiopathology of mechanisms of wakefulness and sleep, this syndrome is observed in fatal familial insomnia, delirium tremens, limbic autoimmune encephalopaties and the Mulvihill-Smith syndrome. We analized polysomnographic findings of a proven case of LAE-associated with VGKC antibodies (LAE-VGKC) and performed its comparisons with findings previously reported in our case of IFF (Garay A. et al., Neurology 1996).
Materials and Methods: We analized polisomnograms (PSGs) of LAE-VGKC (PSGs, n=3) using digital video-polysomnographic recordings. Sleep-wake patterns were scored in 30 seconds epochs and in 5 seconds epochs by time-frequency analysis thorough continuous wavelet transform (CWT). For the analysis of our results we performed simulations using a mathematical model of sleep and wake of Rempe et al. (J. Math. Biol. 2010).
Results: LAE-VGKC showed during microepochs analysis of the motor segmental overactivity a cyclic alternating pattern (CAP) with cycles of rest and activity of 100-130 sec. ($p < 0.05$, Kruskall-Wallis NP Test, Dunn's NC Test). Previous data of IFF showed CAP during "intra-atypical REM sleep" fragmentation near to 60-90 sec. During modeling, modifications of circadian and homeostatic variables were able to produce a cyclic behaviour like LAE-VGKC and IFF.
Conclusion: This study demonstrates patterns of severe abnormality during cycles of wakefulness-sleep and activity-rest with CAP behavior during motor overactivity (LAE-VGKC) and during fragmentation of atypical REM sleep (IFF). These findings and the mathematical simulations performed suggest that the expression of this short-term arousability of rhythms of near 1-2 min. (CAP) could be related to a loss of the inhibitory control of corticothalamic-limbic circuits upon the hypothalamic and reticular-activating-systems.

M-E-050 ANALYSES OF SLEEP CHARACTERISTICS IN POST-POLIO SYNDROME PATIENTS

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Introduction and Objectives: Study of 60 PPS patients in 2010 (1) (ages 32 to 59 years) analyzed their sleep patterns. Median male age was 47, median female age 48. Patient evaluations: scales for fatigue; sleepiness; pain; and a sleep exam. Observations: high sleep latency and increased arousals reduced sleep efficiency. Higher index numbers for apnea and hypopnea (AHI) and PLM were noted. No other abnormalities were seen. Conclusion: The newly observed PPS sleep disturbances were isolated symptoms caused by intensive dysfunctions of surviving motor neurons in patients' brainstems. Abnormal dopamine production could also be inferred in these findings. In

2011, findings in our double-blind (as yet unpublished) study noted effects of MIG3 bioceramic mattresses on PPS patient sleep quality. Objective: Assessment of four week use of MIG3 bioceramic mattresses and PPS patient improvements in pain; daytime sleepiness; daily activities; quality of life; and sleep quality.
Materials and Methods: Random; controlled; and double-blind. Two groups of PPS patients were compared over four weeks. One group used mattresses lined with MIG3 bioceramic (TG) (n=25), and a control group (CG), used common mattresses i.e. no MIG3 linings (n=27). Patient evaluations used: Epworth sleepiness scale; a sleep exam the night before the first use of the MIG3 mattress and another the night after 4-weeks use of MIG3 mattress; McGill pain questionnaire; analogic visual pain scale; Barthel index for daily activities; and WHOQOL-BREF for life quality.
Results: After four weeks MIG3 patients had reduced sleep latency (28.2±15 vs. 58.4±45 minutes, p=0.003), reduced duration of stage II (p=0.04), and improved life quality (30.2±8.4 vs. 24.1±9.6, $p<0.05$), and patients presented improved pain scores (p=0.001).
Conclusion: After 4 weeks MIG3 bioceramic mattress use PPS patients afflicted with poor sleep quality showed marked sleep quality improvement, decreased pain, and dramatic improvement in life quality.
Acknowledgements: Instituto do Sono; Instituto Invel de Tecnologia e Pesquisa; Universidade Federal de Sao Paulo

M-E-051 CHIDHOOD EPILEPSY!... WHAT ABOUT YOUR CHILD'S SLEEP?

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Introduction and Objectives: Sleep disturbances are common in adults with epilepsy. For children sleep is often abnormal too, but exact data are not available. The aim of the study is to provide more insight in the interaction epilepsy and sleep during childhood.
Materials and Methods: The parents of 4-10 y/o children with partial epilepsies (N=140) were asked to participate. The children visited normal school or one level below. They used no more than two anti-epileptic drugs (AEDs). These requirements precluded participation of severely handicapped children. All were patients in our specialized epilepsy center. The WHO epilepsy questionnaire, Medical Outcome Score-Sleep (MOS), Sleep Disturbance Scale for Children (Bruni list) and a severity scale for epilepsy in children (HSSC) were used. Every child brought in a healthy control of similar age whose parents filled in the same questionnaires on the aspects of sleep
Results: Patients and controls differed substantially ($p<0.05$ - $p<0.001$): initiating and maintaining sleep was abnormal in 40% of the patients and in 15% of controls, For parasomnia's and sleepiness during the day these figures were 32-21% and 38-18%, respectively. There were no differences for the respiratory parameters. The total score on the Bruni list was abnormal in 35% of the patients and in 17% of controls with similar data for the MOS.
Conclusion: In children with epilepsy about twice as much sleep disturbances were encountered when compared to controls, in particular regarding initiating and maintaining sleep, parasomnia and sleepiness during the day.

M-E-052 EFFECT OF GABAPENTIN ON SLEEP PATTERNS IN A PATIENT WITH NOCTURNAL EPILEPSY

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Introduction and Objectives: There are complex physiologic mechanisms that support the interaction of sleep and epilepsy. Certain epileptic seizures tend to occur predominantly during sleep such as in supplementary sensorimotor area epilepsy or benign focal epilepsy of childhood. Numerous researchers have described that alert wakefulness and REM sleep inhibit this kind of nocturnal epilepsy. In contrast, transitional states between waking and NREM sleep and also between NREM sleep and REM sleep have a promoting effect of epilepsy. On the other hand, administration of anti-epileptic drugs (AEDs) can induce both detrimental and beneficial effects on sleep. Most of the AEDs result in a normalization of the sleep architecture. Objective. The objective of this work was to analyze the effect of gabapentin, a GABA analogue, on sleep patterns in a patient with nocturnal epilepsy.
Materials and Methods: Nocturnal polysomnographic studies were carried out on a patient before and after gabapentin treatment. EEG was obtained from frontal and central regions of the brain. Additional electrodes were placed to obtain activity of different physiological variables such as EOG, EMG, respiratory activity and oximetry.
Results: Sleep efficiency increased from 40.76% to 86.50% after gabapentin administration. Concomitantly, sleep fragmentation was reduced showing 44 awakenings before and 15 after gabapentin treatment. Number of REM sleep episodes throughout the night increased from 1 to 5. REM sleep percentage in relation to total sleep time increased from 6.41% to 27.50%.
Conclusion: Administration of gabapentin resulted in an improvement in the sleep efficiency as well as in a decrease in the number of awakenings. In addition, there was a decrease in the shifting of sleep stages, improving the sleep stability.

M-E-053 EFFECTS OF TRANSDERMAL ROTIGOTINE ON SLEEP AND NOCTURNAL SYMPTOMS OVER A 1-YEAR PERIOD IN PARKINSON'S DISEASE: AN OPEN-LABEL EXTENSION OF THE RECOVER STUDY

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Introduction and Objectives: In RECOVER (Randomized Evaluation of the 24-hour Coverage: Efficacy of Rotigotine; NCT00474058), a double-blind, placebo-controlled trial, 24h transdermal delivery of rotigotine was associated with statistically significant improvements in sleep quality and control of early morning motor function in subjects with Parkinson's disease (PD). Long-term efficacy and safety of rotigotine were assessed in a 1-year open-label extension (NCT00519532).
Materials and Methods: After de-escalation of the double-blind maintenance dose, rotigotine was up-titrated at 2mg/24h/week to its optimal dose (≤16mg/24h) which was maintained for a 10-month maintenance period. The primary outcome measure was the Unified Parkinson's Disease Rating Scale Part III (Motor Examination; assessed at any time of the day) with the modified Parkinson's Disease Sleep Scale (PDSS-2) as a co-primary measure.
Results: Of 84 subjects enrolled, 79% (n=66) completed 1 year of treatment. (Note: enrollment was lower than anticipated due to a change in the manufacturing process of rotigotine). At end of maintenance (EOM) the mean ± SD UPDRS Part III score had improved by 5.8±9.4 points from the open-label baseline score of 28.1±13.7. The improvement of 5.9±7.6 points in PDSS-2 total score seen for the rotigotine subjects (n=178) at EOM of the double-blind phase (from baseline of 19.3±9.2) was sustained for up to 1 year (improvement from double-blind baseline of 5.8±7.8 points [n=78] at EOM of the open-label study). Improvements from double-blind baseline to EOM of the open-label study were observed for all 3 PDSS-2 domain scores: (1) disturbed sleep (change of -2.5±4.1 points); (2) motor symptoms at night (-2.2±3.5 points); and (3) PD symptoms at night (-1.3±3.1 points). As in RECOVER, all individual item scores of the PDSS-2, except for "distressing hallucinations", were improved relative to double-blind baseline at EOM of the open-label study.
Conclusion: The beneficial effects of 24h transdermal rotigotine on sleep quality and nocturnal symptoms seen in RECOVER were maintained over this 1-year extension.

M-E-054 EVIDENCE THAT POSTSYNAPTIC NMDA RECEPTORS UNDERLIE ENHANCED EXCITABILITY OF THALAMIC NEURONS DURING EEG SOWING FOLLOWING TETANIC STIMULATION OF THE SCIATIC NERVE

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Introduction and Objectives: Insomnia and fragmented sleep are common complaints of chronic pain patients. In particular, EEG "slowing", reflected by predominant delta and theta wave EEG activity manifests in chronic pain patients during relaxed wakefulness. This EEG slowing phenomenon has been

coined thalamocortical dysrhythmia (TCD) (PNAS, 1999, 96: 15222-7). We recently reported that high-intensity-tetanic stimulation (HFS) of the sciatic nerve in isoflurane-anesthetized rats produces a long-term-potentiation (LTP) of thalamic neuron excitability in conjunction with sustained delta waves in the cortical EEG (Sanoja and Soja. SFN, 2010). It is not clear whether thalamic LTP following HFS is due to alterations in the properties of somatosensory thalamo-cortical neurons. The present study addressed this issue by comparing the glutamate (GLU)-evoked responsiveness of individual thalamic neurons around HFS.
Materials and Methods: Multibarrel micropipettes were employed to iontophoretically eject glutamate (GLU, 0.5M, pH8.0, 60-80nA, 15s, 20 s intervals) juxtacellularly onto individual ventro-postero-lateral (VPL) thalamic neurons in isoflurane-anesthetized Sprague Dawley rats. Five to eight consecutive GLU-evoked responses of individual wide-dynamic-range VPL neurons (n=10) obtained before and after HFS were computer-averaged (0.25 s binwidth) and analyzed offline for response onset and magnitude. A Mann Whitney Rank Sum test was used to detect significance between control and test responses in the sample population.
Results: The mean (± SEM) magnitude of GLU-evoked responses measured 9.6±3.3 and 26.2±6.5 Hz before and after HFS, respectively ($P<0.05$). The onset of the GLU responses, i.e., time to 50% maximum and 10-90% slope, measured 7.2±0.9 s and 1.07±0.53 before HFS while after HFS, these parameters measured 4.6±0.9 s and 2.1±0.4, respectively ($P<0.05$). In three VPL neurons, the NMDA selective antagonist CPP abolished HF-induced changes in GLU responsiveness.
Conclusion: Our findings indicate that marked alterations in postsynaptic NMDA receptor responsiveness may occur during LTP of thalamic VPL neurons and TCD following HFS.
Acknowledgements: Supported by CIHR

M-E-055 SLEEP INVESTIGATION OF TEENAGERS (13-18 YEARS OLD)

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Introduction and Objectives: It concern a descriptive sleep's investigation of 1005 teenagers (13-18 years old) realised in colleges of the city of Sidi-Bel-Abbès (Algeria).
Materials and Methods: A questionnaire was elaborated to evaluate the quality and the quantity of teenagers's sleep, in order to detect the troubles witch they encounter the fatigue, diurn drowsiness, low yield in classroom and, delayed development.
Results: Of 1005 teenagers, 82,78% are good sleepers and, 17,22% are bad sleepers, according to this following index, like latency of sleep, time of sleep, wake up time and, nocturn awakening frequency. The comparative analysis of our results revealed: Good sleepers (82,78%) – excited drinks 51,01%, wake up quality 15,62% (fatigue), noise 4% (disturbed), nocturn awakening 9,24%, school attendance 2,28% (negligence). Bad sleepers (17,22%) – excited drinks 89,1%, wake up quality 54,91% (fatigue), noise 35,9% (disturbed), nocturn awakening 35,9%, school attendance 12,13% (negligence).
Conclusion: According to these results of our study, we can confirm that sleeping is vital, a specialy in this category of age. Teenagers needs a good sleeping, because a deficiency of sleep can cause a consequentials effects in vigilence.

M-E-056 SLEEP SLOW WAVES IN PARKINSON'S DISEASE

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Introduction and Objectives: Parkinson's disease (PD) is clinically characterized by motor symptoms including resting tremor, rigidity and bradykinesia. Non-motor symptoms, such as sleep disorders, are frequent and central features of PD. Indeed, abnormalities of the electroencephalogram (EEG) activity have been reported in PD, notably a slowing of waking EEG. This study aimed to compare slow waves (SW; >75μV and <4 Hz) characteristics during non-rapid-eye-movement (N-REM) sleep in PD and healthy control subjects.
Materials and Methods: SW detection was automatically performed in 77 subjects, including 38 PD patients without dementia (27 men; mean age, 62.2±9.0 years) and 39 controls (29 men; mean age, 63.3±8.1 years) on parasagittal derivations F3, C3, P3 and O1. SW parameters included: SW density (number per minute), SW amplitude (μV), SW mean frequency (Hz), SW slope between positive and negative phase (μV/sec) and SW negative and positive phase durations (sec).
Results: PD patients showed lower SW amplitude (PD: 113.7 vs CTR: 119.2; $p=0.04$), faster SW frequency (PD: 0.89 vs CTR: 0.83; $p<0.001$) and shorter SW positive phase duration (PD: 0.62 vs CTR: 0.67; $p<0.0001$) in parietal and occipital regions compared to healthy controls. No between-group differences were observed for age, sex and sleep architecture.
Conclusion: Our results show EEG abnormalities during N-REM sleep in PD patients and suggest disturbances in neurophysiological mechanisms responsible for N-REM sleep EEG activity.
Acknowledgements: This study was supported by the Fonds de la Recherche en Santé du Québec and the Canadian Institutes of Health Research.

M-E-057 THE IMPACT OF A DEFICIENCY OF SLEEP ON THE TYPE 2 DIABETES

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Introduction and Objectives: A repeated restrictions on sleep time can cause alterations in glucose metabolism, frequently found in patients with type 2 diabetes (DT2). The aim of the study is to detect the sleep troubles in pateints with DT2.
Materials and Methods: A group of 300 patients (G1) with DT2 (55% F, 45% M) with a history of 1 to 15 years of DT2, was compared with a group of young normal persons (G2). A questionnaire was developed to evaluate the quality and the quantity of sleep and completed with a specific questions concerning the DT2, and an auto-questionnaire to evaluate the daytime drowsiness using Epworth scale. We also used a French criterion in order to classify our two groups in good and bad sleepers.
Results: The bad sleepers representes 6% of G1 vs 3% of G2. Respiratory troubles of sleep are more frequent in G1 vs G2. Among the respiratory troubles we can encounter a sleep apnea syndrom detected with the clinical criteria: a daily snoring, a respiratory break (reported from the joint or entourage), and a daytime drowsiness. This symptoms are more frequent in G1 than G2 (50% vs 36%). The daily snoring is three times more frequent in G1 than G2. The sleepless nights are two times more frequent in G1 than G2. The duration of sleep which is a risk factor for DT2 is less in G1 than G2.
Conclusion: According to these results we can confirm that DT2 is the cause of sleep's troubles. The lack of sleep may cause enhancement of DT2. This situation was observed in the most of the countries including our country. This investigation has permitted to answer for the cited aim of the study, that in any patient with DT2, we must suspect sleep troubles.

M-E-058 WHAT DO WE KNOW ABOUT PEDIATRIC SLEEP POST TRAUMATIC BRAIN INJURY? A SYSTEMATIC REVIEW OF THE LITERATURE IDENTIFIES GAPS IN RESEARCH AND KNOWLEDGE

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Introduction and Objectives: Sleep disturbance is one of the most common yet least studied sequelae of patients post traumatic brain injury (TBI). In this study we systematically review the current literature regarding prevalence and types of sleep disturbance in children post TBI.
Materials and Methods: A search based on Cochrane methodology was conducted evaluating available literature in the MEDLINE, EMBASE, PsycINFO and Web of Science databases. Relevant articles were classified for the strength of evidence based on type of study, the presence of a control group, and the use of objective measurements to evaluate sleep disorders (polysomnography or actigraphy).
Results: Our search yield 1618 articles. To date 1000 articles have been screened and only seven meet criteria to be included in the final analysis. In six studies, the TBI is mild. Symptoms were evaluated at a variety of follow-up intervals (less than 1 month post TBI in 3 studies, 1-6month in 2 studies and >6 month in 6 studies). Only two of the studies used objective

measurements to evaluate sleep disorders, and in most studies there was no control group. Sleep disturbance was commonly reported in all the studies. However, when objective measurements were included (in two studies) only one of these found a significant difference in the subjects v.s. controls.
Conclusion: This review emphasizes that there is a lack of understanding of the relationship between TBI in children and associated sleep disturbance. Further conclusions will be reported with the completion of the final analysis of the available literature.

M-E-059 WHAT IS CAUSING SLEEP PROBLEM? RESTLESS LEGS SYNDROME OR BENIGN MUSCLE CRAMPS!

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Introduction and Objectives: Benign cramps and symptoms of RLS are commonly reported by otherwise healthy elderly individuals as well as by patients with Parkinson's disease, particularly in the wearing off periods. There are no diagnostic investigations to confirm and differentiate these two conditions which can cause a diagnostic dilemma as the treatment is different for each of these conditions. We report some exemplary cases with differentiating features of these two conditions.
Materials and Methods: Mrs. R.S. was a 75 year old female with pulling sensation in calves, thighs and occasionally her arms, worse in the evenings, interfering with her sleep and not relieved by walking. Massaging did not help her symptoms. Mr. K.K. was a 63 year old male with DM-II who had cramping of his left leg involving the mid calf and mid thigh area at night time from 1:30 a.m. and would continue until 7:00 a.m. and would go away if he would get up and walk around. The symptoms would reoccur if he would take a nap in the day time. He had no sensory symptoms involving his legs or arms.
Results: Symptoms of Mrs. R.S. were improved with pramipexole, whereas symptoms of Mr. K.K. were improved with application of a heating pad.
Conclusion: Restless legs syndrome and benign cramps have overlapping features. In the case of cramps, sometimes the muscle involved may be seen contracting; only a single or group of muscles may be involved. The symptoms may involve only one leg whereas symptoms of RLS usually involve both legs and sometimes arms as well. Careful history taking is the only tool currently available in to differentiate these conditions and further research is needed in this area.

F: Parasomnia

M-F-060 CEREBRAL DYSFUNCTIONS IN RAPID EYE MOVEMENT SLEEP BEHAVIOUR DISORDER: AN EVENT-RELATED POTENTIAL STUDY

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Introduction and Objectives: Rapid eye movement (REM) sleep behaviour disorder (RBD) is a parasomnia characterized by a loss of muscular atonia and the presence of elaborate motor activities during REM sleep. RBD is often seen as a preclinical stage of Parkinson's disease and dementia with Lewy bodies. The aim of this study was to verify the presence of cerebral dysfunctions in RBD patients using visual event-related potentials (ERP).
Materials and Methods: ERP were recorded in 13 RBD patients (age: 62.9±10.5 years) and 15 healthy control subjects (age: 69.3±6.7 years). They performed a visual attention task in which three types of stimuli were presented (i.e. standard, target, and distractor). The amplitude and latency of sensory (N100 & P200) and attention (P3a & P3b) ERP components were measured. Subjects also underwent neuropsychological and neurological testing. Groups were compared on neuropsychological and neurological tests, as well as on amplitude and latency of ERP components. Moreover, correlations were performed between scores obtained in neurological and neuropsychological tests and ERP characteristics.
Results: No between-group differences were found for the behavioural responses. A trend for a group difference was observed for the P200 amplitude on Oz ($p=0.05$) where RBD patients had higher amplitudes compared to control subjects for the target and distractor stimuli. Significant differences were found for the cognitive and neurological tests (i.e. MMSE, UPSIT, WAIS-III Block design, and FM-100, $p<0.05$) where RBD patients had poorer performance than control subjects. Correlations were also observed between P200 amplitude and cognitive and neurological impairments (MMSE, UPSIT, ROCF, reaction times, $p<0.05$), showing higher impairments in patients with higher P200.
Conclusion: Our results suggest an occipital dysfunction characterized by higher P200 amplitude in RBD patients. This occipital dysfunction was associated with other markers of cognitive and neurological decline in this population.
Acknowledgements: This study was supported by a grant from the Canadian Institutes of Health Research.

M-F-061 CHILDREN DIFFICULT TEMPERAMENT, MOTHERS' DEPRESSION AND NIGHTMARES: A MAVAN STUDY

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Introduction and Objectives: Maternal well-being associates with children temperament. For instance, children of women who suffer from depression and/or anxiety tend to display behavioural, social, and emotional impairments such as increased negative emotionality. Children with difficult temperament also show an increased prevalence of parasomnias such as nightmares or night terrors. With the present study, we aimed to determine whether maternal depression and children nightmares and/or night terrors, predict differences in negative emotionality at 36 months of age.
Materials and Methods: Our representative community sample consisted of 138 mother/children dyads recruited in Montreal and Hamilton (Ontario) in the prenatal period and that were part of a large longitudinal study: the MAVAN (Maternal Adversity, Vulnerability, and Neurodevelopment) study. At 36 months, mothers were asked to complete questionnaires pertaining to their own mood and mental states (CES-D) and their children's temperament (ECBQ-R). The presence of nightmares and night terrors was assessed using maternal reports.
Results: Multivariate models including maternal depression, frequency of nightmares and/or night errors, and child negative emotionality, revealed a significant interaction. Child negative emotionality increased as a function of their mothers' depression scores only if they were subject to doing nightmares and/or night terrors.
Conclusion: Child negative emotionality at 36 months was associated with mothers' depressive state only if children experienced nightmares and/or night terrors. Considering the association between nightmares and emotional well-being, the role of chronic nightmares and night terrors in the development of early signs of psychopathology will also be presented.

M-F-062 FREQUENCY OF PARASOMNIAS IN PATIENTS WITH NON-EPILEPTIC SEIZURES

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Introduction and Objectives: Psychogenic Non-Epileptic Seizures (PNES) have been associated with a history of psychosocial stressors, an association that has also been suggested for certain types of parasomnias. There is little data on frequency of parasomnias in patients with PNES. Our objective was to assess the frequency of self-reported parasomnias in patients with PNES.
Materials and Methods: We selected a cohort of patients (n=9) with video-EEG (vEEG) confirmed PNES from our Epilepsy Monitoring Unit database and administered sleep questionnaires (Epworth Sleepiness Scale, Munich Parasomnia Scale) on follow-up visits and phone interviews. An age-matched group of patients with vEEG-confirmed epilepsy (n=9) were interviewed for comparison. Participants were scored based on frequency of responses to questions relating to twenty-one distinct parasomnias. Results were converted to categorical data and responses of PNES patients were compared to epilepsy patients using Chi square analysis (SPSS v16).

Results: PNES patients reported a higher frequency of NREM parasomnias when compared to epilepsy patients, notably hypnic jerks (77.8% vs. 11.1%, p=0.004), rhythmic foot movements (55.6% vs. 0%, p=0.023), exploding head syndrome (44.4% vs. 0% p=0.023), and bruxism (66.7% vs. 0%, p=0.003). No patients in either group reported symptoms of REM Behavior Disorder. There was no significant difference in subjective sleepiness as determined by Epworth scores.
Conclusion: Patients with PNES in our study population had a higher reporting frequency of NREM parasomnias when compared to epilepsy patients, and a much higher frequency when compared to general population prevalence estimates. This may be due to a higher prevalence of psychosocial stressors in this population. Parasomnias should always be considered in the differential of paroxysmal nocturnal events in these patients.

M-F-063 SLEEP RELATED VIOLENCE – A CASE REPORT OF A NREM PARASOMNIA TRIGGERED BY FEVER

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Introduction and Objectives: Sleep related violence has a prevalence of 2% in the general population.1 This may result from NREM or REM parasomnias. There is limited evidence on febrile illness being a risk factor for NREM parasomnias.(1) We describe a case of violent NREM parasomnias associated with a febrile illness.
Materials and Methods: A 16 year old boy presented with three episodes of confusional arousals and sleepwalking on two consecutive nights when he had a high-grade fever. This occurred between midnight and 2 am. On the third occasion, he repeatedly struck his face on a mirror and whilst bleeding, went to his father's room, repeatedly stating that he was dying and assaulted his father. His father restrained him till he awakened confused and unaware of what had happened. He has a past history of confusional arousals with abnormal behaviour during febrile illnesses in the first third of the night on 3-4 four occasions since the age of four. No other triggers were identified in the assessment.
Results: Two consecutive nights of full EEG sleep study with video recording were conducted. The study reported arousals from SWS associated with heart rate acceleration and sudden awakening from stage 2. This is found in a high percentage of young people with NREM parasomnias. Increased spontaneous arousals were recorded. No seizure activity was noted. The boy was successfully treated with clonazepam 0.5 mg. His current management involves using prophylactic clonazepam in situations that trigger the parasomnias in his case i.e. fever.
Conclusion: Disorders of arousal maybe triggered by several risk factors including exercise, sleep deprivation, fever and stress. To our knowledge this is the first reported case of violent parasomnias triggered by fever. The predisposing, priming, precipitating factors in this case can be the SWS arousals and past history, fragmented sleep and fever respectively.
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M-F-064 SLEEP TEXTING: A NEW VARIATION ON AN OLD THEME

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Introduction and Objectives: Sleep walking, the classic NREM parasomnia [1] is sometimes associated with complex behaviors, including wandering, conversing, and at times driving. We recently evaluated a patient with a classic history of somnambulism, but in addition she sent a text message to a friend while asleep. This manifestation of sleep activity has not been described, but may be increasingly common as the sending of text over the phone has become part of our daily routine.
Materials and Methods: A 25 year old woman had somnambulism in childhood, recurring as an adult, when her schedule was more variable and sleep deprivation frequent. Episodes happened at least weekly, and resulted in sleep disruption with daytime sleepiness. She climbed a ladder on a bunk bed, walked down stairs and conversed. Clonazepam, improved the symptoms but was not tolerated. She sent a detailed text message to a friend during sleep and retained it on her phone. It was patient initiated and upsetting to the recepient. A polysomnogram was done.
Results: Patients with insomnia and delayed sleep phase syndrome may send text messages from bed after "lights out" but before sleep onset. In this patient the message sent after sleep onset, was agrammatic but the thoughts were coherent. She was asking to be picked up but could not tell the recipient where she was located. Lorazepam controlled sleep texting although she still walks occasionally.
Conclusion: Part of the assessment of sleep walking should include questions about texting and other complex technology based activity. Securing portable devices in an inaccessible place and use of benzodiazepines are effective therapies and should be considered in our young tech savvy patients.
Reference:
1. Gastaut H. and Broughton R.J: Biol Psychiatry 7:197-221, 1965.

M-F-065 TEMPORAL RELATIONSHIP BETWEEN EEG AROUSAL, BRUXISM AND NOCTURNAL GROANING (CATATHRENIA)

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Introduction and Objectives: Sleep related groaning (catathrenia) is characterized by episodes of monotonous vocalization during sleep and is classified into a parasomnia. A few reports suggest that arousal mechanisms play an important role in triggering nocturnal groaning (NG), and that NG can occur concomitantly with sleep bruxism (SB), which is associated with sleep arousal. On the other hand, some groups have reported that catathrenia should be classified in the sleep disordered breathing. We will present a patient with NG and SB, and describe the temporal relationship between NG, SB and EEG arousal.
Materials and Methods: A 39-year-old man with complaints of NG, snoring and excessive daytime sleepiness underwent a full-night video-polysomnography. Sleep variables, and NG and SB episodes were scored and analyzed.
Results: Sleep efficiency was 88.2%, and the proportions of the various sleep stages as a percentage of total sleep time were as follows: stage N1 8.1%; stage N2 66.2%; stage N3 0.7%; and REM sleep 25.0%. Arousal and apnea-hypopnea index were 6.6 and 12.0/hour, respectively. One hundred and seventy NG episodes (index 22.1/hour) and 51 concomitant SB episodes (index 6.6/hour) were scored. Both NG and SB episodes occurred during stage N1, N2 and the Wake stage. Successive NG episodes occurring within 15 seconds were defined as a cluster type otherwise isolated type. In 62 cluster and isolated types, EEG arousal occurred before the onset of 92% (57/62) of NG events with (46.8%) or without (45.2%) SB. When NG and SB co-occurred, NG events were always preceded by SB.
Conclusion: In this patient, a stereotyped sequence from EEG arousals to NG events was observed with or without the intervening SB, suggesting that sleep arousal is closely related to the trigger mechanism for NG. Further studies are needed to clarify the pathophysiological associations that organize a stereotyped sequence between EEG arousal and NG.

M-F-066 THE APPLICATION OF POLYSOMNOGRAPHIC RECORDING IN NONREM PARASOMNIAS: IMPLICATIONS FOR RESEARCH AND CLINICAL UNDERSTANDING

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Introduction and Objectives: A continuum of parasomnias arises from non-rapid eye movement (NonREM) sleep: from brief confusional arousals to sleep walking, sleep talking, and night terrors. While presenting complaints relate mostly to behavioural disturbances, such events can lead to self-harm and disturb sleep continuity. The occurrence of NonREM parasomnias depends on predisposing (genetic susceptibility), priming (quality of slow wave sleep (SWS) and arousal threshold), and precipitating factors (younger age, sleep deprivation, irregular sleep schedule, fever, etc.). 1,2 Coincidentally, density of delta activity and its power dominates in young age, significantly decreasing in older adults; sleep deprivation has been shown to increase delta wave activity during sleep recovery, and following irregular

sleep schedules.3 While a diagnosis of REM sleep behavioural Disorder requires polysomnographic validation with confirmed markers of increased bursts of muscle activity during REM, the utility of polysomnography for diagnosis of NonREM parasomnias has been questioned, mainly due to the fact that episodes are often isolated, and may not occur during a single overnight sleep study. Searching for specific markers of NREM parasomnias in a paediatric population, a pilot study was performed.
Materials and Methods: The observation of confusional arousals from SWS with cardiac acceleration was studied in a sample of 200 pediatric patients who underwent overnight polysomnography at a Toronto sleep centre. Parents of 100 children with confusional arousals from SWS with cardiac acceleration and parents of 100 children without confusional arousals from SWS were asked if their children ever experienced episodes of sleep walking, talking, or night terrors.
Results: 84% of parents of children with confusional arousals from SWS with cardiac acceleration reported NREM parasomnia events in the past compared to only 22% in the second group.
Conclusion: We conclude that further studying microstructure of sleep, specifically arousals from SWS with accelerated heart rate and the delta waves power in sleep can contribute to the understanding and assessment of NREM parasomnias.

M-F-067 THE EFFECT OF HYPNOTHERAPY ON SPECTRAL POWER IN SLEEPWALKERS

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Introduction and Objectives: Hypnotherapy is considered effective for reducing sleepwalking episodes and increasing the control over agitated behaviors. The aim of the study was to investigate the effect of hypnotherapy on spectral power during normal sleep and during recovery sleep after 25 hours of sleep deprivation. The latter was shown to increase the frequency and the complexity of sleepwalking episodes.
Materials and Methods: Participants were eight sleepwalkers (5 males, 3 females; mean age: 44±12.5 years) referred to our Sleep Disorders Clinic and who reported improvement of their condition one year post-hypnotherapy. Each subject was investigated for four nights: one normal night (N1) and one recovery night following 25 hours of sleep deprivation (N2), before and after a four to six weeks hypnotherapy (N3 and N4). Spectral power in delta, theta, alpha, sigma and beta frequency bands was calculated on the C3-A2, C3, C4, F3 and F4 leads.
Results: Trends for a Night (pre/post treatment) x Cycle interaction in delta power were found for frontal leads for the N1-N3 (p=0,054-0,08) and the N2-N4 (p=0,07-0,08) comparisons. T-tests performed on cycle 2 revealed a higher delta power (or trends) in post-treatment (N4) than in pre-treatment (N2) recovery nights in frontal (p=0,028-0,014) and central (p=0,046-0,014) leads. Main Night effects were also found for higher sigma (p=0,017) and beta (p=0,023) power in the recovery night after treatment (N4) compared to that prior to treatment (N2).
Conclusion: Our data suggest that hypnotherapy could take effect by increasing delta power, especially in sleep cycle 2 as well as sigma and beta frequencies. Results also suggest that the physiological effects of a treatment may be more prominent when looking at recovery nights after sleep deprivation. These results should be interpreted with caution due to the small sample.
Acknowledgements: This study was supported by the Canadian Institutes of Health Research.

M-F-068 THE TREATMENT OF SLEEPWALKING WITH HYPNOSIS

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Introduction and Objectives: Hypnosis has been successfully applied in treating parasomnias including sleepwalking, nightmares, night terrors and sleep related eating disorders. Hypnosis with a unique post hypnotic suggestion was utilized successfully in treating sleepwalking in a sleep medicine practice.
Materials and Methods: Twelve patients seen for treatment of sleep walking were treated with hypnosis. Hypnotherapy was performed by the author who is a board certified sleep specialist and an Approved Consultant in Clinical Hypnosis by the American Society of Clinical Hypnosis. Hypnosis was performed using visual imagery induction with images chosen by the patient prior to the hypnotherapy. The patient was seated with his feet on a stool. Post hypnotic suggestions included ego strengthening and the suggestion that “whenever your feet touch the floor you will immediately be awake and will go back to sleep as soon as you want to.” Following the initial session the patient was asked to evaluate how he felt and to suggest changes in the wording of the post-hypnotic suggestion. A second session was held immediately thereafter and a tape was made. The patients were asked to practice the tape at least once a day.
Results: Twelve patients, 6 females and 6 males ranging in age from 11 ½ years to 77 years, with onset of sleepwalking ranging from preschool to age 64 underwent hypnotherapy. The number of sessions ranged from 1 to 3. Over the short term, all 12 patients showed cessation or marked reduction in sleepwalking. Eight patients which were followed from between 3 and 42 months reported complete cessation in sleepwalking.
Conclusion: Hypnotherapy is an effective and safe treatment for sleepwalking.

M-F-069 SHAKEN BUT NOT STIRRED – EVIDENCE TOWARDS THE ONGOING DEBATE OF TRIGGERS FOR NREM PARASOMNIAS

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Introduction and Objectives: Sleep deprivation, psychoactive drugs, exercise and fever are among the various precipitants of NREM parasomnias. Alcohol, previously considered an important trigger, has recently been disputed as a risk factor. We carried out a clinical exercise to evaluate the triggers for parasomnias, with a particular focus on alcohol consumption.
Materials and Methods: 50 consecutive adult patients with documented NREM parasomnias and 50 sleep disorder patients without parasomnias matched for age, sex and weight (±10lbs) were asked to identify from personal experience about four behaviours (that have been reported to trigger parasomnias) i.e. alcohol consumption, sleep deprivation, exercise and sexual intercourse.
Results: Among the parasomnia group, 21 patients identified at least one of the four triggers. Eight (7 men) clearly recalled at least one parasomnia episode "out of the blue" after more than 3 glasses of wine, 3 beers or 3 shots. Five men who consumed alcohol frequently reported parasomnia events but could not clearly indicate that these were related to alcohol consumption. Seven (5 men) identified heavy exercise, four (3 men) identified sexual intercourse and two (1 man) identified long distance driving (>18hrs sleep deprivation) as triggers for parasomnias. Of the non-parasomnia group, only one individual described enuresis after inebriation as a behaviour akin to parasomnia and none identified any other trigger for parasomnias.
Conclusion: This clinical exercise provides evidence on a more idiographic basis and complements to the nominal data available on effects of alcohol on NREM parasomnias. It is suggestive that alcohol is a precipitant of parasomnia behaviour as identified by susceptible individuals in a non-forensic clinical setting. It also points towards the prospect that alcohol may be a trigger in less frequent drinkers rather than more regular users. It would seem premature to eliminate alcohol from the list of parasomnia risk factors and emphasises the need of further clinical research in this area.
Acknowledgements: Sleep and Alertness Clinic and Youthdale Child and Adolescent Sleep Centre, Toronto

G: Pharmacology

M-G-070 AGE AND CAFFEINE HABITUAL CONSUMPTION PATTERNS MODULATE THE EFFECTS OF CAFFEINE ON SLEEP

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Introduction and Objectives: Patterns of caffeine consumption may alter sleep sensitivity to caffeine. Up to now, age-related effects of caffeine were mostly studied in moderate caffeine users. Older subjects who are more sensitive to age-related effects of caffeine may reduce/stop their caffeine consumption, which will then exclude them from studies on moderate consumers. This study aimed to compare the effect of 200 mg of caffeine on sleep in young (20-30 years old) and middle-aged (40-60 years old) subjects in relation to their habitual caffeine consumption.
Materials and Methods: The sleep of 26 moderate consumers (100-300 mg/day; 12 young and 14 older) and 24 light consumers (<50 mg/day; 12 young and 12 older) was recorded. Each participant received a caffeine capsule (100 mg) or a placebo (lactose) three hours and one hour before sleep in a double-blind counterbalanced crossover design. Three-way ANOVAs with two independent factors (age group: young and middle-aged, habitual caffeine consumption: light and moderate) and one repeated measure (condition: placebo and caffeine) were performed on polysomnographic variables.
Results: Caffeine increased wake after sleep onset (WASO) and decreased sleep efficiency and total sleep time more strongly in light consumers than in moderate consumers (all $p<0.05$). Caffeine decreased slow-wave sleep only in young subjects ($p<0.01$) and increased WASO in the last third of the night only in older subjects ($p=0.03$). No interaction between age and caffeine consumption were found.
Conclusion: These results suggest that moderate caffeine consumption habits lead to lower sensitivity to caffeine effects on sleep. Importantly, ageing amplifies sleep maintenance disturbances following caffeine intake.
Acknowledgements: Natural Sciences and Engineering Research Council of Canada (NSERC)

M-G-071 FORMALIN-INDUCED THETA WAVE EEG ACTIVITY: RESISTANCE TO CLASSICAL ANESTHETICS

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Introduction and Objectives: Asynchronous nociceptive inputs induced by intraplantar injection of formalin produces a sustained enhancement of thalamic ventro-postero-lateral (VPL) neuron excitability in conjunction with sustained theta wave cortical EEG activity (Sanoja et al., SFN, 2011) The theta wave EEG entrainment is reminiscent of the phenomenon of thalamocortical dysrhythmia (TCD) (PNAS, 1999, 96: 15222-7). While general anesthetics produce unconsciousness, analgesia, and atonia, it is not known if such agents protect thalamocortical networks from the induction of TCD. Accordingly, the present study addressed this issue.
Materials and Methods: Experiments were conducted in male Sprague Dawley rats under 1% isoflurane (ISO) anesthesia. The animal's head was fixed in a stereotaxic frame. Left and right cortical parietal EEG activity was monitored before and after each animal was paralyzed and artificially ventilated; as well as before and after a single subcutaneous (s.c.) intraplantar injection of formalin (5%, 0.1 ml). Separate control experiments (s.c. saline) were also performed. EEG activity was monitored for 1 hr before and >3 hrs after a specific anesthetic agent was administered. Power spectra of cortical EEG were calculated between 1-100 Hz using a fast Fourier transformation (FFT, 512 point). Frequency/power plots across standard EEG bandwidths (i.e., delta, theta, alpha, beta, and gamma) were constructed for all control and test conditions.
Results: EEG activity during stable ISO anesthesia (1%) consisted of a recurrent "burst-pause" signature. Following formalin, the EEG shifted to a pattern of repetitively occurring large-amplitude slow waves in the theta bandwidth; a phenomenon that is akin to TCD. Deep anesthesia afforded by either isoflurane (4%), diazepam (5 mg/kg, i.v.) and pentobarbital (50 mg/kg, i.v.) rapidly diminished all cortical activity, which eventually returned as the ISO concentration was re-adjusted to 1%, or diazepam and pentobarbital were metabolized.
Conclusion: These data indicate that formalin-induced cortical theta wave activity is resistant to common anesthetics.
Acknowledgements: Supported by CIHR

M-G-072 THE PREVALENCE AND NATURE OF STOPPED ON-THE-ROAD DRIVING TESTS AND THE RELATIONSHIP WITH OBJECTIVE PERFORMANCE IMPAIRMENT (SDLP)

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Introduction and Objectives: The on-the-road driving test in normal traffic is applied to examine the impact of drugs on driving performance. Although participants are accompanied by a licensed driving instructor, under Dutch law, the driver is primarily responsible for safe driving and is not permitted to continue driving when experiencing drug compromised safety. This review examined the prevalence and nature of stopped driving tests, and the relationship with Standard Deviation of Lateral Position (SDLP), i.e. the "weaving of the car".
Materials and Methods: A literature search was conducted to gather all publications on clinical trials that applied the on-the-road driving test.
Results: 48 papers reported on 51 clinical trials in which 1,077 subjects participated (921 healthy volunteers and 156 patients). A total of 7,448 driving tests were performed; 5,212 after drug treatment and 2,096 after placebo. 3.02% of all driving tests were terminated before completion: 4.0% after drug treatment, and 0.76% after placebo. The decision to stop a driving test was 3 to 4 times more often made by the driving instructor than the subject. Most common reasons for stopping were feeling tired and drowsy. Although SDLP values of stopped driving tests are sometimes high, there is no clear relationship between SDLP (changes from placebo) and the decision to stop a driving test. Based on 8 studies that reported exact data, 39.6% of stopped drivers had a lower and 60.4% had a higher SDLP than 35 cm, i.e. the cut-off point of safe driving. This confirms that perception of driving to be "unsafe" differs between individuals.
Conclusion: Driving tests are sometimes stopped after drug treatment or placebo. When SDLP is below 35 cm, the decision to stop driving is a poor correlate of objective performance (SDLP).

M-G-073 XYLARIA NIGRIPES WULING MITIGATES SPATIAL MEMORY IMPAIRMENT INDUCED BY RAPID EYE MOVEMENT SLEEP DEPRIVATION IN THE RAT

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Introduction and Objectives: To investigate the effects of Xylaria Nigripes Wuling on the rapid eye movement sleep deprivation (REMSD)-induced memory impairment and find out the mechanism.
Materials and Methods: Male Sprague Dawley rats were randomly divided into six groups [cage control (CC)- NaCl group, tank control (TC)-NaCl group, SD-NaCl group, CC-Wuling group, TC- Wuling group and SD-Wuling group], each consisting of eight animals. The rats in SD group were deprived of REM sleep for 72 h using the modified multiple platform method. We used the Morris water maze (MWM) to determine the effects of Xylaria Nigripes Wuling on spatial learning and memory in rats after 72 h REMSD. We also investigated the change of CREB and p-CREB expression in the rat hippocampus in all the groups.
Results: In Morris water maze test, the rats in SD-NaCl group had significantly longer mean escape latencies in finding the platform compared to the control rats ($p<0.05$). The rats treated with Xylaria Nigripes Wuling had slightly shorter mean latencies in finding the platform compared with the rats in SD-NaCl group. The SD-NaCl group spent significantly less percent time in the goal quadrant compared to the control group and SD-Wuling group. We also measured the expression of CREB and p-CREB using western blot. There was no difference in CREB expression among all the groups. After

72-h REMSD, the expression of p-CREB in the hippocampus significantly decreased, which was reversed by Xylaria Nigripes Wuling.
Conclusion: The results suggest that Xylaria Nigripes Wuling mitigates spatial memory impairment in rats induced by 72 h REMSD and CREB. Phosphorylation in the hippocampus maybe one of the mechanisms.

H: REM Behavior Disorders

M-H-074 TONIC AND PHASIC MUSCLE ACTIVITY IN REM SLEEP BEHAVIOR DISORDER

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Introduction and Objectives: REM sleep behavior disorder (RBD) is characterized by the loss of the normal REM sleep skeletal muscle atonia, resulting in complex motor behaviors associated with dream mentation. The polysomnographical hallmarks of RBD include tonic/phasic loss of the muscle atonia of REM sleep (REM sleep without atonia; RWA). However, scoring RWA is not well established. We will describe our methods of scoring RWA and will discuss some unsolved issues of RWA scoring.
Materials and Methods: The diagnosis of RBD was made based on the International Classification of Sleep Disorders 2nd criteria. The subjects were 20 consecutive patients (19 male and 1 female, mean age: 67.9±7.8 years) who underwent full PSG. In our RWA scoring based on "The AASM Manual for Scoring 2007", increased EMG activity was counted separately according to the EMG activity patterns; tonic EMG, phasic pattern, and combined EMG activities. If chin EMG activity was present for more than 50% of each 30-second epoch, that epoch was scored as tonic. Phasic EMG density was scored from the chin EMG and represented the percentage of 3 second mini-epochs containing EMG activity lasting 0.1 to 5 seconds. We calculated the percentage of RWA, tonic REM, phasic and REM density.
Results: The mean values of the proportions of REM and RWA as a percentage of total sleep time were 19.7±6.3% and 7.2±4.6%. The mean values of tonic REM percentage and phasic EMG activity during REM sleep were 26.0±19.8% and 18.7±7.9%.
Conclusion: Some groups have reported cut off or mean values of RWA to diagnose RBD or to identify a predictor for the development of neurodegenerative diseases. Compared to this data, our tonic REM percentage and phasic activity was low. The causes of differences were unclear. Further investigation including a large scale study population will be necessary to clarify the adequate values.

M-H-075 COGNITIVE PERFORMANCE AND MILD COGNITIVE IMPAIRMENT IN REM SLEEP BEHAVIOUR DISORDER

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Introduction and Objectives: Idiopathic REM sleep behaviour disorder (iRBD) is a parasomnia considered as a risk factor for Parkinson's disease (PD) and Lewy body dementia (LBD). Studies have reported cognitive dysfunctions and mild cognitive impairment (MCI) in iRBD. However, these studies have been performed on relatively small samples of participants. The aim of this study is to evaluate cognitive performance and the frequency of MCI in a large cohort of patients with iRBD.
Materials and Methods: One hundred and twenty participants, including 60 iRBD patients confirmed by polysomnography (46M; age, 66.68±8.50 years; education, 12.87±3.81 years) and 60 healthy subjects (38M; age, 64.58±11.4 years; education, 13.55±3.69 years) underwent a comprehensive neuropsychological evaluation. Three cognitive domains were defined: attention/executive functions, episodic verbal memory, and visuospatial abilities. MCI was defined as 1) a subjective cognitive complaint; 2) objective evidence of cognitive decline defined as any two scores, in a same cognitive domain, $\geq$ 1.5 standard deviations below the standardized mean; and 3) preserved activities of daily living. The Chi Squared test was used to compare the proportion of participants with MCI in each group. Independent-samples t-test or the nonparametric Mann-Whitney U was used for between-group comparisons. Statistical significance was set at $p<0.05$.
Results: No between-group difference was found for age, gender and education. MCI was more frequent in iRBD patients than in controls (60% versus 15%; $p< 0.001$). Moreover, iRBD patients performed worse than controls in neuropsychological tests that evaluate attention/executive functions and episodic verbal memory. The visuospatial domain was relatively well preserved in iRBD.
Conclusion: MCI and cognitive dysfunctions affecting attention/executive functions and episodic verbal memory are frequent features in iRBD. Prospective studies will allow us to determine the utility of MCI and neuropsychological testing in predicting PD or DLB in iRBD.
Acknowledgements: This study was supported by the CIHR and the FRSQ.

M-H-076 DISCORDANCE BETWEEN DOPAMINE TRANSPORTER DEFICIT AND MOTOR SYMPTOMS IN A CASE OF REM BEHAVIOUR DISORDER

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Introduction and Objectives: It has been shown that nigrostriatal dopaminergic degeneration could play a role in the pathogenesis of RBD. On the other hand abnormal striatal dopamine transporter levels have been detected 2 yrs before Parkinson Disease (PD) motor onset. Previous studies show that timing and lateralization of clinical symptoms are likely correlated to asymmetric metabolic changes at the putaminal node of this network. In this study we present a paradigmatic case of idiopathic RBD who show a DAT-SCAN SPECT with asymmetric putamen alteration without motor symptoms.
Materials and Methods: A 69-year aged man was admitted to our outpatient Service for sleep disturbance mostly characterized by dream-enacting behaviours with a clinical history of 8 years. Patient underwent all-night repeated with continuous audiovisual monitoring (VPSG BQ-Micromed ®). Sleep stages were scored according to standard criteria with allowance for REM sleep completed by neuropsychological examination with specific aggressivity scale evaluation. Brain MRI (1.5 Tesla Phylips Gyroscan®) and cerebral DAT-SCAN SPECT (fanbean Varicam®) were acquired.
Results: Neurological examination failed to show extrapiramidal symptoms as well as sleep breathing disorder at VPSG, while reduced muscle atonia was detected during REM. It is worth noting that during this session three consecutive episodes of abnormal motor behaviour were recorded, though after the following awakening the patient was unable to account for the dreams content. Neuropsychological assessment was normal and the agressivity scale showed no significant score. Morphological brain MRI was normal, while DAT-SCAN-SPECT showed a asymmetric putaminal defect of DA transporter. Three years of follow-up clinical evaluation didn't show motor extrapiramidal alteration.
Conclusion: This case report, atypical in the instrumental results and clinical features, highlights the fact that, the use of DAT-SCAN, though highly sensitivity for nigrostriatal dysfunction, cannot predict the time course of motor PD manifestations and confirms the possibility of different interindividual dependent occurrences.

M-H-077 OCCIPITAL DYSFUNCTION IN PATIENTS WITH PARKINSON'S DISEASE AND REM SLEEP BEHAVIOUR DISORDER: AN EVENT-RELATED POTENTIAL STUDY

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Introduction and Objectives: Rapid eye movement (REM) sleep behaviour disorder (RBD) is a parasomnia characterized by a loss of muscular atonia and the presence of elaborate and undesirable motor activities during REM sleep. RBD is often a precursor of Parkinson's disease (PD) and dementia with Lewy bodies. The presence of RBD in PD was previously associated with a waking electroencephalographic slowing. The aim of this study was

to compare the cerebral activity in PD patients with and without RBD using visual event-related potentials (ERP).
Materials and Methods: Fourteen PD patients without RBD (PD-NRBD; age: 62.3±5.4 years; PD duration: 5.5±4.0 years; H&Y stage: 2.1±0.8), 16 PD patients with RBD (PD-RBD; age: 64.7±8.0; PD duration: 5.4±3.5; H&Y stage, 2.1±0.8) and 15 healthy control subjects (age: 69.3±6.7) were tested with ERP. Subjects performed a visual attention task, where 3 types of stimuli were presented (i.e. standard, target and distractor). The amplitude and latency of sensory (N100 & P200) and cognitive (P3a & P3b) ERP components were measured.
Results: The two PD groups did not differ for disease duration or severity. PD-NRBD patients were younger than controls ($p<0.05$); however, age was not correlated with ERP characteristics. No between-group differences were found for reaction times or accuracy. Significant between-group differences were observed for P200 amplitude on Oz where PD-RBD patients had higher amplitudes than control subjects for distractor ($p<0.05$), target, and standard stimuli ($p<0.01$). Higher P200 amplitude was associated with longer disease duration in PD patients ($p<0.05$).
Conclusion: Higher occipital P200 amplitude in PD is related to the presence of RBD. In PD patients, higher occipital amplitude of P200 was associated with longer PD duration. 1Gagnon JF et al. Neurology 2004.
Acknowledgements: This study was supported by a grant from the Canadian Institutes of Health Research and the Fonds de la Recherche en Santé du Québec.

M-H-078 OCCURRENCE AND DAERGIC THERAPY CORRELATES OF REM SLEEP BEHAVIOUR DISORDER IN A LARGE POPULATION OF PATIENTS WITH PARKINSON'S DISEASE

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Introduction and Objectives: Patients with Parkinson's disease usually complain of a wide range of parasomnias most of them related to rapid eye movement sleep behaviour disorder (RBD) or to a spectrum of symptoms ranging from vivid dreaming to psychosis. The present study is aimed at investigating RBD using the validated 10-items self-rating questionnaire (maximum total score 13 points), which includes the clinical features of RBD. This approach allows for investigating the occurrence of RBD and whether DAergic therapy plays a role in its physiopathology.
Materials and Methods: 261 subjects (mean age 68.7±13.4) affected by Parkinsonism were consecutively recruited. Among them, 86 patients were recruited as first line diagnosis without any DAergic treatment. Clinical sleep scoring was realized by using standardized and translated PDSS, the RBD screening questionnaire, finally UPDRS and H&Y scores. According to treatment, patients were grouped in non-DAergic therapy (n=86); only L-dopa (n=87); exclusively Dopamine-agoniste (n=30) and combined L-dopa + Da-agonist therapy (n=58). Non-parametric Kruskal-Wallis test with Dunn's Multiple Comparison post hoc test were computed between the four categories.
Results: Parasomnias were evident in 70.2% of the total patients and specifically 62.45% were positive to RBD score. No significant correlation was found between Daergic group and non-Daergic therapy in the RBD group, neither significant correlation was found in respect to H&Y score. As expected RBD is not related to stage of PD. Nonetheless, therapy stratification surprisingly showed direct effect connected with L-dopa therapy, with a significant highest RBD score in respect to no-therapy subjects (p=0.019).
Conclusion: The role of L-DOPA treatment seems crucial in this observational study with an enhancing/inducing effect; however, da-agonist seems to modulate and attenuate clinical manifestations of RBD. Further studies, longitudinal follow up monitoring and possible investigations on animal models are required for the adequate comprehension of the subtended mechanism.

M-H-079 REM-SLEEP BEHAVIOUR DISORDER SCREENING QUESTIONNAIRE: USEFUL IN PARKINSON'S DISEASE?

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Introduction and Objectives: The REM sleep behaviour disorder screening questionnaire (RBD-SQ) was primarily developed to screen for possible REM sleep behaviour disorder (RBD) in the population. Sensitivity was good with 0.96 and specificity was 0.56 in idiopathic RBD patients (1). As idiopathic RBD may represent a preclinical stage of Parkinsonism, the RBD-SQ is considered a useful tool aiding identification of the population at risk. We investigated whether the RBD-SQ is also applicable to patients with diagnosed Parkinson's disease (PD) to identify those at risk for developing potentially endangering nocturnal behaviours. We tested sensitivity and specificity of the RBD-SQ in PD patients.
Materials and Methods: 75 consecutive sleep disordered PD patients completed the RBD-SQ. Patients were then investigated with video-supported polysomnography (vPSG). The presence of RBD was established according to ICSD 2 criteria by identification of REM without atonia (RWA) and dream enacting behaviours visible on time-synchronized video during REM sleep. Using the pre-defined cut-off score of 5 or greater on the RBD-SQ as predictive for RBD, sensitivity and specificity was calculated.
Results: Mean age of the patients was 66±9 yrs., mean disease duration was 7.5±5.3 yrs. and mean Hoehn&Yahr stage was 2.7±1. 38 of 45 patients scoring 5 and greater on the RBD-SQ showed RBD in vPSG. 18 of 30 patients scoring <5 on the RBD-SQ showed RBD in vPSG. Sensitivity was calculated at 0.678 and specificity at 0.63.
Conclusion: In comparison to idiopathic RBD, sensitivity of the RBD-SQ was significantly poorer in PD patients. Therefore, the RBD-SQ is not an adequate screening instrument for RBD in PD. Poor self-perception and additional nocturnal motor activity besides RBD may account for this result.

I: Sleep Breathing Disorders

M-I-134 A SURVEY ON THE MANAGEMENT OF OBSTRUCTIVE SLEEP APNEA IN EUROPE

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Introduction and Objectives: In Europe, services for the investigation and management of obstructive sleep apnea (OSA) vary from country to country. The aim of this questionnaire-based study was to investigate the current status of diagnostic pathways, and therapeutic approaches applied in the treatment of OSA in Europe, qualification requirements of physicians involved in diagnosis and treatment of OSA, and reimbursement of these services.
Materials and Methods: Two questionnaires were sent to 39 physicians in 22 countries in Europe. In order to standardize the responses, the questionnaire was accompanied by a completed example.
Results: Sleep centers from 21 countries (38 physicians) participated. A broad consistency among countries with respect to the following was found: pathways included referral to sleep physicians/sleep laboratories, necessity for objective diagnosis (primarily by polysomnography), usage of portable monitoring techniques, analysis of polysomnography (PSG), indications for positive airway pressure (PAP) therapy, application of standard continuous PAP (CPAP) therapy (100% with an CPAP/APAP ratio of 2.24:1), and the need (90.5%) and management of follow-up. Differences were apparent in reimbursement of the diagnostic procedures and follow-up, in the procedures for PAP titration from home APAP titration with portable sleep apnea monitoring (38.1%) up to hospital monitoring with PSG and APAP (85.7%), as well as the qualification requirements of sleep physicians.
Conclusion: Management of OSA in different European countries is similar except the reimbursement rules, qualification of sleep specialists and procedures for titration of the CPAP treatment. A European network can implement the findings into health service in order to standardize management in a cost effective perspective.
Acknowledgements: The study was supported by travel grants from COST (European Cooperation in Science and Technology) Action B26 funded by the European Union.
References:
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M-I-135 COMPARISON OF EFFICACY, ADHERENCE AND FUNCTIONAL OUTCOMES WITH AUTOMATICALLY-ADJUSTED POSITIVE AIRWAY PRESSURE WITH A-FLEX®

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Introduction and Objectives: Positive airway pressure (PAP) treatment for obstructive sleep apnea (OSA) can be limited by suboptimal adherence. The A-Flex® technology (Philips Respironics, PA, USA) combines autoadjusting algorithm (APAP) and the Bi-Flex® pressure relief feature, aiming to increase comfort levels and therefore adherence. The purpose of this study was to assess A-Flex® in terms of efficacy, adherence and functional outcomes compared to APAP-derived and manually titrated optimal pressure for CPAP.
Materials and Methods: The study was conducted as a prospective, randomized, double-blinded, three-arm, multicenter trial, the reported data concern the 164 patients with moderate to severe OSA enrolled. Patients were randomly treated for six months with A-Flex®, CPAP or APAP for 14 days and then switched to fixed pressure (A-CPAP).
Results: Anthropometric and polysomnographic data were comparable in the three groups at baseline. After six months of therapy the correction of sleep respiratory disturbance and of sleep structure was satisfactory in all groups. There was a similar adherence with CPAP, A-CPAP and A-Flex® as determined by average machine use (4.63±1.75; 4.44±1.98; 4.40±2.02 h/night, p = 0.8). There were no significant differences between improvement in subjective sleepiness, objective vigilance, blood pressure, and quality of life during the study for participants in A-Flex vs. the CPAP groups.
Conclusion: In patients with moderate to severe OSA A-Flex®, APAP and CPAP resulted in substantial improvements of AHI and sleep fragmentation. The use of A-Flex® did not result in greater adherence but appeared as effective also in terms of functional outcomes.
Acknowledgements: We gratefully acknowledge the support of Philips Respironics.

J: Sleep Deprivation

M-J-080 A REVIEW OF SLEEP PROMOTING INTERVENTIONS IN FAMILY CAREGIVERS

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Introduction and Objectives: There is a global reliance on family caregivers to care for recipients with chronic illness and disability 'around the clock'. Sleep disturbance in family caregivers is associated with negative physiological, psychological, and emotional outcomes. This review describes the evidence for sleep promoting interventions in family caregivers.
Materials and Methods: A computerized search of: CINAHL, EMBASE, MEDLINE, and PsychINFO was undertaken in December 2010. English language studies were reviewed that included the use of an outcome sleep measure in family caregivers with recipients >21 years of age. The identified studies were diverse with respect to the methods, nature of the intervention, and outcomes, precluding a meta-analysis. Therefore this presentation provides a systematic summary of the findings in a narrative review.
Results: 12 empirical studies and no systematic reviews were examined. Major findings included: 1) dementia caregivers have been investigated most often, 2) randomization was applied infrequently, 3) behavioral interventions appeared to be significantly helpful, 4) improvements in at least one sleep variable was seen in studies of physiological (eg. Exercise) complementary (eg. Massage therapy) and respite interventions, 5) elevated refusal and attrition rates were frequently reported, 6) individual home-based treatments were deemed acceptable to most caregivers, 7) sleep variables were not consistently described, and 8) and objective outcome measures sleep were seldom employed.
Conclusion: This review offers insight into which interventions are showing the most promise, which delivery methods are most acceptable, and which methodological issues require particular attention in sleep medicine and research with family caregivers. There is good evidence for the utility of behavioral therapies in the treatment of sleep problems in family caregivers. Considerable bias exists within most of the sleep and family caregiver studies and thus further investigation is merited that pays particular attention to the recruitment and retention of diverse participants and objective sleep measurement.
Acknowledgements: Canadian Nurses Foundation, Canadian Lung Association, and the Ontario Lung Association.

M-J-081 ACUTE ALERTING EFFECTS OF DAYTIME EXPOSURE TO SPECIFIC WAVELENGTHS OF LIGHT

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Introduction and Objectives: The non-image forming (NIF) effects of light have been shown to be partly mediated by intrinsically photosensitive retinal ganglion cells that express the short wavelength–sensitive photopigment melanopsin (lambda max 480 nm). There is evidence that the classical rod and cone photoreceptors may also contribute to these effects in humans. The objective of this study was to assess the acute alerting effects of daytime exposure to 3 h of monochromatic light [either blue (lambda max 460 nm, n=14), or green light (lambda max 555 nm, n=16), matched for photon density (2.8×10^{13} photos/cm^2/sec)] following two nights of sleep restriction under controlled laboratory conditions.
Materials and Methods: Thirty young adults (15 M, 15 F; 22.84±3.01 mean ± SD years) maintained a regular sleep-wake schedule (8:16 h) for at least three weeks prior to the laboratory visit. Participants were then sleep restricted for two consecutive nights: 5 h on the last night of the baseline period and 3 h on the night of their laboratory stay. Participants attended the sleep laboratory (<2 lux) for 26 h, during which they were placed in a 8 h modified constant posture protocol (beginning 1 h after wake time). Subjective sleepiness and psychomotor vigilance performance was assessed every 30-60 minutes.
Results: Participants in the longer-wavelength condition experienced fewer lapses of attention when compared to the short-wavelength condition immediately after, but not during light exposure. In contrast, the Psychomotor Vigilance Task did not reveal a significant main effect or interaction effect of light on reaction time. Subjective sleepiness scores also did not differ significantly between the two light conditions.
Conclusion: These results demonstrate a possible role of visual photoreceptors for the acute alerting effects of light exposure during the daytime. A control (no light) condition is currently being evaluated.
Acknowledgements: Supported by NHMRC, Compumedics, Philips Lighting and Postgraduate Research Scholarship.

M-J-082 ALPHA EEG POWER SHOWS INATTENTION PRIOR TO IMPULSIVE RESPONSES IN A SIMPLE RT TASK FOLLOWING ONE NIGHT OF SLEEP DEPRIVATION

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Introduction and Objectives: Sleep deprivation leads to slower, more variable reaction time. To understand the brain basis of performance instability, we investigated EEG prior to slow and fast reaction time (RT) bins during a simple RT task following one night of sleep deprivation.
Materials and Methods: Following screening and baseline nights in the laboratory, healthy good sleepers were randomly assigned to a sleep deprivation (SD, n=16) or control (C, n=16) group. A 6-minute RT task was administered at 10:30h and 14:00h; data were combined for analysis. Auditory tones (50ms) were delivered at random (2-10s); participants were to respond as quickly as possible. EEG from 64-channels was quantified using FFT analysis in 2-sec windows preceding tones. RTs were binned into

discrete categories of 10% slowest and 10% fastest artifact-free trials; mean RT differed significantly across bins for both groups.
Results: The SD group was significantly slower and more variable for: mean RT, standard deviation, fastest 10%, slowest 10%, lapses (>500ms), and missed responses (p's<05). A Group x Bin (fast, slow) x Site (Fz, Cz, Pz, Oz) x Band (theta, alpha, beta) ANOVA yielded a significant Group x Bin x Band interaction, p=0.037. Follow-up tests indicated the SD group had greater theta and beta power than controls for both slow and fast RT bins; SDs had greater alpha than controls for fast, but not slow bins (p's<05).
Conclusion: As expected, a night of sleep deprivation led to slower, more variable RT. The SD group had more theta (physiological sleepiness) and beta EEG power (effort to maintain performance on task). The greater alpha power prior to fast, but not slow RTs, reflects inattention associated with impulsive responding. Further examination of EEG predictors of RT instability, from multiple scalp sites and with different performance tasks, will enhance understanding of mechanisms underlying performance failure during sleepiness.
Acknowledgements: The Brock University Sleep Research Laboratory is funded by the Natural Science and Engineering Research Council (NSERC) of Canada.

M-J-083 CONFIRMATION OF THE U-SHAPED ASSOCIATIONS BETWEEN SLEEP DURATION AND CARDIOVASCULAR DISEASES AND BIOMARKERS IN A NATIONALLY REPRESENTATIVE SAMPLE OF U.S. ADULTS

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Introduction and Objectives: Emerging evidence suggests U-shaped associations between sleep duration and cardiovascular diseases (CVD) but its underlying mechanisms are unclear. The aim of the present study was to examine the potential U-shaped associations of sleep duration with CVD and biomarkers
Materials and Methods: A total of 10,896 individuals aged 20 years or older in the 2005 to 2008 National Health and Nutrition Examination Surveys (NHANES) were included in this study. Subjects were divided into 3 groups according to their usual sleep duration on weekdays, namely < 6 hours (14.1%), 6- 9 hours (78.8%), and ≥ 9 hours (7.0%).
Results: There were significant U-shaped associations of sleep duration with the risk quintiles of systolic blood pressure, C-reactive Protein (CRP), and urinary albumin-to-creatinine ratio, congestive heart failure (CHF), heart attack, stroke and any CVD (range ORs = 1.32-2.04 for short sleep duration and 1.35- 2.65 for long sleep duration) in univariate analyses. However, most associations found in long sleep duration did not maintain statistical significance after controlling for demographic and clinical factors, except for CRP. By contrast, majority of significant associations found in short sleep duration persisted in the fully adjusted models (range ORs = 1.20-1.69), except for CRP and CHF. The associations of short sleep duration with risk quintile of SBP, stroke and any CVD occurred in females only.
Conclusion: The results directly support the hypothesis that long sleep duration represents undiagnosed co-morbidity whereas short sleep duration may be considered as an independent risk for cardiovascular morbidity. Females are more vulnerable to sleep loss than males.
Acknowledgements: This study was funded by an intramural grant (1Z011Z01MH002870) from the National Institute of Mental Health

M-J-084 EFFECT OF SLEEP FRAGMENTATION IN CONGENITAL DEAF

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Introduction and Objectives: We hypothesize that congenital deaf are more sensitive to sleep fragmentation due to their more unstable sleep. The objective was to analyze Cyclic Alternating Pattern (CAP) density (no.events/min) in deaf and normal-hearing subjects before and after a provoked awakening.
Materials and Methods: 8 congenital deaf and 8 control subjects underwent 2 consecutive nocturnal video-PSGs in the lab, during which subjects were awakened after 5 minutes of each stable REM sleep period for dream recording. CAP A, B and NonCAP phases were identified, measured and density calculated in the periods before (BA) and after (AA) the provoked awakenings.
Results: Both groups seem to have lower density of A1 and higher A3 density in the AA period. Deaf subjects have a statistically significant increase in A1 density in AA periods compared to BA periods (p=0.015). Comparing the two groups in AA periods, normal-hearing subjects seem to have higher density of A1 subtype (p=0.057) and deaf subjects have higher density of A3 subtype (p=0.037).
Conclusion: This study showed that sleep fragmentation increases sleep instability in normal-hearing and deaf subjects, although the effect on them is not similar. After provoked awakenings, A1 subtype (which is related to mechanisms of stability and maintenance of sleep) showed an important density decrease in the deaf; while A3 subtype (related to sleep instability and arousal mechanisms) have an equally great density increase when compared with control subjects. These results indicate that sleep fragmentation is more disruptive in the deaf.

M-J-085 EFFECTS OF PARADOXICAL SLEEP DEPRIVATION ON HYPERALGESIA AND ITS RELATIONSHIP WITH DOPAMINERGIC SYSTEM IN PERIQUEDUCTAL GRAY MATTER

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Introduction and Objectives: Paradoxical sleep deprivation (PSD) leads to changes in pain sensitivity, but the mechanisms that govern these changes are poorly understood. Because dopaminergic neurons in the periaqueductal gray matter (PAG) are involved in pain modulation and opioid induced anti-nociception, we evaluated the effects of PSD on thermal pain sensitivity, morphine- and L-DOPA-induced antinociception and dopaminergic functionality in the PAG.
Materials and Methods: Adult male rats (250g-300g) were submitted or not to 96h of PSD through the single platform method. After 96h of PSD they received vehicle, morphine (2.5, 5 or 10 mg/kg, i.p.), L-DOPA (50 or 100 mg/kg, i.p.) or L-DOPA (50 mg/kg) + morphine (2.5 and 5 mg/kg) and were tested with a 46°C hot plate one hour after the injections. TH immunoreactivity was evaluated in the ventrolateral PAG through immunohistochemistry techniques.
Results: The paw withdrawal latency response to the hot plate was decreased in the PSD rats and was modified by the highest dose of morphine, L-DOPA and L-DOPA+morphine. The analgesic effects were observed in control groups for all morphine doses, 100 mg/kg of L-DOPA and L-DOPA (50 mg/kg) + morphine (5 mg/kg). The number of cell bodies that were immunopositive for TH in the PAG was reduced in PSD rats.
Conclusion: In conclusion, the increased thermal sensitivity was reversed by L-DOPA and could be caused by a reduction in PAG TH level. Our data also suggests a relationship between central dopaminergic network and opiate-induced analgesia in rats.
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M-J-086 EFFECTS OF PERCEIVED DRIVING SIMULATOR PERFORMANCE AND PROLONGED WAKEFULNESS ON SELF-RATED SLEEPINESS

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Introduction and Objectives: Self-assessment of sleepiness is probably the commonest action leading drivers to decide whether to continue driving. Relatively little is known about the factors influencing this self-assessment. We hypothesised that individuals rely on outside cues, including the assessment of their own behaviour, when formulating a self-assessment of sleepiness. In this study of simulated driving behaviour, deterioration in performance was produced by intermittent wind gusts, intended to be undetected by the participants. It was predicted that self-assessed sleepiness would increase as a function of wind-gust frequency.
Materials and Methods: Participants (16F; 16M) completed four simulated, 30-minute driving sessions at 2400, 0200, 0400 and 0600. Each participant experienced: no wind, low frequency of gusts, and high frequency of gusts. Self-ratings of sleepiness (Stanford Sleepiness Scale) and performance were completed before and after each condition.

Results: In accordance with the prediction, as wind frequency increased, so did participants' ratings of sleepiness, $F(2,60) = 67.50$, $p<0.005$, while self-ratings of performance decreased, $F(2,60) = 77.32$, $p<0.001$. According to a post-experiment debriefing, whether or not participants reported being aware of the presence of wind gusts had no effect on their self-ratings of sleepiness or performance.
Conclusion: The results are consistent with the hypothesis that individuals use outside cues, including their perception of their own driving performance, to aid them in assessing their level of sleepiness.
Acknowledgements: This research was supported by a grant from Queen's University to A.W. MacLean. We are grateful to Martin York for support of the York Driving Simulator.

M-J-087 ERROR DETECTION IS REDUCED AND EMOTIONAL EVALUATION OF ERRORS IS HEIGHTENED FOLLOWING A NIGHT OF TOTAL SLEEP DEPRIVATION

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Introduction and Objectives: Total sleep deprivation leads to deficits in reaction time, attention, and frontal lobe functioning. Sleep loss also impairs error detection and evaluation as reflected in event-related brain potentials (ERPs). The error-related negativity (ERN; index of error detection) and error positivity (Pe; index of error evaluation) are ERP waveforms elicited after making an error; imaging studies reveal they originate from the anterior cingulate cortex (ACC) located in the frontal lobe. Previous research on the ERN and Pe during sleep loss have been mixed, possibly due to small sample sizes, varying levels of sleep loss, and the type of tasks employed.
Materials and Methods: Following PSG screening and a baseline night, participants were randomly assigned to a Sleep Deprivation (SD) (n=10, 4 female, mean age 20.8) or a Control group (n=11, 4 female, mean age 19.7). EEG was recorded from 64-channels during a Flanker task (at 27 hours awake); participants responded to the middle letter in a series (e.g., HHHHH, HHSHH).
Results: Although accuracy did not differ between groups on either congruent or incongruent trial types, the SD group performed significantly slower on congruent error trials, $t(19) = -2.61$, $p=0.02$ and incongruent correct trials, $t(19) = -0.75$, $p=0.04$. The SD group had significantly smaller ERN amplitudes at FCz, $t(19) = -2.58$, $p=0.02$ and a trend towards an increased Pe at Pz $t(19) = -1.74$, $p=0.10$ (1-tailed test, $p=0.05$).
Conclusion: The smaller ERN is consistent with previous studies and indicates the detection of errors is reduced during sleep deprivation. A larger Pe in the SD group is contrary to prior research, and suggests that a heightened emotional response to making errors may occur following this degree of sleep loss.
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M-J-088 I DON'T WANT TO GO TO BED YET: THE IMPACT OF SLEEP MANIPULATION ON ACADEMIC AND BEHAVIOURAL FUNCTIONING IN ELEMENTARY SCHOOL-AGED CHILDREN

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Introduction and Objectives: Sleep is an important component of child development, yet a growing number of children are sleeping fewer hours than recommended. Correlational research shows a significant relationship between shortened sleep and difficulties with academic performance, attention and behaviour, however, very few studies experimentally manipulate children's sleep to evaluate the daytime consequences.
Materials and Methods: This study was an experimental within-subjects design, examining the impact of sleep restriction on attention, behaviour, and academic functioning in twenty typically developing children aged 8 to 12 years. Sleep duration was restricted and extended by one hour in relation to baseline sleep for 4 nights. The impact of these sleep conditions was assessed through both objective (one-to-one tests) and subjective (parent, teacher, RA, child questionnaires) measures. We hypothesized that all informants would report a decrease in behavioural functioning (e.g., increased opposition, impulsivity and hyperactivity) in the sleep restricted condition compared to sleep extended condition, and that children would perform less well on tasks of academic functioning during the sleep restriction condition.
Results: A paired samples t-test was used to determine that the experimental manipulation was successful and children slept significantly less, 73 minutes, in the restricted condition than in the extended condition ($p<0.001$). Using repeated measures MANOVA, no significant differences were found on teachers' ratings in the extended versus restricted sleep condition; however, parents reported significant changes in both hyperactivity ($p=0.042$) and opposition ($p=0.012$). The research assistant, blind to experimental condition, reported significant changes in attention ($p=0.038$).
Conclusion: Results indicate that even modest amounts of sleep restriction can affect daytime behaviour in children; however, the changes may be subtle and not observable in a classroom context. The results of this study will be used to inform educators and parents about the implications of less than optimal sleep on children's school functioning.
Acknowledgements: Penny Corkum (Supervisor), Jennifer Vriend (Co-investigator), Nova Scotia Health Research Foundation (Funding)

M-J-089 IMPACT OF SLEEP RESTRICTION ON THE REGULATION OF APPETITE IN MIDDLE-AGED OBESE SUBJECTS

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Introduction and Objectives: Sleep curtailment has been linked to increased obesity risk. We aimed to evaluate the effect of sleep restriction, as compared to sleep extension, on appetite regulation in middle-aged, obese adults.
Materials and Methods: Seven men and 4 women (age 38±6years, BMI 34±3kg/m^2) underwent, in a randomized cross-over design, 4 nights of restriction or extension of their habitual sleep schedule by 2-3 hours/night. After 3 or 4 nights of sleep intervention, blood was sampled for 24 hours at 10-30 min intervals for the measurement of leptin, an anorexigenic hormone. Caloric intake consisted of 3 identical carbohydrate-rich meals. On the next day, subjects were served an ad libitum buffet and caloric intake was evaluated.
Results: Energy intake during this buffet was 15±6% higher after bedtime restriction ($p=0.04$), mainly due to an increase in protein consumption (17±6%, $p=0.04$). This overall increase in energy intake translates into an excess 400 Kcal/day, resulting in a higher risk of weight gain. After sleep restriction, leptin levels were decreased in 5 out of the 11 subjects and increased in the remaining 6 subjects, such that leptin levels were similar in both bedtime conditions. The difference in caloric intake between bedtime conditions tended to be correlated to the difference in daytime leptin levels ($r=0.54$, $p<0.11$); paradoxically, the stronger the increase in leptin levels, the stronger the increase in food intake. These results demonstrate that sleep restriction promotes food intake, extending previous observations of increased hunger after sleep loss. However, the present findings obtained in obese subjects differ from our report of consistently decreased leptin levels in healthy sleep-restricted lean subjects. The role of leptin-resistance known to be associated with excess weight needs to be evaluated to elucidate these findings.
Conclusion: Recurrent sleep restriction in middle-aged, obese subjects resulted in increased energy intake, possibly via an alteration in leptin regulation and/or efficacy of action.
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M-J-090 MILD COGNITIVE IMPAIRMENT IN A SAMPLE OF PATIENTS UNDERGOING CLINICAL SLEEP STUDY

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Introduction and Objectives: Chronically disrupted sleep has negative consequences for patients. Deficits in attention, alertness, vigilance, and memory may arise. Similar dysfunction is seen in patients with mild cognitive impairment (MCI). Patients presenting with cognitive concerns may have untreated sleep pathology or early dementia. To investigate the

relationship between MCI and sleep disruption, we assessed patients being investigated for sleep pathology. We sought to determine if these patients had evidence of MCI using the Montreal Cognitive Assessment (MoCA) and cognitive dysfunction consistent with head injury/concussion using the Paced Auditory Serial Addition Test (PASAT).
Materials and Methods: Fifty three patients attending a sleep disorders clinic completed the MoCA and PASAT. The MoCA was administered during an interview and the PASAT had patients listening to the digit sequences from a computer audio file with manual transcription.
Results: Analyses showed that this sample demonstrated neurocognitive dysfunction. MoCA scores were significantly lower than what would be predicted from normative data (z -9.83, $p<0.001$). This sample had 73.6% of the patients scoring in the diagnostic range for MCI ($p<0.001$). PASAT results showed a similar pattern. Patients scored significantly lower than the population norms for both the 3 and 2-second versions (z= -9.4, $p<0.001$ and z= -5.57, $p<0.001$ respectively). 66.7% of patients were in the lower half of the distribution ($p<0.05$) for the 3-second version. For the 2-second version, 67.6% scored below μ ($p<0.001$).
Conclusion: We assumed that sleep disruption over many nights would result in neuropsychological deficits. Our analyses suggest that: 1. A significant proportion of patients with sleep pathology have neurocognitive dysfunction consistent with a diagnosis of MCI. 2. Our patients exhibited decreased vigilance, sustained attention ability, and information processing speeds much like those with some types of head injury.
Acknowledgements: Ontario Work Study Program.

M-J-091 PARADOXICAL SLEEP DEPRIVATION AND HYPERALGESIA IN RATS: ROLE OF NITRIC OXIDE IN DORSOLATERAL PERIAQUEDUCTAL GRAY MATTER

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Introduction and Objectives: Paradoxical Sleep Deprivation (PSD) has been found to promote hyperalgesia in animals and human beings. Pain hypersensitivity following both PSD and sciatic nerve injury seem to share the same spinal pain mechanisms, since it can be reversed by nitric oxide synthase (NOS) inhibition. Given that both Nitric Oxide (NO) and the dorsolateral Periaqueductal Gray Matter (dlPAG) area of the brainstem are thought to be involved in hyperalgesia, we evaluated the NOS activity on the dlPAG and the pain-related behavior response after PSD.
Materials and Methods: Adult male rats (250 - 300 g) were randomly separated into Control and PSD groups. After 96 hs of regular sleep or paradoxical sleep deprivation using the flower pot technique, animals were submitted to formalin test (n=8/group), to von Frey filaments test (n=8/group) or to transcardial perfusion and subsequent NADPH-d histochemical staining (n=5/group), which served as an indicator of NOS activity.
Results: Data revealed that PSD led to increased pain-related behavior (+27%, $p\leq0.05$) in phase I of the chemical test (formalin) and a lower paw withdrawal threshold (-47%, $p\leq0.05$) in the mechanical test (von Frey filaments), confirming its hyperalgesic effect. The number of NADPH-d positive cells in dlPAG was higher after PSD than that in control animals (+59%, $p\leq0.05$), indicating an increased NOS activity in dlPAG.
Conclusion: Taken together, our data suggest that the hyperalgesia observed in PSD rats after mechanical and chemical noxious stimuli might be associated with increased NOS activity in dlPAG. These nitrergic neuronal changes in dlPAG is presumably influencing the descending antinociceptive pathway.
Acknowledgements: CNPq, UERJ

M-J-092 SLEEP HABITS AND SLEEP QUALITY IN A PORTUGUESE POPULATION-BASED SAMPLE

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Introduction and Objectives: Sleep deprivation has a significant health impact. There is a general belief that this behavior has been increasing around the world but specific data regarding Portuguese people is not known since the last decade. Our aim was to describe the sleep habits and quality on the adult mainland Portuguese population.
Materials and Methods: During 2009 we evaluated a national sample of non-institutionalized Portuguese inhabitants. The sample was weighted by age, gender and region. A total of 3706 individuals (51.9% female) were included with a mean (standard deviation) age of 45 (17.7) years. Demographic and clinical data were obtained by trained interviewers using a structured questionnaire. Pittsburgh Sleep Quality Index was used to evaluated sleep quality and duration. Epworth Sleepiness Scale was used as a measure of sleepiness. Sleep deprivation was defined as sleeping 6h or less.
Results: The mean of sleep duration was 7h10min (1h16min), the mean bedtime was 23h41min (0h28min) and the awake up time was 8h09m (0h27min). The prevalence of sleep deprivation was 27.7% in the global sample and 26.2% in individuals with less than sixty years old. The prevalence of sleep deprivation increased significantly from 18.0% among those aged <25 years to 32.0% among those aged <60 years ($p<0.001$). We also found a significant higher prevalence of sleep deprivation in females (34.0 vs. 24.8, $p<0.001$). Approximately 10% of the participants reported being dissatisfied or very dissatisfied with their sleep. The daily use of sleep-enhancing medication was reported by 10.3% of the total population. This medication was suggested in 75% cases by doctors and in 12% by friends.
Conclusion: Portuguese data suggest similar sleep durations to those described in other European countries. Sleep deprivation was reported in a relevant proportion of the sample.
Acknowledgements: This study was promoted by the Portuguese Sleep Association and sponsored by Sanofi-Aventis.

M-J-093 SLEEP PATTERN, QUALITY AND SLEEPINESS AMONG PATIENTS WITH CHRONIC PULMONARY PARENCHYMA DISEASE IN NIGERIA

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Introduction and Objectives: Sleep is very important for optimal daily activities and contributes significantly to health and quality of life. Patients with pulmonary diseases have various sleep related problems which have not been well documented in our environment. We aim to study sleep pattern and sleepiness in patients with pulmonary tuberculosis.
Materials and Methods: PTB patients seen at the Chest clinic of OAUTHC, Ile Ife were recruited. Subjects were obtianed through an interviewer administered questionnaire looking into sleep pattern, clinical presentation and social characteristics. The questionnaire contains items from the Pittsburgh Sleep Questionnaires.
Results: Overall 100 subjects were studied: 64 cases and 36 controls. The mean age of the cases and control were 41.5+ 5years and 34.0 + 5.6 years respectively. 15% of the cases was smokers. Overnight mean sleep duration was not significantly different between the cases and the controls. The predominant sleep problem among the cases was frequent night time awakenings which was present in 31 (48%), while problems initiating sleep was a predominant problem among the cases, 4/36 (11%). More cases have problems initiating sleep, increased nightmares and snoring than controls, which were all statistically significant, $p<0.05$. Sleepiness was reported in 20/64 (31%) and none (0/36%) of the cases and controls respectively. Overall 48% of the cases and 50% of the controls described their sleep as good respectively. Among the cases, sleep quality is significantly influenced by the extent of involvement on CXR. Mean duration of symptoms in those with good sleep was 2.5 months compared with 6.4 months among those with poor sleep. This is statistically significant <0.05. Smear negative results is significantly associated with good/fair sleep quality
Conclusion: This study shows that PTB patients have poor sleep pattern, quality and have sleepiness compared with general population. Extent of pulmonary disease and duration of symptoms have significant impact on their sleep.

M-J-094 THE ASSOCIATION BETWEEN SLEEP DURATION AND TEACHERS' REPORTS OF INATTENTION AND BEHAVIOR PROBLEMS IN HEALTHY SCHOOL-AGED CHILDREN

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Introduction and Objectives: Sleep deprivation is a prevalent problem affecting approximately 61% of students. This reduction in sleep duration

has been shown to lead to cognitive and behavioural impairments such as inattention and hyperactivity. Sleep problems in children with ADHD are thought to exacerbate these problems, but the nature of this association in typically developing children is unclear. The goal of this study was, therefore, to examine the association between children's sleep duration and teacher-reported cognitive impairment/inattention. It is hypothesized that short sleep duration will be associated with poorer attention and behaviour within the school context.
Materials and Methods: Thirty-five healthy participants, aged 7 to 11 years (M=8.7, SD=1.1), kept their natural bedtimes and wake times for five consecutive weekdays. The first 4 nights, parents documented children's bedtime and wake time using sleep logs. On the fifth night, sleep duration was measured using ambulatory assessment of sleep architecture with portable polysomnography (PSG) equipment (TEMEC Vitaport-3). Teachers were given the Conner's Teacher Rating Scale (CTRS-R) to evaluate behavioural problems and inattention.
Results: Partial correlations were carried out to examine the relationship between PSG-measured sleep duration and teachers' report of cognitive difficulty/inattention and hyperactivity among typically developing children. A significant negative correlation was found between sleep duration and scores of cognitive problems/inattention ($r= -0.47$, $p \leq 0.01$), such that children with shorter sleep durations had more problems.
Conclusion: Short sleep duration was associated with higher teachers' ratings of inattention among typically developing school-aged children. As sleep deprivation is highly prevalent in school-aged children, these findings emphasize the need for interventions aimed at improving sleep in order to reduce inattention and increase chances for academic success.
Acknowledgements: We thank our volunteers and the participating families. This work was supported by grants to Dr. Reut Gruber from the Canadian Institutes of Health Research and the Fonds de la recherche en santé.

M-J-095 THE EFFECT OF CHAIR MASSAGE ON SLEEP QUALITY OF PROFESSIONALS OF AN URGENCY AND EMERGENCY SERVICE

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Introduction and Objectives: Sleep disturbances are common in society and the costs are considerable. The causes of disturbed sleep are varied, and one of them is the effects of shift work, which is well established as a cause of disturbed or shortened sleep. Urgency and emergency service needs shift workers and this professional probably has decreased sleep quality. It has been suggested that massage therapy can lead to a good sleep quality and anxiety reduction in several populations, including nurses and doctors. Objective: To evaluate the effectiveness of eight sessions of 15 minutes chair massage on the sleep quality of professionals of urgency and emergency service.
Materials and Methods: After signature of Informed Consent, Twelve (M = 9; F = 3) professionals of an urgency and emergency service, participated in this study to determine the effect of eight sessions of 15-min on-site chair massage (n =12) had on their sleep quality. Using the Pittsburgh Sleep Quality Index (PSQI), sleep quality was assessed in an experimental pre-test/post-test design and analyzed using t-tests for dependent samples
Results: Sleep quality was significantly lower in the sample, after the eight sessions of chair massage there was a significant change in the sleep quality (PSQI: before MTS = 7,5; after MTS = 5; p=0,01).
Conclusion: The chair massage for professionals of an urgency and emergency service in a 15 min session increases sleep quality in this population and can be a good tool to reduce the shift work effects.
Acknowledgements: Thanks to SAMU Patos.

M-J-096 THE EFFECT OF SLEEP DEPRIVATION ON CORTICAL EXCITABILITY: A

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Introduction and Objectives: Electroencephalography-transcranial magnetic stimulation (EEG-TMS) co-registration is an innovative technique to study cortical reactions to external perturbations and their modulation. TMS evoked potentials (TEPs) have been described during both wake and sleep, but the effect of sleep deprivation on TEPs is unknown. The objective of this study was to investigate vigilance-related modifications of cortical reactivity by measuring variability in TEP.
Materials and Methods: In twelve healthy subjects, EEG-TMS co-registration was performed with compatible equipment (BrainVision Recording System, 32 electrodes) and the dominant motor area was stimulated in a standard wake condition, after partial sleep deprivation, and during sleep. Of the initial twelve subjects, nine fell asleep during the experiment and qualified for analysis. EEG traces were scored off-line according to Rechschaffen-Kales sleep stages; segments were analysed from 100 msec before to 500 msec after the TMS artifact.
Results: TMS induced clear-cut EEG activity lasting up to 300 msec after the TMS artefact and consisting of alternating positive and negative polarity deflections. Sleep deprivation caused a statistically significant amplitude increase of the whole EEG response to TMS, with a prominent anterior distribution.
Conclusion: Our results showed increased cortical reactivity after sleep deprivation, with a tendency for a more anterior topographical distribution of this effect. Neurophysiologically, this finding underpins the notion that the frontal-prefrontal areas are more susceptible to the effects of sleep deprivation. Moreover, while no effect of sleep deprivation in healthy subjects has been detected with TMS alone, TMS-EEG co-registration seems to be a more sensitive tool for studying vigilance-induced modulations.

M-J-097 SHORT SLEEP DURATION IS ASSOCIATED WITH INSULIN RESISTANCE INDEPENDENT OF ADIPOSITY IN CHINESE ADULT TWINS

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Introduction and Objectives: To investigate the association between sleep duration and insulin resistance in rural Chinese adults and examine whether any such associations are independent of adiposity.
Materials and Methods: This is a cross-sectional analysis of 854 men and 640 women aged 20 to 70 years from the Anqing Twin Cohort. The following measures were obtained for each subject: Body mass index (BMI) and percentage of trunk fat (%TF), fasting plasma glucose, homeostatic model assessment of insulin resistance index (HOMA-IR), self-reported sleep duration, and measures of snoring and sleep disturbance from the Pittsburgh Sleep Quality Indices (PSQI) questionnaire modified for a Chinese population. Multivariate linear regressions were applied to examine the association of sleep duration with HOMA-IR, with and without adjustment for adiposity variables, along with other relevant covariates.
Results: In this sample of relatively lean rural Chinese adults, short sleep duration was associated with HOMA-IR in women but not in men. In women, short ($\leq$7 hrs/night) sleep duration was associated with a higher HOMA-IR (p=0.003) compared with normal sleep duration ($>$7 to $\leq$8 hrs/night) after adjustment for all the covariates except adiposity. Further adjustment for BMI or %TF attenuated the sleep-HOMA-IR association, but the association remained significant upon adjustment for BMI (p=0.013); and upon adjustment for %TF (p=0.026). Long sleep duration ($>$8 hrs/night) was not significantly associated with HOMA-IR.
Conclusion: In this rural Chinese cohort, short sleep duration is independently associated with increased insulin resistance among women only, even after adjusting for adiposity and other potential confounders.

M: Psychiatric Disorders Affecting Sleep/Waking

M-M-098 ARE THERE BIOMARKERS FOR DEPRESSION IN ADOLESCENTS? A REVIEW

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Introduction and Objectives: Sleep dysfunction is characteristic of major depressive disorder (MDD) in adults and adolescents. Although sleep markers for depression, based on electroencephalographic (EEG) recordings, in adults have been relatively well established, there continues to be variability in the types of proposed sleep markers for depression in adolescents.

Further, additional biomarkers such as sleep wake cycle changes, circadian rhythm abnormalities, and alterations in the hypothalamic pituitary adrenal (HPA) axis function may be associated with depression in adolescents. This has not been extensively studied in this population. The primary objective of this study was to systematically identify biological variables that indicate MDD in adolescent populations.

Materials and Methods: The literature on depression was reviewed with a focus on studies investigating biological factors consistently present in depressed adolescents.

Results: Sleep architecture, specifically sleep spindle activity, circadian rhythm disturbances, abnormal sleep wake patterns, and hyperactive HPA functioning were identified as potential biomarkers of depression in the adolescent depression literature. Greater sleep latency is currently the primary differential characteristic marking distinct adolescent sleep changes in MDD as compared to adults. The sleep architecture in adolescent MDD is marked by decreased temporal coherence and decreased sleep spindle activity in depressed adolescents, particularly in females. Other reported biomarkers include lower activity levels in the sleep wake cycle, damped circadian amplitude, and increased peri-sleep cortisol levels in adolescents.

Conclusion: There are several proposed biomarkers of depression in adolescents in the depression literature, including sleep specific markers, ultradian and circadian rhythm abnormalities, and HPA axis cortisol secretion. Further work is needed to ascertain the precise nature, sensitivity, and specificity of these markers in predicting depression in adolescent populations.

M-M-099 CHARACTERISTICS OF SLEEP IN AUTISTIC CHILDREN

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Introduction and Objectives: Pervasive developmental disorders (PDD) refer to a group of neurodevelopmental disorders, autism being the best known, that are characterized by a triad of behavioral symptoms: (1) severe deficits in social interaction, (2) communication deficits, and (3) presence of restricted, repetitive behaviors (American Psychiatric Association, 1994). Although these areas define PDD diagnostically, many other symptoms often coexist, such as cognitive impairment, and sleep problems (Johnson, 1996). Although sleep problems are not part of the diagnostic criteria for autism, these problems are commonly present in children with the disorder (Hering, Epstein, Elroy, Iancu, & Zelnik, 1999). There are reports that most children with autism are affected by difficulties with sleep (Arbelle & Ben-Zion, 2001; Didden & Sigafoos,2001;Richdale, 1999; Schreck & Mulick, 2000; Sweeney, Hoffman, Ashwal, Downey & Stolz, 2003 Research is needed to further clarify the extent and character of the sleep problems experienced by these children compared to children who do not have this disorder. There has been a limited amount of information regarding the characteristics of the children studied or of the severity of their disorders included in empirical reports to date (e.g., Durand, 2002). Objective. The aim of this work is to describe the sleep patterns displayed by autistic children

Materials and Methods: Nocturnal polysomnographic studies were carried out during two consecutive nights in control and autistic children of both sexes. EEG was obtained from frontal and central regions of the brain. Additional electrodes were placed to obtain activity of different physiological variables such as EOG, EMG, and respiratory activity.

Results: Significant sleep differences were obtained when comparing control and autistic children. Longer sleep latency, sleep fragmentation, lower sleep efficiency were observed in the autistic children. Epileptiform Electroencephalographic (EEG) activity was also observed during the light sleep.

Conclusion: Autistic children present sleep patterns disorganization, reduced sleep efficiency and EEG alterations.

M-M-100 CIRCADIAN TENDENCIES AND BEHAVIOURAL FACTORS AS PREDICTORS OF BEDTIME RESISTANCE AND SLEEP ONSET INSOMNIA AMONG CHILDREN WITH ADHD

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Introduction and Objectives: Studies indicate a higher prevalence of sleep problems among children with ADHD compared to controls; however, the specific association between sleep and ADHD remains unclear. Biological and behavioural factors are proposed as potential mechanisms for "going-to-sleep" issues among children with ADHD. The objective of this study was, therefore, to investigate the relative contributions of behavioural problems (externalization) and circadian tendencies to bedtime resistance and Sleep Onset Insomnia among children with ADHD and controls.

Materials and Methods: Participants with ADHD (N = 26) were asked to discontinue stimulant medication, and all participants (N = 75; aged 7 to 11) were asked to avoid caffeinated products 48 hours before evaluation. Parents completed the Child Sleep Habits Questionnaire, and documented their child's bedtime routine over four nights using sleep logs. On the fifth night, sleep was recorded using ambulatory assessment of sleep architecture afforded by portable polysomnograph (PSG) equipment (Vitaport-3 System). Circadian tendency was evaluated with the Child Morning-Evening Preference Scale and externalizing problems were assessed using the Child Behaviour Check List.

Results: Regression analyses revealed that externalizing problems contributed significantly to bedtime resistance (Beta = 0.35, p=0.01), whereas evening circadian tendency contributed to both parental reports of sleep onset delay (Beta = -0.49, $p<0.001$), and PSG-measured sleep-onset latency (Beta = -0.46, $p<0.001$) in both groups.

Conclusion: The results demonstrated that children's behavioural problems and circadian tendencies contributed to different bedtime issues, suggesting that bedtime problems vary in etiology. Moreover, they emphasize the need for accurate diagnoses of sleep problems. A better understanding of these factors is needed to further the development of more effective intervention strategies for such children.

Acknowledgements: We appreciate all the volunteers who helped with the data collection, as well as the participating families. This work was supported by grants to Dr. Reut Gruber from the Canadian Institutes of Health Research and the Fonds de la recherche en santé.

M-M-101 EARLY CIRCADIAN ABNORMALITIES AND NEUROPEPTIDE DEGENERATION WITHIN THE CIRCADIAN PACEMAKER ARE PREDICTIVE OF FUTURE ALZHEIMER'S DISEASE PATHOLOGY

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Introduction and Objectives: Patients with Alzheimer's disease (AD) often exhibit circadian abnormalities early on in the progression of the disease, such as increased daytime napping, disrupted nighttime sleep, and sundowning. Alterations to the mammalian circadian pacemaker, the suprachiasmatic nucleus (SCN), has been speculated to play a role in these abnormalities. The current study examined whether any circadian changes are present pre- and post-AD pathology in a triple transgenic model of AD, as well as whether the SCN is affected by the disease.

Materials and Methods: 3xTg-AD mice (n=20) were compared to non-transgenics on several measures. General activity and wheel-running behaviour, as well as light-induced behavioural phase shifting at circadian time 16 and 22, were evaluated prior to and following the onset of plaque pathology. Immunohistochemical evaluation of cells expressing vasoactive intestinal polypeptide, gastrin-releasing peptide, and vasopressin, within the SCN, was conducted prior to the onset of tangle pathology.

Results: Significant changes were found in daytime activity levels prior to the time of plaque development. When compared to age-matched controls, AD mice exhibit greater overall activity levels, with much higher activity observed both during the subjective day and the subjective night, as AD pathology progresses. A reverse in activity levels was observed in female mice exhibiting both plaque and tangle pathology, with general activity dropping dramatically when compared to pre-tangle formation as well as age-matched controls. Prior to tangle pathology, these mice were also shown to have significantly diminished vasoactive intestinal polypeptide- and vasopressin- containing cells within the SCN.

Conclusion: These findings correspond to the irregular sleep/wake patterns of patients in the early stages of AD, as well as the neurodegeneration that occurs over the course of the disease in humans. This model demonstrates the potential for circadian abnormalities to act as a predictive tool for diagnosing the development of AD pathology.

M-M-102 EVALUATION OF DREAM CONTENT AMONG SCHIZOPHRENIC PATIENTS

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Introduction and Objectives: Schizophrenia is a chronic psychotic disorder with unknown etiology that causes cognitive impairment and influences thinking, behavior and social function. This study considered the dream content of patients with schizophrenia. The study had two goals.
Materials and Methods: Participants were 36 inpatients with schizophrenia whose medications were stable for at least four weeks. A 14-item dream content questionnaire was administered for all the participants and the Positive and Negative Symptoms Scale (PANSS) was administered for the two groups of hospitalized patients.
Results: Results showed that the dream content of the schizophrenia had the most complexity. No significant differences were found between the positive and negative subscales of PANSS and any of the dream questionnaire subscales. The dream content of patients with schizophrenia included more familiar acquaintances, more females, more joyful content and lesser innocuous components.
Conclusion: Our results suggest that there were a few changes in the dream content of the schizophrenic patients.
Acknowledgements: The authors wish to express gratitude to all those who participated in this study.

M-M-103 EXAMINING SLEEP AND SLEEPINESS IN CLINICAL (ADHD) AND NON-CLINICAL PEDIATRIC POPULATIONS

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Introduction and Objectives: Many children with ADHD suffer from excessive daytime sleepiness, which may exacerbate already problematic symptoms. Furthermore, sleepiness measures (objective or subjective) have not been adequately validated within pediatric populations. Thus, the objective of the present study was to assess the association between objective measures of sleepiness with both objective measures of sleep (cumulatively and immediately preceding sleepiness assessment) and subjective measures of sleepiness for children with ADHD and controls, in order to examine possible differences between these groups, as well as reliability within a pediatric sample.
Materials and Methods: Eighty-three children (26 ADHD, 57 Controls), 7 to 11 years of age, underwent nocturnal sleep recording, using actigraphy, for 4 nights and polysomnography for one night, within their natural home environments. Daytime sleep latencies were examined using the multiple sleep latency test (MSLT) within a controlled laboratory setting the day following nocturnal polysomnography. Using Spearman correlations, MSLT latencies were compared with scores on a modified Epworth Sleepiness scale (ESS), polysomnographic and mean actigraphic sleep duration, latency, efficiency, total wake time, and mean actigraphic activity scores and fragmentation indices.
Results: A negative correlation between ESS scores and MSLT latencies was found for both children with ADHD and controls. Polysomnographic nocturnal sleep latencies were positively related to MSLT latency in controls, while mean measures of sleep disturbance (actigraphic time awake, activity and fragmentation), as well as time in stages 3 and 4, were positively related to sleep latencies in children with ADHD.
Conclusion: These findings suggest that the ESS adequately measures sleepiness in pediatric populations. The MSLT, however, may be more a measure of general arousal levels, at least for a subset of children, as more disturbed sleep in both children with ADHD and controls was related to longer latencies on the MSLT within this pediatric population.
Acknowledgements: We thank our volunteers that helped with data collection and the families that participated in the study. This work was supported by grants to Dr. Reut Gruber from the Canadian Institutes of Health Research and the Fonds de la recherche en santé.

M-M-104 EXAMINING SLEEP ARCHITECTURE IN CHILDREN WITH ADHD, AND THEIR TYPICALLY DEVELOPING PEERS

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Introduction and Objectives: Over the last 30 years, various polysomnography (PSG) sleep studies have found inconsistent results when comparing the EEG sleep architecture profiles of children diagnosed with ADHD and their typically developing (TD) peers (e.g., Sadeh, 2007). Nevertheless, methodological issues (e.g., participant medication status, co-morbidities) could have accounted for the published studies' non-significant group differences. Therefore, the present study used PSG technology to analyze sleep quality and sleep architecture variables of a medication-naïve, rigorously diagnosed sample of children aged 6 – 12 years with ADHD, comparative to their TD peers.
Materials and Methods: The (n=15) children who comprised the ADHD sample had (1) a new diagnosis of ADHD based on a comprehensive clinical diagnostic assessment, (2) were medication-naïve, and (3) had not been diagnosed with another primary mental health disorder known to impact sleep (e.g., depression, anxiety disorder). The (n=15) children who comprised the TD sample were not diagnosed with any mental health disorder-confirmed through parent-completed rating scales. All PSG testing was performed at the Chronobiology Laboratory in the Department of Psychiatry at the QEII HSC in Halifax.
Results: Multivariate analysis (MANOVA) revealed significant differences in both sleep quality and sleep architecture between ADHD and TD groups. Specifically, children in the ADHD group had a significantly longer latency to REM sleep, significantly fewer REM cycles, as well as significantly less Stage 1 sleep than TD peers. Also, children in the ADHD sample had significantly larger sleep onset values, but also had significantly shorter sleep duration values than their TD peers.
Conclusion: These results provide evidence to suggest children with ADHD may have underlying etiological issues regulating sleep architecture patterns compared to TD peers.
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M-M-105 FACE PERCEPTION AND REM SLEEP IN CHILDREN WITH AUTISM

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Introduction and Objectives: Autistics (AUT) show atypical REM sleep characteristics, including less rapid eye movements (rems). Since rems are generated by a limbic network and since children with ASD show an atypical pattern of neural responses to emotional stimuli, including faces, we measured rems density REM sleep and tested whether this measure would correlate with face recognition performance.
Materials and Methods: Thirteen male autistic high functioning children (AUT; 10.3±1.9 years) and thirteen comparison children (COM; 9.6±2.2 years) were recorded for two consecutive nights. Data from night 2 were computed. An immediate (evening) and delayed (morning) recognition task of unfamiliar face (positive, negative or neutral emotions) was used. Statistical analysis includes Mann-Whitney U-tests and Spearman's rho correlation.
Results: Thirteen male autistic high functioning children (AUT; 10.3±1.9 years) and thirteen comparison children (COM; 9.6±2.2 years) were recorded for two consecutive nights. Data from night 2 were computed. An immediate (evening) and delayed (morning) recognition task of unfamiliar face (positive, negative or neutral emotions) was used. Statistical analysis includes Mann-Whitney U-tests and Spearman's rho correlation.
Conclusion: Although correlations do not allow drawing causative relationships, these findings indicate that the neural networks dedicated to the recognition of faces with positive emotions relate differently with sleep variables in typically developing and in HFA children.
Acknowledgements: Supported by the CIHR and the FRSQ.

M-M-106 POLYSOMNOGRAPHIC ASSESSMENT OF SOMATOFORM DISORDER PATIENTS COMPARED TO PATIENTS WITH MAJOR DEPRESSION: A STUDY IN AN EGYPTIAN SAMPLE

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Introduction and Objectives: There is a diagnostic overlap between the clinical presentations of both major depressive disorder (MDD), and somatoform disorder (SD). Like MDD patients, SD patients commonly have a disturbed sleep pattern. The aim of the present study was to evaluate the role of sleep assessment as a possible biological correlate, differentiating SD from MDD patients.
Materials and Methods: We investigated the sleep of 40 SD patients, in comparison to 40 MDD patients,(diagnosed according to DSM-IV TR criteria), and 40 healthy matched controls, by means of polysomnographic recordings of their sleep after subjective assessment using Structured Sleep Questionnaire (in Arabic), Taylor Anxiety Scale, Beck Depression Inventory, and Toronto Alexithymia Scale.
Results: Both MDD and SD patients had, in comparison to healthy controls, significantly decreased sleep efficiency, increased sleep latency, increased arousal index, increased stage 1, and decreased SWS. Although REML was reduced in both MDD and SD groups, the changes in REM sleep were more robust in MDD patients regarding short REML, increased REM % and longer duration of first REM period.
Conclusion: Some similarities of sleep changes in both MDD and SD patients might suggest a common or shared biological basis of both conditions. Quantitative rather than qualitative differences in sleep profile seem to be possibly differentiating parameters, which is in need of further studying.

M-M-107 RELATIONSHIP BETWEEN SLEEP DISTURBANCES, PTSD, DEPRESSION AND ALCOHOL USE AMONG VETERANS REFERRED FOR TREATMENT AT AN OPERATIONAL STRESS INJURY CLINIC

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Introduction and Objectives: Among combat veterans, sleep complaints are ubiquitous and significantly higher for veterans with PTSD (Mellman et al, 1995). Although treatments such as CBT are effective at reducing PTSD symptoms, almost half of treatment responders still report insomnia (Zayfert & De Viva, 2004). Apneas are also highly prevalent among trauma survivors (e.g., Douglass, Commandant, & De Koninck, 2011). Germain et al. (2004) found that severity of PTSD paralleled severity of sleep disturbances (SD), while psychiatric comorbidity had little impact on SD. However, SD, particularly insomnia, is common among individuals diagnosed with depression (Riemann, 2009) and substance abuse (Roth, 2009). The focus of this study was therefore to examine whether PTSD symptoms are related to a greater number of SD than symptoms of depression or substance abuse.
Materials and Methods: A sample of 153 combat veterans referred to the OSI clinic completed the BDI-II, AUDIT, PCL-M and items from the Sleep Disorder Questionnaire (SDQ). SDQ items were clustered to form 5 different SD indicators (sleep-related anxiety; apnea; insomnia, sleepiness and sleep-related substance use) and correlations with scores on the BDI-II, AUDIT, and PCL-M were calculated.
Results: While all measures were significantly correlated with insomnia indicators (p's <0.05); specific SD differed by symptom type: PTSD symptoms were significantly correlated with sleep related anxiety, somnolence, and apnea indicators (p's <0.05); depressive symptoms were correlated with sleep related anxiety ($p<0.05$); and alcohol use symptoms were correlated with sleep related substance use ($p<0.01$).
Conclusion: These data suggest that PTSD symptoms are associated with a greater number of SD than are symptoms of depression or alcohol use, and may imply that the underlying cause of SD differs by diagnosis. Thus, interventions aimed at improving sleep disruptions among trauma survivors should be tailored to address the specific sleep difficulties experienced by those with various OSI's.
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M-M-108 SLEEP ATYPICALITIES AND BEHAVIORAL MEASURES IN CHILDREN WITH AUTISM

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Introduction and Objectives: Disrupted sleep in children is associated to behavioral problems during daytime. Children with autism present with high prevalence of sleep disorders as reported by parents, including long sleep latency and nocturnal awakenings. Laboratory polysomnographic recordings support these observations. Poor sleep in children with autism may thus be associated with disturbances in daytime functioning and modulate core symptoms of autism. The aim of our study was 1- To compare sleep characteristics of children with autism, as measured with questionnaires filled by parents and laboratory polysomnography; 2- To evaluate the relationship between sleep characteristics in children with autism and core symptoms of autism.
Materials and Methods: Thirteen boys diagnosed with autism according to DSM-IV criteria (ASD: 10.7±1.9 years) and 21 typically-developing boys (10.7±1.7) spent 2 consecutive nights in a sleep laboratory. All had a normal IQ and were free of psychiatric or neurologic conditions. None reported difficulties with sleep. Sleep was evaluated in two ways: 1) The Children's Sleep Habits Questionnaire (CSHQ), filled by parents; 2) Polysomnographic recordings. The ADI-R (current scores) measured daytime functioning. Groups were compared using t-tests for independent samples. Pearson's correlation coefficients evaluated the association between sleep and daytime functioning.
Results: The CSHQ showed that ASD children have more problems than TD children with sleep onset delay and sleep duration. Compared to the TD group, polysomnographic recordings of ASD children showed a longer sleep latency (30.4±7.2 min, vs. 13.5±4.6; (p=0,006), more awakenings (15.54±2.47 min, vs. 13.97±2.31; p=0.055), less slow-wave sleep (18.4±0.8%, vs. 24.0±1.3%; p=0.002), but the same amount of REM sleep (18,9±0,9%, vs. 17,0±1,0; p=0,186). The density of EEG sleep spindles per hour of stage 2 was the same over the central electrodes (294.4±32.0, vs. 288.4±26.7; p=0.70) but inferior over the frontal electrodes (147.1±19.6 vs. 213.0±26.9; p=0.08). In the ASD group, CSHQ sleep latency showed a positive correlation with ADI-R on the communication (r=0.72; p=0.008) and the repetitive behavior scale (r=0.665; p=0.018) sum scores; CSHQ daytime sleepiness showed a positive correlation with the ADI-R socialization sum score (r= 0.590; p=0.043); PSG sleep efficiency showed a negative correlation with the ADI-R on the communication sum score (r= -0.742, p=0.006).
Conclusion: Objective and subjective measures show signs and symptoms of alterated sleep in children with autism. Sleep atypicalities in children with autism is associated with prototypicality of the autism phenotype: the more the sleep is modified in comparison to typical individuals, the higher are the scores indexing the atypicality of the autism phenotype.
Acknowledgements: Supported by the Canadian Institutes of Health Research and the "Fonds de la recherche en santé du Québec".

M-M-109 SLEEP DISORDERS IN ADULTS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER OF THE PREDOMINANTLY INATTENTIVE AND COMBINED SUBTYPES

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Introduction and Objectives: Attention-deficit/hyperactivity disorder (ADHD) is a condition characterized by inattention and/or impulsivity that starts in early childhood and persists into adulthood in 60% of cases. The aim of this study is to investigate the nature and frequency of sleep disturbances in adult ADHD.
Materials and Methods: Subjective data on sleepiness, sleep quality, alertness, circadian preference, and fatigue were collected from ADHD patients. Patients with significant daytime sleepiness and/or poor sleep quality were invited to participate in the second phase of our study, in which sleep-wake cycle and sleep architecture were objectively assessed by polysomnography and a dim light melatonin onset test.
Results: Subjective data have been collected from 102 patients with ADHD. Approximately 90% of patients with ADHD reported either excessive daytime sleepiness and/or poor sleep quality. While correlation studies revealed

no relationship between daytime sleepiness and sleep quality, there appears to be a correlation between sleep quality and fatigue. This is clinically important as it implies that fatigue, rather than daytime sleepiness, is a marker of sleep quality. It also raises the question of whether sleepiness is a pathological condition rather than a symptom of poor sleep quality. Regarding objective methods, data collected from 28 patients indicate that a large percentage of patients suffer from sleep apnea, initial and middle insomnia not associated with a circadian sleep disorder, reduced total sleep time, and increased REM sleep.
Conclusion: Given the high incidence of sleep problems in ADHD, understanding sleep in ADHD will lead to better understanding of the complexities of ADHD and, consequently, to the development of alternative and effective treatment options. Although the data presented here represent the preliminary results, this is one of the largest objective studies of sleep in adult ADHD conducted to date, and the results of this study are expected to open new avenues of investigation for the understanding of ADHD.
Acknowledgements: We would like to thank the Ontario Mental Health Foundation for financial support

M-M-110 SLEEP DURING REMISSION PERIODS OF BIPOLAR DISORDER

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Introduction and Objectives: Bipolar disorder is a mental illness characterized by periods of depression and mania/hypomania, interspersed with periods of remission. Even during these periods, many individuals continue to experience significant symptoms, including sleep difficulties. This study aims to describe the nature and severity of sleep disturbances of individuals with bipolar disorder.
Materials and Methods: Following an initial interview, where participants completed a series of questionnaires evaluating sleep and mood, they were asked to keep a sleep diary, to wear an actigraph, and to complete other instruments measuring sleep related issues for two consecutive weeks.
Results: The total sample consists of 40 participants including 14 with a bipolar disorder, 13 with primary insomnia, and 13 healthy controls without insomnia or psychiatric disorders. The three groups were not different in terms of age, sex, marital status or occupation. Sleep diary data showed that participants in the bipolar disorder and good sleeper groups were similar, with both groups reporting less sleep disturbances relative to the insomnia group on measures of sleep onset latency, time awake after sleep onset, total sleep time and sleep efficiency (all ps less than or equal to 0.01). A similar pattern of results was also observed, although less striking, on the actigraphic measures. Nevertheless, participants with a bipolar disorder perceived their sleep as more disturbed than participants without mental health or sleep problems ($p<0.001$), whereas their daytime functioning was more similar to the insomnia participants.
Conclusion: These results indicate that sleep difficulties are quite variable across individuals during remission periods of bipolar disorder. On the other hand, daytime functioning data are more consistent and suggest increased sleepiness and more irregular scheduling of activities. Interventions aimed at increasing daytime activity and maintaining a routine could have a positive impact on daytime functioning, including sleepiness, and could also have an indirect impact on sleep.

M-M-111 SLEEP IN MAJOR DEPRESSION: EFFECTS OF PHARMACOLOGICAL REM SLEEP SUPPRESSION ON PERFORMANCE IN NEUROPSYCHOLOGICAL TASKS

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Introduction and Objectives: Earlier findings suggest that non-rapid eye movement (NREM) sleep facilitates declarative memory consolidation and rapid eye movement (REM) sleep is particularly important in promoting procedural learning. The aim of this study was to examine the effects of pharmacological REM sleep suppression on performance in different neuropsychological tasks.
Materials and Methods: Pre-treatment polysomnography was examined in 41 moderately depressed patients (age range 19–44 years). In the morning after polysomnography, we tested memory recall and cognitive flexibility by assessment of verbal and figural fluency, a shift of attention task and the Trail Making Test B. After recording baseline values, patients were assigned randomly to one of three treatment groups: medication with citalopram or reboxetine or exclusive treatment with psychotherapy. Retesting took place one week after onset of treatment.
Results: The main results were (1) an association of slow wave sleep with verbal memory performance at baseline, (2) a suppression of REM sleep in patients taking citalopram and reboxetine, (3) no differences regarding neuropsychological performance within the treatment groups, and (4) no association of REM sleep diminution with decreases in memory performance or cognitive flexibility in patients treated with citalopram or reboxetine.
Conclusion: In line with other studies, our results suggest that there are no negative effects of a decrease in REM sleep on memory performance in patients taking antidepressants.

M-M-112 SLEEP INFLUENCE ON CARDIAC ACTIVITY IN ADULTS WITH AUTISM

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Introduction and Objectives: Poor sleep is a frequent finding in individuals with autism spectrum disorder (ASD) and it has been shown to interfere with daytime functioning, using either behavioral (Limoges et al., 2005) or EEG measures (Daoust et al. 2004). Literature in typically developing individuals (TD) shows that sleep also influences the regulation of the autonomic nervous system so that the sympathovagal tone is normally higher in the morning compared to evening values. Studies of electrocardiographic (ECG) recordings suggest that there might be disequilibrium between sympathetic and parasympathetic activity in autism (Ming et al., 2005) but it is not known whether this observation is related to sleep or not.
Materials and Methods: Fifteen men with ASD (22.3 ± 3.5 years) and 18 men TD (21.0 ± 4.2 years) were evaluated over two consecutive nights in a sleep laboratory. ECG samples were taken for 5 minutes at bedtime and just before final rise time in the morning. Spectral analysis of the ECG signal was performed using a commercial software and the following four variables were extracted: total spectral power, low frequency power (LF: sympathetic tone), high frequency spectral power (HFabs: parasympathetic tone), normalized values of high frequency spectral power (HFnu). Groups were compared with Student's t-tests.
Results: Significant differences between evening and morning values were found only in the TD group, with lower evening values for total spectral power ($p=0.008$), LF ($p=0.007$) and HFabs ($p=0.040$). In the morning, significantly lower HFabs ($p=0.043$) and HFnu ($p=0.027$) values were found in ASD vs. TD groups.
Conclusion: These results suggest that the effect of nocturnal sleep differs in TD and ASD individuals and that the parasympathetic tone is lower in ASD at rise time. Further analyses will focus on ECG activity during sleep, for each of the sleep stages.
Acknowledgements: This project was supported by the Canadian Institutes of Health Research and the "Fonds de la recherche en santé du Québec".

M-M-113 SLEEP PROBLEMS IN YOUNG ADULTS WITH ATTENTION-DEFICIT-HYPERACTIVITY DISORDER (ADHD) SYMPTOMATOLOGY

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Introduction and Objectives: The current study examined the relationship between sleep problems, sleep hygiene and Attention-Deficit-Hyperactivity Disorder (ADHD) symptoms in a sample of young adults with elevated ADHD symptomatology. ADHD has been linked to sleep problems in the literature; however, the nature of the relationship is not yet fully understood. Previous research has also failed to take into account lifestyle issues related to poor sleep hygiene (e.g., substance abuse) which have also been associated with ADHD in adults.
Materials and Methods: Sleep symptoms were assessed using the Sleep Problems Inventory (SPI) and ADHD was assessed using the DSM items from the Conners Adult ADHD Rating Scales (CAARS). Data from 713 undergraduates were analyzed, and "ADHD symptom groups" were identified based on

CAARS scores: High inattentive (n= 63); high hyperactive/impulsive (n= 55); high combined (n=29), and non-ADHD controls (n=222).
Results: ADHD symptoms were associated with insomnia and sleepiness, and also substance abuse and poor sleep scheduling. However, poor sleep hygiene did not account for the sleep problems. Young adults with elevated ADHD symptoms reported higher insomnia and sleepiness levels, even after controlling for substance abuse and poor sleep scheduling.
Conclusion: Findings suggest a genuine association between ADHD and sleep symptoms that may reflect the underlying presence of sleep disturbances in young adults with elevated ADHD symptoms.

M-M-114 SLEEP PROFILE IN POST-TRAUMATIC DISORDER PATIENTS: A POLYSOMNOGRAPHIC EVALUATION IN AN EGYPTIAN SAMPLE

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Introduction and Objectives: Although sleep disturbance is considered a hallmark of post-traumatic stress disorder (PTSD), objective evidence for sleep disturbance in those patients has been equivocal. The aim of this study is to explore the subjective and objective sleep disturbance in PTSD patients, and its correlation with severity of PTSD symptoms.
Materials and Methods: The study included 20 patients fulfilling DSM-IV-TR criteria of PTSD, recruited from outpatient clinics of the Institute of Psychiatry, Ain Shams University, Cairo (aged 18-45 years, no medical or mental comorbidity and medication free, for at least two weeks). A control group of 10 healthy volunteers (age and sex matched) were slected from emploees of the same Institute of Psychiatry. All patients were subjected to complete medical and neurological examination, Structured Clinical Interview for DSM-IV axis-I diagnosis (SCID-I), PTSD Checklist (PCL), Standardized Sleep Questionnaire (SSQ) (in Arabic), and overnight polysomnographic (PSG) assessment. Control group completed General Health Questionnaire (GHQ)and general physical examination to exclude any medical or mental morbidity as well as SSQ and PSG.
Results: Subjective sleep assessment revealed more initial and middle insomnias in the patients group with higher prevalence of nightmares and sleep talking. Significant differences in PSG revealed longer sleep latency, lower sleep efficiency and higher arousal index in PTSD patients. Increased stages I and II, with decreased SWS, were obtained in patients, with no significant difference regarding REM sleep parameters, and sleep related breathing disturbance. Periodic limb movement index was significantly higher in PTSD patients. Correlation between sleep changes and severity of PTSD was not significant.
Conclusion: Our study confirmed both subjective and objective sleep abnormality in patients with PTSD. Despite the higher prevalence of nightmares, the nature of PSG abnormality is more related to NREM parameters, with no significant correlation between sleep changes and severity of PTSD symptoms.

M-M-115 SLEEP-WAKE PATTERNS AND MOOD DISTURBANCES IN PATIENTS WITH PSYCHOTIC DISORDERS: A CONTROLLED STUDY

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Introduction and Objectives: In the general population, sleep and mood have been shown to influence each other. The prevalence of comorbid mood and sleep disruptions is especially high in people with psychotic disorders, but little is known about their interaction in this population. This study aimed to investigate the relationship between sleep and mood disturbances in young adults with psychotic disorders, and to evaluate how these disturbances relate to subjective quality of life.
Materials and Methods: Twelve outpatients with psychotic disorders and 12 age-matched healthy controls underwent up to 14 consecutive nights of actigraphy recording. Symptoms of depression were determined using the Hamilton Depression Rating Scale (HAM-D), which was used to subdivide the psychotic group into two groups: minimal depression and mild depression. Subjective quality of life was assessed with the World Health Organisation Quality of Life questionnaire. Sleep and mood data were analysed with Kruskal-Wallis ANOVAs and Pearson correlations.
Results: Compared to the control group and the minimal depression psychosis group, the mild depression psychosis group had significantly higher variability in rest efficiency and in wake after rest onset ($p \leq 0.05$). Moreover, the variability in rest efficiency was significantly correlated with HAM-D total score ($r=0.70$, $p=0.04$). Objective sleep variables and depressive symptoms were associated with different domains of quality of life; sleep was related to the social, physical and environmental domains whereas depression was linked to the social and psychological domains ($r= -0.64$, $p \leq 0.03$).
Conclusion: These results suggest that comorbid mild depression may be a possible aggravating factor for sleep problems in people with psychotic disorders, and that sleep and mood difficulties may be independently linked to lower quality of life in this population. These findings reinforce the importance of evaluating and treating both sleep and mood disturbances in patients suffering from psychotic disorders.

M-M-116 SLOW-WAVE EEG ACTIVITY DURING NREM SLEEP IN ADULTS WITH AUTISTIC SPECTRUM DISORDERS

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Introduction and Objectives: Sleep of autistic adults is characterized by low amounts of slow-wave sleep (SWS: stages 3+4). The main polysomnographic feature of SWS is Delta activity, a low frequency EEG signal peaking over frontal recording sites. Our objective was to map quantified EEG Delta activity in adults with autism using a full EEG montage in order to verify its amplitude and distribution vs. a group of typically developed individuals.
Materials and Methods: Sixteen autistic adults (ASD:15M, 1W, 22.0±3.8 years) and 18 comparison participants (COM: 17 M, 1 W, 21.0±4.2 years) were recorded for two consecutive nights using Fp1, Fp2, Fz, F3, F4, F7, F8, Cz, C3, C4, T7, T8, Pz, P3, P4, P7, P8, O1, and O2 electrodes. Spectral amplitude of Delta activity (0.75-3.75Hz) was computed in nonREM sleep (stages 2+3+4) for the first seven hours after sleep onset, and in SWS for the first hour of sleep after sleep onset. Groups were compared for a) the seven frontal electrodes and b) the remaining electrodes, with one-way ANOVAs.
Results: a) Frontal Delta activity was significantly *decreased* for ASD compared to controls for Fz (ASD=2.7±0.06, COM=2.9±0.06) and F3 (ASD=2.7±0.06, COM=2.8±0.06) during nonREM sleep. A stage-by-stage analysis showed that differences were restricted to stage 2; moreover, this analysis disclosed *increased* Delta activity for F7 in the ASD group (ASD=296.13±52.06, COM=158.22±11.43) and a comparable trend at T7. b) More posterior recording sites showed a *decreased* activity over C3, C4, Pz, P3, P4, O1 and O2 both during stage 2 and SWS.
Conclusion: Delta activity during nonREM sleep is *decreased* over most of the recording sites of the ASD group while it is *increased* over the left temporal lobe (F7, P7). These results further support the hypothesis of an atypical cortical connectivity in ASD, possibly due to altered synaptic density, maturity, or cortical metabolic rate during nonREM sleep.
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M-M-117 THE RELATIONSHIP BETWEEN SLEEP AND MEMORY IN PTSD

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Introduction and Objectives: Research has shown that in normal individuals sleep is critical to the formation of memories. Successful memory consolidation during sleep is contingent on the presence of slow-wave sleep (SWS), REM sleep and the successful transition of stages across the night. In PTSD, both sleep and memory processes are disrupted, but no previous study has examined whether these two variables are inter-

related. This study aimed at determining whether disrupted sleep was a mechanism underlying declarative memory deficits in PTSD, investigating whether memory consolidation during sleep is disrupted in PTSD diagnosed individuals in comparison with controls.
Materials and Methods: Participants were recruited to one of four groups – PTSD (n = 16), trauma-exposed non-PTSD (n = 15), depression (n = 15) and healthy controls (n = 14). After a screening interview, participants attended the Vincent Pallotti sleep laboratory for one night. On arrival, they completed several tasks measuring declarative and procedural memory performance. Declarative memory was assessed using a story recall task. Procedural memory was measured using a finger tapping task. After memory tasks were completed, participants prepared for bed and went to sleep. Sleep variables such as total sleep time, sleep latency, number of awakenings, and percentage spent in REM and SWS were measured using sleep adapted EEG.
Results: Results were analysed using one-way ANOVA for sleep and memory variables as well as regression analysis with memory variables as the outcomes. PTSD participants retained significantly less information on a declarative memory task than healthy controls after sleep, despite the fact that PTSD diagnosed individuals did not show the worst encoding or delayed recall scores. Further disruptions in SWS, which is directly implicated in declarative memory consolidation during sleep, predicted poor memory performance in at least one domain of declarative memory.
Conclusion: Overall results show some support for the disruption of memory consolidation during sleep in PTSD.
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M-M-118 THE REM SLEEP ABNORMALITIES OF 90 CHINESE DEPRESSED PATIENTS

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Introduction and Objectives: REM sleep activity is reported abnormal in depressed patients, such as shortened REM latency, increased REM density. In our study, we observed the REM sleep variances of 90 Chinese depressed patients. We aimed to detect the characteristics of REM sleep in depression and to check if degree of severity of depression contributes to REM sleep variance.
Materials and Methods: The study was conducted at psychological department and sleep medicine center of Guang'anmen Hospital, China Academy of Chinese Medical Sciences, from January 2008 to May 2010. According to depression diagnostic criterion of ICD-10, 90 depressed patients aged between 20 and 60 years were enrolled after diagnosed by 1 psychiatrist with more than 10 years' working experience. Montgomery-Asberg Depression Rating Scale (MADRS) was used to evaluate the degree of severity of depression. Polysomnography (PSG) were used to evaluate the REM sleep variance. 50 healthy people were enrolled to do PSG only as the control group. The PSG data was analyzed by 2 technologists.
Results: Compared to healthy controls, REM sleep of depressed patients manifested a series of variances: shortened RL (79.27±20.44), increased REM sleep percentage (24.81±6.11), REM sleep numbers (5.20±1.10), and REM activity (123±37.25). However, in our study, no significant correlation between REM variance and degree of severity of depression was found when relevant data was analyzed by Spearman's correlation.
Conclusion: The changes of REM sleep of 90 Chinese depressed patients are similar to other reports; however, whether degree of severity of depression contributes to REM sleep variances still remain unclear. More studies are needed before a definite conclusion can be made.
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M-M-119 ANXIETY DISORDERS IN PATIENTS WITH UNEXPLAINED CHEST PAIN: INVESTIGATING INSOMNIA AND FAULTY BELIEFS ABOUT SLEEP

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Introduction and Objectives: The relationship between sleep and anxiety in patients with unexplained chest pain (UCP) remains unexplored. This study aims at: (1) estimating the prevalence of insomnia in this population; (2) evaluating the relationship between anxiety disorders and insomnia, considering the possible mediating effect of depression; and, among individuals reporting insomnia, (3) comparing beliefs and attitudes about sleep in anxious and non-anxious patients.
Materials and Methods: The sample includes 305 patients who consulted for UCP in emergency departments of two hospitals in the province of Québec. Inclusion criteria were: (1) UCP as chief complaint, (2) age 18 and older, and (3) ability to speak and write in English or French. Exclusion criteria were the presence of: (1) a physical cause explaining chest pain or (2) an unstable medical condition. The Anxiety Disorders Interview Schedule was administered, and participants completed the Insomnia Severity Index and the Dysfunctional Beliefs and Attitudes about Sleep Questionnaire.
Results: More than half (54%) of participants reported clinically significant insomnia. Hierarchical linear regressions showed a significant association between insomnia and a diagnosis of anxiety disorder ($p<0{,}001$), with a diagnosis of depression being a non significant mediator (p=0,509). Among patients reporting insomnia, those with an anxiety disorder showed: (1) a diminished perception of control and predictability of sleep ($t(147) = 2{,}99$, p=0,003), (2) greater amplification of consequences of insomnia ($t(155) = 2{,}80$, p=0,006), and (3) more faulty beliefs about sleep-promoting practices ($t(143) = 3.165$, p=0,002).
Conclusion: Insomnia is frequent among emergency department patients with UCP and is associated with anxiety disorders. Examining beliefs and attitudes about sleep exposes a thinking pattern typically found in anxiety that is characterized by intolerance of uncertainty and need for control.

N: Narcolepsy

M-N-120 ENVIRONMENTAL RISK FACTORS FOR NARCOLEPSY IN A SERIES OF 32 NARCOLEPTIC-CATAPLECTIC PATIENTS

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Introduction and Objectives: Epidemiological studies emphasize the importance of environmental risk factors in the aetiology of narcolepsy-cataplexy (NC) in genetically predisposed patients. The aim is to replicate literature findings in a case-control study using disease controls matched for age at onset.
Materials and Methods: All narcoleptic patients were recruited through our outpatient department, and the diagnosis of NC fulfilled the criteria of the ICSD. Picchioni's questionnaire was administered to 32 NC patients, and we specifically determined the stressor and infectious factors one year before the onset of the first potentially related symptom (sleep episodes or cataplectic attacks). The questionnaire consisted of 54 environmental risk factor items and 42 infectious disease items. Data from questionnaires were matched with 32 control participants recruited from non-related family members (e.g. spouses) and local community members. We asked the control group about the risk factors appearing in early adulthood. The cases and controls were matched for current age.
Results: The questionnaire was answered by 32 patients (20 males [16

sporadic cases, and 7 cases from the same family]) with a mean age at the onset of sleep episodes of 22.19±9.1 yrs (range, 6-36) and mean age at diagnosis of NC of 39.2±13.2 yrs (range, 18-61). The most frequent environmental risk factor was a major change in sleeping habits (31.3%), and the difference was statistically significant compared with the control group (p=0.029). This was followed by death of a close friend or family member (31.3%) and major change in working hours or conditions (21.9%), although the differences were not significant. Common cold was the most frequent infectious disease (48.3%), although, once again, the difference between the groups was not significant.
Conclusion: In line with previous studies, the only significant difference in risk factors in our NC series was major change in sleeping habits.

M-N-121 FAVORABLE EFFECT OF STEROID THERAPY FOR AN 11-YEARS-OLD GIRL WITH ACUTE ONSET NARCOLEPSY

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Introduction and Objectives: Introduction: The autoimmune mechanism has been hypothesized to underlie the pathogenesis of narcolepsy. Here we reported favorable effect of steroid on a girl with very recent onset-narcolepsy with cataplexy.
Case Report: An eleven-years-old girl visited our clinic because of sleepiness and cataplexy. On the day when her second menstruation occurred, she abruptly developed difficulty walking due to frequent knee bucklings. Soon severe daytime sleepiness followed and she could not keep awake for 15 minutes during daytime, sometimes became stuporous in school or at home. She collapsed on the floor with her jaw sagging when she laughed. Frequent nocturnal awaking together with muscle twitches and sleep talking also started. Her medical histories were unremarkable except for mild bronchial asthma from childhood. Initial nocturnal polysomnography (nPSG) revealed seven sleep cycles and 4 slow wave sleep (SWS) periods distributed throughout the night, predominantly in the morning. The hypocretin-1 level in her cerebrospinal fluid (CSF) was undetectable and other inflammatory cytokines were not elevated. HLA-typing revealed she carried HLA-DQB1*0602 allele. From the 32nd day of her illness, she was medicated with full dose of predonisolone for two weeks with three weeks tapering off period. Her frequent knee bucklings decreased and she could walk by herself. She could stay awake longer in daytime. Her Epworth Sleepiness Score reduced from 19 to 9, though sleepiness and cataplexy remained. Second measurement of CSF hypocretin-1 and cytokine levels showed no change.
Discussion: Steroid therapy reduced her cataplexy frequency and subjective daytime sleepiness, though CSF cytokines and hypocretin-1 levels were not changed. Change in nocturnal sleep structure might contribute to the improvement. The steroid therapy could be effective for symptoms of narcolepsy. Steroid could be one therapeutic option for acute onset narcolepsy.

M-N-122 MONOZYGOTIC TWINS AFFECTED WITH KLEINE-LEVIN SYNDROME

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Introduction and Objectives: A recent review article on recurrent hypersomnia indicated that the percentage of familial cases of Kleine-Levin syndrome (3.7%) was in the same range as that of narcolepsy with cataplexy. Aim. To report a unique pair of Spanish monozygotic twins who were affected with Kleine-Levin syndrome.
Materials and Methods: Both patients underwent a complete physical examination and laboratory work-up including EEG, PSG, MRI, and HLA class II antigen typing
Results: – Case No. 1 was the second-born twin. His first attack occurred at the age 17, after breaking up with his first girlfriend, and his last attack occurred at the age of 31. Clinical features included recurrent bouts of hypersomnia associated with compulsive eating, increased libido, cognitive symptoms, depression and anxiety, profuse sweating, and transient elation and insomnia at the end of episodes. The patient was diagnosed with Kleine-Levin syndrome.
– Case No. 2 was the first-born twin. His first attack occurred at the age of 16, in the context of rhinitis, and his last attack at the age 29. Clinical features included recurrent hypersomnia, anorexia, odd behavior, cognitive symptoms, depression and anxiety, transient partial amnesia, and insomnia at the end of episodes. His diagnosis was Kleine-Levin syndrome without compulsive eating. The twin brothers looked very much like each other and genetic markers (HLA and 7 additional highly polymorphic markers on chromosome 11 and 15) revealed identical results, confirming monozygosity.
Conclusion: To our knowledge this is the first published report of monozygotic twins with Kleine-Levin syndrome. Although familial cases of KLS are extremely rare, our observation raises the possibility of genuine genetic forms of KLS.

M-N-123 MULTICOMPONENT COGNITIVE BEHAVIORAL TREATMENT EFFICACY FOR NARCOLEPSY (MCBT-N)

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Introduction and Objectives: Narcolepsy treatment includes pharmacological strategies, with high recommendation levels and strong studies that demonstrate the effectiveness. So far there are few studies on the effectiveness of CBT for the treatment of narcolepsy. The objective of this study was to evaluate the effect of a multicomponent cognitive-behavioral treatment of 12 weeks for narcolepsy.
Materials and Methods: Randomized study sample of 11 patients, assigned MCBT-N (sleep satiation, scheduling naps, cognitive restructuring, problem solving, systematic desensitization and training in social support), and controls. Care was taken to confirm the diagnosis of narcolepsy and that they were not receiving pharmacological treatment when assigning the intervention protocol. Multiple Sleep Latency, Epworth Sleepiness Scale, the SF36, Ullanlina Narcolepsy scale and the Stanford cataplexy scale (modified) were used at pre-treatment, 6 months and 12 months of treatment.
Results: Differences were significant for patients compared to controls ($p < 0.001$) with improvement in TCC-MN at six months and one year after finishing treatment. Dimensions of quality of life related to health (SF-36), excessive daytime sleepiness and symptoms of narcolepsy improved along with improvement in the areas of social function ($p < 0.005$), vitality and role limitations, physical problems both in emotional problems ($P < 0.001$). These areas were more abormal in the patients before the measurements and their improvement has been reported in previous studies. Importantly, the reduction of episodes of excessive daytime sleepiness, the TMLS means ($p < 0.005$), and episodes of cataplexy ($p < 0.005$), were significant at the one year of treatment, without significant differences compared to the six months treatment.
Conclusion: Multicomponent cognitive behavioral therapy applied systematically produces appropriate levels of efficacy intervention in narcolepsy, results that significantly impact the improvement of quality of life of patients treated with this protocol. However, it is necessary to study larger samples support the conclusions of this study.

M-N-124 PSYCHOPATHOLOGICAL PROFILE IN PATIENTS WITH PRIMARY HYPERSOMNIA

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Introduction and Objectives: Psychopathological profile in patients with Primary Hypersomnia has not been systematically studied, probably due to the complexity and chronicity of this disease and to the possible side-effects

of the drugs used for treatment. The Minnesota Multiphasic Personality Inventory (MMPI) is the clinical test used most frequently to identify personality profiles and for diagnosing different psychopathologies. It is composed of multiple scales, including six critical variables with a greater influence in the treatment decision.

Materials and Methods: We have performed a comparative and observational study using the latest version of the MMPI-2RF in 10 patients in our sleep laboratory diagnosed with Primary Hypersomnia. The range of age was 18 to 40 years. 7 of them had Narcolepsy, 3 of them with Cataplexy, and 3 had Idiophatic Hypersomnia. None of them had a history of psychiatric or somatic problems. The education level of the patients was at least the high school level. We compared the results with 10 healthy controls with similar demographic characteristics but without sleep disorder. Previous informed consent was obtained from all patients.

Results: Preliminary results showed in patients a high level of demoralization, somatization, absence of positive emotions, hopelessness and no motivation for change. Many patients showed a propensity for violence, familial conflicts and impulsivity. None of these characteristics were identified in the control group. We performed a statistical analysis with the data. In a discriminant analysis between the critical variables, we found that a combination of two factors, specifically anxiety (AXY) and defenselessness (HLP), were capable of separating patients from the control subjects.

Conclusion: Based on preliminary data we have found a specific psychopathological profile in patients with Primary Hypersomnia but a more detailed and extensive study is needed to provide consistent data. In our experience, we suggest that these patients need specific psychological support.

M-N-125 REACTION TIME IN A MONETARY INCENTIVE TASK DOES NOT DIFFER BETWEEN NARCOLEPSY PATIENTS AND HEALTHY CONTROLS

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Introduction and Objectives: Hypocretin deficiency in narcolepsy – cataplexy patients has been linked to disturbed emotional processing, especially reward. We aimed to assess reaction time in narcolepsy patients and healthy controls in an incentive monetary task and to compare outcomes to those in healthy controls.

Materials and Methods: Nine HLA positive, hypocretin-deficient (7/7 tested) unmedicated (8/9) narcolepsy patients with cataplexy (mean age 39 years) and nine healthy controls (mean age 31 years) performed an incentive monetary task using different value and valence cues. The participants had to press a button as fast as possible while a picture of a landscape was presented on the screen in order to gain or not lose money. On each trial, the picture was preceded by one of four possible cues: potential gains (+1/+5 points) or losses (-1/-5 points). The duration of the target presentation was adapted online based on the participant's performance on the previous trials to ensure a balanced amount of won and lost trials in each participant. Data was analyzed using repeated measures ANOVA (with group as a between subject factor and valence – positive versus negative, and value – small versus big cues, as within subject factors) and unpaired t-tests.

Results: Reaction time for successful trials did not differ between patients (mean ± SD, ms 313±66) and controls (277±61) in general. There were no differences in reaction times neither for small versus large cues nor for positive versus negative cues.

Conclusion: Narcolepsy patients achieve normal reaction times in highly motivational game-like tasks.

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M-N-126 RETROSPECTIVE EVALUATION OF PREGNANCIES IN EUROPEAN NARCOLEPTIC WOMEN

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Introduction and Objectives: Narcolepsy is a chronic disease that causes patients many complications in everyday life. Although there have been advancements in recent years in understanding this disorder, its effects on pregnancy and childbirth are still largely unknown. To address this problem we ran an international study.

Materials and Methods: We carried out a retrospective questionnaire study with patients suffering from narcolepsy in 10 European countries. The data were collected from 245 mothers with a total of 373 children

Results: 213 patients were diagnosed with narcolepsy and cataplexy (NC) and 32 with narcolepsy without cataplexy (Nw/outC). The patients were aged during pregnancy on average 27.4±6.2 years old. The mean BMI before pregnancy was 28,2±5,6, the patients gain on average 14,7±7,8 kg. Women with NC gained significantly more weight than women without cataplexy. Ten percent of patients suffered from complications as impaired glucose tolerance, type 2 diabetes mellitus, hypertension or preeclampsy. Twenty women took medications against the symptoms of narcolepsy (Ephedrin, Fenmetrazin, Modafinil, Sodium Oxybate) without any reported complication. Duration of pregnancy was 39.3±5.1 weeks, 78% of patients delivered spontaneously. Two patients with NC experienced cataplexy during the delivery. Women with NC reported significantly higher rate of Caesarean sections, than patients without cataplexy. Weight of newborns was 3328±826 g and their height was 50.7±3.0 cm. From 373 newborns, there were 207 boys and 166 girls. 64% of babies endured reduced levels of care due to mothers afflicted with one or more symptoms of narcolepsy

Conclusion: Overall, no clinically relevant adverse effects of narcolepsy on pregnancy, childbirth or the newborn were disclosed. Coping with baby care is more difficult due to symptoms of narcolepsy.

M-N-127 SUBJECTIVE RATING OF ATTENTION AND MOOD IN PATIENTS WITH NARCOLEPSY-CATAPLEXY

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Introduction and Objectives: Narcolepsy-cataplexy is a neurological disease due to hypocretin deficiency. Hypocretin is a neurotransmitter which is especially important for sleep wake regulation, motor control in sleep and food intake. Findings about cognitive functioning in narcolepsy-cataplexy are inconsistent. Deficits have been described in demanding tasks assessing attention or executive functions. Patients themselves frequently report difficulties in cognitive domains including attention and memory. Furthermore, a high proportion of anxiety disorders (Droogleever Fortuyn et al., 2010) or of depressive symptoms (Dauvilliers et al., 2009) has been reported. The present study investigates how subjective ratings of attention relate to objectively measured cognitive functions and to ratings of depression and anxiety.

Materials and Methods: Thirty consecutive patients with narcolepsy-cataplexy according to ICSD-2 criteria completed the FEDA questionnaire assessing everyday attention in three different domains (distractibility and

slowing in mental processes, fatigue and slowing in practical activities, drive; Zimmermann et al., 1991), standard neuropsychological tests of attention and executive functions, as well as ratings of depression, anxiety and sleepiness.
Results: No correlations were found between subjectively perceived attention and objectively measured neuropsychological functions. Significant correlations appeared between attention ratings and depression scores. Furthermore, the self rating of subjective attention scores correlated with sleepiness.
Conclusion: Subjective and objective measures of attention may dissociate. Self reported deficits in attention are not always related to objectively measured performance decrease, but may be related to depressive symptoms. These results are of importance for clinical practice and for patients'counseling.

M-N-128 THE AMYGDALA IS NECESSARY FOR TRIGGERING CATAPLEXY IN OREXIN KO MICE

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Introduction and Objectives: Narcolepsy, a sleep disorder that results from a loss of orexin/hypocretin signaling, is characterized by cataplexy and excessive daytime sleepiness. Cataplexy is the sudden loss of postural muscle tone during waking and is often elicited by positive emotions in both human patients and animal models of narcolepsy. The neural circuitry responsible for triggering cataplexy is not well understood, but the amygdala helps regulate positive emotions and amygdala neurons fire in association with cataplexy. To investigate whether the amygdala is necessary for triggering cataplexy, we ablated amygdala neurons in orexin KO.
Materials and Methods: Excitotoxic lesions were made using ibotenic acid and mice were recorded using EEG, EMG, and video to identify cataplexy under both baseline and cataplexy-inducing conditions.
Results: We found that compared to baseline conditions, sham-lesioned orexin KO mice had a 100% increase in the occurrence of cataplexy when given a running wheel and a 218% increase when given palatable food plus a running wheel. Bilateral amygdala lesions had little effect on baseline levels of cataplexy, but they reduced the frequency of cataplexy by 54% and 63% (for wheel running and palatable food/wheel running, respectively) when compared to the sham-lesioned group. Interestingly, lesioned mice had increased amounts of REM sleep when compared to the sham group.
Conclusion: This data suggest that the amygdala is a necessary part of the neural circuitry responsible for cataplexy induced by positive emotions.

M-N-129 THE NARCOLEPSY AND SCHIZOPHRENIA IN PEDIATRIC CASES

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Introduction and Objectives: Narcolepsy is a sleep disorder with daytime sleepiness, cataplexy and other manifestations of REM sleep. There is no large sample size study looking at the simultaneous presence of narcolepsy and schizophrenia. Therefore, we performed a retrospective case controlled study based on a prospectively recruited group investigating this question.
Materials and Methods: We collected 158 total narcolepsy patients with 100 narcolepsy with cataplexy patients meeting all ICSD-2 criteria for diagnosis. Ten of the narcolepsy with cataplexy had both narcolepsy and schizophrenia. For the 90 subjects with narcolepsy without schizophrenia, 37 matched for age and gender at time of study with the 10 narcoleptics with schizophrenia. Moreover, 13 young schizophrenia patients could also be matched for age and gender with these narcoleptic with schizophrenia group.
Results: The age of onset of narcolepsy with schizophrenia group is 11.25±2.92 years old and 12.59±3.41 years old in narcolepsy without schizophrenia group. At entry mean BMI of narcoleptic with schizophrenia group is 27.39±6.17 (p=0.016). The comobidity data showed there is 80% (n=8) of the narcolepsy with schizophrenia group had BMI >25 compared to 37.8% (n=14) of narcoleptic without schizophrenia group and 15.4% (n=2) schizophrenia group (p=0.028).There was a significantly higher percentages of major depression using DSM criteria in narcoleptic- schizophrenia (50%). They also had significantly lower total sleep time and stage 2 NREM sleep in narcolepsy with schizophrenia group.
Conclusion: At entry narcoleptic- schizophrenia had abnormal BMI and subjective more important PANSS, CGI, PDSS and VAS score. Our genetic analysis did not show significant results between these three group.

M-N-130 TIME PERCEPTION IN NARCOLEPSY PATIENTS AND HEALTHY CONTROLS

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Introduction and Objectives: Prefrontal cortex plays an important role in cognitive time processing, and time perception depends on sustained attention. Narcolepsy-cataplexy patients are unable to maintain sustained attention, probably due to deficient hypocretin signaling. We aimed to assess time perception in patients with narcolepsy-cataplexy and compare the outcome that of healthy control subjects.
Materials and Methods: Nine HLA positive, hypocretin-deficient (7/7 tested) unmedicated (8/9) narcolepsy patients with cataplexy (mean age 39 years) and nine healthy controls (mean age 31 years) performed a time estimation task, where they had to estimate one, two or five seconds. A picture was presented on the screen and the participants had to press a button after the above mentioned time periods. If the time estimation was right, the initial picture turned funny, if not a mirror image of the initial picture was presented. Data was analyzed using unpaired t-tests and repeated measures ANOVA (with group as a between subject factor and standard deviation of the time estimation as a within subject factor).
Results: No significant differences were observed in time estimation between patients and controls. However responses of narcolepsy patients varied significantly more than those of healthy controls (main effect for group, $F=5.2$, $p=0.041$). In both groups the responses varied significantly more for longer periods to be estimated (main effect for standard deviation of the time estimation, $F=12.2$, $p<0.001$). There was no interaction between the two factors.
Conclusion: Time perception appears to be normal in narcolepsy patients although response times were more variable than the response times of healthy controls.
Acknowledgements: The study is supported by a Swiss National Foundation (SNF) Grant.

M-N-131 COULD ORAL IMMUNOTHERAPY TO COW MILK INDUCE NARCOLEPSY-CATAPLEXY?

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Introduction and Objectives: The autoimmune hypothesis of narcolepsy-cataplexy is based on the close association with HLA. The possibility that narcolepsy-cataplexy is a side effect of vaccination against H1N1 influenza has been raised. Hypotheses include specific immune response or generalized stimulation of the immune system. Aim: To present a unique case of narcolepsy-cataplexy that appeared during oral immunotherapy to cow milk (CMOIT).
Materials and Methods: Case Report. A 6-year-old girl with cow-milk allergy and asthma since the age of 3 was referred due to sleep episodes at school and cataplexy attacks triggered by laughter 3 months after starting a 6-month CMOIT protocol. She was not vaccinated against H1N1. Cataplexy consisted of tongue protrusion and complete loss of muscle tone. She also presented frightening hypnagogic hallucinations, headache, and binge eating.
Results: Physical and neurological examinations (including EEG) were normal. Cranial MRI showed a hyperintense periatrial signal. Video-PSG showed disturbed nocturnal sleep with a sleep onset REM episode, increased N-1, sleep fragmentation, WASO, low sleep efficiency, bruxism, and central apnoeas. Mean sleep latency was 7.5 minutes and 4 SOREMPs were observed

on MSLT. She was DRB1*1501-DQB1*0602–positive and her CSF Hcrt-1 level was undetectable (<10 pg/ml). She was treated with intravenous immunoglobulin 2 g/kg/d for 2 days repeated 4 times at 4-week intervals followed by 1 g/kg/d (2 days) and 400 mg/kg/d (every month). Before the fourth cycle, sleep episodes were less frequent, but cataplexy persisted. She did not gain weight and the binge eating disappeared. PSG showed increased WASO and sleep fragmentation. MSLT showed sleep latency of 9 minutes and 2 SOREMPs. A new lumbar puncture revealed undetectable levels of Hcrt-1.
Conclusion: To our knowledge, this is the first report of pediatric narcolepsy-cataplexy induced by oral immunotherapy to cow milk. Larger epidemiological studies are needed to obtain more reliable data.

O: Other

M-O-132 ASSESSING UNDERGRADUATE SLEEP KNOWLEDGE, ATTITUDES, AND CHARACTERISTICS USING A MODIFIED DARTMOUTH SLEEP SURVEY

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Introduction and Objectives: American college students reportedly cavalierly neglect sleep as much as possible. However, their sleep attitudes, knowledge, and practices have not been well studied, despite its importance for planning any intervention. This study assesses these factors by developing a questionnaire and using it to survey a large undergraduate population.
Materials and Methods: The Dartmouth Sleep Knowledge and Attitude Survey was modified for a general undergraduate population and items were added about undergraduate sleep related practices. All undergraduates at Johns Hopkins University were invited via general university-wide announcements to take the new survey. 655 students participated (average age 20.6±2.6 years), 503 surveys were completed.
Results: Students reported an average nightly sleep of 6.45±1.12 hours during the academic weekday, 8.38±1.23 hours during the academic weekend, and 6.34±1.36 hours during exam week. 80% strongly agreed that sleep is important to people's health, 69% strongly agreed it was important to individual health, while 71% felt sleep loss was unavoidable for undergraduates, and 63% felt it was possible to adapt to chronic sleep loss. 28% reported being involved in a "close call" due to sleepiness while driving. Weekday sleep was more likely to be correlated to personal perspectives on sleep than to sleep knowledge.
Conclusion: This survey provides a cheap and simple way to monitor college student's sleep habits and attitudes. It documented undergraduate sleep loss and associated adverse consequences, but also revealed subtle disconnects between sleep knowledge and attitudes. Sleep was viewed as important but something that could be sacrificed despite possible risks. Campus interventions should address personal attitudes and individual needs, more than increasing general sleep knowledge, to improve the sleep habits of undergraduates.

M-O-133 FATIGUE IN MULTIPLE SCLEROSIS: WHICH PATIENT SHOULD BE REFERRED TO A SLEEP SPECIALIST?

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Introduction and Objectives: Fatigue is among the most frequent symptoms in multiple sclerosis (MS) patients with substantial negative impact on quality of life and employment status. The enormous personal and socioeconomic burden of this symptom is in striking contrast to our sparse knowledge on aetiopathogenesis and the insufficient treatment options. In a previous study (Veauthier et al., Multiple Sclerosis Journal 2011) we found a significant relationship between sleep disorders and fatigue in MS, measured with the Modified Fatigue Impact Scale (MFIS), but there was no significant relationship between sleep disorders and the values in the Epworth Sleepiness Scale (ESS). Fatigue is usually not associated with the propensity to fall asleep. In order to find a screening instrument for sleep disorders in MS-related fatigue we investigated the self-rating questionnaires applied in our previously reported polysomnographic investigation to predict the presence of a sleep disorder.
Materials and Methods: A Receiver Operating Characteristic (ROC) analysis was performed (SPSS 13, SPSS Inc., Chicago, IL, USA).
Results: Here, a MFIS score of > 34 yielded a sensitivity of 71.4% and a specificity of 82.4% for predicting sleep disorders as detected by polysomnography (positive predictive value 92.1%; negative predictive value 50%). A threshold value of > 5 in the Pittsburgh Sleep Quality Index (PSQI) yielded 75% sensitivity, 64.7% specificity (positive predictive value 85.7%; negative predictive value 47.8%). By jointly applying the MFIS-cut-off of 34 and the PSQI-cut-off of 5 (either MFIS > 34 or PSQI > 5), a higher sensitivity of 89.8% was achieved (specificity 58.8%, positive predictive value 86.3%, negative predictive value 66.7%).
Conclusion: Our data show that the combination of two self-rating questionnaires which can easily be filled out within a few minutes is a good screening instrument for sleep disorders in MS-related fatigue: the MFIS and the PSQI together can predict sleep disorders with a good sensitivity in fatigued MS-patients.

Tuesday, September 13, 2011

D: Insomnia

T-D-001 ABSENCE OF TOLERANCE, DEPENDENCE POTENTIAL, AND REBOUND DURING PRN TREATMENT OF MIDDLE-OF-THE-NIGHT AWAKENING WITH ZOLPIDEM TARTRATE SUBLINGUAL TABLET 3.5MG

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Introduction and Objectives: Zolpidem tartrate sublingual tablet 3.5mg (ZST), with buccal absorption promoting buffers, was developed for MOTN awakening. Data from a 4-week prn outpatient study were analyzed to evaluate persistence of efficacy (tolerance potential), weekly tablet utilization (dependence potential), and sleep on non-dosing nights (rebound).
Materials and Methods: Dependence potential was determined by assessing: 1) repeated measures ANCOVA of post-MOTN sleep latency (LSOMOTN) across 4 weeks of treatment, 2) to determine tolerance; weekly medication use across weeks; and 3) change in sleep onset and total sleep time relative to baseline on the first non-dosing night after one or more nights of medication as a measure of rebound insomnia.
Results: There was no evidence of development of tolerance for the sleep-promoting properties of ZST. LSOMOTN improved at week 1 and efficacy stabilized by week 3 for both the ZST and placebo, suggesting a non-specific initial trend toward improvement over time. There was no significant difference in frequency of weekly tablet utilization between ZST and placebo throughout the treatment period. Interestingly, average week 4 medication use was significantly lower than week 1 for both groups. There were no rebound effects on sleep initiation or total sleep time, regardless of the number of nights of continuous use before the first non-use night.
Conclusion: In placebo-controlled clinical studies, ZST has been shown to be efficacious in treating MOTN insomnia on a prn basis without producing residual effects in primary insomnia patients. The data showing absence of tolerance, no increase in medication use, and no rebound insomnia, three measures associated with abuse potential, further demonstrate the utility of prn treatment with ZST for MOTN awakening followed by difficulty returning to sleep.
Acknowledgements: Funded by Transcept Pharmaceuticals, Inc., Pt. Richmond, CA.

T-D-002 ACUPUNCTURE AS A COMPLEMENTARY MEDICINE IN TREATING INSOMNIA

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Introduction and Objectives: Acupuncture, as complementary medicine, has been used for many years in China and many research studies have proved its effect separately or combined with other treatment methods. In this study we tried to compare therapeutic effects of Acupuncture plus estazolam and Cognitive - Behavioral Therapies plus estazolam on insomnia to determine the efficacy of acupuncture as complementary medicine in treating insomnia.
Materials and Methods: 64 insomnia patients were randomly divided into an acupuncture group and a behavioral group, 30 cases in acupuncture group and 18 cases in behavioral group completed the research. The acupuncture group was treated by administration of oral estazolam before sleeping each day and needling, three times a week, the behavioral group received Stimulus control as Cognitive - Behavioral Therapy plus oral estazolam before sleeping each day. Treatment course was 3 weeks. The insomnia severity index (ISI) scores before and after treatment were observed in the both groups.
Results: The total effective rate was 86.7% in the acupuncture group and 50% in the behavioral group with statistically significant difference ($P < 0.05$). The cured rate of 30% in the acupuncture group was significantly higher than 16.7% in the behavioral group (both $P < 0.05$).
Conclusion: The therapeutic effect of Acupuncture as a complementary medicine on insomnia is better than stimulus therapy as a Cognitive - Behavioral Therapy.
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T-D-003 ADHERENCE TO COGNITIVE BEHAVIORAL THERAPY FOR INSOMNIA (CBTI) IN BREAST CANCER SURVIVORS

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Introduction and Objectives: Previous studies have demonstrated adherence to CBTI is associated with positive sleep outcomes, but few have identified adherence as a continuous variable or explored intent to change behavior. This study aims to examine selected predictors of CBTI adherence. Indices of adherence included: prescribed bedtime hour (TIB), prescribed arising time from bed (TOB), and total time spent in bed (TST).
Materials and Methods: Twenty -three breast cancer survivors with insomnia (Mean age = 53.5) received CBTI for 6 weeks. Measures included a single baseline rating of intent to change sleep behavior, HADS and ISI. Daily sleep diaries were completed during CBTI, 2 weeks post-CBTI, 3 and 6 months. Adherence measures including days non-adherent, average minutes of non-adherence, and proportion of adherent days/week to prescribed TIB, TOB, and TST.
Results: Data indicates that adherence varies from week to week, and tends to diminish over time. Adherence to recommended TIB, TOB, TST was 83%, 47%, and 64% of the nights/week, respectively. Hierarchical linear model analysis indicated that older women were more likely to go to bed earlier than recommended (t Ratio = 2.221, p=0.04) and those with higher anxiety had a longer TST (t Ratio = 2.074, p=0.05). Rating of intent to change sleep behaviors was significantly associated with multiple measures of adherence, but demographic variables (e.g., education, marital status), depression level, insomnia severity did not predict adherence to prescribed TIB, TOB, or TST.
Conclusion: Preliminary results suggest that breast cancer survivors receiving CBTI adhere to the recommended bedtime; adhere to TST restriction, yet less than half adhere to the prescribed TOB. Only intent to change behavior, age and anxiety predicted adherence to recommended sleep times. If these results are supported in larger samples, studies aimed at identifying and increasing adherence are warranted.

T-D-004 ATTITUDES AND PRACTICES OF NORTH GLASGOW GENERAL PRACTITIONERS TOWARDS PATIENTS RECEIVING OPIATE SUBSTITUTION THERAPY WHO REPORT SLEEP DISTURBANCES

Ivan Julio Fernández Cabrera. *Glasgow Addiction Services, United Kingdom*

Introduction and Objectives: Introduction: Insomnia has been linked to detrimental physical and mental consequences, increased mortality rates and poor quality of life. Drug misuse, which typically alters sleep architecture, increases the incidence of insomnia. The goal of MMT (Methadone Maintenance Treatment), the most researched and widely available treatment for opiate dependence, is to reduce and even eliminate heroin use among drug misusers by stabilizing them on methadone for as long as is necessary to help them avoid returning to previous patterns of drug use. Research has shown that 4 out of 5 patients on MMT complain of poor sleeping patterns. Successful treatment of insomnia has been shown to increase therapeutic retention, as well as diminish the chances of relapse. At present, there is no guidance available to General Practitioners (GP's) regarding insomnia in opiate dependent patients. Objectives: 1. To explore the attitudes of North Glasgow GPs towards patients receiving MMT who report sleep disturbances. 2. To explore local practice in the context of current research and provide recommendations for improvement.
Materials and Methods: A qualitative design has been chosen to generate data rich in information due to the lack of previous studies about this aspect of care. A series of digitally recorded semistructured interviews were conducted. Thematic analysis followed Colaizzi's seven step method.
Results: Findings suggest that GPs often face complaints of insomnia from patients on MMT. GPs experience a degree of mistrust towards those patients which makes consultations arduous and successful treatment infrequent. GPs firmly believe that the socioeconomic background of their patients is the main cause behind their drug misuse and, as a consequence, of their sleeping problems.
Conclusion: In this context, education regarding sleep disorders and formal guidance for the treatment of this specific group of patients could potentially benefit both patients and practitioners
Acknowledgements: Mairead MCcann, UNOPS, Copenhaguen; Michael Simpson, Glasgow Addiction Services, Glasgow; Paul Ryan, North Glasgow Community Healt and Care Partnership, Glasgow.

T-D-005 CHRONIC INSOMNIA: WHICH TREATMENT? A DESCRIPTIVE STUDY IN A FRENCH SLEEP UNIT IN PSYCHIATRY

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Introduction and Objectives: Insomnia is the most frequent sleep disorder, affecting 19% of the adult population in France. Causes include psychiatric and medical conditions but this problem is often under-diagnosed and under-treated. Insomnia is a major public health problem because of its high prevalence and quality of life impairment. Despite scientific progress, too many patients are treated with hypnotic or other psychotropic agents for a long time, in contrast with non-pharmacological techniques.
Materials and Methods: We tried to understand what sort of treatment we proposed to insomniac patients in our sleep units in psychiatry.
Results: 500 patients, 17 to 90 years old, identified by their general practitioner (70%), came into our sleep units between 2006 and 2010, for chronic insomnia (ICSD's criteria). Many causes were diagnosed: 36% depressive disorders, 33% anxiety, 14% addiction, 14% primary insomnia (Mini DSMIV). We observed 12% with sleep initiation disturbance, 40% with mixed insomnia (sleep initiation and maintenance trouble) and 48% with early morning awakening. 30% of our population presented with a use of hypnotics: 70% received benzodiazepine, Zolpidem or Zopiclone. First, we proposed a withdrawal of benzodiazepines, and an etiologic treatment. 25% of our population received no pharmacological treatment. Sleep hygiene is reviewed systematically. Sleep hygiene and etiologic treatment were sufficient for one third of our patients. Behavioural therapy was sufficient for one third and cognitive and behavioural therapy was necessary for one third, depending on dysfunctional beliefs (Dysfunctional Beliefs About Sleep Scale (DBAS)).
Conclusion: Despite the belief that cognitive and behavioural therapies are the gold standard treatment in chronic insomnia, it seems that Sleep hygiene and behavioural therapy can constitute a complete treatment in many cases. These non pharmacological techniques would constitute an alternative in community medicine.

T-D-006 CLINICAL EFFECTIVENESS TRIAL OF MEDICAL-ADMINISTERED SMALL-GROUP COGNITIVE BEHAVIOR THERAPY FOR PRIMARY INSOMNIA IN GENERAL PRACTICE

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Introduction and Objectives: Insomnia is very common in general practice however it has a difficult management. This study investigates the clinical effectiveness and adherence of applying cognitive behavior therapy (CBT) methods for insomnia in primary care.
Materials and Methods: A prospective, multicentric design was employed. It used general medical practice patients. Sixty eight adults (mean age, 47 years) were assigned to receive CBT (n=18; 50 women). CBT comprised 3 sessions which included sleep hygiene education delivered individually by a sleep medical doctor. The aim of the CBT treatment was the use of weariness to prevent hyper-alert status. There were two options of inducing weariness: Ironing and phone book memorizing. They should be used before sleep time.
Results: Assessments were completed at baseline, two weeks after treatment, and six weeks follow-up visits. Sleep outcomes were accessed by sleep diary, and clinical visits. CBT was associated with improvements in self-reported sleep latency, wakefulness after sleep onset, and sleep efficiency. Improvements were partly sustained at follow up. Absenteeism was not a common issue among patients. CBT was associated with significant positive changes in mood and sleep satisfaction. Comorbid mental health difficulties had no impact in the sleep improvement after CBT.
Conclusion: This study suggests that it is possible and useful to deliver CBT for insomnia using weariness as an easy tool in general medical practice. Further research is required to consider the possibilities of increasing adherence to CBT in primary healthcare.
Acknowledgements: To Gilmar Fernandes do Prado and his family for friendship and scientific support

T-D-007 COGNITIVE-BEHAVIORAL THERAPY FOR INSOMNIA CO-MORBID WITH HEARING IMPAIRMENT: A RANDOMIZED CONTROLLED TRIAL

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Introduction and Objectives: Based on research showing that sleep complaints are common among individuals with hearing impairment, the purpose was to examine the effects of cognitive behavior therapy for insomnia in patients with insomnia co-morbid with hearing impairment.
Materials and Methods: A randomized controlled design was used with a three-month follow-up. Thirty-two patients with insomnia co-morbid with hearing impairment were recruited from audiology clinics and randomized to either cognitive behavior therapy (CBT-I) or a wait-list condition (WLC). The primary outcome was insomnia severity. Secondary outcomes were sleep diary parameters, dysfunction, anxiety, and depression.
Results: While neither CBT nor WLC led to improvements on anxiety and depression, CBT was superior to WLC on the remaining outcomes. Compared to WLC, CBT resulted in lower insomnia severity at post-treatment and at follow-up (d = 1.18-1.56). Relative to WLC, CBT also led, at both assessment points, to reduced sleep onset latency (d = 1.07-1.18) and wake after sleep onset (d = 0.94-1.05) and increased sleep restoration (d = 1.03-1.07) and sleep quality (d = 0.91-1.16). Both groups increased their total sleep time, but no significant group difference emerged. Compared to WLC, CBT resulted in higher function at both assessment points (d = 0.81-0.96). Based on the Insomnia Severity Index, more CBT (53-77%) than WLC participants (0-7%) were treatment responders. Also, more CBT (24%) than WLC participants (0%) remitted.
Conclusion: In patients with insomnia co-morbid with hearing impairment, cognitive behavioral therapy aimed at reducing insomnia symptomatology was effective in decreasing insomnia severity, subjective sleep parameters, and dysfunction.
Acknowledgements: We would like to express our appreciation to the Swedish funding agency for funding and to the two clinics for recruitment.

T-D-008 COMMON PSYCHOLOGICAL SYMPTOMS OF 1320 PATIENTS WITH INSOMNIA FROM GUANG'ANMEN HOSPITAL, CHINA ACADEMY OF CHINESE MEDICAL SCIENCES

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Introduction and Objectives: To analyze the common psychological symptoms of 1320 patients with insomnia from Guang'anmen Hospital, China Academy of Chinese Medical Sciences.
Materials and Methods: The results of Minnesota Multiphasic Personality Inventory (MMPI) of 1320 cases with insomnia enrolled in the Guang'anmen Hospital, China Academy of Chinese Medical Sciences from 2002 to 2009 were analyzed retrospectively.
Results: The factor scores of depression, anxiety, neuroticism, hysteria, hypochondriasis, epileptic personality, distress, worry, stress, psychasthenia, ill health, complaints of health, impotence, fatigue, headache, autoblame, autopunition, autotomy, work worry, social withdrawal, school discomfort, seeking instruction, traffic accident, ominous prognosis were higher than normal values for China. The factor scores of optimism, academic success, social responsibility and self-strength were lower than normal values for China.
Conclusion: Depression, anxiety, hypochondriasis, hysteria and epileptic personality, low self-strength and high dependence are the common personality basis of Chinese patients with insomnia. Stress from social, school, work and physical diseases are the causes. The risk for suicide of insomnia increased significantly, a matter for serious attention. Besides sleep disorders, insomnia often accompanies many somatic symptoms, such as fatigue, headache and sexual dysfunction, etc. These symptoms may contribute to causing the insomnia. Insomnia can also cause these symptoms.
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T-D-009 COMORBID DEPRESSION AND INSOMNIA: WHO SEEKS WHICH TREATMENT?

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Introduction and Objectives: Individuals presenting with comorbid Major Depressive Disorder (MDD) and insomnia comprise a diverse group. Whereas insomnia was originally considered to be a mere symptom of depression, it is now regarded as a common independent disorder that warrants its own treatment. Given this previously held bias towards exclusive treatment of depression, it is unclear who is motivated to receive treatment primarily for their depression or their sleep. This study examines differences amongst those with MDD and insomnia who present for depression treatment (CBT-D) or for insomnia treatment (CBT-I).
Materials and Methods: Participants (N=28) met diagnoses of MDD and research diagnostic criteria for insomnia, and were matched on sex and age. One group presented for a CBT-D study, and the other presented for a study of CBT–I for those with MDD. We examined group differences among depression severity, maladaptive sleep beliefs, sleep medication status, antidepressant status, and the presence/absence of comorbid conditions.
Results: CBT-D patients had significantly higher depression scores (p=0.048), and were more likely to be taking antidepressants (p=0.042) than CBT-I patients. Individuals seeking CBT-I had significantly greater maladaptive sleep beliefs than those in CBT-D (p=0.022). There were no group differences on sleep medication status or the presence of other disorders.
Conclusion: Individuals seeking depression treatment were more depressed and more likely to receive antidepressant medication, whereas insomnia treatment seekers reported elevated levels of maladaptive sleep beliefs. This suggests some degree of appropriate patient self-selection for depression-focused versus sleep-focused treatment amongst this group. Since clinicians may make diagnostic errors in favour of treating depression, perhaps patients have something to tell us about which problem is more troublesome for them. Future studies should investigate whether this apparent self-selection has any treatment utility (i.e., whether those who perceive their main problem as sleep actually do better in sleep-focused treatment).
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T-D-010 COMPARISON OF TWO ASSESSMENT TOOLS THAT MEASURE INSOMNIA: THE INSOMNIA SEVERITY INDEX AND POLYSOMNOGRAPHY

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Introduction and Objectives: Insomnia is a common sleep disorder, characterized by difficulties in sleep initiation, sleep maintenance or early morning awakening. Although polysomnography is a standard method in the evaluation of sleep disorders, it is not recommended for routine use in the clinical assessment of insomnia. Instead, standard questionnaires could be used in the primary evaluation of insomnia. Objective: The main objective of this study was to compare the type and severity of patients subjective complaints of insomnia gathered from Insomnia Severity Index (ISI) questionnaire with the result of their polysomnographic evaluation.
Materials and Methods: In this cross-sectional study conducted during 2006 to 2009 in Iran, all of the patients with sleep disorders were evaluated. The study consisted of self administered questionnaires completed by participants to provide information on demographic characteristics, and ISI questionnaire. After completing the questionnaire, all the participants underwent standard overnight polysomnography.
Results: Subjects were 151 patients (47.2±10.8 years old). The average ISS was 6.1±4. There was significant relationship between subjective complaint of difficulty in sleep initiation and sleep onset latency in PSG (r=0.5)
Conclusion: Our findings suggest that objective insomnia measured with Insomnia Severity Index is related with PSG variables and ISI could be useful tools to quantify perceived insomnia severity. Further studies are needed to determine sensitivity and specificity of this questionnaire.

T-D-011 DIFFERENCES BETWEEN GOOD SLEEPERS AND INSOMNIA SUFFERERS IN NAPPING CHARACTERISTICS AFTER A MENTALLY EXHAUSTING BATTERY OF COGNITIVE TESTING

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Introduction and Objectives: It has been shown that good sleepers (GS) sleep better than insomnia sufferers (INS) while napping. The objective of this study was to examine if sleep during napping differs between GS and INS (subdivided in paradoxical 'IPA' and psychophysiological 'IPS') after individuals underwent a mentally exhausting battery of cognitive testing.
Materials and Methods: 14 IPS (Mean age = 36.0), 11 IPA (Mean age = 37.2) and 14 GS (Mean age = 34.8) completed four consecutive PSG nights in the laboratory. Upon awakening on mornings 2 and 3, cognitive testing (lasting between 90 to 120 minutes) was administered and then followed by a 20 minute nap. Sleep onset latency (SOL), total sleep time (TST), total wake time (TWT) and sleep efficacy (SE) were computed for each napping session.
Results: One way ANOVAs revealed significant group differences ($\geq$0.01) for TST, SE and TWT. GS had a longer TST (Mean = 7.15, SD = 7.21) than IPS (Mean = 2.80, SD = 4.60) and IPA (Mean = 2.80, SD = 4.37) and a better SE (Mean = 34.25, SD = 34.24) than IPS (Mean = 14.46, SD = 23.51) and IPA (Mean = 13.3, SD = 20.86). Finally, INS were awake significantly longer than GS (IPS: Mean = 16.93, SD = 4.87; IPA: Mean = 17.93, SD = 4.21; and GS: Mean = 12.70, SD = 7.04). However, only a marginal significant difference was observed for SOL (p=0.307). Still, GS were seemingly falling asleep more rapidly than both groups of INS.
Conclusion: Results show that GS sleep better than INS during naps following prolonged cognitive testing, suggesting that, in INS, hyper arousal predominates over exhaustion. These results may parallel what is observed at night when INS experience cognitive loading but are unable to fall asleep.
Acknowledgements: Supported by the Canadian Institute of Health Research.

T-D-012 DOES CBT-I DECREASE CONCOMITANT ANXIETY? A META-ANALYTIC REVIEW

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Introduction and Objectives: Anxiety and insomnia are prevalent and frequently comorbid disorders. It is unclear whether cognitive-behavior therapy for insomnia (CBT-I) has an impact on concomitant anxiety symptoms. The impact of CBT-I on anxiety has neither been a primary focus of efficacy studies nor the subject of a review. The present systematic review and meta-analysis represents an effort to fill this gap. The objectives are (1) to assess the impact of CBT-I on associated anxiety; (2) to determine which characteristics of studies, samples, treatments, and measures influence the magnitude of the impact; and (3) to document methods of assessing anxiety in CBT-I trials.
Materials and Methods: Systematic search for clinical trials of CBT-I in PsycInfo, Medline, and Proquest Dissertations and Theses.
Results: Of the 216 CBT-I trials reviewed, 72 (33.3%) reported data on anxiety. The combined effect size (ES) of CBT-I on anxiety was 0.406 [95% CI 0.318 – 0.493], indicating a small to moderate effect of CBT-I on concomitant anxiety. Use of a between-group experimental design and inclusion of a hypnotic withdrawal program significantly decreased ES. Presence of a comorbid condition (including anxiety disorders) and inclusion of anxiety management strategies did not impact ES. Anxiety and anxiety-related constructs were measured with 31 different questionnaires or questionnaire subscales, the majority of which were used only once.
Conclusion: Available data suggest that CBT-I has a positive moderate impact on associated anxiety. However, magnitude of this effect may be overestimated by the inclusion of findings from less rigorous research protocols. Greater consensus about the relevant aspects of anxiety and the most appropriate instruments for anxiety assessment will facilitate improved integration of research findings in this area. Further research on the impact of CBT-I on anxiety, and particularly on the impact of adding anxiety management strategies to CBT-I for populations with or without anxiety disorders, is needed.

T-D-013 DON'T WORRY, BE CONSTRUCTIVE: A RANDOMIZED CONTROLLED FEASIBILITY STUDY COMPARING BEHAVIOR THERAPY SINGLY AND COMBINED WITH CONSTRUCTIVE WORRY FOR INSOMNIA

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Introduction and Objectives: Based on the lack of research on interventions targeting intrusive and worrisome thinking for insomnia, the aim was to examine whether a constructive worry intervention (Carney and Waters, 2006) adds to the effects of behavior therapy.
Materials and Methods: A randomized, controlled design was used. The design included a two-week baseline, a four-week intervention phase [sleep restriction and stimulus control (BT) or sleep restriction and stimulus control plus constructive worry (BT+CW)], and a two-week follow-up. Twenty-two patients with primary insomnia participated. The primary outcome was the Anxiety and Preoccupation about Sleep Questionnaire to tap sleep-related worry, and secondary endpoints were subjective sleep estimates, the Insomnia Severity Index, and the Work and Social Adjustment Scale to index dysfunction.
Results: Although both conditions produced significant improvements in subjective sleep estimates, no significant group differences over time were shown for total wake time and total sleep time. Both interventions resulted in reductions over time in insomnia severity, worry, and dysfunction. Compared to BT, BT+CW led to a larger decrease in insomnia severity at all three time points (controlled d = 1.10-1.68). In comparison with BT, BT+CW resulted in a larger reduction in worry at two of the time points (controlled d = 0.76-1.64). No significant differences between the two conditions were demonstrated for dysfunction. While more participants responded positively to treatment in the BT+CW (80-100%) than in the BT condition (18-27%), none of the participants remitted.
Conclusion: The findings suggest that, compared to behavior therapy alone, constructive worry might result in additional improvements in insomnia severity and worry. Given the small sample size and short follow-up, future studies are warranted.
Acknowledgements: We would like to express our appreciation to Mikael Bermås and Andreas Kjellén for collaboration on recruiting the participants.

T-D-014 HEALTH ANXIETY AMONG POOR SLEEPERS

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Introduction and Objectives: There is evidence to support an MMPI somatization profile in those with insomnia (e.g., Kales et al., 1976; Levin et al., 1984). Indeed, the belief that insomnia will have serious adverse consequences on one's health discriminates good sleepers from those with clinical insomnia, and modifying this belief with Cognitive Behaviour Therapy (CBT-I) is associated with improvement of wakefulness after sleep onset (Carney & Edinger, 2006). It is possible that some people with insomnia have significant levels of health-related anxiety, but this has yet to be examined. This study investigated the relationship between sleep and health anxiety by comparing good and poor sleepers on health anxiety.
Materials and Methods: Participants (N = 119, 85.7% females; Mean age = 20.39 years old) were undergraduate students recruited from Ryerson University. Participants completed a battery of online questionnaires including the Short Health Anxiety Index (HAI; Salkovskis et al., 2002) to assess for health anxiety and the Insomnia Severity Index (ISI; Morin, Vallières, & Ivers, 2007) to assess for insomnia symptoms. Participants who scored $\leq$7 on the ISI were classified as good sleepers, and participants who scored $\geq$8 were classified as poor sleepers.
Results: Of the sample, 55% of participants were classified as poor sleepers. Health anxiety scores were found to be significantly higher among poor (M = 17.64, SD = 8.10) versus good sleepers (M = 13.85, SD = 7.50, t(103) = -2.461, $p<0.05$).
Conclusion: These findings suggest that relative to good sleepers, health anxiety is significantly elevated in poor sleepers. Should future investigations of health anxiety in clinical insomnia sufferers replicate this finding, it could lead to possible treatment add-ons to CBT-I. CBT for health anxiety is an empirically supported treatment (Barsky & Ahern, 2004) that may include tools that could be used in CBT-I.

T-D-015 IMMUNOLOGIC ALTERATIONS IN INSOMNIA

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Introduction and Objectives: Insomnia is defined as the complaint of not being able to fall asleep or to maintain sleep, and/or nonrestorative sleep, accompanied by impaired daytime functioning on a social, emotional or professional level. Sleep loss has an impact on the expression of cytokines genes. Objectives. The aim of the present study was to investigate whether there is a difference in daytime interleukin-6 (IL-6) and TNF serum excretion in runners with insomnia vs without insomnia.
Materials and Methods: We studied IL-6 and TNF in 33 marathon runners participating in the São Paulo Marathon (42.195Km), who finished the race. One runner was excluded and we investigated IL-6 and TNF basal, immediate and post 72h. We compared insomniac vs non insomniac runners.
Results: We found 21.21% of runners with insomnia. IL-6 showed elevation in non insomniac (basal = 24.49$\pm$40.58; immediate = 124.96$\pm$92.907), compared to insomniac immediately after the race (basal = 28.841$\pm$31.294; immediate = 71.17$\pm$47.598), and all returned to basal levels (72h = 10.57$\pm$ 18.73 vs 72h = 19.614$\pm$39.461). TNF showed negative association with insomnia: insomniac runners: basal = 6.54$\pm$4.73; immediate = 10.55$\pm$7.36; 72h = 2.87$\pm$1.425 and no insomniac: basal = 7.26$\pm$13.32; immediate = 36.75$\pm$43.55; 72h = 5.69$\pm$13.84.
Conclusion: Studies suggest that IL-6 is a putative 'sleep factor' and its circadian secretion correlates with sleep/sleepiness. Following sleep deprivation or in disorder of sleep disturbance, e.g. insomnia, IL-6 is elevated during the day. Our study demonstrated that higher systemic inflammation, as demonstrated by serum IL-6 immediately after the race is associated with good sleep. TNF is elevated in disorders associated with excessive daytime sleepiness (EDS) and studies suggest that TNF are a possible mediator of EDS. Our findings confirm this association. Runners may be effective for improving the quality of sleep. Sleep is gradually regarded as a restorative process important for proper immune system functioning. Recognizing the extremely heavy burden of insomnia and related complications in the population, more aggressive action to survey patients with sleep disorders and adequate intervention is increasingly important.
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T-D-016 INSOMNIA AND COMORBIDITIES IN THE ELDERLY

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Introduction and Objectives: Insomnia complaints in the elderly are associated with other health problems, the consumption of medication, poor self-perceived health and a higher use of health care services. The main objective of this study has been to analyze which illnesses are more often associated with insomnia due to a general medical condition (DSM-IV-TR criteria).
Materials and Methods: Cross-sectional, observational study performed in the city of Albacete (Spain). Participants were randomly selected from a list of persons over 65 years of age on the register of public health cardholders. The sample size was 926 subjects. Participants were diagnosed through an interview conducted by psychiatrists. They were also questioned about their sociodemographic characteristics and their health problems (ICPC-2) by nurses or psychologists.
Results: The mean age was 74.38 years (45.2% men). Health problems more prevalent were those related to the circulatory system (74.0%), endocrine system, metabolism and nutrition (55.7%), locomotive system (34.9%), digestive system (11.2%) and respiratory system (10.3%). A prevalence of 7.0% of insomnia due to a general medical condition was observed. Using logistic regression, it was determined that there was a statistically significant association between the presence of insomnia due to a general medical condition and the following variables: presence of any illness of the locomotive system (OR:1.808; p=0.037), presence of any illness of the male genital system (OR:3.398; p=0.001) and presence of 4 or more health problems (OR:2.009; p=0,000). Of these illnesses, among those who presented insomnia due to a general medical condition, the more prevalent were osteoarthritis (31,75%), signs or symptoms related to the prostate (15,87%), osteoporosis (14,29%), back pain (4,76%) and rheumatoid arthritis (4,76%).
Conclusion: Among those people who present with a diagnosis of insomnia due to a general medical condition, the illnesses associated with that diagnosis are those related with the locomotive system and the male genital system.
Acknowledgements: This research has been funded through a grant from the Castilla-La Mancha Health Research Foundation (FISCAM).

T-D-017 INSOMNIA AND PERIODIC LIMB MOVEMENTS WITH NO RLS. ACTORS OR BYSTANDERS?

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Introduction and Objectives: Periodic Limb Movements in Sleep (PLMS) have a prevalence up to 25% of the population, increasing with age. They often occur together with other disorders as Parkinsons disease, renal failure, use of anti-depressants, etc. Eighty percent of patients with Restless Legs Syndrome (RLS) have PLMS. Still, a high percentage of patients with PLMS have no causative or related co-morbidity. In these cases the PLMS are often thought to be just concurrent with another disorder, for which polysomnography (PSG) was performed, for example insomnia. Some studies suggest that PLMS and the accompanying arousals from sleep may cause tiredness and excessive sleep during daytime, which still may introduce clinical significance for these events in the night. The presentation is meant to summarize the ongoing discussion if PLMS have clinical significance in cases with no RLS and if PLMS should be treated as a separate entity, in particular when seen in insomnia patients.
Materials and Methods: The literature search will be discussed, but gives no clear answers. There is a tendency that PLMS should be considered as nonspecific events during the night with no need for therapy except for patients with RLS. As a challenge to this theory, patients with insomnia and PLMS but no RLS were treated with dopamine agonists (DA).
Results: Recent studies (Ferri et al., de Weerd et al.) suggest that subgroups of patients with insomnia can be delineated, in whom the PLMS have well defined characteristics (strict periodicity, highest prevalence in the first

hours of sleep). The efficacy of treatment with DA is higher in this subgroup when compared to similar patients who do not have these features of PLMS.
Conclusion: PLMS remain to be seen as unspecific phenomena during the night. The exceptions are concurrent RLS and possibly insomnia with specific characteristics of the accompanying PLMS.

T-D-018 THE RELATIONSHIP BETWEEN PSYCHOPHYSIOLOGICAL REACTIVITY TO STRESS AND MUSIC AND SLEEP IMPROVING EFFECT OF MUSIC

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Introduction and Objectives: Studies in the past have yielded inconsistent results regarding the sleep-improving effect of music. Therefore, individual differences may exist in the reaction to music. This study is to evaluate the effect of music on sleep in daily life environment and to examine whether individual difference in psychophysiological reactivity to music can predict its sleep-enhancing effect.
Materials and Methods: 37 young adults (28 females) who complained of mild sleep difficulties and did not meet the criteria for insomnia participated in the study. The study procedure consists of two parts: 1) a daytime evaluation session to measure psychophysiological reactivity to music. Electrocardiogram (ECG), skin conductance level (SCL), and finger temperature, were conducted during the process of experimentally induced stress and a period followed with music listening; 2) three in-home experimental conditions: one music condition (adagio classical music) and two control conditions (distracting story and no-manipulation control). Each condition lasted for 4-5 days and actigraphy was used to record their sleep at home.
Results: One-way repeated measures were conducted to compare the sleep parameters among the three conditions. Post-hoc comparisons revealed significant shorter SOL and higher SE under music condition in comparison to "no-manipulation control condition". Stepwise logistic regression revealed that SCL slope reacting to music during daytime session can predict the improvement in SE at night with music. LF/HF can best discriminated responders and non-responders to music in SOL and SE.
Conclusion: These findings supported that music has a sleep-improving effect as measured by actigraphy at home, although the effect sizes were within small-effect range. Individual differences of psychophysiological reactivity toward music can predict the effect of sleep improvement.

T-D-019 MULIMODAL TRAINING IN PATIENTS WITH CHRONIC PRIMARY INSOMNIA

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Introduction and Objectives: For treatment of chronic insomnia hypnotics or sleep-inducing "psychotropic" drugs are used most often. Patients with primary insomnia typically complain of long Sleep Latency and/or Nighttime Awakenings, and often also a limited quality of life. The multimodal therapy is a treatment for such difficulties. In the present study its effectiveness will be checked, including the quality of life (QOL).
Materials and Methods: The multimodal therapy involves e.g. writing in a sleep log, the calculation of sleep efficiency and the establishment of a sleep window. Further, numerous practical exercises to modify sleep behaviour are performed and theoretical and practical backgrounds are provided. The study was carried out so far in 46 patients with chronic primary insomnia (23 males, 23 females, age: 50.9±12.1 years).
Results: In the study, Therapy improved both sleep parameters (decrease in Sleep Latency, increase in the Total Sleep Time, reducing Nighttime Awakenings, and 20% increase in Sleep Efficiency) and various aspects of quality of life. The results were almost values of sleep-healthy people. The average Total Sleep Time (TST) increased during the 6-week training from 301 minutes of sleep to 321 minutes) The Time in Bed (TIB) decreased from 497 minutes to 400 minutes). Sleep Efficiency increased as a result of the improved Sleep Latency and Total Sleep Time from 61.8% to 84.5% (normal healthy sleep: $>$ 85%). Subjectively the nighttime parameters improved, relating to Sleep Quality ($p = 0.003$), Sleep Latency ($p = 0.002$), Total Sleep Time ($p = 0.001$) and Nighttime Awakenings ($p < 0.001$). The treatment positively improved the quality of life (QoL) in its 4 subscales ($p < 0.001$).
Conclusion: The multimodal therapy seems to be an appropriate therapeutic agent for the treatment of chronic primary insomnia and its consequences (e.g. QoL), especially because it is easy to perform, cost effective and free of side effects.

T-D-020 PASSIVE COPING STRATEGIES AS A MEDIATOR BETWEEN PERFECTIONISM AND INSOMNIA IN CANCER PATIENTS

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Introduction and Objectives: A few studies conducted in the general population have shown that perfectionism and avoidant coping strategies are independently associated with sleep difficulties. Moreover, avoidance has been found to be a mediator between perfectionism and insomnia symptoms in recent studies. However, these associations have yet to be investigated in the context of cancer.
Materials and Methods: As part of a larger epidemiological research, this study investigated associations between perfectionism, coping strategies and insomnia symptoms in patients scheduled to undergo surgery for cancer (N = 962). The patients completed the Multidimensional Perfectionism Scale, the Coping with Health Injuries and Problems and the Insomnia Severity Index a few days before or after surgery (T1) and six months later, during adjuvant treatments (T2).
Results: At T1, the association between perfectionism and insomnia symptoms was mediated in totality by passive coping strategies (total mediation; $p \leq 0.0001$). A similar pattern was found at T2 (total mediation; $p \leq 0.0001$). Consequently, the direct association between perfectionism and insomnia symptoms was not significant at both time assessments ($p=0.16$ and $p=0.28$, respectively).
Conclusion: These findings suggest that perfectionism may increase the risk of insomnia symptoms through a greater utilization of passive coping strategies. It might be beneficial to help perfectionist cancer patients change their passive coping strategies (e.g., avoidance, rumination) in favour of more active strategies, such as cognitive restructuring, to prevent them from developing sleep difficulties. In order to better understand the associations between perfectionism and insomnia symptoms, other potential mechanisms than coping strategies should also be investigated, such as intrusive thoughts.
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T-D-021 PHYSICAL ACTIVITY IS ASSOCIATED WITH IMPROVED SLEEP IN CANCER PATIENTS

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Introduction and Objectives: Both in the general population and among people with cancer, some studies have reported that physical activity appears to be helpful to improve sleep quality. The objective of this study was to assess whether there is an association between the frequency of physical activity and insomnia symptoms in a large population of patients with cancer.
Materials and Methods: As part of a larger population-based longitudinal study, 991 cancer patients completed various self-report scales on 6 occasions over a period of 18 months following the peri-operative period. These evaluations included a validated measure of insomnia (Insomnia Severity Index) and a self-reported measure of the frequency of moderate physical activity of the past month (i.e., leading to an increased heart rate for at least 20 minutes). All participants were divided into four groups according to the frequency of their physical activity per week: 1) no activity; 2) 1-2 times; 3) 3-5 times; and 4) 6 times or more.
Results: An ANOVA revealed a significant difference between the four groups $F(3,1015) = 5.57$, $p = 0.0009$. Compared to sedentary individuals, a decrease of 0.42, 0.39 and 1.05 points on the ISI was found in patients who reported doing physical activity once to twice a week, three to five times a week and at least six times a week, respectively.
Conclusion: These findings suggest that there is a first beneficial effect on sleep by simply doing any physical activity and a second gain when exercising more regularly ($\geq$ 6 times per week). Thus, although this hypothesis

will need to be investigated in a clinical study, a more regular practice of physical activity may be a suitable recommendation for cancer patients who have sleep difficulties.
Acknowledgements: This study was supported by a research grant held by the third author from the Canadian Institutes of Health Research (MOP – 69073).

T-D-022 RELATIONSHIP BETWEEN COGNITIVE FUNCTION AND HIPPOCAMPAL VOLUMES IN PATIENTS WITH PRIMARY INSOMNIA

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Introduction and Objectives: To investigate the relationship between cognitive function and hippocampal volumes in patients with primary insomnia (PI).
Materials and Methods: We enrolled 20 female patients with PI and 20 good sleepers (GS) (mean age 50.8 yrs) matched by age and educational status. Patients were diagnosed with PI according to ICSD-2 criteria and all of them reported subjective memory decline. All subjects had undergone night polysomnography, neuropsychological tests, and brain MRI (1.5T). The hippocampal volumes (HV) were manually measured bilaterally. HV was corrected for intracranial volume.
Results: Mean insomnia duration was 7.2 yrs, mean education period was 11.8 yrs, mean number of sleep-aid pills was 2.1, and mean duration of taking sleep pills was 3.7 yrs in PI. Mean HV of right hemisphere was 3265.2±255.1 mm^3 in PI and 3151.3±295.7 mm^3 in GS (p=0.185) and that of left side was 3000.3±214.7 mm^3 in PI and 2897.4±390.5 mm^3 in GS (p=0.265). Right HV was significantly correlated with insomnia duration (r=- 0.885) and duration of taking sleep medication (r=- 0.488) and left HV was negatively correlated with insomnia duration (r=- 0.536) and duration of taking sleep medication (r=- 0.539). PI showed significant impairment for attention, frontal lobe function, and non-verbal/verbal memory compared to GS. Recognition in the non-verbal memory test was positively correlated with right (r=0.913) and left HV (r=0.969). Short delay free recall in the verbal memory test was positively correlated with left HV (r=0.759).
Conclusion: Although there was no significant difference in HV and ICV between PI and GS, long insomnia duration had negative influence on HV. PI had impaired cognitive function compared to GS and HV was positively correlated with memory function in PI. Chronic insomnia may deteriorate daytime cognitive impairment in PI, which was related to the HV.

T-D-023 RELIABILITY AND VALIDITY OF THE CHINESE TRANSLATION OF INSOMNIA SEVERITY INDEX (C-ISI) IN CHINESE PATIENTS WITH INSOMNIA

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Introduction and Objectives: The Insomnia Severity Index is a Questionnaire with 7-self rated items that briefly screens patients with insomnia in clinics and also is a tool to easily assess treatment outcome in research. This research plans to determine the reliability and validity of the Chinese Translation of Insomnia Severity Index (C-ISI) in patients with Insomnia (clinical group) and compare it with the Chinese version of the Pittsburgh Sleep Quality Index (C-PSQI).
Materials and Methods: English version of Insomnia Severity Index (ISI) was translated into Chinese based on standard guidelines then Chinese version of Insomnia Severity Index was filled in by 83 patients with insomnia as a clinical group and 45 persons without sleep complaint as the control group by themselves. For finding Test-Retest reliability they refilled ISI questionnaire 2 weeks later. Study was done in Neuropsychiatery Department of Dongzhi Men hospital affilated with Beijing University of Chinese Medicine
Results: Cronbach-alpha; coefficient of C-ISI for the clinical group was 0.72 and for control groups was 0.75 and for both of them was 0.91. The C-ISI component and total scores in test were significantly correlated with their related components and total scores in re-test ($P < 0.05$). Mean Ranks for All C-ISI components, total scores were significantly higher in clinical group than control group that presents low sleep quality in clinical group. There are Significant correlations between C-ISI component and total scores and C-PSQI components and Total scores in related Items.
Conclusion: C-ISI is an adequate scale with acceptable reliability, C-ISI components and global score have a good sensitivity for insomnia patients and C-ISI can evaluate the insomnia patients similarly to the PSQI-C so it can be used as a good scale to measure sleep quality in Chinese speakers
Acknowledgements: Dr.caokegang

T-D-024 SCALE BASED ON DSM-IV-TR CRITERIA FOR DETECTION OF INSOMNIA IN THE ELDERLY (IES)

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Introduction and Objectives: Even though the complaints about sleep are common in the elderly, insomnia disorders are under-diagnosed by family physicians. It is necessary to develop instruments to support the insomnia diagnosis and, although scales can be found in the literature, they are not specifically designed and validated in people over 65 years using psychiatric diagnosis as the gold standard. The main objective of this study has been the design and validation of a scale to help detect Insomnia in the Elderly (IES).
Materials and Methods: Cross-sectional observational study of diagnostic tests validation carried out in Albacete (Spain), with a sample of 926 people over the age of 65. Different health professionals (psychologists, psychiatrists and family physicians) collaborated in the design of the scale. It has 9 items with 4 response options about frequency of symptoms. Participants attended 2 interviews, the first one for the insomnia psychiatric diagnosis, following DSM-IV-TR criteria, and the second one with a nurse or psychologist to answer the IES.
Results: The mean age was 74.38 years (45.2% male). The scale was divided into 2 sub-scales to independently detect the A and B criteria of insomnia as specified in the DSM-IV-TR. Intraclass correlation coefficients were 0.929 and 0.766, and a Cronbach's alpha of 0.85 and 0.80 respectively. The areas under the ROC curves for the sub-scales A and B were 0.868 and 0.832 respectively. For sub-scale A, a cut-off point=3 (Se=86.4%; Sp=69.5%) is recommended and a cut-off point=2 for sub-scale B (Se=86.3%; Sp=66.4%).
Conclusion: IES has a high reliability and adequate psychometric properties. The division into 2 sub-scales to individually evaluate insomnia criteria allows separately verifying the presence of symptoms for category A and B insomnia criteria, helps symptom differentiation and matches the usual diagnostic procedure. The scale has been validated in people over 65 years, the same target population for its later use.
Acknowledgements: This research has been funded through a grant from the Castilla-La Mancha Health Research Foundation.

T-D-025 SLEEP DISTURBANCES IN PATIENTS WITH STAGE III-IV CANCER

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Introduction and Objectives: A few cross-sectional studies have revealed high rates of sleep difficulties among advanced cancer patients. However, these studies did not differentiate between subsyndromal and clinical levels of insomnia. Moreover, the evolution of insomnia over time after cancer diagnosis has yet to be investigated in advanced cancer patients. The aim of this study was to assess the prevalence and the evolution of insomnia symptoms and insomnia syndrome in patients with a stage III-IV cancer.
Materials and Methods: In the context of a larger epidemiological research, 200 patients with an advanced cancer scheduled to undergo surgery were recruited. The patients completed the Insomnia Interview Schedule during the peri-operative period, as well as 2, 6, 10, 14 and 18 months later. At each time point, patients were categorized into the following three groups: insomnia syndrome, insomnia symptoms or good sleepers.
Results: The prevalence of insomnia symptoms and insomnia syndrome at the peri-operative period were respectively 30% and 19.8% (total of 49.8%). Dependent t tests showed a significant reduction of insomnia symptoms between the baseline and the 2-month follow-up, ((30.0% to 21.2%), $t(3636) = 2.06$, $p \leq 0.05$) and also between the 6- and 10-month follow-ups, (19.1%

to 11.7%), t(3636) = 1.97, p≤0.05. The prevalence of insomnia syndrome was fairly stable over time.
Conclusion: The high rates of insomnia symptoms and syndrome found in this study emphasize the need to develop appropriate interventions for the treatment of insomnia in this specific population.
Acknowledgements: This study was funded by the Canadian Institutes of Health Research by a subvention (BO507974) according to the second author. The first author would like to thank the Canadian Institutes of Health Research and the Psychosocial Oncology Research Training

T-D-026 SLEEP PERCEPTION IN INSOMNIA AND OTHER DIAGNOSTIC ENTITIES

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Introduction and Objectives: The perception of sleep has two main components: the ability to known whether one is asleep or awake and the capacity to assess the duration of sleep. It's currently considered that insomniacs have a deficient perception of their sleep sub estimating its duration; furthermore sleep apneas misperceive their sleepiness with consequent accident risks. The objective was to study the ability of sleep duration assessment in several diagnosis (insomnia, sleep apnea and PLM).Other variables such as gender, age and recording type were also evaluated
Materials and Methods: In 200 patients of both genders, the total sleep time (TTS) and the perceived sleep duration (PSD) after the final awakening during PSG were collected. Two measures were derived: Perception (Per%): the ratio (PSD/TTS*100) and the Difference (Dif): (PSD-TTS).
Results: In the all sample the average values were: TTS=6h:46; PSD=5h:56; Per%=88.69; Dif=49min. Patient's age (Males: 51.2; Females 52.3), TTS, PSD,Per% and Dif were identical in both genders. Patient number across diagnosis was: Insomnia: 53; Apnea: 107; PLMS: 43.Insomnia patients had a lower TTS and a higher perception than the remaining group; gender did not influence perception; the average Per% was 92.8%, min 23%; max 162%, skewed to the lower values. No differences were found for sleep apnea or PLM patients.The presence of alpha delta sleep had no influence in perception, while those with a fragmented sleep had a higher perception of sleep duration. In ambulatory recordings the PSD, Per% were significantly higher than laboratory.
Conclusion: Insomniacs, in spite of the large range in perception and significant extremes, either in the pessimistic or in the optimistic side, in average perceive sleep better than apnea or PLM patients. Diagnosis and alpha delta sleep have no major influence in the perception of sleep duration but ambulatory recordings and sleep fragmentation improve perception. These are however preliminary results and other variables must be evaluated.

T-D-027 SLEEP-REGULATING TECHNIQUE UNDER THE TRANQUILIZATION STATE OF QIGONG: A NOVEL TECHNIQUE FOR PRIMARY INSOMNIA

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Introduction and Objectives: To introduce a sleep-regulating technique under the tranquilization state of Qigong which is based on Chinese culture and psychological characteristics of Chinese people for primary insomnia.
Materials and Methods: Primary insomnia is sleeplessness that cannot be attributed to a medical, psychiatric, or environmental cause. Sleep hygiene plays an important role in the treatment of primary insomnia. Other traditional therapies include behavioral therapy, stimulus control therapy, sleep restriction therapy and relaxation therapies, etc. Sleep-regulating technique under the tranquilization state of Qigong is a novel technique invented by a Chinese expert in traditional Chinese medicine psychology and sleep medicine on the basis of his 20 years' clinical experience. It consists of three major techniques. The first technique is sleep stimulate adaptive technique with two operation points. They are "language induction" and "process of stimulate-wake up-quiet-falling into sleep again". The second technique is emotions and sleep dissection technique. The third technique is sleep confidence strengthening technique. The three operation points for the third technique are "induction at the beginning of tranquilization state", "induction after sleep stimulate adaptive technique" and "induction at the close".
Results: Sleep-regulating technique under the tranquilization state of Qigong is a specific and practical technique, which has been gradually standardized. Clinical studies about it have been carried out.
Conclusion: As a novel technique, sleep-regulating technique under the tranquilization state of Qigong may have great clinical value. More clinical studies are needed to establish the efficacy and safety of it, and its potential to be used as an intervention for primary insomnia.
Acknowledgements: The Mechanism of TCM Nondrug Treatment to Treat Depression with Insomnia: National Nature Science Fund Project (National Natural Science Foundation of China): grant number 30772845.

T-D-028 THE CLOCK AS A FOCUS OF ATTENTION IN INSOMNIA: HOW DOES DAY DIFFER FROM NIGHT?

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Introduction and Objectives: Research in recent years has demonstrated selective attention to sleep in insomnia (Marchetti et al, 2006). Woods et al (2009) demonstrated a delayed disengagement from sleep related times using a modified Posner paradigm. The data presented here is from two experiments, one presenting the clock cue for 100ms and the other for 250ms.
Materials and Methods: The methodology follows that of Woods et al (2009) with two significant alterations. Firstly, the clock cue presentation times are 100ms or 250ms. Secondly, day times were also presented in both experiments as well as sleep times.
Results: The presentation time of the clock cue and time displayed influenced reaction time. With 100ms cue presentation, an interaction was found between sleep quality and trial type [F(1,31)=4.97, p<0.05. The largest effect was seen in PI and validly cued day times (d'=0.5). Furthermore, sleep quality and daytime impairment measures accounted for nearly 20% of the variance on valid day time trials only. With 250ms cue presentation, PI showed a general delay in performance compared to GS over all trial types and times presented on the cue [F(1,46)=18.7, p<0.000). The largest effect size was found on valid sleep trials (d'=1.23). Sleep quality and insomnia severity accounted for between 14% and 15% of performance variance on all trial types. Error rates could not account for these group differences with PI making significantly fewer errors than GS [F(1,51)=7.8, p<0.0005] in the 250ms experiment.
Conclusion: The delayed disengagement to sleep times seen previously (Woods et al, 2009) is not replicated here as it would appear that day times are the more salient cue at 100ms but, when cue presentation time increases to 250ms, this differential pattern of attention allocation disappears and a more general performance deficit is seen. This is relevant in the context of daytime impairment in insomnia as well as neurocognitive impairment.

T-D-029 THE EFFECTIVENESS OF COGNITIVE BEHAVIORAL THERAPY FOR CHRONIC INSOMNIACS IN KOREA

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Introduction and Objectives: Use of nonpharmacological behavioral therapy has been suggested for treatment of chronic insomnia. Since cognitive behavioral therapy for insomnia (CBT-i) has not been popular in South Korea until now, there was few data of the effectiveness of CBT-i in Korean insomnia patients.
Materials and Methods: Thirty (25 women; 5 men, mean age, 57.8 years, range 32-64 years) who were diagnosed with primary or secondary chronic insomnia participated in an 8-week, 4-session, multi-component group intervention. On sleep diary sleep latency, total sleep time, wakefulness after sleep onset (WASO), presumed numbers of awakening during sleep, sleep efficiency were reported before and after CBT-i. Questionnaire measures of global insomnia symptoms, sleep related self-efficacy, and mood status were also assessed before and after every session.
Results: Mean duration of insomnia history was 7.3 yrs (1.5-30 yrs, mean 5.3 days/week). Six patients had obstructive sleep apnea syndrome (mean

11.4/hr). Another 10 had periodic limb movement during sleep (mean total index, 35.1/hr) and others had no specific findings on night polysomnography except higher arousal index (mean 15.3/hr). After CBT sessions, mean global insomnia symptoms was significantly improved (16.5 ->10.6) ($p < 0.001$). Patients achieved a mean 51% decrease in sleep latency (0.84 -> 0.4 hr), a mean 35% reduction in WASO (1.48->0.95 hr), and increased sleep efficiency (70.0->85.1%) ($p < 0.05$). Total sleep time (4.8 ->6.5 hr) and number of awakening (1.8->1.2) showed a trend towards an improvement after CBT-i session.
Conclusion: CBT-i for insomnia produced significant improvements across the majority of sleep outcome measures, which suggested that CBT-i for insomnia was effective for the treatment of primary or secondary chronic insomniacs in Korea.

T-D-030 THE RELIABILITY AND VALIDITY OF THE JAPANESE VERSION OF ATHENS INSOMNIA SCALE

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Introduction and Objectives: The Athens Insomnia Scale (AIS) was developed as a brief self-assessment questionnaire for the evaluation of the severity of insomnia, and has been confirmed to have highly reliability and validity. However, the reliability and validity of the Japanese version of AIS (AIS-J) has not been examined. This study aims to confirm the internal consistency and factorial, convergent, and diagnostic validity of the AIS-J.
Materials and Methods: One hundred and seventy nine insomniacs who met the insomnia criteria of the ICSD-2 and 160 healthy control subjects having less than 30-min of sleep onset latency and/or wake after sleep onset were enrolled. At the first visit to the outpatient clinic of the Japan Somnology Center, participants completed the following self-rating scales of insomnia; the AIS-J, the Pittsburgh Sleep Quality Index (PSQI), Insomnia Severity Index (ISI), and Dysfunctional Beliefs and Attitudes about Sleep Questionnaire (DBAS).
Results: Results of exploratory factor analysis showed that the AIS-J has a one factor structure. The Cronbach's alpha was high in both group (insomnia: 0.70, healthy: 0.70). The correlation analysis showed that the AIS-J showed significantly positive correlation with the PSQI (insomnia: r = 0.57, healthy: r = 0.64), ISI (insomnia: r = 0.26, healthy: r = 0.70), and DBAS (insomnia: r = 0.47, healthy: r = 0.21) in both groups. A result of the ROC curve showed that individuals having 7 points or more of the AIS-J score were highly likely to be positive for insomnia (AUC = 0.99, sensitivity: 0.94, specificity: 0.95, positive likelihood ratio: 17.78, negative likelihood ratio: 0.06).
Conclusion: It was revealed that the AIS-J has high reliability and validity, and that the AIS-J can be utilized not only as an instrument to measure the severity of sleep-related problems but also as a screening tool for the diagnosis of insomnia.

T-D-031 THREE ITEMS PREDICT INSOMNIA DIAGNOSIS

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Introduction and Objectives: The goal was to validate the Insomnia Subscale of the Sleep Symptom Checklist (SSC) as a proxy for research diagnostic criteria for insomnia (i.e. $\geq$ 31 minutes undesired wake time,$\geq$3 nights/week, $\geq$6 months).
Materials and Methods: 108 adults (52 females, 56 males, aged 28 - 84 (M = 57, SD = 13) were recruited from primary care. While waiting to see their doctor, participants completed the SSC, an 18-item screening instrument which includes 3 subscales: Sleep Disorder, Daytime Distress, Insomnia. The insomnia subscale is comprised of: 1) Waking up and trouble getting back to sleep; 2) Insomnia; 3) Trouble falling asleep; 4) Poor sleep quality; 5) Waking up too early in the morning; 6) Waking often to urinate; and 7) Daytime sleepiness. Participants rate each symptom from 0 (not severe) to 3 (very severe). Participants also completed a Sleep Questionnaire: a brief retrospective measure that inquires about usual sleep experiences during the past typical month. This allows us to diagnose the presence of insomnia according to research criteria.
Results: A stepwise discriminant function analysis was carried out to predict Insomnia Diagnosis Yes/No from all 7 items from the SSC Insomnia Subscale. The following predictor variables: Insomnia, Trouble falling asleep, and Waking up and trouble getting back to sleep, discriminated between the Insomnia/No Insomnia groups at the 0.0001 level with a canonical correlation of 0.603, accounting for 100% of the variance. Classification accuracy for the two insomnia groups was 78.7% overall, with the Insomnia group at 70% and the No Insomnia group at 82.1% accuracy.
Conclusion: The SSC is validated for screening for sleep disorders in primary care. Here we show that 3 items from the Insomnia subscale can be used as a proxy, with significant accuracy, for diagnosis of insomnia according to accepted research criteria.
Acknowledgements: This project is funded by the Canadian Institutes of Health Research.

T-D-032 TREATMENT OF MIDDLE-OF-THE-NIGHT INSOMNIA: CURRENT MEDICAL PRACTICE

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Introduction and Objectives: Epidemiological studies indicate that middle-of-the-night (MOTN) awakening with difficulty resuming sleep affects 15% of the U.S. population, and about 16% of these patients seek medical attention. The purpose of this study was to assess current therapeutic practices, given the absence of FDA approved drugs for the treatment of MOTN awakenings.
Materials and Methods: 178 physicians (45 psychiatrists/133 primary care [PCP]) each provided data for 4 general insomnia patients and 1 patient specifically with MOTN insomnia, all on a hypnotic prescription currently, or within the last 3 months. This yielded a total of 712 (178x4) general insomnia records (62 with MOTN insomnia) and 178 MOTN records for analysis.
Results: On average, psychiatrists and PCPs were treating similar numbers of insomnia patients (approximately 137/month), issuing a similar number of prescriptions (approximately 133/month), and directing use of MOTN dosing at a similar rate (5%). 14% of MOTN-identified patients and 5% of the general insomnia patients were instructed to dose in the middle of the night. A variety of hypnotic drugs were prescribed for off-label use as an MOTN therapy, 61% of which were zolpidem and eszopiclone, which are approved for at-bedtime use. Importantly, 78% of MOTN patients did not experience MOTN awakenings every night of the week and the less frequent the MOTN awakenings, the more likely physicians were to instruct patients to dose at the time of awakening rather than at bedtime.
Conclusion: Physicians are treating MOTN insomnia with medications indicated for use at bedtime. Given that currently available hypnotics are frequently prescribed off label with no data on dose-related safety and efficacy for MOTN use, there is a clear need for medications that are safe and effective when used prn for MOTN insomnia.
Acknowledgements: Funded by Transcept Pharmaceuticals, Inc., Pt. Richmond, CA.

T-D-033 WHAT ARE YOU LOOKING AT? MOVING AWAY FROM SNAPSHOTS OF ATTENTION IN INSOMNIA: A NOVEL EYE TRACKING STUDY

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Introduction and Objectives: Research has documented that individuals with insomnia selectively attend to sleep stimuli compared to good sleepers (Marchettti et al 2006, MacMahon et al 2006, Woods et al 2009, Spiegelhalder et al 2010). The objective of the current study was to establish a timeline of approach and avoidance to sleep words using a novel methodology in insomnia research, eye tracking.
Materials and Methods: A sleep positive, sleep negative or neutral word (Marchetti et al, 2006) was presented simultaneously with a pseudoword to insomnia and good sleeper groups. Recordings were made using an Eyelink II (SR Research, Ontario, Canada) eye-tracking system set at 500Hz.
Results: On all parameters measured, significant differences ($p<0.05$) were found between insomnia and good sleepers: onset of gaze began later $F(1,8654) = 8.32$, $p<0.005$, speed of processing was slower $F(1,39)=5.0$, $p<0.05$ and interpretation strength was poorer $F(1,39)=4.6$, $p<0.05$ in those with insomnia suggesting poorer vigilance. Duration of first fixation on the target word was shorter $F(1,3167) = 75.8$, $p<0.005$ and time to home in on

the target word was longer $F(1,39)=3.9$, $p<0.05$ for those with insomnia. However, duration of first fixation provides the only effect of word condition $F(2,3167)= 3.22$, $p<0.05$.

Conclusion: This study has two main findings. Firstly, word salience had less effect than found in Marchetti et al (2006) with only one parameter, duration of first fixation, being influenced. Secondly, although this experiment was first thought to be a simple measure of attention allocation, it now appears that the nature of the task, target versus distractor, is complex for those with insomnia and a general delay in discrimination of the target word is found over all parameters. This suggests an online performance deficit rather than a selective processing bias leading to questions on the neuropsychology affected by insomnia. These results are comparable to current neurocognitive deficit work (Altena 2008, Edinger 2008).

I: Sleep Breathing Disorders

T-I-034 A ONE-YEAR, RANDOMIZED, DOUBLE BLIND, 6-MONTH SHAM CONTROLLED STUDY EVALUATING THE EFFECT OF CPAP IN OSA PATIENTS

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Introduction and Objectives: Most CPAP trials are not SHAM controlled or randomized. We sought to evaluate, in a randomized, Sham-CPAP controlled-fashion, the effects of 6-months and one-year effective CPAP usage upon blood pressure (BP), blood and anthropometric variables in OSA patients.

Materials and Methods: 72 recently-diagnosed OSA patients with AHI>20 were randomized to CPAP or Sham-CPAP. They all underwent two full PSG: one baseline and another for CPAP or Sham-CPAP titration. At titration PSG, CO2 was measured. Forty-three patients completed 6-months treatment (23 CPAP, 20 Sham-CPAP). Codes were opened after 6 months trial. All CPAP users were then followed for 6 more months, in an open label study. Their mean age was (CPAP:53.7±8.4,Sham-CPAP:56.9±8.0;p=0.8). 24-hour BP, blood parameters, anthropometric variables and compliance data were collected each 3 months. Statistical analysis: T Test and repeated measures ANOVA.

Results: Twenty-nine patients dropped CPAP or Sham-CPAP ($p>0.05$). None of the variables analyzed changed after 6 months of CPAP or Sham-CPAP use. However, at 12-months of CPAP the following variables changed significantly, in the open label arm of the study: Reduction in abdominal circumference ($p=0.01$); hip circumference ($p<0.01$); hemoglobin ($p<0.01$); hematocrit ($p<0.01$); uric acid ($p=0.01$), 24-h systolic BP ($p<0.01$), and 24-h diastolic BP ($p<0.01$). BMI, neck circumference, cholesterol, triglycerides, glycemia, CRP and urea did not change after 1-year.

Conclusion: Only one-year, but not 6 months of CPAP effective use, was able to significantly reduce abdominal and hip circumference, as well as hemoglobin, hematocrit, uric acid, and 24-h BP. Surprisingly metabolic blood variables did not change in our sample. Our results suggest that long-term CPAP trials are warranted. We question whether Sham-CPAP as a control would be useful in clinical trials, due to the long-term nature of the results obtained.

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T-I-035 A RATIONAL APPROACH TO THE MANAGEMENT OF OBSTRUCTIVE SLEEP APNEA SYNDROME

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Introduction and Objectives: Snoring & Obstructive Sleep Apnea Syndrome (OSAS) is a globally prevalent problem which is on the rise in recent times. The treatment modalities include Medical Appliances & Surgery. It is mandatory to have a rational approach in the management of OSAS, by meticulously analyzing both anatomical & physiological parameters. Aim is to define a rational approach for the management of OSAS, by devising a comprehensive protocol with assessment of anatomical level of obstruction by Dynamic MRI and physiological factors by Epworth sleepiness scale (ESS) and Polysomnography.

Materials and Methods: A prospective study in 110 patients was conducted over a period of two years. Surgery was advocated in 46 patients (Group 1) and remaining 64 patients (Group 2) were provided Continuous Positive Airway Pressure support (CPAP). Successful outcomes among these 110 patients were analyzed. A few patients required multimodal therapy.

Results: Among 46 patients, surgical treatment proved successful in 41 patients in whom AHI reduced from 46.96 to 12.88 (improved by 62%) and ESS improved by almost 10 points. Among 64 patients in CPAP group, AHI reduced from 54.2 to 11.3 (improved by 79%) and ESS improved by 11 points in all the patients, but 6 of them had poor compliance. 5 patients among the surgical group had persistence of symptoms. Inferences derived from the above results proved the success of formulating a rational approach in the management of OSAS.

Conclusion: Critical analysis of the anatomical & physiological factors inducing obstructive episodes & an appropriate treatment plan is vital, to produce successful outcomes in patients with OSAS. Failure of surgical procedures, are often due to improper case selection. A small group of patients may require multimodal therapy with surgery and CPAP.

T-I-036 ADVERSE HEALTH IN INDIVIDUALS WITH AND AT HIGH RISK OF SLEEP APNEA

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Introduction and Objectives: Sleep apnea (SA) is associated with reduced quality of life. We assessed the adverse health risks related to general health, restriction of activity, pain, cognitive function, emotion, sleep-related symptoms, and injuries in Canadians with and at high risk of SA.

Materials and Methods: The Public Health Agency of Canada developed the 2009 Sleep Apnea Rapid Response survey, a supplement to Statistics Canada's Canadian Community Health Survey. A sub-sample of 8647 respondents aged ≥18 years was included in this study from a total sample of 9523 respondents aged ≥12 years. Log-linked binomial regression modelling was employed to assess prevalence rate ratios for 22 health outcomes among individuals with versus without self-reported diagnosed SA (excluding those at high risk of OSA), and in those at high risk versus not at risk of OSA (excluding those reporting diagnosed SA). High risk of OSA was defined by the presence of ≥2 out of 4 indicators for obstructive sleep apnea: Snoring, Tiredness, Observed apnea, and hyPertension (STOP tool).

Results: Compared to those without SA, individuals reporting SA were significantly ($p<0.05$) more likely to report poor general health and worsened health compared to one year ago. They were also more likely ($p<0.05$) to report being unhappy with little interest in life, experiencing difficulty remembering things, thinking clearly, or solving problems, and more likely to report sleep-related symptoms such as extreme sleepiness, difficulty falling or staying asleep, and waking suddenly with the feeling of gasping or choking. They were less likely to report being free of pain or discomfort ($p<0.05$). Individuals at high risk of OSA were more likely than those not at risk to report similar adverse health outcomes ($p<0.05$).

Conclusion: Individuals with diagnosed SA and individuals at high risk of OSA were at increased risk of reporting adverse health outcomes.

T-I-037 ANATOMICAL REVIEW OF HYOID SURGERY FOR OBSTRUCTIVE SLEEP APNOEA

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Introduction and Objectives: The role of Hyoid surgery in treatment of OSA is not well understood. This study is to review the changes in anatomical parameters in patients with thyroid-hyoid approximation and Hyoid expansion

Materials and Methods: Patients who underwent modified Thyroid-Hyoid Approximation (12 patients) and hyoid expansion (2 patients) were reviewed with lateral Cephalometry, Computer assisted endoscopic measure-

ments and CT scan. Linear parameters such as posterior airway space (PAS), MPH-Mandibular plane to hyoid (MPH), Hyoid-posterior pharyngeal (HPP) distance were reviewed. Hypo-pharyngeal airway surface areas at epiglottis and hyoid levels were also reviewed in the group of hyoid expansion.
Results: There is less significant change in linear parameters in patients with modified thyroid hyoid approximation despite improvement in RDI and symptoms. There is more significant change in linear parameter and surface area at hyoid level in patients with hyoid expansion with improvement in RDI and symptoms. The distance from epiglottis to posterior pharyngeal wall increased from 4.09mm to 6.89mm, Hypo-pharyngeal airway at epiglottis level (65.54mm^2 to 90.65mm^2), hypo-pharyngeal airway at hyoid level (227.86mm^2 to 370.66mm^2)
Conclusion: Our observations from this small group of patients suggest that modified thyroid hyoid approximation surgery treats patient with OSA by stabilizing the muscles of hypo-pharyngeal airway rather a significant increase in these airway parameters. Observations from Hyoid expansion surgery suggest that it may increase the tension of Hypo-pharyngeal and Hyoid muscles and ligaments and result in some improvement of the airway parameters. Larger study is certainly needed to assess the role and outcome of Hyoid surgery in OSA treatment. Hyoid surgery should be considered as part of upper airway reconstructive procedures, together with other soft tissue and skeletal surgery to enlarge and stabilize the upper airway of OSA patients.

T-I-038 BRAZILIAN STATE PUBLIC PROGRAM OF REFERENCE IN RESPIRATORY MONITORING OF PATIENTS WITH DUCHENNE MUSCULAR DYSTROPHY WITH SLEEP BREATHING DISORDERS

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Introduction and Objectives: In Duchenne muscular dystrophy (DMD) motor unit of the respiratory muscles suffer impairments in their duties because of genetics, so variable. The clinical manifestations usually begin in early childhood, insidiously, with motor disorders. In Brazil, in most cases, confirmation of diagnosis is still delayed. In DMD can be present even if the disorder swallowing, sleep, and the progressive motor impairment with the risk of chronic respiratory failure in adolescence. The clinical evaluation should be related to the assessment of respiratory function as a measure of vital capacity (VC). As the disease worsens, it may require the institution of ventilatory support (VS) non-invasive (NIV) or invasive (IV) associated with features of respiratory therapy for patients with chronic respiratory failure. Besides the cost of the device for mechanical ventilation (rather representative for developing countries), you must count on a multidisciplinary assistance, caregiver well-trained and multidisciplinary care. In Brazil, until in 2001 no well-structured institutional program of home ventilation was available. In August 2002, was implemented in the State of Minas Gerais, through the Muscular Dystrophy Association of Mining and Hospital Foundation of Minas Gerais (FHEMIG), a public assistance program for patients with DMD (Program Ventilar-VP) in John Paul II Child Hospital/Hospitalar Foundation of Minas Gerais State (JPIICH/HFMGS) that feasible, the National Health System (SUS), multidisciplinary assistance at home. Objective: To describe the main features of the VP/JPIICH/HFMGS.
Materials and Methods: Cohort study. Data collected from all patients who were followed by VP from August 2002 to December 2010 in JPIICH/HFMGS. Kruskal-Wallis test for analysis of the medians between group A (SV users) and B (non-users VS).
Results: 62 patients with DMD were followed by VP (16 group A, 46 group B). One patient died in group B. No patient had respiratory disease unrelated to the disease, with no exclusions. Median age (years) the entire sample: onset of symptoms: 4 (00-10), diagnosis: 7.4 (2.8 to 14.7), loss of ambulation: 9 (5-15), last visit: 15.6 (6.4 to 30.2), followed at VP: 4.5 (0 to 6.5). Data from all sample: Caregiver: 4 (6.5) parents, 42 (67.7) mother, 16 (25.8) others. Family income (minimum wages): 4 (8.2), 8 (16.3) 31 (63.3) 6 (12.4). Extremes of maternal schooling: 4 (8.2) incomplete higher education, 6 (12.4) illiterate. Brothers with DMD: 46 (74.2) none 10 (16.1) 1, 6 (9.7) 2. Deviation of the spine to the panoramic radiograph: 21 (42.9) without deviation, 15 (30.6) lightweight, 8 (16.3) moderate 5 (10.2) severe. Most of the relatives felt the first symptom of the disease and the frequent occurrence of falls (p=0.04) for group B. Higher frequency of swallowing disorder (p=0.001) and greater number of hospitalizations (p=0.01) for group A. Cognitive impairment (p=0.08) occurred more frequently in group B. CV (% predicted) at first visit was lower in group A (p=0.001). Daytime arterial oxygen saturation was initially similar in both groups (p=0.001). Median body mass index was low in both groups (p=0.01).
Conclusion: Is it possible in a developing country with a population of low socioeconomic status, provide monitoring for patients with DMD and sleep breathing disorders, efficiency, especially for those with severe clinical presentation of disease.
Acknowledgements: Ventilar Program - John Paul II Child Hospital/Hospitalar Foundation of Minas Gerais State (FHEMIG)

T-I-039 BREATHING ROUTE AND SEVERITY IN OSAS WITHOUT NASAL OBSTRUCTION

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Introduction and Objectives: Nasal obstruction may cause sleep apnea and changes in breathing route. But it remains unclear how breathing route changes effect obstructive sleep apnea syndrome (OSAS). We evaluated the relationship between breathing route and OSAS severity.
Materials and Methods: We evaluated the relationship between breathing route and OSAS severity. We conducted polysomnography on 45 subjects with OSAS but no nasal obstruction using simultaneous multipoint pressure measurement. Pressure sensors were placed in the pharyngeal cavity such at the epipharynx, the oropharynx immediately below the soft palate, the hypopharynx next to the posterior tongue and in the esophagus.
Results: Subjects were divided into 3 groups based on negative pressure in epipharynx - nasal breathing with nasal obstruction (n=13), normal nasal breathing (n=16) and oral breathing (n=16). The apnea-hypopnea index (AHI) of the oral breathing group was 52.0/h - significantly higher than in the nasal obstruction group at 32.1/h and the normal nasal breathing group at 24.4/h. The pressure study indicated oral breathing obstructs the upper airway in the oral cavum and at tongue bases and nasal obstruction in turn generates negative pressure in the epipharynx collapsing the lower upper airway. In contrast nasal breathing normally obstructs the upper airway only via the uvula in OSAS during sleep.
Conclusion: Severity thus clearly differs between oral and nasal breathing during sleep. Subjects with OSAS breathing orally during sleep tend to have a higher AHI than subjects with nasal breathing due to severe hypopharynx airway obstruction.

T-I-040 BRUXISM IN CHILDREN: POLYSOMNOGRAPHIC CHARACTERISTICS AND OROFACIAL CHANGES

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Introduction and Objectives: This study was to compare orofacial and polysomnographic variables in a group of children, aged 6 to 12 years, with and without bruxism.
Materials and Methods: We selected those who met the criteria for bruxism based on a questionnaire (n=87), and controls without bruxism (n=41). Both groups underwent comprehensive dental, upper airway and orofacial evaluations. In the bruxism group, polysomnography was performed to evaluate the presence and distribution of bruxism episodes, and other associated sleep disturbances.
Results: The mean weight of the children with bruxism was 32.57±9.98 kg, compared with 36.41±10.45 kg for the control group (p=0.048). The frequency of morning headaches among the bruxism group was higher (p<0.001). Children with bruxism were more brachycephalic (p=0.008). The facial muscle pattern of children with bruxism significantly varied in type, whereas in the control group, the majority of children had long facial muscles (p<0.001). The dentition of the bruxism group significantly varied in type, whereas the control group had only mixed dentition (p=0.003). The supero-inferior relationship in the bruxism group was also more variable, in the control group only deep and open bite were found (p<0.001). The latero-lateral relation varied in the bruxism group, in the control group only sharp bite and cross bite side were found (p<0.001). Children belonging to the test group presented with smaller pharyngeal tonsils (p=0.007). The creak scores in the test group were significantly higher (p<0.001). In chil-

dren with bruxism, the number of tonic bruxism episodes was significantly higher in S2 (p=0.002) and REM (p<0.001) sleep stages, whereas phasic bruxism occurred more frequently in S2 (p=0,002) and S4 (p<0.001) NREM sleep.
Conclusion: Bruxism was more common in children with lower body weight, better breathing pattern indices, more complaints of morning headaches. The tonic and phasic events are distributed differently among the sleep stages. The tonic episodes tend to occur more in younger and thinner children.

T-I-041 CHANGES IN LEFT VENTRICULAR MECHANICS IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA

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Introduction and Objectives: Obstructive sleep apnea (OSA) is associated with increased cardiovascular morbidity and mortality, and may predispose to left ventricular (LV) remodelling, hypertrophy and heart failure. Our aim was to determine relationships between OSA and myocardial mechanics reflected by myocardial deformation and LV diastolic function.
Materials and Methods: Thirteen patients with severe OSA [41.9 12.6 years; apnea-hypopnea index (AHI) 68.8 27.1 events/h; lowest SaO2 63.9 17.9%] and 15 control subjects OSA [45.5 12.0 years; AHI 7.5 2.7 events/hour; lowest SaO2 88.3 5.0%] were studied. Speckle-tracking echocardiography and tissue doppler imaging - powerful novel modalities to identify reversible myocardial dysfunction - were used to determine the global longitudinal strain (GLS), E wave (peak flow velocity in early diastole), A wave (peak flow velocity at atrial contraction), and the E/A ratio.
Results: Compared to control subjects, patients with OSA had significantly reduced GLS (-18.0±3.7 vs -14.8±3.3%, p=0.024), and significantly higher A wave in association with reduced E/A ratio (57.7±9.9 vs 68.6±15.9 cm/s, p=0.036; 1.32±0.34 vs 0.96±0.22, p=0.023, respectively). No differences were observed between control subjects and patients in LV ejection fraction, LV mass and LV mass index (59.9±7.3 vs 56.5±5.5%, p=0.182; 189.2±36.1 vs 193.1±39.8 g, p=0.789; 91.5±12.9 vs 87.4±18.1 g/m^2, p=0.491, respectively).
Conclusion: The present results suggest that OSA is related to impairments in LV relaxation and contractility. Further studies are needed to explore mechanisms contributing to changes in myocardial mechanics in patients with OSA.
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T-I-042 CLINICAL AND FUNCTIONAL SEVERITY IN DUCHENNE MUSCULAR DYSTROPHY: COMPARING VARIABLE BETWEEN USERS AND NON-USERS VENTILATORY SUPPORT

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Introduction and Objectives: Duchenne muscular dystrophy (DMD) has a high prevalence among neuromuscular diseases in infancy and higher prevalence among the muscular dystrophies. The respiratory impairment in DMD may be due to primary weakness of the diaphragm, the intercostal and expiratory muscle that causes impairment in pulmonary ventilation, the patient's ability to cough and chest wall deformities and scoliosis, which further aggravates the restrictive process. Features such as physiotherapy air stacking, glossopharyngeal breathing, assisted cough in the presence of hypersecretion in the airways and ventilatory support (VS) are used in the prevention and treatment of respiratory disorders (sleep) in patients with DMD. The literature demonstrates the efficacy of VS in improving the paradoxical breathing pattern on sleep, alveolar ventilation and gas exchange, with increased oxygen saturation (SpO2), vital capacity (VC) and peak cough flow (PCF), and promote the reduction of dyspnoea, muscular effort, atelectasis and relieve symptoms of alveolar hypoventilation on sleep. In the last two decades, several authors have reported the importance of SV in the reversion of acute and chronic respiratory insufficiency, leading to better quality of life and increased patient survival. The Ventilar Program (VP) in John Paul II Child Hospital/Hospitalar Foundation of Minas Gerais State (JPIICH/HFMGS) assist DMD patients in a Brazilian state for 8 years. Objective: To compare, among patients with DMD, changing user and non-users of the SV in the VP of JPIICH/HFMGS.
Materials and Methods: Cohort study. Data collected from August 2002 to December 2010. Two groups: Group A: users of VS on sleep. Group B: non-users of VS. Kruskal-Wallis test for comparison of medians. It was considered statistically significant when p<0.05.
Results: 62 patients with DMD were analyzed: 16 (25.8%) in group A and 46 (74.2%) in group B. No patients with DMD showed respiratory disease unrelated to the disease, with no exclusions. Median age (years) for the entire sample monitored by the Program: 4.5 (0 to 6.5). Falls as the initial symptom of DMD group A: 13 (86.7), group B 21 (56.7) (p=0.04). Presence of dysphagia: group A: 7 (43.7), group B: 3 (6.5) (p=0.001). Oral corticosteroid use: group A 11 (91.7), group B 22 (56.4) (p=0.01). Number of hospitalizations during follow-up period: group A 9 (60), group B 11 (21.1) (p=0.01). Presence of moderate to severe scoliosis: Group A 6 (50), group B 6 (50) (p=0.03). Mild to moderate cognitive impairment: Group A 1 (6.3), group B 12 (26.1) (p=0.08). Median age (years): last query: group A 17.7 (11.4-25.8), group B 15.4 (9.1-26.1) (p=0.08), onset of symptoms: group A 4 (2-8), group B 5 (0-10) (p=0.53), diagnosis: group A 5.9 (2.8-14.7), group B 7.9 (3 0.5-13, 3) (p=0.07), loss of ambulation: group A 8.1 (5-13), group B 10 (6.7-15) (p=0.05). Median: CV first visit (% predicted): group A 39 (14-101), group B 71 (43-110) (p=0.001), SpO2 in the first visit (%): group A 97 (95-100), group B 98 (94-100) (p=0.40), body mass index (BMI) at last visit: group A 11.2 (10-12), group B 18.4 (10-31) (p=0.01). There were significant differences between groups A and B in relation to falls as the initial symptom of DMD, the presence of dysphagia, use of oral steroids, number of hospitalizations, presence of scoliosis, age of loss of ambulation, CV and BMI.
Conclusion: Clinical and functional variables indicate more severe impairment related to disease for DMD patients needing to use SV compared to patients with DMD who do not yet require SV.
Acknowledgements: Ventilar Program - John Paul II Child Hospital/Hospitalar Foundation of Minas Gerais State (FHEMIG).

T-I-043 CONCENTRIC NEEDLE ELECTROMYOGRAPHIC CHARACTERISTICS OF THE ANTERIOR AND POSTERIORREGIONS OF THE GENIOGLOSSUS IN OBSTRUCTIVE SLEEP APNEA PATIENTS AND NORMAL SUBJECTS

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Introduction and Objectives: To compare the electromyogram differences in the anterior and posterior regions of the genioglossus (GG) in obstructive sleep apnea (OSA) patients and normal subjects, we speculated the mechanical loads may be related to the electromyographic changes of the GG in OSA patients.
Materials and Methods: The data obtained with concentric needle electrode in the anterior and posterior regions of the GG were compared in nine healthy subjects and seventeen OSA patients.
Results: All parameters obtained from the anterior and posterior regions of the GG were not significantly different in normal subjects (P>0.05). In OSA patients, abnormal potentials were observed both in the anterior and posterior regions and the outliers in the posterior region were increased significantly than that in the anterior region with the parameters of amplitude and area (P<0.05). Although there is no significant difference between the anterior and posterior region with the parameter of duration in OSA patients, the duration in the posterior region is much longer than that in the anterior region. Some irregular discharging potentials were observed in the posterior region GG in OSA patients, while these potentials did not occur in normal subjects.
Conclusion: Neural drive input to the genioglossus is significantly increased in the posterior as compared to the anterior region of genioglossus in OSA patients. And some morphological changed motor units were observed in the posterior region indicated the neurogenic lesions were more severe in the posterior than that in the anterior of genioglossus.

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T-I-044 CT SCALE FOR EVALUATING THE COMBINED EFFECT OF UPPER AIRWAY ANATOMY IN OBSTRUCTIVE SLEEP APNEA

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Introduction and Objectives: The previous studies confirmed the respective role of each anatomic feature which was associated with obstructive sleep apnea (OSA), the objective of the present study was to design a scale which could reflect the combined effects of the anatomic features as many as possible, using three-dimensional Computer Tomography Scan (3-D CT) measurement.
Materials and Methods: This study collected 1-D, 2-D, 3-D measurements related with OSA first, then a few were chosen which were significant statistically (correlation coefficients were more than or close to 0.500) or were significant according to previous literature to form the initial scale, and selected the initial scale to form the final CT scale, finally tested the validity and the reliability of the scale.
Results: 168 adult male subjects were enrolled in this study. Final CT scale (OSA UA-CT 19) consisted of 19 items, including the measurements of Retropalatal Region (6 items), Retroglossal Region (5 items), Laryngopharynx (3 items) and the whole airway (5 items). The validity and reliability analysis showed the final scale had good discriminate validity ($p \leq 0.01$), concurrent validity ($r=0.749$, $p \leq 0.01$) and reliability (Cronbach α coefficient $=0.880$). The area under Receiver-operating-characteristic (ROC) curve was 0.885, and two cut-off points were 33 and 40 for demonstration (with sensitivity of 67.7% and specificity of 92.1%, respectively). Linear regression model between Total Score of the scale (Y) and AHI (X) in OSA group was conducted as $Y = 29.098 + 0.295X$ ($R2=0.720$, $p \leq 0.001$).
Conclusion: OSA UA-CT 19 scale may provide a guide for phenotypic analysis of etiology, assessment of surgical treatment, and choice of Positive Airway Pressure (PAP) therapy about OSA.

T-I-045 DETERMINANTS OF POOR ADHERENCE TO CPAP TREATMENT FOR OBSTRUCTIVE SLEEP APNEA

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Introduction and Objectives: Continuous positive airway pressure (CPAP) is the treatment of choice for patients with moderate-to-severe obstructive sleep apnea (OSA). Randomized controlled trials have demonstrated that PAP can effectively reduce the apnea-hypopnea index and improve subjective and objective sleepiness. In Manitoba, PAP equipment is fully covered by the Health Services, a large number of patients either don't use PAP or use it suboptimally.
Materials and Methods: We developed a social cognitive model that has been applied to the treatment of chronic disease including CPAP treatment. The patient's perception of the relative weight of costs (side effects, inconvenience) vs. benefits (symptom improvement) is viewed as determining adherence. This study enrolled patients prescribed CPAP for OSA but discontinued its use and returned the machine. Demographic data was collected, we conducted a telephone interview of these individuals to assess their understanding of the disease process and difficulties encountered.
Results: A total of 123 patients were enrolled in the study. Only 84 patients had complete data and were available for phone interviews. Average age was 51.5 ± 11.15 years, 68% were female; BMI was 33.21 ± 16.42 kg/m^2. Epworth sleepiness scale score was 15.5 ± 5.79 at baseline and decreased to 12.52 ± 6.40 ($p=0.23$) post treatment. SAQLI score was 3.95 ± 1.86 ($p=0.18$) and increased to 4.21 ± 2.54 on treatment. The major reasons for referral were: snoring 68%, awakening with a choking sensation 34% excessive daytime sleepiness 54%, restless sleep 43%, impaired ability to maintain attention, concentration, and memory 23%. The reasons for discontinuation of CPAP were: no benefit from using CPAP 87%, claustrophobia 62%, did not like the CPAP pressure 53%, mask uncomfortable 49%, mask too tight 44%.
Conclusion: Our model of social cognitive theory confirmed the following to be relevant to CPAP adherence: (1) Poor perception of risk from untreated sleep apnea, and (2) High expectations regarding treatment outcome (outcome expectancies) and (3) Lack of perceived benefit from therapy.

T-I-046 DIFFERENCE OF CORTICAL EXCITABILITY IN OBSTRUCTIVE SLEEP APNEA SYNDROME ACCORDING TO THE SEVERITY: TRANSCRANIAL MAGNETIC STIMULATION STUDY

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Introduction and Objectives: It is known that severe OSAS patients have imbalanced cortical excitabilities that enhanced inhibition or decreased brain excitability in TMS-based study. The aim of this study was to investigate cortical excitability in obstructive sleep apnea syndrome (OSAS) according to the severity.
Materials and Methods: The authors recruited 54 untreated OSAS patients (14 mild, 16 moderate, 24 severe) and 10 healthy volunteers. All patients and volunteers underwent polysomnography and TMS. The TMS parameters measured were resting motor threshold (RMT), motor evoked potential (MEP) amplitude, cortical silent period (CSP), and short-interval intracortical inhibition (SICI) and intracortical facilitation (ICF).
Results: Severe OSAS patients had a higher SICI than normal and mild OSAS patients. However, there were no significant difference on the RMT, MEP, CSP, and ICF.
Conclusion: Our study shows that cortical inhibition is enhanced in more severe OSA patients. It suggests that fragmented sleep by recurrent sleep apnea-hypopnea events result in enhanced cortical inhibition in OSAS group.

T-I-047 EFFECTS OF CPAP THERAPY ON HYPOKINETIC ARRITHMIAS IN AN OSAS PATIENT

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Introduction and Objectives: It's well known that in OSAS patients the increased parasympathetic tone observed during the apnea events could determine significant bradiarrhythmhias during sleep. We analyzed the effectiveness of CPAP therapy on hypokinetic arrhythmias in a young obese patient with severe obstructive sleep apnea syndrome.
Materials and Methods: A 39 years old male patient, overweight (BMI: 36.4 kg/m^2),with an history of neurogenic syncope and ECG finding of nocturnal pause $>$ 3 sec associated to junctional escape rhythm and atrio-ventricular block, underwent a polysomnographic study (PSG) for suspected OSAS. He performed a second PSG control study after beginning of CPAP treatment.
Results: The baseline PSG showed a severe obstructive sleep apnea syndrome (AHI: 64/h, ODI: 65/h) associated with 20 episodes of long third-degree AV block during the apnea periods (max pause of 3.6 sec). A cardiological indication for implantation of cardiac pacemaker was taken into consideration. A PSG recording after ten days of CPAP therapy showed an optimal control of sleep breathing disorder (AHI: 0.3/h) and the absence of bradiarrhythmhias in the sleep ECG. Holter ECG monitoring in the next 24 hours confirmed the absence of bradyarrhythmias, so it ruled out the need for implantation of cardiac pacemakers.
Conclusion: In a young patient, overweight, with a picture of severe obstructive sleep apnea and episodes of third-degree AV block in the absence of heart disease, CPAP therapy was effective not only in the optimal resolution of obstructive sleep breathing disorder but also in the normalization of cardiac arrhythmias. This effect is probably mediated by the attenuation of the increased parasympathetic tone secondary to the overstimulation of cardio-pulmonary vagal afferent fibers during the apnea periods.

T-I-048 EFFICACY OF MAXILLOMANDIBULAR ADVANCEMENT IN THE TREATMENT OF OSAS: A SYSTEMATIC REVIEW AND META-ANALYSIS OF CASE SERIES

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Introduction and Objectives: Obstructive sleep apnea syndrome (OSAS) is characterized by repetitive pauses in breathing during sleep due to obstruction of the upper airway (nasopharynx, oropharynx, and hypopharynx). Maxillomandibular advancement (MMA) surgery has been indicated in the treatment of OSAS, as it pulls forward the maxilla and mandible and thus enlarges the upper airway. The present study assessed the efficacy and safety of MMA-based surgical treatment of OSAS.
Materials and Methods: A systematic review of the literature, open to all study designs, was performed. Studies assessing apneic patients who underwent MMA as the sole surgical intervention for treatment of OSAS were included. Patients' pre- and postoperative polysomnographic records were reviewed. The primary endpoint was change in the apnea–hypopnea index (AHI). The secondary endpoints were safety of the surgical procedure, postoperative complications, changes in facial appearance, and subjective daytime sleepiness scores.
Results: Two case series including a total of 51 apneic patients treated solely with MMA were included in the review, and suggested substantial reductions in AHI values (Hochban, 1997, 36 subjects: mean pre-op AHI, 43.5±15.9; mean post-op AHI, 1.8±2.5; Dattilo and Drooger, 2004, 15 subjects: mean pre-op AHI, 76.2±45.7; mean post-op AHI, 12.6±12.1). Dattilo and Drooger also employed the Epworth Sleepiness Scale and found a mean reduction to 4.7 points postoperatively, down from 17.8 at baseline.
Conclusion: This systematic review suggests that MMA can be an effective treatment option for OSAS. However, this conclusion is based on case series data, and studies with higher levels of evidence are required.
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T-I-049 FACTORS ASSOCIATED WITH A POSITIVE STOP-BANG SCREEN IN THE PREOPERATIVE CLINIC POPULATION

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Introduction and Objectives: Introduction: Many preoperative clinics use the STOP-Bang Questionnaire as a screening tool for obstructive sleep apnea considering data that suggests obstructive sleep apnea predisposes to increased postoperative complications. Factors associated with obstructive sleep apnea include but are not limited to age, gender, Body Mass Index (BMI) $>$ 35 kg/m^2, hypertension, hyperlipidemia, and diabetes. Factors associated with positive STOP-Bang screening need clarification.
Materials and Methods: We analyzed STOP-Bang scores collected on 996 patients in the Virginia Commonwealth University (VCU) preoperative clinic over a 6 week period. A score greater than or equal to three defined a positive STOP-Bang screening. In addition to the STOP-Bang score, we collected data regarding age, gender, race, BMI and other co-morbidities including those most commonly associated with obstructive sleep apnea.
Results: We found that 43.3% of preoperative patients scored positive on the STOP-Bang Questionnaire. Increasing body mass index demonstrated a direct, linear correlation of 0.982 with increasing STOP-Bang, ultimately contributing to STOP-Bang positive patients averaging 38.9 kg/m^2. A positive STOP-Bang screen yielded an average age of 57.6 years compared with 48.9 years seen in those with a negative screen. Among co-morbid conditions, renal disease exhibited the highest STOP-Bang positivity with 67.9%, followed by diabetes (66.9%) and hypertension (65.3%). Sixty-seven percent of preoperative patients presenting for gastric bypass surgeries scored positive on STOP-Bang.
Conclusion: STOP-Bang positivity demonstrates associations similar to co-morbid conditions identified in obstructive sleep apnea. Specifically, these include increased body mass index, average age and the presence of renal disease, diabetes and hypertension. Based on the above findings, one could speculate that patients scoring positive on STOP-Bang, regardless of a sleep apnea diagnosis, exhibit similar increased risks of associated postoperative complications.
Acknowledgements: Kabolizadeh K1, Mims KN1, Price-Stevens L2, Leszczyszyn D1.

T-I-050 FULL RESPIRATORY ASSISTANCE ON SLEEP OF MUCOPOLYSACCHARIDOSIS DISORDERS: A REFERENCE AND INNOVATIVE STATE PROGRAM THAT IMPROVES THE QUALITY OF LIFE IN BRAZIL

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Introduction and Objectives: The organization of a service to assist patients with mucopolysaccharidosis disorders (MPS) is not simple. In early 2007, there was implemented in Belo Horizonte, Minas Gerais state, Brazil, for FHEMIG by a government agency of the State of Minas Gerais, the MPS Program (MPSP) of John Paul II Child Hospital/Hospitalar Foundation of Minas Gerais State (JPIICH/HFMGS) with a multidisciplinary care for patients with MPS. This allows a monitoring sleep system within the National Health System (NHS). Although there are specific etiological treatment for some types of MPS, the multidisciplinary approach with neurologists, cardiologists, orthopedists, pulmonologists, nurses, physical rehabilitation and psychological counseling, nutritional and social, allows the relief of symptoms resulting from systemic involvement, improving the quality of life and reducing morbidity and mortality of patients. Prior to implementation of PMPS, patients diagnosed with MPS had no connection with the NHS, which found itself unable to meet patient needs for a multidisciplinary approach. In Brazil, assistance programs for patients with MPS and home care is still poor and scarce. Objective: To describe the main features of respiratory assistance during sleep at the MPSP of JPIICH/HFMGS.
Materials and Methods: A descriptive, retrospective, observational study. Data collected between January 2007 and december 2010. We included all patients in the MPSP/JPIICH/HFMGS.
Results: 25 patients were evaluated by MPSP (7 MPS I, MPS II 4, 1 MPS IIIa, 13 MPS VI). Only two of Belo Horizonte. Median follow up: 3.5 years. 13 meandering. 4 brother with MPS. Median age at 1st assessment in PMPS: 7 years. 20 do (ram) ERT for at least 10 weeks in HIJPII. Deaths: 1 patient on ERT and ventilatory support (VS), an ERT in SV, without a ERT and without SV. Median hospitalizations per year per patient: 2 from respiratory infections. 2 with a swallowing disorder and 2 with serious cognitive impairment. 2 with tracheotomy (one with continuous VS). Oxygen Users: 2 before-post-MPSP and 0 after-MPSP. Sleep obstructive and central apnea (SAS) undiagnosed, before-MPSP: 25, after-MPSP: 12 with SAS treated with SV. Median age-of-onset for commitment of cardio-respiratory: 10 years. In multidisciplinary follow: before-MPSP: 10, after-MPSP: 15. The patients with trained caregivers for acute respiratory problems: 2 with home care and 23 outpatient weekly. 11 had VS (10 noninvasive and 1 invasive continuous).
Conclusion: With the installation of MPSP, there was a qualitative leap in the monitoring of patients with MPS. You can effectively perform a multidisciplinary follow up care appropriate for patients with MPS, even in developing countries.
Acknowledgements: MPS Program - John Paul II Child Hospital/Hospitalar Foundation of Minas Gerais State

T-I-051 FUNCTIONAL IMPROVEMENT OF THE STOMATOGNATHIC SYSTEM BY MEANS OF MAXILLAE FUNCTIONAL ORTHOPEDIC TREATMENT AND PREVENTION OF RESPIRATORY DISORDERS RELATED TO SLEEP DISORDERS – CASE REPORT

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Introduction and Objectives: A precondition for the bone remodeling and dental movement activities is the occurrence of an inflammatory process triggered by the neural stimulus by means of the Functional Jaw Orthopedic (FJO) appliance, captured by the orofacial proprioception. Inflammatory mediators, growth factors and neuropeptides play roles in the periodontal tissues plasticity with varied degree of connectivity through synaptic mech-

anisms that act in a vast neural net that is interconnected by feed-forward and feedback structures projections in the transmission of neural stimulus with high neuroplasticity potential. They are closely related with dental eruption, occlusion and mastication, suggesting that the mechanical stimuli due to the dental eruption are a necessary condition to the differentiation and maturation of the dentoalveolar process. Together with the mouth functions, nasal breathing is also a factor of equal importance in the conformation of the dental arches for both the masticatory function and the dental aesthetics to occur in a balanced way. This neuromolding interface is observed in the functional priority octagon, where the head, neck, jaw and tongue position is intimately connected to the air space, inframandibular region, and spinal cord. The intention of presenting two clinical cases is to show how the FJO treatment stimulates the growth direction and the development of the bone bases with the correction of oral functions.

Materials and Methods: Two male children, with mouth-breathing and alteration on functional priority octagon with skeletal and dental open bite were treated with Simões Network and Planas appliance.

Results: After the treatment, we observe the recovery of the functional priority octagon, with alteration of growth direction of mandible and the interrelationship with the maxilla, increase in the air space with reduction in the soft palate length.

Conclusion: Additional studies must be performed with objective data related to sleep, comparing the restoration of the functional skeletal pattern and the quality and architecture of sleep.

T-I-052 HILBERT-HUANG TRANSFORMATION ANALYSIS OF POLYSOMNOGRAPHIC DATA OF OBSTRUCTIVE SLEEP APNEA PATIENTS RECEIVING CPAP TREATMENT

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Introduction and Objectives: A recently developed method, Hilbert-Huang Transform (HHT), is examined in this study. The previous studies demonstrated the key step of the HHT algorithm, called Empirical Mode Decomposition (EMD), can reconstruct the time function with a particular frequency-amplitude modulation related to the specific physiologic processes.

Materials and Methods: The EMD is further modified into Ensemble Empirical Mode Decomposition (EEMD), a noise-assisted EMD algorithm, to prevent the potential problem of mode mixing. The EEMD obtains an ensemble of decompositions of data with added white noise, and uses the resultant means as the final result of each corresponding IMF, making it more reliable. The chi-square test or Fisher exact test were performed. The continuous variables were represented as mean value $\pm$ SD and Student's paired t test was calculated between baseline and CPAP treatment. Correlation between different parameters were estimated by Pearson's correlation. The statistical significance was set at $p<0.05$.

Results: The correlation analysis revealed that the OSAamp increased as AHI indexes increased ($p<10\text{-}4$) and LF was weakly correlated with AHI indexes ($p<0.05$) while AHI indexes had no relationship to VLF ($p=0.081$) or HF power ($p=0{,}387$). The AHI indexes were significantly reduced during CPAP treatment (baseline:34.3 ± 22.9; CPAP:2.3 ± 1.5, $p<10\text{-}11$). Although VLF power was the highest during baseline, all spectral indices were markedly reduced during successful treatment of OSA. OSAamp derived from modified EMD was also significantly diminished during CPAP treatment ($p<10\text{-}9$).

Conclusion: Although AHI remains the gold standard in assessing the severity of OSA, the modified EMD may provide an alternative index for clinicians with the advantage of using only heart rate signals. Moreover, this method may serve as a simple and inexpensive home monitoring tool for the effects of OSA treatments. Removal of the OSA oscillation may also provide a potential solution for spectral analysis during sleep.

T-I-053 HYPERGLYCEMIA IN ANIMAL MODEL OF SLEEP APNEA: EFFECT OF MELATONIN AND N-ACETYLCYSTEINE

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Introduction and Objectives: Repeated episodes of sleep apnea cause intermittent hypoxia (IH). Pathophysiological effects similar to hypoxia-reperfusion lead to the formation of free radicals, oxidative stress, and changes in the glycolipid metabolism. We investigated the ability of the antioxidants melatonin and N-acetylcysteine (NAC) to reverse hyperglycemia caused by IH in a sleep apnea animal model.

Materials and Methods: Seventy-two Balb/c mice, divided in six groups, were exposed during 35 days to IH (n=36) and to sham IH (SIH; n=36). The daily IH procedure lasted 8 hours during which the rodents underwent a total of 480 cycles of 30 seconds of progressive hypoxia to a nadir FIO2 of 6%, followed by 30 seconds of normoxia. After day 21, each mouse was injected daily with vehicle (n=24), melatonin (n=24), or N-acetylcysteine (n=24) intra-peritoneally. Glucose, total cholesterol, and triglycerides levels were measured by enzymatic colorimetric assay tests.

Results: Glucose levels were higher in the group exposed to IH (141 ± 38 mg/dL) than to SIH (75 ± 17 mg/dL; $p<0.05$). The group receiving NAC also exhibited the effect of IH, increasing the glucose concentration to 131 ± 39mg/dL. Administration of the antioxidant melatonin prevented increase of glucose levels by IH (74 ± 13 mg/dL). Total cholesterol and triglycerides levels did not show significant changes under IH.

Conclusion: These results suggest that melatonin prevents increase of glucose levels after chronic exposure to intermittent hypoxia simulating sleep apnea. Since the antioxidant NAC was ineffective, it is more likely that melatonin acts through its direct action on insulin release than through an antioxidant effect that would compensate for the detrimental influences of oxidative stress on glucose metabolism.

Acknowledgements: Research was financed by FIPE-HCPA

T-I-054 INTERIM ANALYSIS OF LONG-TERM PATIENT FEEDBACK ON A NOVEL AUTOMATIC RAMP FEATURE IN FIXED PRESSURE CPAP

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Introduction and Objectives: Patients using CPAP therapy commonly arouse or wake from sleep during the night1 and during these times they are most likely to perceive high pressure2. Some CPAP devices have a timed ramp feature to relieve pressure during wakefulness. Using SensAwake™ technology3,4 to automatically detect the transition from sleep to wake, this process has been automated. A fixed pressure is maintained when the patient is asleep and the pressure is rapidly reduced when the patient arouses or awakes (CPAPSA). This is an interim (30-day) analysis of patient preference and compliance with this novel algorithm.

Materials and Methods: Ethics approval was obtained and adult OSA patients were enrolled to receive CPAPSA for 90 days. Machine usage was downloaded and patients were asked to fill out a questionnaire about their perceptions at 30 days.

Results: 94 patient reports have been collected and 90 questionnaires returned. Subjectively, 78% of all responders slept well with the device and 14% of patients found the device disrupted their sleep regardless of CPAP experience. Objective data from the machine (30 day reports) is listed below and separated by user experience. Notably, 4 patients (4%) accidentally turned SensAwake™ off and 1 withdrew from the study due to pressure intolerance. The average time on CPAP for experienced users was 3.5 years. Values are mean and SD. Naïve (47%); Experienced (53%); Combined (100%) AHI: 3 (2); 4 (3); 3 (3) Therapeutic Pressure: 9 (3); 10 (3); 10 (3) 90% Pressure: 9.5 (2.6); 10.2 (2.7);9.9 (2.7) SensAwake™ events per night: 11.9 (5.0); 13.6 (6.4); 12.8 (5.8) Hours used per night: 5.51 (1.8); 5.71 (1.99); 5.6 (1.9)

Conclusion: CPAPSA controlled the AHI well in this group and patients responded positively to the algorithm. However, raising the SensAwake™ pressure may be necessary for optimal comfort in some patients. CPAP and SensAwake™ was preferred by most patients and offers noticeable relief from high pressures.

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T-I-055 IS DAYTIME SLEEPINESS MEASURED BY THE EPWORTH SLEEPINESS SCALE ASSOCIATED WITH LONG TERM CONSEQUENCES OF UNTREATED OSA (CARDIO-VASCULAR EVENTS AND DEATH)?

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Introduction and Objectives: The Epworth Sleepiness Scale (ESS) is a commonly-used scale in sleep laboratories and the only one that measures a person's average sleep propensity in daily life. This study examined the published evidence to (a) assess the psychometric properties of the ESS for describing the level of daytime sleepiness among adult patients with obstructive sleep apnea (OSA) and (b) assess the predictive validity of the ESS, defined here as the extent to which ESS scores predict cardiovascular events.
Materials and Methods: Articles describing psychometric properties and using the ESS for predictive purposes were located through a MEDLINE and EMBASE search. Psychometric properties were appraised using the methodological principles of item development, sensibility, reliability and validity.
Results: The ESS was developed in a diverse sleep disorder population, and later tested for uni-dimensionality and cumulative, hierarchical pattern of sleep-related situations within the items in a large OSA sample. However due inadequate item development, unclear items (e.g., #2, #3, #8), possible redundancy between pairs of items (e.g. #6 and #8, #3 and #7) and vagueness around time frames for questions were reported. The ESS was found to form an ordinal scale with between four to six levels of somnificity and not all true levels were represented. ESS has good sensibility and reliability (between-item correlations 0.33-0.57; Rho=0.79). Uncertainty existed around convergent construct validity: correlations between the ESS and the multiple sleep latency test ranged from medium to weak, possibly due to distinct underlying conceptions (average versus situational sleep propensity). Known-group construct validity was well established. Some studies have shown predictive validity for ad hoc measures of sleepiness, but predictive validity of the ESS for cardiovascular events has not been evaluated. No predictive study was of good quality.
Conclusion: The ESS is an acceptable instrument for descriptive purposes with good psychometric properties but its predictive validity has not yet been studied.

T-I-056 LONGITUDINAL STUDY OF SLEEP BREATHING DISORDER (SBD) IN A GENERAL POPULATION SAMPLE

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Introduction and Objectives: Evolution of SBD has been insufficiently documented in a general population. Longitudinal information can be gathered by interviewing the same individuals at different times but it can also be obtained by measuring a population on different occasions. This study presents the results related to SBD in South Korea assessed in a 7-year interval.
Materials and Methods: The first study was carried out in 2001 with 3719 individuals aged 15 years or older representative of the general population of South Korea. The second study was performed in 2009 using a representative sample of 2537 individuals in the same age range. The methodology was the same for both studies. The participants were interviewed by telephone using the Sleep-EVAL system. The interviews covered sleep habits, sleep symptomatology,and physical and psychiatric illnesses. DSM-IV sleep and psychiatric disorder diagnoses were also assessed.
Results: 1) Men: In 2001 8.1% of the sample reported snoring; the prevalence increased to 13.7% in 2009. In 2001 2.9% of the sample reported OSAS; the prevalence increased to 4.7% in 2009. 2) Women: In 2001 2.8% of the sample reported snoring; the prevalence increased to 6.2% in 2009. In 2001 1.7% of the sample reported OSAS; the prevalence was increased to 2.6% in 2009.
Conclusion: Overall, prevalence of SBD has increased over a 7-year period mainly in young adults. The increase of SBD is strongly correlated with weight gain among young adults in Korea.

T-I-057 MEDICATION IS NOT ASSOCIATED WITH HYPOVENTILATION IN PATIENTS WITH SUSPECTED SLEEP APNEA

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Introduction and Objectives: Hypoventilation is considered both a serious co-morbidity and consequence of sleep apnea, especially in obese patients. It is substantially under-diagnosed prior to the advent of clinical respiratory failure. We evaluated the association of concomitant medication with the incidence of a new diagnosis of hypoventilation using the systematic monitoring of main stream end-tidal CO2 (ETCO2).
Materials and Methods: We surveyed 518 community-based who were referred for clinically suspected sleep apnea. Participants were evaluated by a sleep medicine specialist, questionnaire and one night of polysomnography. All patients were monitored with main stream ETCO2 during diagnostic nocturnal polysomnography. All medications were coded for opiates, antipsychotics, benzodiazepines, benzodiazepine receptor antagonists (BZDRA), antidepressants and respiratory drugs.
Results: Patients were a mean (SD) age of 49.9 (SD 12.1) years and 69% were men. The mean apnea-hypopnea index was 45.4 (SD 36.2) and 398 (77%) of patients met diagnostic criteria for at least moderate obstructive sleep apnea. Of all patients, 4 were treated with opiates, 8 with antipsychotics, 37 (7.1%) with benzodiazepines, 17 (3.3%) with BZDRA, 77 (14.9%) with antidepressants and 42 (8.1% of 518) with respiratory medications. Overall, 101 (19%) patients spent at least 10% of sleep time in hypoventilation, while 24 (4.6%) had at least 10% of total sleep time with an ETCO2 of 50mmHg or higher. None of these patients were known for hypoventilation prior to polysomnography. The odds ratios (95% confidence intervals) for association with hypoventilation were: benzodiazepines 0.96 (0.41-2.25), BZDRA 0.55 (0.12-2.41), antidepressants 0.48 (0.20-0.93), and respiratory drugs 0.56 (0.20-1.40).
Conclusion: We conclude that hypoventilation is frequent is patients with suspected sleep apnea, and that medications do not appear to be a useful risk factor to aid in predicting hypoventilation.

T-I-058 NEED FOR VENTILATORY SUPPORT ON SLEEP AND LOSS OF WALKING IN PATIENTS WITH DUCHENNE MUSCULAR DYSTROPHY

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Introduction and Objectives: Duchenne muscular dystrophy (DMD) is a recessive genetic disease that affects male children. In adolescence comes the cardiorespiratory impairment on sleep, marked by the loss of ambulation. This restriction is related to respiratory muscle weakness caused by diaphragmatic, intercostal and accessories, which can lead to: respiratory failure with hypoventilation, sleep disorders and respiratory effort. At that time, the institution may be required ventilatory support (VS). The VS can increase survival by 85% in the 1st year of use up to 73% after 5 years of decreasing death rate. Death is often related to cardiopulmonary complications: sleep disorders breathing, chronic respiratory failure, pulmonary hypertension and cardiomyopathies, around 25 years old. Despite the clinical outcome following a well-defined sequence of events (falls, loss of gait, respiratory failure and cardiac), there is significant variability in age and intensity with which these events occur. In recent decades, several studies support and strengthen the institution of the VS in improving lung function, reducing the need for intubation and/or tracheostomy in patients with DMD. The Ventilar Program (VP) in John Paul II Child Hospital/Hospitalar Foundation of Minas Gerais State (JPIICH/HFMGS) assist DMD patients by the National Health System in a Brazilian state. Objective: To evaluate the cumulative probability of the need to VS in patients with DMD in the VP/JPIICH/HFMGS.
Materials and Methods: Cohort study. Data collected between August 2002 and December 2010 in VP/JPIICH/HFMGS. Group A: VS users and group B: nonusers of VS. The likelihood of ventilatory support during the observation period was estimated by survival analysis of Kaplan-Meier. The response variable studied was the need for introduction of ventilatory support regarded as binary variable.
Results: 62 patients with DMD were assessed at VP. To date, 16 patients

(25.8%) required ventilatory support and 46 patients (74.2%) have not yet needed. No patients with DMD showed respiratory disease unrelated to the disease, with no exclusions. Medians for the entire sample (years): last visit: 15.6 (6.4 to 30.2), monitored by the VP: 4.5 (0 to 6.5) performed before-physical therapy VP: 13 (20, 6). Median age (years) loss of ambulation: group A 8.1 (5-13), group B 10 (6.7 to 15) (p=0.05). It is observed that the majority of patients in group A lost early ambulation. There was a significant difference between the two groups (p=0.05). The survival curve of cumulative probability of VS according to age showed that age below 11 years of age no patient needed VS. At 16, the probability of using SV was about 20% at 23 years and 50% at 26 years was almost 100%. Establishing a cutoff point for the loss of march to 10 years, we could study two groups of patients. There is a statistically significant difference in the cumulative probability ($p<0.001$) in need of SV among patients with loss of ambulation before 10 years of age (group C) and with loss of ambulation after that age (group D). With 15 years of age, approximately 12% of patients in group C required SV. While in Group C 100% of patients needed to SV 20, SV in group D was necessary only after 23 years.
Conclusion: Age of loss of ambulation at age 10 is a marker for estimating the need of early VS on sleep in patients with DMD.
Acknowledgements: Ventilar Program - John Paul II Child Hospital/Hospitalar Foundation of Minas Gerais State (FHEMIG).

T-I-059 OROPHARYNGEAL EXERCISES AS THERAPY OF OBSTRUCTIVE SLEEP APNEA IN A PATIENT WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Introduction and Objectives: Obstructive Sleep Apnea (OSA) is a serious public health problem. The adherence to the gold standard treatment with Continuous Positive Airway Pressure is variable among patients with mild OSA. Oropharyngeal exercises are a promising alternative treatment (AM J Respir Crit Care Med 2009;179:962-966). However it has not been tested in patients with OSA and severe comorbidities. Objective: Describe the effects of therapy in a patient with mild OSA and severe comorbidities.
Materials and Methods: Case report of a patient 59 years old male, body mass index = 40 kg/m^2, edentolous, severe chronic obstructive pulmonary disease and on use of continuous oxygen. The patient was referred with a history of loud snoring, excessive daytime sleepiness and dry mouth awakening. Full polysomnography (PSG) showed: Apnea Hypopnea Index (AHI)=11 events/hour, minimum oxygen saturation of 64% on oxygen 2L/min. Patient underwent oropharyngeal therapy for 8 weeks. Each session takes 30 to 45 minutes, once a week and he did the same exercises three times a day, sessions of 5 minutes, everyday.
Results: Oropharyngeal examination showed that the patient was: toothless, tonsil grade II, large tongue, swollen and elongated uvula. During the sessions, the following were performed isotonic and isometric exercises. In the fourth session, he reported improvement of symptoms and at the end of therapy he did another full PSG that showed: AHI = 5.5 events/hour and minimum oxygen saturation of 71% on oxygen 2L/min.
Conclusion: Although the patient presented severe comorbidities and was toothless, the oropharyngeal exercises proved to be efficient, evidenced by decrease in AHI and symptoms.Therefore, oropharyngeal exercises are a promising treatment for patients with mild OSA and severe comorbidities.

T-I-060 PREDICTING USE OF PORTABLE MONITORING VERSUS POLYSOMNOGRAPHY IN THE PREOPERATIVE CLINIC

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Introduction and Objectives: Obstructive sleep apnea is highly prevalent in the preoperative population and evidence suggests that it causes postoperative complications. One can use the simple STOP-Bang questionnaire to differentiate between preoperative patients at high or low risk for obstructive sleep apnea. However, even those found to be at high risk of obstructive sleep apnea need a sleep study to confirm the diagnosis. Most sleep centers cannot perform in-laboratory, preoperative, polysomnograms in a timely manner, but portable monitoring is more accessible in this setting.
Materials and Methods: We analyzed STOP-Bang scores collected on 996 patients in the Virginia Commonwealth University (VCU) preoperative clinic over a 6 week period. We stratified patients determined to be at high risk on STOP-Bang as to whether they should receive portable monitoring or polysomnograms based on recommendations from the American Academy of Sleep Medicine (AASM).
Results: We found that 43.3% of preoperative patients scored positive on the STOP-Bang questionnaire, a percentage higher than any previously published. Based on the American Academy of Sleep Medicine guidelines, 78.8% were eligible for portable monitoring and only 21.2% required in-laboratory polysomnograms. Clinical history and not the STOP-Bang score most strongly supported the need for a full polysomnogram. Although a near perfect correlation between rising body mass index (BMI) and rising STOP-Bang values exists, only when the body mass index was 50 or higher did a significant percentage (30.8%) of the patients require polysomnogram.
Conclusion: Seventy-eight percent of preoperative patients scoring positive on the STOP-Bang questionnaire meet criteria for portable sleep apnea testing. Other than morbid obesity, no predictors exist for delineating between a high risk patient's need for portable monitoring or polysomnography.
Acknowledgements: Kabolizadeh K1, Mims KN1, Price-Stevens, L2, Leszczyszyn D1

T-I-061 PREVALENCE OF SLEEP ABNORMALITIES AND THEIR ASSOCIATION AMONG HYPOTHYROID PATIENTS IN INDIAN POPULATION

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Introduction and Objectives: To estimate prevalence of sleep abnormalities and their association with Hypothyroidism and metabolic risk factors in a relatively lean urban South Indian population.
Materials and Methods: This population-based, cross-sectional study was carried out in 250 subjects aged 20-70 years (58% male) with a mean body mass index (BMI) of 22.7±3.2, randomly selected from the Chennai Urban population. A validated questionnaire assessing various sleep abnormalities (snoring, daytime sleepiness, lack of refreshing sleep and number of hours of sleep) was administered. Anthropometric and biochemical measurements were obtained to assess metabolic risk factors including thyroid status.
Results: The overall prevalence of snoring and daytime sleepiness was 52% and 64%, respectively. Snorers were more often male, older, smokers and had higher BMI, Neck circumference, blood pressures, and hypothyroidism. Subjects with daytime sleepiness had higher BMI and Neck obesity. Both sleep measures were associated with hypothyroid status. Metabolic syndrome was significantly associated with snoring even after adjusting for age, sex, family history of Hypothyroidism, physical activity, smoking and alcohol.
Conclusion: The prevalence of snoring and daytime sleepiness is high among urban South Indians who are relatively lean. Both disorders are associated with hypothyroidism, although these associations were stronger in those with obesity.
Acknowledgements: I thank Prof. Mohan Kameswaran for his valuable guidance and help. I thank all the patients without whom this study would not have been possible.

T-I-062 PREVALENCE OF SLEEP-DISORDERED BREATHING IN KOREAN PATIENTS WITH ISCHEMIC STROKE

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Introduction and Objectives: The aim of this study is to evaluate the prevalence of OSA and snoring history in Korean patients with ischemic stroke.
Materials and Methods: Patients with acute to subacute ischemic stroke were evaluated for the presence of OSA or other sleep-disordered breathing by portable polysomnogram (PSG) or in-lab night PSG. Berlin questionnaire (BQ) was asked to investigate previous history of snoring or apnea. Their medical history, demographic data, neurologic examination including dysarthria and dysphagia were reviewed as well as lesion location.
Results: Eighty-seven patients with ischemic stroke were enrolled (mean age 65.5±11.4yrs, 52 male). Mean BMI was 23.9±3.4. 57.1% and 50% of

59 patients who answered BQ had a history of persistent snoring and experienced apnea, respectively. 87.7% (50/57) of patients with ischemic stroke who underwent PSG within a month after the onset of stroke were diagnosed with OSA. The prevalence of mild, moderate and severe sleep apnea was 30%, 20%, and 50%;, respectively. The rates of dysarthria or dysphagia, prevalence of hypertension, diabetes mellitus, ischemic heart disease, age, BMI and lesion location were not different between patients with OSA and those without OSA. Mean AHI was 30.9±19.5/hr. One patients out of 57 showed Cheyne-Stokes respiration combined with OSA. 11 patients underwent nasal CPAP titration. Four agreed to a trial of nasal CPAP but only one continued using it.

Conclusion: Our study showed that OSA is very prevalent in patients with ischemic stroke. High prevalence of snoring history suggests that OSA might be a pre-existing condition rather than the result of stroke. Due to low acceptance and adherence of nasal CPAP, alternative treatment other than CPAP might be feasible although more education and encouraging using CPAP in patients with ischemic stroke should be tried.

T-I-063 PROLONGED APNEA AND APNEA ACCOMPANIED BY SIGNIFICANT DESATURATIONS AND BRADYCARDIA IN INFANTS WITH AND WITHOUT BRONCHOPULMONARY DYSPLASIA

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Introduction and Objectives: Apnea is a common breathing pattern in premature infants especially those with bronchopulmonary dysplasia (BPD). Our objective was to describe the occurrence of apnea, desaturations and bradycardia in infants with and without BPD.

Materials and Methods: We performed pneumography on 25 premature infants with BPD and 25 non-BPD prematures comparable in gestation age (26-30 weeks). Infants were examined 1–3 times at ages of less then 29 days, 29-50 days, more than 50 days. Percent of prolonged apnea ≥20 s or events accompanied by oxygen saturation (SatO2) ≤80%, bradycardia ≤80 beats per minute among all apnea ≥10 s were analyzed. The total amount of 717 episodes was revealed. The main neurologic abnormalities appeared not to differ among groups.

Results: During the first 28 days infants with mild BPD had less prolonged apnea than non-BPD infants (49% vs. 59%, P=0,08) and more events with SatO2 ≤80% (43% vs. 27%, P<0,05). During the second age interval there was no difference between these groups. Infants with moderate to severe BPD had more apnea with SatO2 ≤80% compared to infants with mild BPD and without BPD at the second (59%, 41% and 41%) and third (50%, 18%, 0, P<0,05) age interval. Bradycardia ≤80 beats per minute accompanied more apnea in infants with BPD (9% before 29 days, 11% at 29-50 days, 15% after 50th day) than in patients without chronic lung disease (7%, 1%, 0, respectively).

Conclusion: Infants with moderate to severe BPD are characterized by deeper SatO2 falls while infants with mild illness has similar accidence of prolonged apnea ≥20 s and events with oxygen saturation (SatO2) ≤80% as prematures without chronic lung disease. Apnea in BPD infants are often accompanied by significant bradycardia.

T-I-064 QUALITY OF LIFE IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA AND DEPRESSION

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Introduction and Objectives: The clinical and neuropsychological implications of comorbid depression and obstructive sleep apnea (OSA) are not well understood. This study aimed to: 1) investigate the prevalence of comorbid OSA in patients with treatment resistant depression (TRD) who were referred to a tertiary care mood disorders clinic; 2) determine the effect of comorbid OSA on daytime function: quality of life, mood and anxiety symptoms, and sleep in patients with TRD.

Materials and Methods: Seventy-two patients (52 females; mean age 46.7±9.7) with TRD participated in the study. Detection of OSA was performed by ambulatory overnight polysomnography. Variables assessed included standardized scales for sleep (Pittsburgh Sleep Quality Index, Epworth Sleepiness Scale), depression and anxiety (Profile of Mood States; POMS, Montgomery-Asberg Depression Rating Scale, Beck Anxiety Index), and health perception (General Health Questionnaire, SF-36 Health Survey).

Results: Thirty patients (42%) were found to suffer from OSA (Respiratory Disturbance Index > 10, M = 30.7, SD = 27.7). POMS fatigue subscale scores were significantly higher in patients with TRD and OSA than in patients with TRD alone ($p<0.05$). Patients with TRD and OSA were significantly more impaired in physical and social functioning, role limitations due to emotional concerns, and mental health subscales on the SF-36 than patients with no OSA. There were no significant differences found between groups regarding subjective sleep quality, daytime somnolence or anxiety and depressive symptoms.

Conclusion: This preliminary study demonstrates a high prevalence of previously undiagnosed OSA in patients with TRD. Comorbid OSA is associated with more impaired daytime function in patients with depression. The POMS is an important tool for assessing the symptom severity in patients with TRD with suspected OSA. Screening for OSA in patients with TRD may enhance our understanding of the relationship between these common disorders and their treatment.

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T-I-065 RANDOMIZED CROSSOVER EVALUATION OF A NOVEL IMPLEMENTATION OF PRESSURE RELIEF TECHNOLOGY – SENSAWAKE™ AND FIXED PRESSURE CPAP

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Introduction and Objectives: Pressure intolerance during wakefulness is one potential source of poor compliance with CPAP therapy1,2. SensAwake™, currently available in some autoCPAP devices, uses the flow signal to detect the transition from sleep to wake and rapidly reduces the pressure in a similar manner to a ramp activation3,4. A novel algorithm (CPAPSA) has been developed whereby a fixed therapeutic pressure is maintained when the patient is asleep and, at the onset of wakefulness, rapidly reduced to a preset minimum (4 cmH2O in this study) using SensAwake™. The objective of this study was to investigate the efficacy of this algorithm for treating OSA.

Materials and Methods: Ethics approval was obtained and CPAP-experienced, adult OSA patients without co-morbidities received either CPAPSA or conventional CPAP at the same therapeutic pressure for half of a split night PSG in a randomized, crossover design. Sleep parameters and AHI were calculated for each patient following standard techniques. Additionally, patients were asked which therapy they preferred in the morning.

Results: A total of 29 patients were recruited but 2 were excluded for a total sleep time of less than 2 hours with either therapy. There was no significant difference in AHI between treatments (CPAPSA v CPAP: 4.6±4.6 hr-1 v 3.9±6.5 hr-1, p=0.32). Furthermore, there were no significant differences in PSG-calculated variables (SpO2 < 90%, sleep efficiency, sleep architecture). The majority of patients who expressed a preference preferred CPAPSA (CPAPSA 12, CPAP 3 patients, p=0.039).

Conclusion: This study shows that CPAPSA controls sleep disordered breathing in OSA patients as effectively as conventional CPAP and is generally preferred by patients. This technology may offer improved comfort to CPAP users through reduction of pressure during wakefulness (when they are likely to experience pressure intolerance) leading to improved compliance. Further long-term studies are required to clinically verify these findings.

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T-I-066 RELATIONSHIP BETWEEN SYMPATHETIC AND CORTICAL REACTIVITY IN RESPONSE TO RESPIRATORY EVENTS DURING SLEEP

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Introduction and Objectives: Several studies have suggested a tight and reciprocal relationship between autonomic and cortical reactivity to different types of stimuli during sleep, with concomitant cortical arousal and sympathetic activation after the stimulus and an increase in sympathetic basal activity when the stimulus gives rise to an arousal. However, this relationship remains unclear in case of respiratory events. Thus, we studied autonomic reactivity after respiratory events according to sleep stages, type of respiratory events, presence of cortical arousal (CA) and autonomic activity during respiratory events.
Materials and Methods: Fourteen untreated patients with obstructive sleep apneas/hypopneas syndrome underwent laboratory polysomnographic recordings. RR intervals (RR) and spectral analysis of RR by wavelet transform were used to study sympathetic (LFWV and LFWV/HFWV ratio) and parasympathetic (HFWV) activities before and after the end of respiratory events. These RR variability indexes were compared according to sleep stages (stage 2, slow wave sleep and paradoxical sleep), to the severity of respiratory events (hypopnea with or without oxygen desaturation, and obstructive apnea) and presence cortical arousal. The possible relationship between RR variability indexes before the end of respiratory events and the occurrence of subsequent CA were studied by adjusted multivariate statistic analysis.
Results: After respiratory events, RR ($p<0.001$) and HFWV ($p=0.033$) decrease whereas LFWV ($p=0.006$) and LFWV/HFWV ratio ($p=0.001$) increase, without any statistical difference according to sleep stages and severity of respiratory events. Decrease in RR ($p=0.001$) and increase in LFWV/HFWV ratio ($p=0.008$) were significantly higher when respiratory events gave rise to CA. Multivariate analysis showed that high level of LFWV and LFWV/HFWV ratio during respiratory events were related to CA ($p<0.001$).
Conclusion: These results suggest that the sympathetic cardiac reactivity to respiratory events is modulated by arousal process rather than by sleep stages or severity of respiratory events, and reciprocally, sympathetic dominance during respiratory events could facilitate the occurrence of subsequent cortical arousal.

T-I-067 RELATIONSHIP BETWEEN WEIGHT AND SLEEP ARCHITECTURE IN CHILDREN

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Introduction and Objectives: Overweight has been associated with sleep problems in children. It is important to identify if weight gain changes the sleep architecture. OBJECTIVE: Evaluate overweight as a risk factor for sleep architecture disturbances.
Materials and Methods: This is a retrospective review of 224 polysomnograms (PSG) performed between January and December 2006 in a population between 2 and 20 years of age. The patients were classified in three groups: normal weight, overweight and obese. Underweight subjects were excluded. Total Sleep Time, Sleep Efficiency, Sleep Latency, REM duration, slow wave duration (stage 3), light sleep duration (sleep 1 and stage 2), daytime sleepiness, arousal index, age, gender, ethnicity, height, weight, BMI, and the Apnea Hypopnea Index (AHI) were evaluated.
Results: 123 patients were male and 101 female, 120 Caucasians and 92 African American; 100 patients had normal weight, 26 patients were overweight and 98 patients were obese. No significant relationship was found between weight and Apnea-Hypopnea index (0.266 Kruskal Wallis test). The normal weight group showed normal sleep stages durations and normal sleep latency. Overweight group showed greater durations of stage 3 and REM duration and a tendency to have decreased sleep latency. The obese group showed more severe OSAS, decreased sleep latency, decreased REM duration, decreased stage 3 duration and increased daytime sleepiness.
Conclusion: Maintaining a normal weight helps to conserve normal sleep architecture. Overweight produces increased deep sleep and decreased sleep latency, which are the earliest changes noticed in the sleep architecture. Obesity produce a significant disturbance in the sleep architecture: decreased sleep latency, decreased REM duration (ANOVA 0.013), decrease stage 3, increased daytime sleepiness (p 0.01) and more severe OSAS. This data shows that obesity produces significant disturbance in the sleep architecture adding further support to the importance of weight control.

T-I-068 RISK OF OBSTRUCTIVE SLEEP APNEA (OSA) SYNDROME IN GENERAL POPULATION: A CROSS-SECTIONAL STUDY

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Introduction and Objectives: Obstructive Sleep Apnea (OSA) syndrome is one of the most common sleep breathing disorders. The aim of the present study was to determine prevalence of symptoms and risk of OSA in general population of Dorood City, Iran.
Materials and Methods: From 2008-2009 by random-cluster-sampling, 260 adult subjects were selected from the urban region of Dorood. The age range of the sample was from 20 to 87 years. Assessment was carried-out using the Berlin questionnaire, a valid scale, dissecting "high risk" and "low risk" peoples for OSA symptoms. Common symptoms were later defined.
Results: 66 (25%) of the subjects with a mean age of 46.6 ± 14.6 year and BMI of 24.1 ± 4.3 were at high risk for OSA (men 18% and Women 7%) and 131 (50%) were suffering from snoring. From those snoring during sleep, 26 (10%) reported a breathing pause more than once per week.
Conclusion: Prevalence of symptoms, risk of OSA and associated factors in this city are noticeable. Considering the adverse effects of this condition on quality of life, further research, effort to early diagnose, and treatment are recommended.
Acknowledgements: The authors wish to express gratitude to all those who participated in this study.

T-I-069 SCREENING FOR OBSTRUCTIVE SLEEP APNEA: ARE THE EPWORTH SLEEPINESS SCALE AND MUELLER MANOEUVRE REALLY WORTHWHILE?

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Introduction and Objectives: Obstructive sleep apnea (OSA) is a prevalent condition with potential serious consequences. The objective of this study is to assess the ability of three different clinical screening modalities at predicting OSA. These modalities are: The Epworth Sleepiness Scale (ESS), Mueller Manoeuvre (MM), and specific signs/symptomatology.
Materials and Methods: This is a retrospective case series study of 280 patients diagnosed with obstructive sleep apnea by polysomnography between 2006 and 2010. Each patient underwent OSA screening with both the ESS and digitally recorded MM. As well, a sleep apnea focused history and physical assessment was performed.
Results: The severity of obstructive sleep apnea, as established by the AHI, correlated significantly with both the MM examination of the base of the tongue ($r=0.45$ with $p<0.03$) and with the ESS ($r=0.31$ with $p<0.05$). The velopharyngeal and hypopharyngeal MM examinations, although correlating weakly with the AHI, were not statistically significant. Finally, the "history and physical" examination data analysis showed both an unrefreshed sleep and uvular hypertrophy correlated weakly with OSA, but these were not statistically significant.
Conclusion: To our knowledge, this is the first study to examine the correlation between OSA severity and popular clinical screening tools available to clinicians. The MM examination of the base of the tongue showed an excellent correlation with AHI. ESS showed statistically significant correlation as well. MM of the velopharynx and hypopharynx, an unrefreshing sleep, and uvular hypertrophy had a correlation with OSA, though weak and not statistically significant.

T-I-070 SEVERITY OF DEPRESSION AND ANXIETY IN OBSTRUCTIVE SLEEP APNEA SYNDROME

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Introduction and Objectives: Obstructive sleep apnea (OSA) is a common sleep disorder which induces nocturnal hypoxemia, hypercapnia and sleep fragmentation. It subsequently results in excessive daytime sleepiness, mood problems, poor neurocognitive performance as well as serious organ system dysfunction. The aim of this study was to evaluate the severity of depression and anxiety symptoms as the most prevalent psychological disturbances present in different severity of OSA.
Materials and Methods: We performed a cross-sectional study of 649 recently diagnosed sleep-disordered patients over 18 years of age, referred to Noor Sleep Lab from August 2008 to November 2010. The participants filled the Beck Depression Inventory-II (BDI-II) and the Beck Anxiety Inventory (BAI) to assess depressive and anxiety symptoms. We collected other characteristics of subjects such as age, sex, body mass index (BMI) and Epworth Sleepiness Scale (ESS). Apnea Hypopnea Index (AHI) was determined by an overnight polysomnography.
Results: Mean age of the participants was 47.19 years (SD = 11.66). More than 40% of patients had normal levels of depression and anxiety. AHI showed no significant correlation with BDI or BAI ($p>0.05$). Obesity was not correlated with depression or anxiety ($p>0.05$). Nonetheless, ESS was weakly correlated with depression and anxiety scores (p=0.01, r2=0.11). BMI and ESS means were significantly higher in patients with severe OSA ($p<0.05$). In comparison with men, the severity of depressive and anxiety symptoms were significantly higher in women (p=0.000).
Conclusion: In this cross- sectional study of patients with sleep problems, a majority of patients had normal to mild levels of depressive and anxiety symptoms and OSA was not associated with severity of these symptoms.

T-I-071 SHORT SLEEP AND DYSFUNCTIONAL BELIEFS AND ATTITUDES TOWARD SLEEP AMONG BLACK MEN

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Introduction and Objectives: Barbershops are an ideal location for health screening and wellness promotion among black men. It is used successfully to screen for the presence of hypertension, diabetes, and prostate cancer. The present study assessed associations of short sleep with dysfunctional beliefs and attitudes toward sleep among black men in the barbershop.
Materials and Methods: Respondents were black barbershop clients (n=120; mean age=42±15 years) in Brooklyn, NY. They provided sociodemographic data and estimated habitual sleep time. Apnea Risk Evaluation System (ARES) was used to identify men at high Obstructive Sleep Apnea (OSA) risk; recommended for populations with large pretest probability for OSA. Dysfunctional Beliefs & Attitudes about Sleep Scale (DBAS) was used to quantify strength of endorsed attitudes/beliefs toward sleep. DBAS is a Likert-type scale from 0 (strongly disagree) to 10 (strongly agree); higher scores indicated more dysfunctional attitudes/beliefs about sleep
Results: Of the sample, 25% reported hypertension, 11%, diabetes, and 3%, heart disease; 68% were overweight/obese. They also reported caffeine intake (22%) and alcohol consumption (29%). Estimated rates of sleep-related problems were: nap=36%, DIS=23%, DMS=24%, and sleep medicine=6.2%. Rate of short sleep (≤6h) was 57%; 34% were satisfied with their sleep. ARES data showed 29% were at high OSA risk (cut-off: >5). The mean DBAS score was 4.26±1.99; log-transformed values were used in ANCOVA, adjusting for effects of age, BMI, HTN, DM, mood, and sleep variables. Short sleepers did not have greater DBAS scores than average sleepers (7-8h) [F1,92=0.89, NS]. Rather, men at high OSA risk had greater DBAS scores [F1,92=13.68, $p<0.001$] and tended to report greater rate of sleep dissatisfaction [36% vs. 21%, p=NS].
Conclusion: Findings suggest that ARES can be used to screen black men in the barbershop. That black men at high risk for OSA have dysfunctional beliefs about sleep might explain low adherence rates to physician-recommended sleep assessment in that population.
Acknowledgements: Brooklyn Health Disparities Center, Department of Medicine, SUNY Downstate Medical Center, Brooklyn, NY, United States

T-I-072 SLEEP APNEA ANIMAL MODEL ELEVATES BRAIN WATER CONTENT AND DECREASES AQP 1 IN MOUSE CEREBELLUM

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Introduction and Objectives: Patients with sleep apnea syndrome exhibit cerebral morphological changes. Aquaporins are membrane proteins responsible for the transport and the balance of water content in the brain. Changes in aquaporin 1 expression in the cerebellum have been reported in pregnancy. Little attention has been dedicated to the role of aquaporins in sleep apnea-related brain alterations. The present study aims to quantify aquaporin 1 levels in mouse hippocampus and cerebellum as well as to determine the brain water content.
Materials and Methods: We exposed C57BL/6 mice to 35 days of intermittent hypoxia (IH; n=17) or sham intermittent hypoxia (SIH; n=18), alternating 30 seconds of progressive hypoxia to a nadir of 6% FIO2 with 30 seconds of room air insuflation. During 8 hours of the light period, the rodents underwent a total of 480 cycles of hypoxia/reoxygenation, equivalent to an apnea index of 60/hour. Brains of 6 HI and 6 SHI animals were dissected, weighted while wet and placed in an oven at 95°C during 48 hours. Percent brain water content was calculated. Levels of aquaporin 1 were measured using an ELISA test.
Results: The mean brain wet weight and brain water content were higher in the IH group (respectively 0.48±0.004 g and 79.7±0.11%) than the SIH group (respectively 0.46±0.008 g and 76.8±0.52%; $p<0.01$). The average aquaporin 1 level in the cerebellum was higher in the SIH group (4.5±0.79 ng/mL) than in the IH group (3.9±0.48 ng/m; p=0.01). No significant difference was found between the two groups for the aquaporin 1 in the hippocampus.
Conclusion: Exposure to intermittent hypoxia during 35 days in a mice model of sleep apnea increases wet weight and water content of the brain while reducing cerebellar aquaporin 1 levels. The relationship between sleep apnea and central nervous system structural alterations may involve downregulation of aquaporin 1 activity.
Acknowledgements: Medical Sciences Graduated Program - UFRGS and research incentive fund (FIPE- Hospital de Clínicas de Porto Alegre).

T-I-073 SLEEP DISORDERED BREATHING AND SHIFT WORK: ASSOCIATION WITH IMPAIRED GLUCOSE METABOLISM

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Introduction and Objectives: Obesity and diabetes are epidemic diseases with increasing rates around the world. Sleep disordered breathing (SDB) are also a public health problem due to its high prevalence and association with obesity, metabolic and cardiovascular diseases. The severity of obstructive sleep apnea has been associated with the degree of insulin resistance. Shift work (SW) has been also related with alterations in lipid and glucose metabolism.
Our aim was to assess the effects of the combination of SDB and SW on glucose metabolism.
Materials and Methods: We conducted a cross sectional study as part of a program of occupational health in workers of a public hospital in the city of Santiago, Chile. The Berlin Questionnaire was utilized, as measurement of height and weight to calculate BMI. A battery of tests including fasting glucose and insulin to calculate HOMA-IR were also performed.
Results: We studied 102 workers with an age average of 45.5 (± 12.3) years, in which 75 (73.5%) were women. 47 (46.1%) were working in rotating night shifts, and 47 (46.1%) were scored at high risk for OSAS in Berlin Questionnaire. The workers were classified into four groups: Under normal schedule and low risk (NS/LR) (n = 35), normal schedule and high risk (NS/HR) (n = 20), rotating shifts and low risk (RS/LR) (n = 20), and rotating shifts and high risk (RS/HR) (n = 27). Results were analyzed by ANOVA for HOMA-IR, resulting in higher values for groups with high risk for OSA: NS/LR = 2.55 (±2.05), NS/HR = 5.8 (±5.33), RS/LR = 3.53 (±2.39), and RS/HR = 7.67 (±6.52); ($p<0.000$).

Conclusion: Our results show that insulin resistance was significantly higher in workers with high risk of OSAS, and it is even greater in those who work rotating night shifts.
Acknowledgements: Workers and managers of the Felix Bulnes Hospital.

T-I-074 SLEEP ILLNESS REPRESENTATION AS A POTENTIAL BARRIER TO TREATMENT ADHERENCE IN OBSTRUCTIVE SLEEP APNEA: A PILOT STUDY

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Introduction and Objectives: Sleep apnea is a chronic disease with severe comorbidities and CPAP adherence is often suboptimal. Behavioral strategies have been shown to help patients accept their disease and encourage them to seek medical attention. Patient perceptions (e.g. cognition, emotion) are viewed as psychological correlates amenable to intervention. The impacts of these perceptions in sleep apnea remain unexplored. The aim of our study was to assess the patient's sleep illness perceptions and to correlate them to the level of sleepiness, a determinant of disease severity and of CPAP adherence, in patients investigated for sleep apnea.
Materials and Methods: Eleven patients (56±14 years; seven men) participated in our study. Sleepiness was measured by the ESS and illness representation by the Brief Illness Perceptions Questionnaire (BIPQ). Questionnaires were filled after the sleep studies. Elevated scores suggest a negative impact in the patient's life.
Results: In terms of cognition, our results suggest that patients believe they will live with the disease all their lives (8/10) and had a low perception of future treatment efficacy (4/10). In terms of emotion, they feel negatively affected by their illness (6.5/10) and their understanding for the latter is rather low (4.5/10). The results of the BIPQ (mean of 6/10±1) and the ESS (11/24±6) correlated positively (r=0.5, p=0.1). We also observed that patients without pathological sleepiness (6 patients, ESS 7/24±3) had better results on the BIPQ (4.6±7.6) compared to those with pathological sleepiness (ESS 16/24±5; BIPQ 5.5±9) (T-test p=0.01).
Conclusion: Our study suggests that sleep illness perceptions are interesting avenues to understanding the coping behaviour of our patients and possibly treatment adherence. Further studies are needed to confirm these findings in patients with diagnosed and treated sleep apnea.
Acknowledgements: Biron Soins du Sommeil for their constant support

T-I-075 SLEEP STRUCTURE AND HEMATOLOGICAL ABNORMALITIES IN PATIENTS WITH SLEEP-RELATED BREATHING DISTURBANCES

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Introduction and Objectives: Sleep-related breathing disturbances (SRBD) is a frequent sleep pathological condition. Multiple researches revealed the role of hematological abnormalities (HA) in those patients in development of prothrombotic states that predispose to stroke. The purpose of the present study was to investigate the HA and night sleep structure in patients with SRBD using Polysomnography method and blood tests monitoring.
Materials and Methods: 15 male patients (mean age 48.0 year) with clinical manifestation of Dyssomnia, Obstructive Sleep Apnea/Hypopnea Syndrome (OSAHS), Habitual Snoring and Periodic Limb Movements (PLM) were investigated. All of them underwent a Polysomnography. Sleep questionnaires were completed and sleep parameters calculated in all cases. The following hematological parameters were evaluated during the night sleep: erythrocyte aggregability index (EAI), prothrombin index and blood fibrinolytic activity.
Results: In patients with hypopnea, accompanied by less snoring (group I), high percentage of sleep III stages and less of REM sleep, were found as well as a long sleep latency period. In patients with hypopnea, accompanied by less mixed apnea and high snoring percentage (group II), were found a defragmentation of the sleep II and III stages and high percentage of REM sleep, compared with group I. In the group III (patients with hypopnea, accompanied by the highest percentage of snoring, central, obstructive and mixed apnea indexes), were revealed defragmentation of the sleep II stage and high percentage of REM sleep, compared with group II. In those patients, there were not found sleep III stage but high frequency of PLM were determined. We found that in patients with SRBD trustworthy changes of hematological data were in evidence in cases of OSAHS, than in other types of SRBD.
Conclusion: Investigation of night sleep using polysomnography can help researchers to reveal variability of sleep architecture during the different clinical presentation of SRBD. We conclude, that HA represents a testing for prothrombotic states in SRBD patients.

T-I-076 THE ACCURACY OF AUTOTITRATING CPAP DETERMINED RESIDUAL APNEA-HYPOPNEA INDEX

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Introduction and Objectives: Although home continuous positive airway pressure (CPAP) titration is an optional recommendation, there is not enough data about the auto-CPAP determined residual apnea-hyopnea index (AHI). The aim of the present study was to determine the accuracy of auto-CPAP determined residual AHI.
Materials and Methods: We studied 137 consecutive patients (72.3% men) with obstructive sleep apnea (OSA) from January 2008 to December 2010 who underwent in-laboratory overnight PSG using auto-CPAP. We excluded patients with comorbidities like CHF, COPD or hypoventilation syndromes and patients with central sleep apnea. Residual AHI obtained from the auto-CPAP device through smart card (CPAP-AHI) was compared with AHI from an overnight PSG on auto-CPAP (PSG-AHI) using Bland-Altman analysis and Paired Samples T-test.
Results: The mean AHI on the diagnostic study was 45.08±1.8. During the titration, auto-CPAP markedly suppressed the respiratory events (PSG-AHI, 3.40±0.20). On the other hand, CPAP-AHI was 3.35±0.17. Blant-Altman analysis showed good agreement between auto-CPAP-AHI and PSG-AHI (AHI mean difference of 0.05, and the limits of agreement for the AHI were from +4.9 to -4.8). Two methods have also been compared with Paired Samples T-test and no statistically significant difference was found ($p>0.05$).
Conclusion: Auto-CPAP derived residual AHI may be used to determine accurately the PSG-directed AHI.

T-I-077 THE CHARACTERISTICS OF SLEEP OR SLEEP DISORDER BREATHING WITH AGE IN A PRE-MENOPAUSE WOMEN

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Introduction and Objectives: Age and body weight are significant risk factors of SDB. The aim of the present study was to identify the characteristics of sleep or sleep disorder breathing with age in pre-menopausal women.
Materials and Methods: A total of 89 subjects (33.0±7.8 years, median 34, range 20 - 45 years) referred to a sleep medicine center, Stanford University, CA, USA for diagnostic PSG between January, 2010 and February, 2011 were enrolled retrospectively. PSG, physical examinations, and complete sleep, medical and surgical history were obtained and statistically analyzed in all subjects.
Results: Although BMI was significant different between younger group (aged 20 to 30) and older group (aged 31 to 45), the distribution of each age group according to OSA severity was similar without significant differences. Compared to younger group, older group reported more frequently snoring, witnessed apnea, and excessive movement during sleep but both groups were approximately of similar daytime symptoms without significant differences. In comparison of PSG parameters between 2 groups, in older female group, the percentage of S3 and REM decreased but the percentage of S2 increased, which showed their sleep was more hindered than younger group. Mean oxygen saturation, but not minimal oxygen saturation, in each stage was lower in an older female group with significant difference and older female group showed AHI, Non-REM AHI, REM AHI, Supine AHI were well correlated with ODI and DI.
Conclusion: Our results demonstrated that daytime symptoms and minimal arterial oxygen saturation show no difference between 2 groups, though the increase of BMI, nighttime symptoms, and correlation of ODI and DI with AHIs is more definite with age in premenopause women. So it is possible

that less female subjects be aware of the progression of SDB because of the lack of their daytime symptoms despite objective aggravations in PSG parameters with age.

T-I-078 THE EFFECT OF HEAD POSITION ON OBSTRUCTIVE APNEA AND HYPOPNEA: DO WE NEED ANOTHER POSITION SENSOR?

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Introduction and Objectives: A lateral position during sleep is effective in reducing apnea and hypopnea in obstructive sleep apnea. However the effect of head posture in supine position on reducing apnea has not been reported. Usually only one body position sensor on the chest is used during polysomnography. In this study, the match rate between head position and body position was evaluated, and we compared the apnea hypopnea index (AHI) of different head posture in the supine position.
Materials and Methods: Nineteen patients with OSA were studied by using full standard overnight polysomnography. Sixteen patients were male and three patients were female. Patients with OSA were naive to treatment. We used two position sensors, one on the chest and the other one on the forehead. Each epoch was classified into 4 categories according to the position of head and body; supine-supine, lateral-lateral, supine-lateral, and lateral-supine. The proportion of each state was calculated by epoch number. The numbers of apnea and hypopnea in each state were also evaluated.
Results: Their mean age and body mass index (BMI) were 48.8±11.3 years and 27.3±4.9 respectively. Ten patients were mild OSA, eight patients were severe OSA, and the other one patient was moderate OSA. In supine position, the epoch number of supine head posture was similar to the lateral head posture (156.5±107.4 versus 187.1±139.6). In supine position, apnea and hypopnea were much more with supine head posture than lateral head posture (60.2±68.8 versus 38.5±31.2). This tendency was more prominent in NREM sleep.
Conclusion: This results show that apneic events occurring in the supine position are more severe with supine head posture. Further evaluation with anatomical analysis would be necessary.

T-I-079 THE RELATIONSHIP BETWEEN THE CYCLIC ALTERNATING PATTERN (CAP) AND RESPIRATORY RATE IN OBSTRUCTIVE SLEEP APNEA (OSA)

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Introduction and Objectives: The Cyclic Alternating Pattern (CAP, Terzano, et al, 1996) is a well-known pattern of arousal instability observed in the electroencephalogram (EEG) during NREM sleep. The pattern has been associated with a variety of clinical conditions, including insomnia, fibromyalgia, and nonrestorative sleep. Less is known, however, concerning the relationship between the CAP pattern and other physiological parameters, including respiration, as observed in common clinical conditions such as OSA.
Materials and Methods: Three minute segments of NREM (stage N2) sleep were reviewed and analyzed from a series of 34 consecutive patients referred for evaluation of obstructive sleep apnea. The CAP period (A-A interval, seconds) was correlated with the respiratory rate for each patient.
Results: CAP EEG patterns were readily identified in patients with OSA, and were notably more prominent when compared to patients with normal sleep. CAP A-A intervals varied considerably among the patient population, ranging from 18 to 40 seconds. The CAP interval was observed to have a strong inverse correlation with respiratory rate (Pearson r = -0.72).
Conclusion: The relationship between EEG patterns of arousal stability/instability (CAP) and respiration may become more distinctly observable in disease states, such as OSA. CAP may represent a common pathway in the loss of the restorative function of sleep that can be observed across a variety of pathophysiological conditions, including restless legs syndrome, insomnia, and sleep-disordered breathing. Treatments for OSA that are associated with decreasing the respiratory rate, such as positive airway pressure modalities (CPAP and bilevel therapy) may exert a therapeutic benefit by modulating the CAP interval, and thereby enhancing the restorative function of sleep.
Acknowledgements: The authors gratefully acknowledge the support of the technical and professional staff of the Alamo Sleep Disorders Center, San Antonio, Texas.

T-I-080 TREATING RESTRICTIVE VENTILATORY LIMITATION AND SLEEP DISORDERS IN MUCOPOLYSACCHARIDOSIS

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Introduction and Objectives: In the advanced stage of mucopolysaccharidosis (MPS), there is cardiorespiratory compromise. The respiratory involvement in MPS could be due to the primary weakness of the diaphragm, the intercostal and expiratory muscle that causes impairment in pulmonary ventilation, the patient's ability to cough and chest wall deformities and scoliosis, which exacerbate the restrictive process. Associated with respiratory failure and alveolar hypoventilation and respiratory effort has been sleeping disorders. Resources respiratory therapy unit with respiratory maneuvers such as manual assisted cough in the presence of hypersecretion in the airways and mechanical ventilation support (MVS) non-invasive (NIV) or invasive (IV) are employed in the treatment of chronic respiratory disorders and sleep MPS patients. These features are associated with the MVS part of treatment adjunct to enzyme replacement therapy (ERT) of chronic respiratory failure, sleep disorders and decrease the incidence of atelectasis, infections, hospitalizations, endotracheal intubation and tracheostomy. The survival rate can be increased. Objective: To describe the use of MVS in the MPS Program (MPSP) in the John Paul II Child Hospital/Hospitalar Foundation of Minas Gerais State (JPIICH/HFMGS).
Materials and Methods: A retrospective study. Data collection: 2007-2010. Included were all patients evaluated by the program in JPIICH/HFMGS.
Results: Patients after MPSP: evaluated: 25, ERT, 16, began MVS: 12 (NIV: 3 MPS I, 7 MPS VI and 1 MPS II, IV 24 hours: 1 MPS VI). Median age at the time of MSV: 9 years. MVS for chronic respiratory failure: 4. Weather Monitoring Program: 3.5 years. Fatalities: follow-up after 3 years of MVS: MVS without an MPS VI of heart failure in a MPS VI ERT and with NIV for at post-surgery intracranial hypertension patients outside of the Program: acute insufficiency respiratory (AIR) 4. Median: number of hospitalizations per patient per AIR: before-MVS: 3, 1 year after-MVS: zero; vital capacity (% predicted spirometry): MVS users: before-MVS: 37%, after-MVS: 48% non-users of MVS: 70%. Polysomnography altered: before-MVS: 9, after-MVS: zero. None for the patients using MVS prevention.
Conclusion: The MVS is an adjuvant treatment modality to ERT for the treatment of chronic respiratory insufficiency and sleep disorders in patients with MPS in JPIICH/HFMGS.
Acknowledgements: MPS Program - John Paul II Child Hospital/Hospitalar Foundation of Minas Gerais State

T-I-081 TREATMENT OF OBSTRUCTIVE SLEEP APNEA IN INFANTS WITH SUPPLEMENTAL OXYGEN

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Introduction and Objectives: Adenotonsillectomy and continuous positive airway pressure are generally not suitable options for treating infants with obstructive sleep apnea (OSA). Given the limited therapeutic options in this age group, we aimed at evaluating the efficacy of low-flow oxygen in treatment of OSA by comparing polysomnographic (PSG) findings in room air and during inhalation of low concentrations of oxygen.
Materials and Methods: This was a retrospective study. The charts of all the infants who underwent a therapeutic trial of oxygen supplementation (0.25-1 liter per minute) during PSG performed between 2004 and 2010 were reviewed. Sleep related parameters on diagnostic PSG with room air were compared with PSG with low-flow oxygen. Twenty patients had undergone a split-night study, and four had two nights of study within 1 month period. Matched-pairs t-test was used for comparison.
Results: Twenty four infants were studied. Their mean age (SD) was 5 (2.8) months, 50% being male, with mean awake SaO2 (SD) being 94.5% (4.5). Low-flow oxygen use was associated with significant decrease (baseline on

room air versus on oxygen) in central apneas (1.9/hour of sleep vs 0.4, p=0.0008), obstructive/mixed apneas (7.8/hour of sleep vs 3.0, p=0.0053), hypopnea index (15.3 vs 7.3, p=0.0013), combined apnea/hypopnea index (24.7 vs 11.0, p=0.0001). There was no significant improvement in sleep efficiency (84.7% at baseline vs 81.0% on oxygen, p=0.137). Average SaO2 improved (93% at baseline vs 96% on oxygen, p=0.0392) as did SaO2 nadir (79% at baseline vs 85% on oxygen, p=0.0434). Oxygen use was associated with increased periodic leg movement (PLM) index (12.2 vs 23.4, p=0.005) and PLM arousal index (2.4 vs 6.9, p=003).
Conclusion: Low-flow oxygen is effective in reducing central, obstructive and mixed apneas in infants with OSA. Proposed mechanisms include alleviation of hypoxemia-induced hypotonia of the upper airway dilators and improved central ventilatory control. Prospective studies are needed to confirm these findings.

T-I-082 VENUS VS. MARS - PAP COMPLIANCE AND GENDER

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Introduction and Objectives: Compliance with nasal PAP devices is overestimated by subjective reports. PAP manufacturer software allows for objective compliance measurements. Previous studies reported PAP compliance ranging from 55-65% versus 30-80% based on subjective information. Gender was infrequently assessed as a variable in compliance and results were mixed. We performed a retrospective study to objectively assess differences in PAP compliance between men and women.
Materials and Methods: Charts were reviewed for compliance monitoring reports. Patients were included after having a diagnostic and therapeutic polysomnograms and received a PAP unit with compliance monitoring. The patient group consisted of 56 adults: 36 males, 20 females. Compliance was measured using downloads from PAP manufacturer software and defined as usage of greater-than or equal to 4 hours per sleep period. Statistics included t-tests performed on the percentage of compliance by gender. Analyses on factors such as BMI, AHI, type of PAP unit and lower (CPAP less-than or equal to 10 cwp) versus higher pressure (CPAP >10 cwp) were performed.
Results: The total mean compliance was 77.79±22.2. Males' mean compliance was 76.72±22.9. Females' mean compliance was slightly higher at 79.72±21.3. The gender difference was not statistically significant (P=0.316). There were no significant differences when the groups were sorted by BMI, AHI, type of unit and lower versus higher pressures. The mean number of days of usage was 183±41.
Conclusion: Our data suggests a relatively high compliance in both females and males that at 78% is close to the higher subjective compliance reported in the literature. Compliance in females seemed to be slightly higher, but was not statistically significant. The small sample is a considerable limitation of this study. Our patient group presented a gender ratio of 1.8:1 (m:f) and is higher than the reported 2:2.7 ratio. Therefore it is possible that increased female representation in a larger group of patients will lead to different results.

T-I-111 INTRACEREBRAL PRESSURE WAVES AND SLEEP DISORDERED BREATHING

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Introduction and Objectives: Increases in Intracerebral pressure (ICP) have been reported to occur in patients with sleep disordered breathing (SDB) in association with the periods of oxygen desaturation. These studies however, involved very small sample sizes. Objective: The purpose of our study was to assess the relationship between alterations in ICP and oxygen desaturations using a large cohort of patients undergoing continuous spinal fluid pressure monitoring for evaluation of hydrocephalus.
Materials and Methods: Patients admitted to the CSF disorders unit for continuous spinal fluid pressure monitoring were selected for analysis. The pressure waves were recorded via pressure transducer attached to an indwelling Codman spinal catheter. Oxygen saturation was recorded by pulse oximetry. The spinal fluid pressure waves and oxygen saturation waveforms were converted to digital format for analysis. Our outcome variables were: 1. Oxygen desaturation defined as 4% below or 96% of the mean; 2. Elevated ICP defined as values above the median value for each patient. We dichotomized the Oxygen data into normal or desaturations and ICP data into above or below the median ICP. We computed the association between Dichotomized Oxygen saturation versus dichotomized ICP using the chi square test. We analyzed desaturations with ICP as a continuous variable using the t test
Results: A consecutive series of 100 patients (median age was 61.5 years; 58% were women) were analyzed. We found that oxygen saturation was more likely to be low immediately before an instance of elevated ICP and ICP was significantly higher immediately before periods of oxygen desaturation. This finding was statistically significant association ($p < 0.05$) in 39 (39%) of patients. A diagnosis of NPH did not differ between those with and without oxygen saturations (p=0.2) but a confirmed diagnosis of SDB did (p=0.07).
Conclusion: Small but consistent elevations in spinal fluid pressure are associated with Oxygen desaturations in patients with SDB.

T-I-113 DIFFERENCE IN THE IMPACT OF SLEEP APNEA SYNDROME ON NOCTURIA ACCORDING TO AGE

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Introduction and Objectives: The relationship between nocturia and sleep apnea syndrome (SAS) may change with aging because many factors are involved in the occurrence of nocturia in the elderly. This study is to assess the association between nocturia and SAS according to age, and to determine factors related to nocturia.
Materials and Methods: We included 1755 male subjects who had been referred to a sleep laboratory for evaluation of suspected sleep disorders. All the subjects underwent polysomnography, and nocturic frequency was assessed using a self-report question. Pathologic nocturia was defined as voiding twice or more per night. We took a medical history and evaluated subjective sleep disturbance and depressive symptoms using the Pittsburg sleep quality index (PSQI) and Beck depression inventory (BDI).
Results: In subjects aged 65 years or more, nocturic frequency was significantly associated with BDI and PSQI without any relation between nocturic frequency and SAS parameters. However, in subjects less than 65 years old, significant correlations were found between nocturic frequency and age, apnea-hypopnea index (AHI), BDI, PSQI, benign prostatic hypertrophy (BPH) and hypertension. ANOVA of three groups based on SAS severity (control, mild-to-moderate and severe degree) showed differences in nocturic frequency (p=0.046) and pathologic nocturia (p=0.002). In the multiple regression analysis, age (ß=0.303, p<0.001), AHI (ß=0.107, p<0.001) and BPH (ß=0.069, p=0.005) were associated with nocturia, and pathologic nocturia was also predicted by age (ß=0.217, p<0.001), AHI (ß=0.106, p<0.001) and BPH (ß=0.085, p=0.001).
Conclusion: SAS had modest impacts on nocturia in young and middle-aged men, but SAS may not play any role as a risk factor for nocturia in the elderly. The mechanism underlying the relationship between nocturia and SAS needs to be clarified, and age-related voiding dysfunction and other medical factors could override influences of SAS on nocturia with aging.

K: Technology/Technical

T-K-083 AUTOMATIC DETECTION OF A PHASES OF THE CYCLIC ALTERNATING PATTERN

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Introduction and Objectives: The aim of this study is to develop an algorithm to detect the activation phases (A phases) of the Cyclic Alternating Pattern (CAP) during non-REM (NREM) sleep.
Materials and Methods: An EEG central trace (C3-A2 or C4-A1) from eight polysomnographic recordings of healthy adult subjects were examined. Five band descriptors (Delta, Theta, Alpha, Sigma and Beta), an activity descriptor and a variance descriptor were extracted and used to train different machine-learning techniques. A visual CAP scoring was provided by an

expert clinician and used as the desired output. Four alternative mathematical machine-learning algorithms were implemented using the Leave One Out technique: 1) Discriminant Classifier, 2) Support Vector Machines, 3) Adaptive Boosting technique (AdaBoost), 4) supervised Artificial Neural Network.
Results: The statistics on the second by second classification showed average accuracies equal to 84.9% and 81.5% for the Discriminant Classifier and the Neural Network respectively, while AdaBoost had a slightly lower accuracy, equal to 79.4%. The SVM leaded to accuracy of 81.9%.
Conclusion: The results obtained are encouraging, since an efficient automatic classifier would benefit the practice in everyday clinics, preventing the physician from the time-consuming activity of manual CAP scoring. Finally, the classification based on learning algorithms would provide an objective criterion capable of overcoming the actual problems of inter-scorer variability.

T-K-084 MEASUREMENT OF SLEEP PROPENSITY WITH THE EPWORTH SLEEPINESS IS NOT INVARIANT TO WORK SCHEDULES

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Introduction and Objectives: In comparison to day workers, shift and night workers report higher levels of sleep propensity as measured by the Epworth Sleepiness Scale (ESS; Johns, 1991, Drake et al., 2004). A requirement of measurement, however, is that the values attributed to variables are independent of persons, instruments and contexts (Bond & Fox, 2007). Therefore, to make useful comparisons between groups of individuals performing different work schedules, it is crucial that the psychometric properties of the instrument remain invariant across these groups. In this study, we investigate whether the ESS meets this criterion.
Materials and Methods: The ESS results of 12 night workers, 10 shift workers and 9 day workers (mean age= 40.47, SD= 9.43), were subjected to a Rasch-analysis.
Results: Person and item reliability are well within acceptable range (0.81 and 0.99 respectively). Rating scale diagnostics show that the 4-point response scale is used adequately (struct. calibr. = n/a; -2.32; 0.16; 2.16). Overall, item analysis show satisfactory INFIT and OUTFIT measures (all >0.50 and <2.0) and unidimensional measurement is achieved (unexplianed variance in 1st contrast <3). However, Differential Item Functioning -analysis shows that, for similar levels of global sleep propensity, shift workers report a significantly higher sleep propensity "in a car, while stopped for a few minutes in traffic" than night workers (Mantel-Haenszel p=0.01) Unsurprisingly, night workers report a significantly higher chance of dozing "lying down to rest in the afternoon when circumstances permit" (p=0.001) than day workers. Finally, day workers report a higher probability of dozing off "as a passenger in a car for an hour without a break" as opposed to night and shift workers (p=0.009; p=0.02).
Conclusion: The ESS used as such may induce a severe psychometric bias in comparing sleep propensity between groups of individuals performing different work schedules, as items are perceived differently.
Acknowledgements: Olivier Mairesse is supported by a grant from the European Space Agency. We are grateful to R. Vandersmissen for helping with the data collection.

T-K-085 SUCCESSFUL CPAP TRIALS SECONDARY TO LEVEL III TESTING IN THE PRIMARY CARE POPULATION

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Introduction and Objectives: In the province of Alberta, there are 8 Level I Polysomnography (PSG) laboratories (5 public and 3 private). PSG wait times vary throughout the province, but may exceed one year. Level III sleep diagnostic testing in the community provides an alternative to Polysomnography based management. The purpose of this study was to determine if patients could be successfully managed using level III sleep diagnostic testing in a community based setting. Based on the results, many patients may require CPAP treatment. The study purpose is to determine how many patients were successful on CPAP therapy after Level III testing.
Materials and Methods: Patients were referred to private sleep diagnostic testing facilities (Respiratory Homecare Solutions (RHS)) by their primary care physician. Qualified professionals (RRTs or RPSGTs) completed Level III instruction and review of results (interpreted by a Board Certified Sleep Physician). A recommendation was made to the primary care physician; who would then determine appropriate treatment. If CPAP was prescribed, the patient would be given a month, auto-CPAP trial. At the end of the trial, depending on how the patients did, they were converted to fixed CPAP. The fixed CPAP pressure was determined by the P90/P95 on the auto-CPAP download.
Results: The preliminary results revealed that there were 170 female and 399 male patients (N=569). The average Epworth Sleepiness Scale (ESS) was 10. The mean RDI was 20.9/hr. There were 123 (21.6%) patients with severe OSA (RDI $>$ 30), 115 (20.2%) with moderate (RDI 15-30) and 190 (33.4%) with mild (RDI 5–15). There were 179 (31.5%) that were given a trial of CPAP therapy.
Conclusion: The preliminary results revealed that 104/179 (58.1%) of patients having a Level III study did purchase CPAP after initial CPAP trial. On one month follow-up post CPAP trial (81%) of these patients show continued use of minimum 4 hours/day.

T-K-086 VALID, SENSITIVE, INTERPRETABLE: A NOVEL APPROACH TO EEG ANALYSIS

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Introduction and Objectives: Relative to other neuroimaging methods in human research, EEG has gradually gained its complexity. Over the past years, advances in EEG technology have allowed for an increased number of sensors to be recorded from, a higher sampling rate, and a broader range of experimental manipulations. Despite such depth in data acquisition, methods with which to analyze evoked potentials have remained relatively primitive and border on statistically invalid, difficult to interpret, and insensitive.
Materials and Methods: Here, arguments are made for a non-parametric, permutation approach to EEG analysis which: uses information from all channels and every time point; can incorporate any statistic; is statistically valid; combines intensity and cluster information optimally; and eliminates the need for user assumptions and interference. In order to maximize sensitivity, threshold-free cluster-enhancement (TFCE) is used which is based on a novel algorithm to calculate channel neighbours in time and space. This novel analysis method is compared with previously used methods both theoretically and with relevant practical examples for single case and group studies. As an example, a tutorial dataset for EEG analysis from the Statistical Parametric Mapping (SPM) software is taken and 100% of trials and 20% of trials used in separate analyses.
Results: For all datasets the TFCE approach generally outperforms the classical maximal intensity approach, parametric SPM approach, most cluster-based methods, and is comparable to even the most finely tuned cluster approach using TFCE's default parameters. Moreover, the TFCE approach retains information on the local maxima within significant clusters and provides an individual p-value for each channel-time pair.
Conclusion: In conclusion, the non-parametric permutation approach guarantees statistical validity while the TFCE approach maximizes sensitivity with minimal opportunity for user bias. Since each channel-time pair has a unique p-value, the structure of results is identical to the structure of the original data and open to any method of interpretation.

T-K-087 VALIDATING ACTIGRAPHY AS A MEASURE OF SLEEP FOR PRESCHOOL CHILDREN

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Introduction and Objectives: While polysomnography (PSG) is the gold-standard measure of sleep quality, it requires significant resources. Actigraphy, which uses a watch-size movement sensor, constitutes a less invasive alternative. However, the algorithms to derive sleep parameters were developed with adults, and therefore have unclear validity with children. Accordingly, this study aimed to evaluate the validity of actigraphy as a sleep

measure for young children, by comparing it to PSG, while also considering the location of the monitor (wrist vs. ankle).
Materials and Methods: 12 children (8 G) aged 2 to 5 years simultaneously wore an actigraph to the ankle and to the wrist (Actiwatch, Mini-Mitter/Respironics) during a night of PSG recording in the home setting. Two types of concordance analyses were performed to compare PSG with different algorithms of actigraphic analyses (thresholds of 20, 40, 80, and regression-based). First, 30-sec epoch-by-epoch comparisons were performed to evaluate sensitivity and specificity. Intra-class correlations were also computed on 4 sleep parameters.
Results: Actigraphy showed good sensitivity (>95%; detection of sleep) but low specificity (±50%; detection of wake). Intra-class correlations between PSG and actigraphy variables were strong (>0.80) for sleep latency, sleep duration and sleep efficiency, but weak for number of awakenings (<0.40). The algorithm based on a threshold of 80 showed higher concordance with PSG than the 20 and 40 threshold-based algorithms when estimating wake duration, total sleep time and sleep efficiency. Regression-based algorithms tended to overestimate sleep duration whereas those based on thresholds overestimated awakenings. Finally, wrist and ankle actigraphy showed similar sensitivity and specificity.
Conclusion: In conclusion, actigraphy is a promising measure to evaluate sleep among young children. However, while a threshold of 40 is often used with adults, the threshold of 80 appears to be more accurate with children.

L: Restless Legs Syndrome (RLS) and Movement Disorders in Sleep

T-L-088 ALTERED CYTOKINES IN MARATHON RUNNERS WITH RESTLESS LEG SYNDROME

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Introduction and Objectives: Introduction Restless Legs Syndrome (RLS) is a sensorimotor disorder characterized by urge to move the legs when at rest that is worse in the evening or night and relieved by movement. Several articles indicated in the literature that cytokines are important in sleep and that exercises changes the production and secretion of cytokines. We studied IL-6 and IL-8 in RLS marathon runners vs no RLS marathon runners, showing strong alteration with RLS. Objectives The aim of the present investigation was to determine cytokines basal, immediate and post 72h in RLS vs no RLS marathon runners.
Materials and Methods: The researchers interviewed 34 runners participating in the São Paulo marathon, was excluded 1 and investigated the concentration of IL-6, IL8 basal, immediate and post 72h who finished the race. We compared with and without RLS.
Results: We found 27.27% of athletes that meet criteria for RLS. Plasma concentration of IL-6 showed a smaller increase immediately after the marathon (basal=16,46; immediate=43,93) and didn't return to basal levels (72h=52,95). IL-8 showed very important increase after the race (basal=35,39; pos=151,26).
Conclusion: After a marathon a large increase of IL-6 with a return to basal levels after 72h is expected. This kinetic is important for metabolic and inflammatory control of internal milieu of athletes. The loss of this pattern can be associated with sleep alteration that might be speculated responsible for the increased number of runners with RLS seen in our study. The high level of IL-8 immediately after the marathon also can be associated with sleep disturbance. The results of IL-6 secretion pattern altered in RLS runners could be fundamental to understand the RLS because it may be associated with altered metabolism and inflammatory mechanism mainly in sleep. IL-8 also is important to sleep regulation. Further studies would be necessary to better understand RLS and cytokines.
Acknowledgements: The authors gratefully acknowledge the athletes for their patience as well as Gianni M.S. dos Santos for help with statistic analysis.

T-L-089 CHANGE OF RLS IN PATIENTS WITH EARLY PARKINSONS DISEASE AFTER ONE YEAR OF DOPAMINERGIC TREATMENT

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Introduction and Objectives: The clinical response to dopaminergic drugs in idiopathic RLS and Parkinson's disease (PD) has been considered to support a relationship between these two disorders. A recent study suggests that long-term dopaminergic treatment rather than the disease itself may be a major risk factor for the development of RLS in PD. This study explores the development of RLS in drug-naive patients with PD after one year of dopaminergic treatment.
Materials and Methods: 200 drug-naive patients with early PD derived from a population-based incident cohort and 173 age- and gender-matched control subjects were assessed for leg restlessness before initiating dopaminergic treatment and after one year on medication. 150 of the patients and 164 control subjects were available for a follow-up assessment. RLS was diagnosed according to the essential diagnostic criteria using the John Hopkins telephone interview.
Results: Thirty-one (15.5%) of the drug-naive PD patients and 16 (9.2%) control subjects met RLS criteria (p=0.07) at baseline. After one year with dopaminergic treatment 18 (13.6%) of the remaining 150 PD patients and 11 (7.2%) control subjects met RLS criteria (p=0.157). 15 (10%) of the PD patients no longer experienced RLS, 11 (7.3%) new cases were reported and 7 (4.7%) patients still experienced RLS. There were no major differences in motor or cognitive function or the type of dopaminergic treatment given.
Conclusion: RLS is inconsistent over time in PD, even though the prevalence of RLS remained rather unchanged during the first year of dopaminergic treatment. More extensive longitudinal studies are necessary for further understanding of RLS in PD.

T-L-090 DESCRIBING RESTLESS LEG SYNDROME (RLS) AS A CAUSE OF CIRCADIAN RHYTHM SLEEP DISORDERS (CRSD): VIDEO STUDIES IN THE HOME SETTING: FROM ETHNOGRAPHY TO QUANTITATIVE ANALYSES

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Introduction and Objectives: Home-based over-night-video-sleep-studies studies may be helpful for the diagnosis of RLS among children with neurodevelopmental conditions (NDC) who have difficulties expressing RLS associated sensations. Reproducibility of individual symptoms and their description is a major challenge in clinical diagnosis, particularly when the patients themselves are not able to express verbally discomfort/urge-to-move/pain. Often, movement patterns and challenging behaviour remains unrecognized as an indication of possible RLS, and challenging behaviour and/or CRSD are treated with various medications.
Materials and Methods: We initially used an ethnographic approach adapted from medical anthropology to explore parent(s)/caregiver(s) perceptions of the sleep problem leading to CRSD and associated behaviour; then developed and piloted home-based over-night-video-sleep-studies with which we could describe sleep efficiency, restful/restless sleep, positioning and movement patterns; out of these reports we developed standardized descriptions. The periods of interest were analyzed qualitatively and quantitatively with Optical Flow computing horizontal and vertical pixel displacements between consecutive frames of a video. Specific regions of interest with respect to each other were chosen and the amount of motion (over time) quantified, magnitudes and frequency of movements were plotted on a time graph.
Results: Along with medical history, collaborating with parent(s)/caregiver(s) in collecting narratives and an ethnographic analysis of the child's favourite daytime activities as well as challenging behaviour and movement patterns during restful daytime activities and falling asleep has helped us to identify RLS as an often overseen clinical diagnosis for CRSD in children and youth with NDC. Standardized qualitative and quantitative analyses make these descriptions reproducible.

Conclusion: The strategy of using narratives, along with ethnography and videos opens the floor for a new 'narrative sleep medicine' useful in describing discomfort/urge-to-move/pain related behavioural movement patterns in non-verbal patients.
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T-L-091 DIFFERENCES IN RLS SYMPTOMATOLOGY, ATTITUDES, AND BELIEFS BETWEEN ADULTS WITH TREATED AND UNTREATED RLS

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Introduction and Objectives: Restless Legs Syndrome (RLS) is common, but remains an under-recognized and under-treated condition in the community. Differences in attitudes toward RLS treatment and symptoms and RLS symptomatology might explain low rates of recognition and treatment. Objective: (a) compare attitudes and beliefs regarding RLS and treatment in no RLS (NRs), treated RLS (TRs), and untreated RLS (URs) subjects; (b) compare severity and symptomatology in TRs and URs.
Materials and Methods: 41 NRs (age: 69.1±9.5; female: 75.6%) and 29 URs (age: 72.6±14.1; female: 89.7%) were recruited from the RLS in Baltimore ECA (RiBECA) study, a community-based epidemiologic study, and 35 TRs (age: 61.1±13.0; female: 68.6%) were recruited from the Johns Hopkins Center for RLS. Diagnosis of RLS was ascertained based on the RLS-Clinical Diagnostic Interview and physical and neurological examination by a neuropsychiatrist. Attitudes and beliefs towards RLS and RLS treatment were assessed based on the RLS Attitude Scale (modified from Diabetes Attitude Scale) in four domains: need for specialized physician training in RLS, severity of RLS, psychosocial impact of RLS and patient autonomy. Subjects were also assessed based on Medical Skepticism Scale, and Trust in Physicians Scale. RLS severity was measured in participants with RLS using the IRLSSG Rating Scale and RLS Quality of Life Instrument. Participants indicated the extent to which they agreed with phrases used to describe RLS symptoms on the RLS Symptoms Survey.
Results: TRs indicated less medical skepticism, less trust in physicians, and belief in greater severity and psychosocial impairment in RLS than the NRs and URs. Also, compared to URs, TRs had more severe symptoms and worse quality of life and frequently endorsed different descriptors of RLS symptoms.
Conclusion: Differences in attitudes and beliefs toward RLS and RLS symptom severity and symptomatology appear to have a role in treatment-seeking behavior in individuals with RLS.
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T-L-092 DIFFERENTIATING COEXISTING RESTLESS LEGS SYNDROME AND POLYNEUROPATHY CAUSING INSOMNIA

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Introduction and Objectives: Symptom of RLS sometimes may be confused with polyneuropathy. NCS may help to differentiate these two conditions however in many cases of small fiber sensory dysfunction or early polyneuropathy NCS may be normal. In these cases it may be difficult to differentiate these two conditions. However in some patients these two conditions may co-exist. We present three of our patients who had co-existing RLS and polyneuropathy contributing to insomnia.
Materials and Methods: We had three patients who presented with symptoms of RLS overlapping with polyneuropathy. Therefore, the two conditions were difficult to differentiate with certainty. Since the diagnosis of two separate conditions with somewhat overlapping symptoms in any one patient is discouraged, the management of these patients was challenging. There was a controversy about the diagnosis and decision of which treatment should be initiated could not be reached. Hence, nerve conduction studies were requested and confirmed the diagnosis of polyneuropathy. Their symptoms were only partially improved after treating for polyneuropathy and they continued to manifest symptoms of RLS. Hence they required the treatment of each condition individually to improve insomnia.
Results: NCS showed distal symmetric axonal sensory polyneuropathy. These patients continued to suffer with symptoms of RLS in spite of treatment for polyneuroapthy and required dopamine agonists resulting in resolution of their symptoms. These patients have insomnia and both of these conditions were responsible for this.
Conclusion: RLS may coexist with polyneuropathy and should be carefully differentiated with the help of detailed history and NCS. Both of these conditions need to be treated to improve insomnia.

T-L-093 EARLS 2010 RLS – EUROPEAN PATIENT SURVEY

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Introduction and Objectives: During September 2010 EARLS conducted a survey in Austria, Belgium, Finland, France, Great Britain, Italy, Spain, Sweden and The Netherlands of patients suffering from RLS. The aim was to get a picture of the situation for RLS patients 2010 in a major part of Europe.
Materials and Methods: We created a very detailed questionnaire which was sent, in their local language, by letter to 6,359 members of European RLS Patient Advocacy Groups. 1,908 questionnaires were returned to EARLS. Questions were asked about age, gender, familial RLS, RLS symptoms, sick leave and early retirement due to RLS, diagnostic data, now used and earlier used RLS medications, the reason for change in RLS medication, co-morbidity medications efficacy, side effects, sleep disorders, hypnotics and sleep clinic. It is the first time that nine European countries were surveyed with the same questionnaire for RLS.
Results: Major differences between countries, but also similarities. Data concerning RLS symptom severity and heredity. Time for diagnosis is shorter but still too long. Many patients on sick leave or early retired due to RLS. RLS medication is safe and effective. Name (trade names and generic names), strengths, doses and daily intake frequencies for medication for RLS and co-morbidities. Side effects Causes of sleep disturbances. Hypnotics and their functions. Frequency of visits to sleep clinics.
Conclusion: The situation for RLS patients is becoming better, but very much has still to be done, mainly educational activities to health care staff and to RLS families to use the health care resources more optimally.
Acknowledgements: EARLS (European Alliance for Restless Legs Syndrome) is a new founded European patient organiza-tion for people suffering from RLS. www.earls.eu.

T-L-094 IMBALANCE BETWEEN THYROID HORMONES AND THE DOPAMINERGIC SYSTEM MIGHT BE CENTRAL TO THE PATHOPHYSIOLOGY OF RESTLESS LEGS SYNDROME: A HYPOTHESIS

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Introduction and Objectives: Introduction: Data from medical literature indicate that dopaminergic (DA) agonists ameliorate Restless Legs Syndrome (RLS), while DA antagonists aggravate it. DA is a physiologycal regulator of thyroid hormone (TH): DA infusion diminishes the levels of TH. TH can provoke restlessness, hyperkinetic states, tremors and insomnia. Conditions with higher levels of TH, such as hyperthyroidism, have a higher prevalence of RLS symptoms. Low iron (LI) levels can cause secondary RLS or aggravate symptoms of primary disease as well as diminish enzymatic activities involved in DA production and the degradation of TH. As a result of LI levels, DA diminishes and TH increases. The daily profile of thyroid-stimulating-hormone (TSH) levels resembles the daily circadian intensity profile of symptoms of an RLS patient. Levels of TSH increase in the evening, as does the severity of RLS symptoms. One mechanism by which TH is modulated by the DA system is through enhancement of the biochemical functions of the complex family of the cytochrome P450 (CYP450) enzymes. In addition, DA inhibits TSH secretion. The CYP450 superfamily of enzymes, heme proteins (all have iron), is important for the degradation of TH, and LI levels diminish the quantity of CYP450 available to degrade TH. Several drugs that alleviate RLS symptoms are inducers of CYP450 activity. Objectives:To present evidence that RLS is, in idiopathic cases, secondary to an imbalance between two physiological forces, TH and DA.
Materials and Methods: Medical literature pertinent to the theme. Thought research: logical reasoning applied on data existing on the theme.

Results: TH, not counterbalanced by DA, induces RLS symptoms. As TH increases in early evening RLS symptoms are higher at that time.
Conclusion: Imbalance between TH and DA is central to RLS pathophysiology.
Acknowledgements: We are much indebted to Dr Arthur S. Walters, Professor of Neurology Vanderbilt School of Medicine, Nashville, Tennesee, USA, for helpful criticism of the manuscript and kind attention.

T-L-095 MULTIPLE SCLEROSIS AND RESTLESS LEGS SYNDROME IN MIDDLE-AGE WOMEN

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Introduction and Objectives: Significant associations between multiple sclerosis (MS) and restless legs syndrome (RLS) have been reported in previous case-controls studies, but these studies have been small. We, therefore, assessed the relationship between MS and RLS in a large cohort of middle-aged women.
Materials and Methods: This is a cross-sectional study including 65,544 women (aged 41-58 years) participating in Nurses Health Study II. Women with diabetes and arthritis were excluded as these conditions can mimic RLS. Participants were considered to have RLS if they met four RLS diagnostic criteria recommended by the International RLS Study Group and had restless legs $\geq$5 times/month. Severe RLS was defined as having RLS more than 15 times per month. MS was self-reported and confirmed by their neurologist or by our study neurologist after medical record review. Multivariable logistic regression models were used to analyze the relation between MS and RLS, with adjustment for age, ancestry, latitude of residence, current BMI and BMI at age 18, physical activity, menopausal status, smoking, use of vitamin D supplement, analgesics, alcohol, folate, oral contraceptive, antidepressant, and history of stroke, MI and hypertension.
Results: After adjusting for potential confounders, women with MS were found to have higher odds of RLS (odds ratio [OR]=2.67, 95% confident interval [CI]: 1.85-3.86) and severe RLS (OR=4.0, 95%CI: 2.58-6.22) compared to those without MS. We did not observe significant associations between MS duration and likelihood of RLS or severe RLS. The adjusted OR for RLS was 2.99 (95% CI 1.57-5.68) for women with MS for 0.1-5.0 years, 2.39 (95%CI: 1.30-4.41) for 5.1-10.0 years, and 2.73 (95%CI: 1.44-5.17) for 10+ years as compared to participants without MS. The associations between MS and RLS persisted in subgroup analysis according to age, obesity, and sleep duration.
Conclusion: Women with MS are more likely to have RLS, especially severe RLS, relative to those without MS.

T-L-096 NOCTURNAL MOVEMENT STUDY DURING SLEEP WITH CLASSIC ANALYSIS SYSTEM AND WITH A METHOD BASED ON VIDEO ANALYSIS

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Introduction and Objectives: Study nocturnal movements during sleep using a combined polysomnography and video analysis method.
Materials and Methods: Five patients were studied with nocturnal polysomnography in sleep laboratory and actigraphy. Movements were studied using offline video analyses with a software system composed by: Manycam, WebcamXP, Zoneminder, Zoneminder Analyzer (ZMA), Actiwatch Activity & Sleep Analysis 7. The sleep stages and the major body movements were classified according to the AAMS Criteria. The time spent in each position and the sleep hours index were calculated. The video analisys was performed with combined use of Manycam and WebcamXP using an IP virtual camera. The ZMA provided data by video analysis performed with Zoneminder to obtain a format compatible with Actigraphy Analysis software. Zoneminder reveals the differences of video frame input, quantifies them and then stores them in an SQL database. ZMA divides the time in epochs of X seconds and calculates for these epochs values compatible with those obtained through actigraphic analysis using the database data. The obtained data are transformed in a legible format by SW Actiwatch Activity & Sleep Analysis 7.
Results: The video analysis offline offers an approach to study the motion during sleep, not always visible with the classic video system and with surface EMG electrodes. This system permits an analysis of body movements of the limbs and the face. The Manycam and WebcamXP system is a more complete characterization of the macrostructure of sleep, visual analysis of body movements, spectral analysis of EMG and Actigraphy Analyses.
Conclusion: This method has been used in studies of: patients recovering in intensive care unit and with altered consciousness; patients affected by movements disturbances during sleep; and animals.

T-L-097 PERIODIC LEG MOVEMENTS, NASAL CPAP AND EXPIRATORY LOAD

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Introduction and Objectives: Periodic limb movements during sleep (PLMS) appear during nasal CPAP titration. We studied 97 successively monitored patients during polysomnography performed during nasal PAP titration with presence of PLMS.
Materials and Methods: PLMS were monitored and scored following AASM guidelines. Simultaneously with monitoring of leg EMG we recorded other EMG including those of inspiratory and expiratory muscles. The relationship between apnea and hypopneas and any periodic EMG discharge during nasal-PAP titration was also temporally determined. The temporal relationship of periodic EMG bursts seen in inspiratory and expiratory muscles and legs was determined: To be considered as "related" the two EMG (leg and abdominal muscles) bursts must have been starting in same time and overlapping in duration.
Results: PLM analyses showed that the mean peak interval between two EMG leg discharges was 24$\pm$4 seconds for the total group. Leg EMG discharges were associated with a sympathetic activation (finger plethysmography curve) in 95$\pm$2.2% and in 95$\pm$3% with change of the sleep EEG. Expiratory muscle EMG discharges were related to increase in PAP pressure and PLMS were associated with simultaneous expiratory muscle EMG discharge. 55 subjects treated with nasal CPAP (n=82/97) and 17/17 subjects treated with bilevel were still presenting PLM despite disappearance of AASM defined hypopneas, but PLMS disappeared with elimination of "flow limitation", and cycling-alternating-pattern phase A2 and A3 which requested higher PAP pressure.
Conclusion: 1) Disappearance of AASM defined hypopneas does not control abnormal breathing and PLMS. 2) PLMS are part of a muscle activation involving active contraction of expiratory muscles. This active contraction of expiratory and leg muscles disappeared with PAP pressure needed to control not hypopneas but flow limitation associated with active expiration during sleep. 3) Are "isolated" PLMS related to periodic muscle discharges of un-studied muscle groups particularly respiratory?

T-L-098 POLYSOMNOGRAPHICALLY VALIDATED REM SLEEP BEHAVIOUR DISORDER IN RESTLESS LEGS SYNDROME: FREQUENCY AND ASSOCIATED FACTORS

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Introduction and Objectives: Due to leg movements in sleep, patients with RLS may show abnormal motor behaviours during sleep which may be difficult to differentiate from RBD by taking the patient's and/or bedpartner's history. We investigated the frequency of REM sleep behaviour disorder (RBD) in Restless Legs Syndrome (RLS) and analyzed associated factors.
Materials and Methods: Video-supported polysomnography (vPSG), comparative statistical analysis of PSG, demographic, clinical and medication data. RBD was defined according to polysomnographic ICSD-2 criteria.
Results: 286 consecutive RLS patients were investigated with vPSG. 20 patients were excluded from further analysis as they showed no REM sleep during vPSG recording. RBD was diagnosed in 12 of the remaining 266 RLS patients (5%). Violent behaviour was not diagnosed in any case, in some cases motor behaviour could not be differentiated from PLMS by history.

Disease duration was 11.5±11 years. 160 patients (60%) were female. Family history was available in 211 cases and positive for RLS in 88 cases (42%). RLS+RBD patients were older (68±14 years) compared to RLSnonRBD with (61±13 years) ($p<0.05$). In 65 RLSnonRBD patients (26%) concomitant sleep apnea was diagnosed, compared to 7 RLS+RBD patients (58%) ($p<0.05$). There was no significant difference in gender distribution, disease duration, RLS medication, RLS severity measured with the International Restless Legs Severity Scale (IRLSS), occurrence of reduced ferritin levels and other PSG parameters between RLS patients with and without RBD.
Conclusion: The prevalence of RBD in the general population is approximated at 0.8%. In this study, RBD affected 5% of RLS patients and was associated with older age and a higher frequency of sleep apnea. RBD may occur in RLS patients, but is not a clinically relevant feature and may be due to older age and respiratory problems in those patients.

T-L-099 PREVALENCE OF SLEEP DISORDERS AND SLEEP WAKE PATTERN IN AN OUTPATIENT PEDIATRIC POPULATION ATTENDING A TERTIARY TEACHING HOSPITAL IN CHENNAI

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Introduction and Objectives: Sleep disorders are encountered in pediatric population and are unrecognized and underreported unless the patients are subjected to specific questionnaires relating to sleep disorders. This study was performed to assess the prevalence of sleep disorders in children attending the outpatient department in a tertiary teaching hospital.
Materials and Methods: 195 children in the age group of 2 months to 15 years attending the pediatric OPD were assessed for their sleep pattern using a standardized sleep questionnaire from an on going study.
Results: Out of 30 children in the age group 2- 12 mths (30) OSA and RLS was seen in (0.3%), 33% had some form of sleep problems. In the age group of 1-2 yrs (41) 4% had RLS,14% had OSA and 41% sleep problems. In the 2-5 yrs group (76) the prevalence of RLS was 11%, OSA 6% and sleep problems 39%.In children aged 5- 15 yrs (48), 29% had RLS, 14% had osa, and 41% had sleep problems. The average sleep time (ST) and sleep latency (SL) of the children were as follows 2-12mths (ST- 12 hrs 30 mins, SL -19 mins), 1-2 yrs ST- 11hrs 40 mins, SL -25mins), 2-5 yrs (ST- 10hrs 45 mins, SL -27mins) and in 5-15 yrs (ST-9hrs 50 mins, SL 23 mins).
Conclusion: Overall 40% of the children had some form of sleep problems like nightmares, sleep talking and waking frequently. Symptoms of RLS and OSA were found to be more prevalent in the age group of 5- 15 yrs. The prevalence of sleep problems in family members were found to be 31%. The results are further discussed in the paper.

T-L-100 RESTLESS LEGS SYNDROME IN SUBJECTS WITH KNEE ARTICULATION PROSTHESIS. EVIDENCE THAT THE SYMPTOMS ARE GENERATED IN THE PERIPHERY

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Introduction and Objectives: There are no data on the prevalence of restless legs syndrome (RLS) in subjects who have knee prostheses. This encouraged us to carry out a cross sectional survey of such a group, and to investigate if their RLS symptoms are unilateral, or bilateral.
Materials and Methods: 107 subjects (30 male, 77 female) submitted to a knee prosthetic surgery (KPS) were interviewed over the telephone regarding RLS symptoms. When RLS was positive, we conducted face to face interviews (FFI) and queried if the existence of RLS was prior or posterior to KPS, if the symptoms were unilateral or bilateral, along with any associated family history of RLS. Lastly, a therapeutic trial with pramipexole was proposed for each subject.
Results: In our cohort, 7 males (23%) and 30 females (39%) had RLS. Of these, 6 males and 23 females were submitted to FFI. From the males, 5 (83%) had RLS after KPS - exclusively in the operated leg - and highlighted no family RLS history. One man had prior bilateral RLS, a positive family history and claimed exacerbation of symptoms in the operated leg. Among the females, 16 (69%) had RLS prior to surgery, 14 of whom had relatives with this syndrome. Ten signaled bilateral RLS symptoms with no change after KPS or presented fewer symptoms in the operated leg, with 6 displaying a worse outcome in the operated leg. The 7 females (31%) without RLS prior to KPS and without family history experienced symptoms only in the operated leg. All subjects responded favorably to the therapeutic trial.
Conclusion: Our results lead us to conclude that unilateral RLS may ensue from KPS; and to posit that the RLS symptoms are generated in the sensorial peripheral nervous system.

T-L-101 RESTLESS LEGS SYNDROME IN PATIENTS ON CHRONIC DIALYSIS TREATED WITH ERYTROPOIETIN

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Introduction and Objectives: There is a high prevalence rate of RLS in patients undergoing dyalisis therapy for end-stage renal disease (ESRD), usually related to iron deficiency. The aim is to evaluate the prevalence and risk factors of RLS in patients on chronic dyalisis, on erytropoietin therapy.
Materials and Methods: In a cross-sectional study, including all patients on chronic dyalisis, we analyszed the relationship between RLS, its risk factors and quality of life (QoL). We collected demographic, clinical and laboratory data. QoL was measured with SF-36. The diagnosis and severity of RLS were established using the IRLSSG criteria. We compared patients diagnosed with RLS (group I) to those who did not fulfill the four minimal IRLSSG criteria for RLS (group II).
Results: Mean age was 52.6±15.8 years. 50.9% were female. The mean time of dialysis therapy was 5.4±4.4 years. RLS was diagnosed in 14 of a 102 patients included in this study (13.7%). The two groups did not differ as to age, gender, race, life style, family history of RLS, etiology of ESDR, QoL and laboratory data. Mean score of the IRLSSG was 18.3±9.1. Patients in group I refer to sleep less during nightime (5.64±2.17 hours vs. 6.5±2.1 hours; $p=0.032$). There was a trend for higher prevalence of initial insomnia among group I patients (78.6% vs. 54.5%; $p=0.091$). Movements of the legs during sleep was a more common complaint among patients of group I (64.3% vs. 29.5%; $p = 0.011$). Therapy with antidepressants was more common in group I (42.8% vs. 17%; $p=0.027$).
Conclusion: Prevalence of RLS was 13.7%. The most important risk factor related to RSL was antidepressant therapy. RLS patients reported sleeping less hours each night and complain more of leg movements during sleep.

T-L-102 RESTLESS LEGS SYNDROME IN SUBJECTS WITH KNEE ARTICULATION PROSTHESIS. EVIDENCE THAT THE SYMPTOMS ARE GENERATED IN THE PERIPHERY

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Introduction and Objectives: There are no data on the prevalence of restless legs syndrome (RLS) in subjects who have knee prosthesis. This encouraged us to carry out a cross-sectional survey of such a group, and to investigate if their RLS symptoms are unilateral, or bilateral.
Materials and Methods: One hundred and seven subjects (30 male, 77 female) submitted to a knee prosthetic surgery (KPS) were interviewed over the telephone regarding RLS symptoms. When RLS was positive, we conducted face-to-face interviews (FFI) and queried if the existence of RLS was prior or posterior to KPS, if the symptoms were unilateral or bilateral, along with any associated family history of RLS. Lastly, a therapeutic test with pramipexole was proposed for each subject.
Results: In our cohort, 7 males (23%)) and 30 females (39%) had RLS. Of these, 6 males and 23 females were submitted to FFI. From the males, 5 (83%) had RLS after KPS - exclusively in the operated leg - and highlighted no family RLS history. One man had prior bilateral RLS, a positive family history and claimed exacerbation of symptoms in the operated leg. Among the females, 16 (69%) had RLS prior to surgery, 14 of whom had relatives with this syndrome. Ten signaled bilateral RLS symptoms with no change after KPS or presented fewer symptoms in the operated leg, with 6 displaying a worse outcome in the operated leg. The 7 females (31%) without RLS prior to KPS and without family history experienced symptoms only in the operated leg. All subjects responded favorably to the pramipexole therapeutic test.
Conclusion: Our results lead us to conclude that unilateral RLS may en-

sue from KPS; and to posit that the RLS symptoms are generated in the peripheral sensorial nervous system.
Acknowledgements: We are much indebted to Dr Arthur S. Walters, Professor of Neurology Vanderbilt School of Medicine, Nashville, Tennesee, USA, for helpful criticism of the manuscript and kind attention.

T-L-103 RESTLESS LEGS SYNDROME: THE RESPONSE OF RLS TO COMPREHENSIVE VARICOSE VEIN CARE

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Introduction and Objectives: Restless Legs Syndrome (RLS) is a progressive disorder of uncomfortable sensations in the legs that leads to unwanted motor restlessness. Recent research has suggested a correlation between RLS and chronic venous disorders (CVD). The purpose of this study is to determine the effect that comprehensive vein treatment has in relieving RLS symptoms in those patients who have both RLS and CVD.
Materials and Methods: This study is a case series report of a physician's detailed account of 54 consecutive patients (mean age: 46±13 years) who presented to a specialty phlebology practice with CVD (CEAP C1 to C5) and who also had RLS conforming to the International Restless Legs Syndrome Study Group (IRLSSG) diagnostic criteria. The IRLSSG Rating Scale (RLSRS) ten question survey instrument (score: 0-40) was administered to each patient prior to treatment. Each patient was treated with sclerotherapy, with or without endovenous laser treatment, according to the presentation of their CVD. Each patient's RLS symptoms were subsequently re-evaluated at predetermined intervals within their treatment course, using the RLSRS survey instrument. The study end points were defined as complete RLS symptom relief (score = 0) or completion of vein treatment protocol, whichever came first. No patients were prescribed any other pharmacologic intervention for their RLS.
Results: Fifty patients completed the study. Four patients did not complete the study and/or their treatment and were lost to follow-up. The mean RLSRS baseline score was 22±6 (range: 9–36). Forty-eight of the 50 patients (96%) experienced complete relief of their restless legs symptoms (RLSRS = 0, $p<0.001$). The mean RLSRS score at the end of the study was 0.5±1 ($p<0.01$). Two patients (4%) experienced significant but incomplete relief.
Conclusion: While the pathology of RLS is unclear, treating a patient's concomitant chronic venous insufficiency provided them with complete or significant relief of their RLS symptoms. Patients having RLS should be evaluated for concomitant CVD and appropriately treated.
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T-L-104 SAFETY AND EFFICACY OF LONG-TERM TREATMENT WITH ROTIGOTINE IN JAPANESE PATIENTS WITH RESTLESS LEGS SYNDROME

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Introduction and Objectives: The aims of this trial were to assess safety and efficacy of long-term treatment with rotigotine transdermal patch in patients with restless legs syndrome (RLS), and to investigate incidence of clinically significant persistent augmentation, the most problematic complication of dopaminergic treatment.
Materials and Methods: This open-label extension trial consisted of 6-week dose-titration and 48-week dose-maintenance period. Rotigotine was administered to 185 patients enrolled from the preceding double-blind phase 2b trial. The dosage was initiated from 1 mg/24h with a weekly optimal titration up to 3 mg/24h, and dose adjustment was not permitted after optimal dose was determined. Efficacy was evaluated with the severity scale (IRLS) developed by the International Restless Legs Syndrome Study Group. Augmentation was diagnosed retrospectively based on the Max Plank Institute criteria by expert panels. Clinical significance of augmentation was evaluated from clinical course as assessed by IRLS, Augmentation Severity Rating Scale (ASRS) and SF-36 scores.
Results: 133 patients (72%) completed and 52 patients (28%) prematurely discontinued the trial. Change of IRLS total score from the baseline in the phase 2b trial to the end of treatment was -15.4, and 134 patients (73%) were judged as treatment responder (50% or more of IRLS reduction from the baseline). The clinically significant persistent augmentation was observed in 5 patients (2.7%). The first episode of augmentation occurred between Week 16 and Week 24 in these patients. Doses at the onset of episode were 3 mg/24h (4 patients) and 1 mg/24h (1 patient). The other common adverse events in this trial were application site reaction (52.4%), nausea (28.6%), somnolence (15.7%) and headache (13.5%).
Conclusion: Long-term treatment with rotigotine improved RLS symptoms in Japanese patients with RLS, with an acceptable safety profile.

T-L-105 STUDY OF RESTLESS LEG SYNDROME IN RUNNERS

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Introduction and Objectives: Long distance running is emerging as a popular sport in Western industrialized countries. It also has beneficial effects such as preventing diabetes, obesityand cardiovascular disease,but it does have adverse effects such as cramping and gastrointestinal bleeding. Objective The purpose of this study was to determine the relationship between Restless Legs Syndrome (RLS) and hematological-biochemical parameters in marathon runners; to estimate the prevalence of RLS in runners and if was associated with alterations in serum biochemical parameters.
Materials and Methods: We investigated the biochemical pre race, immediate and post 72 hour in 73 recreational runners participating in 3 marathons (42.195Km) (São Paulo, Porto Alegre and Florianopolis), who finished the race. We excluded 7 (3 ♂ hypertensive, 1 ♂ and 2 ♀ with hypertension and diabetics and 1 ♂ refused to participate). We compared with presence or no of restless leg syndrome. Iron deficiency was defined as a plasma ferritin (PF) concentration $<15\mu mol/l$ (iron depletion).
Results: RLS was found in 22.45% of runners who finished the marathon in less than 4 h. There were 1.5% of runners had iron <50 mcg/dl and the remaining had normal values, (mean basal = 97.12 (SD 35.79) pos = 109.62 (SD 34.15) 72h = 86.70 (SD 26.83) and 1.5% had ferritin concentration <15 mcg/dl (mean basal = 119.64 (SD 79.41) Pos = 148.18 (SD 89.72) 72h = 139.41 (SD 87.58) in the group with RLS. The marathon runners loss iron during the race, but maintain normal values. The mucoprotein was abnormal in 27.27% in runners without RSL and in 12.12% with RLS.
Conclusion: The incidence of RLS in marathon runners is higher than expected for the Brazilian general population and it is not linked to iron depletion. This sample related worsening of symptoms after long aerobic work. The relationship of long aerobic effort and RLS was demonstrated. Further studies would be necessary to better understand mechanism of RLS
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T-L-106 THALAMIC MR SPECTROSCOPY EVALUATION OF RESTLESS LEGS SYNDROME

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Introduction and Objectives: Evaluate thalamic neurochemistry of restless legs syndrome (RLS) in relation to controls and polysomnographic (PSG) sleep. RLS produces a profound increased arousal (hyperarousal) with both significant wake during sleep times and wakefulness reducing expected daytime sleepiness. Dopamine treatments reduce periodic limb movements in sleep (PLMS) and RLS sensory symptoms but fail to correct sleep loss. A non-dopaminergic abnormality may contribute to RLS sleep problems.
Materials and Methods: Thalamic MR spectroscopy glutamate and glutamine (Glx) measures relative to creatine (Cr) were obtained in 28 primary RLS patients off RLS medications, and 20 matched controls. Most had two nights of polysomnography. We hypothesized Glx/Cr would be greater for RLS patients and would correlate with wake time during sleep
Results: RLS vs. controls did not differ for Cr but showed significantly increased Glx/Cr for RLS ($t=2.2$, $p=0.008$). The Glx/Cr correlated significantly with wake during sleep ($r=0.61$, $p=0.007$) and with all sleep variables that

differed significantly for RLS vs. controls except for PLMS. Other standard MRS neurochemical measures neither differed significantly from controls nor correlated with sleep

Conclusion: In brain, the Glx signal is mostly (80%) glutamate. Increases likely indicate increased glutamate. A primary insomnia study with sleep disruption similar to these RLS patients found reduced GABA with normal glutamate. The glutamate increases, therefore, unlikely result from but rather cause the sleep disruption. If confirmed, this study would provide a missing part of the neurobiological abnormalities of RLS: dopamine, iron and glutamate. Dopamine related to PLMS and sensory symptoms, glutamate related to hyperarousal. Brain iron compromise causes both of these abnormalities in animals.

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T-L-107 THE PREVALENCE OF RESTLESS LEGS SYNDROME IN HORMONAL CONTRACEPTIVE USE

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Introduction and Objectives: The prevalence of Restless Legs Syndrome (RLS) in pregnancy is around 30%. The etiology, however, of this association is not yet known. Changes in sex hormones are postulated to play a crucial role. We hypothesize that combined hormonal contraceptive therapy (OCP) creates a hormonal environment similar to pregnancy, which may confer a similar increased risk of RLS. The objective of our study is to determine the prevalence rate of RLS among women taking combined hormonal contraceptive therapy compared to controls.

Materials and Methods: A survey was distributed to women on the Northwestern Campus of Chicago. The survey included demographic information, contraceptive use history, other medication use, and an International RLS severity index (IRLSS). The prevalence rate of RLS was determined in 145 women taking hormonal contraceptive therapy, who met inclusion criteria and compared to a 169 matched controlled women not taking OCP.

Results: A significant relationship between combined OCP use and RLS symptoms was not found (p=0.53). RLS severity between users and non-users of OCP was not significant either (p=0.2127). OCP users were significantly lighter than non-users (p=0.0040) as were RLS subjects compared with those without RLS (p=0.0015); RLS severity weakly correlated with BMI (R=0.26, p=0.044) as well.

Conclusion: These findings suggest that hormonal contraceptive therapy does not increase the risk of developing RLS symptoms and that RLS in pregnancy is not purely due to hormonal changes. Examining a larger sample of women subdividing by estrogen content to determine if there exists a difference between very low vs. low estrogen containing pills and RLS could provide further insight into the hormonal hypothesis. The correlation of higher BMI and RLS has been reported before but the correlation between not using OCPs and increased BMI needs to be perhaps explored further.

T-L-108 WHICH RECEPTOR SUBTYPE IS THE TARGET OF DOPAMINE-AGONISTS IN RESTLESS LEGS SYNDROME?

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Introduction and Objectives: The aim of this study was to compare the efficacy of equivalent low dosages of the most selective D3 receptor subtype dopamine-agonist available pramipexole and that of the most selective D2 receptor subtype bromocriptine on restless legs syndrome (RLS) and periodic leg movements during sleep.

Materials and Methods: A placebo-controlled prospective investigation was carried out on 45 drug naïve patients with idiopathic RLS. Each patient underwent two consecutive full night polysomnographic studies, the first recording was performed without pre-medication, before the second recording one group received a single oral dose of 0.25 mg pramipexole and a second group a single oral dose of 2.5 mg bromocriptine, the remaining patients received placebo. Subjective evaluation of the severity of RLS symptoms was also assessed the morning after each polysomnography.

Results: Subjective symptoms were improved by both pramipexole and bromocriptine, with pramipexole inducing the most important improvement. Side effects were preponderant after bromocriptine. Only pramipexole induced a mild reduction in REM sleep and an increase in sleep stage 1. Pramipexole was more effective than bromocriptine in reducing PLMS in patients with a high level of PLMS index at baseline. Typical PLMS (inter-LM intervals 10-40) disappeared completely after pramipexole treatment but persisted, even if reduced, after bromocriptine treatment.

Conclusion: This study shows the superior efficacy of a drug targeting D3 receptor subtypes than a drug targeting preferentially D2 subtypes in RLS; establishing the specific target of DA in RLS has scientific relevance and important clinical implications.

O: Other

T-O-109 SLEEP DISORDERS IN PRIMARY SCHOOL CHILDREN IN KERMANSHAH, IRAN

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Introduction and Objectives: Sleep disorders are common in children; they also have a significant impact on the parents. Few studies in this field have been performed in Iran; hence the present study was carried out in order to determine sleep patterns and the prevalence of sleep disorders in school aged children in Kermanshah.

Materials and Methods: This cross sectional study was done on 200 students (100 males and 100 females) of elementary schools in Kermanshah, selected from cluster random samples. The duration of the study was from September 2009 to April 2010, and data was acquired by means of a standard pediatric sleep questionnaire.

Results: The prevalence of sleep disorder among subjects was 40.3% (43.3% in males, and 37.3% in females). Sleep patterns during the school days differed significantly from what was observed on Fridays (p=0.000). In addition, there was a significant difference between males and females in terms of duration of sleep on Fridays (p=0.014).

Conclusion: Considering the high prevalence of sleep disorders in children, their harmful impact on the development of the nervous system and the child's learning and psychological health as well as on parental competency, and again bearing in mind the low level of awareness among the general population about sleep hygiene, we strongly recommend educational programs via public media and via meetings with the parents in schools.

T-O-110 A MOBILE SLEEP UNIT IS FEASIBLE AND COST EFFECTIVE

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Introduction and Objectives: Patients with reduced mobility or those during acute hospitalization experience difficulties in moving to the Sleep Unit for a sleep study. We developed a mobile sleep unit where the nurse moves to the patient's bed-side to conduct the unattended sleep study. We evaluated the feasibility of this approach.

Materials and Methods: Patients were referred for suspicion of sleep apnea. We selected patients hospitalized elsewhere and patients with reduced mobility, for a bed-side sleep study. The sleep nurse moved by a public taxi and the sleep device Embletta Gold (Embla, Denver, CO) was sent back by taxi the next day. A clinical and technical evaluation was performed (0 = no signal, 100 = good signal).

Results: We studied 23 subjects (12 females), mean age 59 (range 24-83 years) and BMI 31 (20-45 kg/m^2). Eight patients were hospitalized elsewhere during the time of the study. Seven patients had tetraplegy; three patients exhibited no communication ability. Two studies failed; one because no data was found, and the other due to patient readiness. The failure rate was 8%. The best signal quality was for the ECG channel 100% and the poorest for the oximetry at 83%. The cost for one bed-side sleep study was €340 (€200 for the routine sleep study, €115 for taxi, and €25 for 75 minutes of extra working time for the sleep nurse) and for a technically successful study

€370. The cost of the same sleep study at the Sleep Unit was €580. The total cost benefit for one bed-side study was €210.
Conclusion: In special indications the bed-side sleep study is practical and gives useful information

T-O-112 ADAPTATION AND VALIDATION OF CHILDREN'S SLEEP HABITS QUESTIONNAIRE AND SLEEP SELF REPORT FOR PORTUGUESE CHILDREN – PRELIMINARY RESULTS

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Introduction and Objectives: Sleep is a critical issue in child development. Surveys are a recognized method to evaluate sleep, in large populations. The aims of this study are: 1- To provide a cultural adaptation of Children's Sleep Habits Questionnaire (CSHQ), a parent report about a child's sleep, and of Sleep Self Report (SSR), a self questionnaire, for Portuguese children; 2- To describe sleep habits and sleep disturbances in a group of Portuguese children. The validation of both questionnaires is currently being done comparing a community with a clinical sample.
Materials and Methods: Both questionnaires were translated, adapted and distributed in 4 schools. Parents of children from 4-10 years old answered CSHQ and children from 7-10 years old answered the SSR. A descriptive analysis was performed. A test-retest was done in the community sample to assure reliability. Internal consistency was assessed by Cronbach alpha. Answers from parents and children were compared using correlation analysis.
Results: In the community sample (n=574), aged 4 to 10 (Mean 7.29; SD 1.5), 299 male (52.1%), parents answered CSHQ. Cronbach alpha was 0.77.Test-retest reliability was 0.80. From these 310 children answered SSR, 50.6% were male (mean age 8.2; SD 0.9) with a Cronbach alpha of 0.68; test-retest reliability was 0.65. A Spearman correlation was calculated for each item of CSHQ and SSR, r values ranged 0.05-0.48. Social score was analyzed in 463 children. Average sleep duration was 9.8h and 92.8% of children go to bed in average 57 min later at weekend. From SSR, 79.7% of children like to sleep but 42.3% think they sleep too much and 51% feel usually sleepy.
Conclusion: The reliability of the Portuguese adaptation of the CSHQ and the SSR has been proven; the correlations between parents and children answers are high. Average sleep duration is lower than the original study but reveals a similar tendency.

T-O-114 ASSESSMENT OF PRINTED MATERIAL ON SLEEP DISORDERS FOR AN EDUCATIONAL OPERATION IN PEDIATRIC HEALTH

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Introduction and Objectives: The quality of sleep directly influences the physical and emotional development of children. Many printed materials have been prepared for actions of health education, but we have little systematic statistical data on the effectiveness of Comic Strips with children. This study assessed the use of the "Snory Sleeps at Home" ("Ronco Dorme em Casa") Comic Strips (CS) in a pediatric health educational operation with 548 children aged 6 to 10 years who were enrolled in public and private elementary schools in the city of São Paulo.
Materials and Methods: The subjects of the sample responded to 3 questions on sleep disorders (test). According to the Salomon 3 group model, the students were divided into 2 groups: Post-CS Group (children who answered the test only after reading the Comic Strip) and the Pre & Post-CS (children who answered the test before and after reading the Comic Strip).
Results: Statistically there was a very significant difference ($p<0.05$) among the correct answers the children provided before and after reading the CS. (Question 1 $p<0.000001$; Question 2 $p<0.000001$ and Question 3 $p<0.000001$). In the answers given after reading the CS there was no significant statistical difference between school origin, gender and age, with the exception of the more complex question 3, where older children (10 years) performed better.
Conclusion: The results showed the effectiveness of the "Snory Sleeps at Home" ("Ronco Dorme em Casa") CS as a support in pediatric health education.
Acknowledgements: We would like to thank the Federal research supporting agencies CAPES (Camargo EP, #3300915) and CNPq (Carvalho LBC, #559187; Prado LBF, #312587; Prado GF, #312584); Roberto Vedolin and Maria Tereza Garcia for the suggestions and Luciano Palma for statistics.

T-O-115 CAN A ONE-TIME SLEEP SPECIALTY CONSULTATION IMPROVE SLEEP DISORDER MANAGEMENT IN PRIMARY CARE?

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Introduction and Objectives: Sleep disorders often are not adequately addressed in the primary care setting. The current study was conducted to determine the effects of a one-time consultation with a sleep specialist on sleep management patterns and outcomes in a primary care setting.
Materials and Methods: The study entailed a prospective, randomized, clinical intervention trial. Participants were 137 veterans (Mage=55.4years; 29 women) enrolled in the primary care clinics of the Durham VA Medical Center. Eligible participants had a sleep complaint $>$ 1 month duration, greater or equal to 6 on the Pittsburgh Sleep Quality Index-PSQI, greater or equal to 24 on the Folstein exam, no unstable medical or psychiatric disorders, and no previous sleep specialist treatment. Participants were randomized to an intervention (INT; N=68) or wait-list control (WLC; N=69). INT consisted of one meeting with a sleep specialist who administered structured interviews assessing sleep and psychiatric disorders, and then provided manualized treatment recommendations to patients and their respective healthcare providers. Providers' referral patterns and patient outcomes (sleep diaries, PSQI, Epworth Sleepiness) were then monitored for a subsequent 10-month period.
Results: Provider-initiated sleep-focused interventions were significantly more frequent for the INT group than for the WLC group including PSG referrals ($p<0.0001$), mental health clinic referrals ($p<0.05$), and medication for restless legs ($p<0.05$). INT recipients showed greater improvements in diary total wake time ($p<0.05$) and sleep efficiency ($p<0.03$) and marginally larger PSQI improvements ($p<0.08$; ES=0.26) than did WLC recipients at 10-month follow-up. Moreover, 56.14% of INT recipients had normal Epworth Sleepiness Scale scores $\leq$10 at the 10-month follow-up whereas only 43.3% of the WLC group fell below this clinical cutoff.
Conclusion: A one-time sleep consultation significantly increased healthcare providers' attention to sleep problems and resulted in benefits to patients' sleep/wake symptoms.
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T-O-116 DIFFERENCES BETWEEN PREGNANT AND NON PREGNANT WOMEN IN DREAM AND DYSPHORIC DREAM RECALL AND IN DREAMED MATERNAL MENTAL REPRESENTATIONS

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Introduction and Objectives: Clinicians describe pregnant women as recalling more dreams and dysphoric dreams (bad dreams, nightmares) than at any other period in life. Research also indicates that pregnant women's dreams differ in content from those of nulliparous women. However, [1] dream (DR) and dysphoric dream (DDR) recall and [2] dreamed maternal mental representations (MMRs) have never been prospectively and comparatively assessed during pregnancy, which we aimed to do in this study.
Materials and Methods: Dreams of 12 primiparous (29.08$\pm$3.68 yrs; 33.08$\pm$4.08 wks of gestation) and 12 nulliparous (29.00$\pm$3.52 yrs) healthy women with similar marital status were collected using 14-day home logs. Women qualified each dream as either a bad dream (a very disturbing dream which though unpleasant did not awaken you) or a nightmare (a very disturbing dream in which the unpleasant visual imagery/emotions woke you up). Dreams were blindly rated by three judges for the presence of MMRs: babies, dreamer as mother/spouse/daughter, spouse, maternal figures, and family. MMRs totals were divided by the #dreams recalled, except for the dreamer as mother/spouse/daughter representations which were divided by the #dreamer representations. Independent t-tests compared groups in

DR and DDR ($p<0.017$). A MANOVA with MMRs as dependent variables assessed group differences in dream content.
Results: Women did not differ in #dreams ($p=0.28$) or #bad dreams ($p=1.00$), but primipara tended to report more #nightmares ($t(22)=2.32$, $p=0.03$). Groups differed on MMRs [Trace = 0.52, $F(7,16) = 4.30$, $p=0.007$], with more babies ($F(1,22) = 9.84$, $p=0.005$), dreamer as spouse ($F(1,22) = 20.54$, $p<0.001$), spouse ($F(1,22) = 26.61$, $p<0.001$), and maternal figures ($F(1,22) = 13.00$, $p=0.002$) in primiparous dreams.
Conclusion: Women recall more nightmares and dreamed MMRs during pregnancy. Differences may reflect the need to remodel mental representations and to regulate associated emotions during this major life transition.
Acknowledgements: Research was supported by the Canadian Institutes of Health Research.

T-O-117 DIFFERENT INTERVENTIONS ON TURBINATE HYPERTROPHY AND COMPLIANCE OF CPAP ON PATIENTS WITH OSAS

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Introduction and Objectives: Many OSAS patients have complaints of nasal diseases, therefore, treatments to keep the nose ventilated are vital parts to improve CPAP compliance.
Materials and Methods: 17 patients (25-52yr, 14 men and 3 women) diagnosed as severe OSAS and using CPAP for over 2 months with various complaints of discomfort. Their pressures had been adjusted several times, but to no avail. They could not sleep over 3 hours. Patients were randomly divided into two groups: 10 of them were treated by orally taking Cetirizine hydrochloride qd for 14 days, 7 of them were treated by nasally taking Nitrofurazone ephedrine tid for 7 days. Clinical data before intervention were collected to show compliance and pressure of CPAP, and medication (Cetirizine hydrochloride or Nitrofurazone ephedrine). Nasal ventilation conditions were valued by VAS. Patients continued with CPAP treatment two weeks after RF, and we recorded compliance and pressure of CPAP, as well as VAS.
Results: For patients with turbinate swelling, it is vital to improve their nasal ventilation. According to cases without deviated septum, orally applying H1 receptor antagonist, using decongestants or radiofrequency treatment of turbinate hypertrophy can all be effective in improving CPAP compliance. Comparatively speaking, orally taking H1 receptor antagonist brings the least improvement and topical application of decongestant brings better effects in nasal ventilation, CPAP compliance and pressure change.
Conclusion: Turbinate hypertrophy and poor ventilation have negative impact on CPAP compliance. RF shows the best therapeutic effects on turbinate hypertrophy among the three interventions. Besides, at the beginning stage of CPAP treatment, conditions of nasal ventilation should be considered as a key determinant to be treated to improve patient compliance.

T-O-118 DISCREPANCY BETWEEN COMPLAINTS AND DIAGNOSIS MAY PROVIDE UNSATISFACTORY INFORMATION ABOUT SLEEP DISORDERS

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Introduction and Objectives: This study aims to measure the correlation between patient complaints and medical diagnosis by comparing prior knowledge about the investigated population's sleep disorders and the patients' ability to report their disorders adequately to health professionals.
Materials and Methods: We analyzed 208 patient records and extracted the following information: medical diagnostic hypotheses, the patients' primary complaint, date of birth, and gender. We considered 95% confidence intervals for the proportions between the complaint and medical diagnostic hypotheses and determined agreement using a Kappa test.
Results: When comparing the complaint and medical diagnostic hypotheses, we found strong correlations for bruxism. The correlations were moderate for snoring, insomnia, nightmares, somniloquy, and restless legs syndrome (RLS). Correlations were fair for excessive movement during sleep (EMDS) and obstructive sleep apnea syndrome (OSA). In men, the correlation was pronounced for insomnia and nightmares; in women, the correlation was marked for somniloquy and RLS. In general, correlations were lower for pediatric patients.
Conclusion: We conclude that the observed correlations were heterogeneous, but important diseases such as OSA and EMDS in children showed fair and weak correlations. This suggests an unsatisfactory knowledge level among the population about these disorders, despite their high prevalence and impact on patients' overall health.
Acknowledgements: We would like to thank the Federal research supporting agencies CAPES (Camargo EP, #3300915) and CNPq (Carvalho LBC, #559187; Prado LBF, #312587; Prado GF, #312584); Yandra Mello and Paula Andrade Barreto for helping on data collecting.

T-O-119 DREAMING AND COGNITION IN PATIENTS WITH FRONTO-TEMPORAL DYSFUNCTION

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Introduction and Objectives: Parkinson's disease (PD) and Temporal Lobe Epilepsy (TLE) share similarities in hallucinations and mild cognitive dysfunctions; therefore considering dreams as a model for hallucination, dream similarities are expected. The objective was the study of dreams in these two neurological disorders (PD and TLE) considering for both cases a common functional model of dream production, namely the involvement of limbic and paralimbic structures
Materials and Methods: We characterized the dreams in early stage PD (19 male) and in TLE patients (52) by dream diaries obtained at morning recall and classified by the Hall van de Castle system; in both groups matched controls were used as reference.
Results: Patient's ages and gender were as follows: PD: 71.6 ± 7.9 years; controls: 71.3 ± 7.8 years; all males. TLE (26 female, 26 male), mean age of 37.9 ± 11.1; controls (21 female, 20 male), mean age of 42.1 ± 12.4 years. Dream recall was lower in patients then in matched controls. TLE had even a lower recall then PD. comparison of Patients' dreams contained significantly more aggression, animal and negative emotion related features than controls. PD patients with frontal dysfunction and more advanced motor stages showed more aggressive features. In the Hall and van de Castle scale there were statistically significant differences between patient's dreams and those of the control group, regarding the following items: animals, physical aggression, befriender (higher in the patient group) and aggressor and bodily misfortunes (lower in the patient group). The largest difference found was in physical aggression. Right Temporal lobe epilepsy had higher proportion of dreams with animals and self negativity, while in Left TLE aggression was more frequent.
Conclusion: Patients of both groups with higher levels of frontal dysfunction had significantly more aggression in their dreams. Dreams of PD and TLE patients share important common features, suggesting a defective interplay between limbic structures and prefrontal cortex.

T-O-120 EEG MAPPING OF DEAF' DREAMS

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Introduction and Objectives: Several theories consider that dreams are the result of memories of the dreamer and can be activated by an internal stimulus. The study of dreams in congenitally deaf can bring relevant information about auditory sensory processing of dreams, and electroencephalographic correlates of dreaming, can provide relevant data regarding the underlying brain processes. In this study we assess the topographical and temporal variation of spectral EEG components during dream recall in REM sleep awakenings in order to: 1) Evaluate brain areas involved in the processing of specific sensory components; 2) Determine the temporal profile associated with dream recall or non recall.
Materials and Methods: 8 congenital deaf, (aged 25-50), half men, and 8 normal hearing. Dream content was assessed with Hall and Van de Castle scale. Mapping of the EEG spectral bands was done in two situations; 5 minutes prior to the forced REM awakenings and in stable REM periods. The relative power of the conventional spectral frequency bands using the FFT was calculated The 5 minutes periods were subdivided in 30 seconds epochs, numbered consecutively from 1 to 10, 1 being the closest to awake and 10 the one 5 minutes apart. The influence of dream reporting topography and study on the temporal evolution of each frequency power was analyzed by multivariate analysis.
Results: There were significant changes over the 5 minutes prior to the

awakenings in every spectral frequency studied, in relation to the group and presence or absence of recall. The various spectral bands evolved according to an underlying rhythm, which is attenuated in the presence of dream recall; this was more evident in Normal subjects. Verbal activities were negatively correlated with high frequency bands in C3, T5 and P3 electrodes in controls.
Conclusion: Differences between recall and no recall were detected. The spectral frequency bands powers were attenuated with dream recall. A cyclic variation in spectral power was detected in association with recall. Verbal activities correlated with high frequencies in left centro-temporo-parietal areas.

T-O-121 ESCITALOPRAM REDUCES INFLAMMATION AND IMPROVES BEHAVIOR WITHOUT AFFECTING SLEEP IN A RAT MODEL OF POST CARDIAC INFARCT DEPRESSION

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Introduction and Objectives: Acute myocardial infarction (MI) in rats is followed by apoptosis in the limbic system, depressive behavior and sleep disturbances compatible with human post-MI depression. We tested the effects of escitalopram, a selective serotonin reuptake inhibitor two weeks after MI.
Materials and Methods: Myocardial ischemia was induced for 40 minutes in 19 young adult Sprague-Dawley rats (MI rats) and compared to 20 Sham rats. Fifteen minutes after the onset of reperfusion, escitalopram (10 mg/kg/day, i.p.) or saline was continuously infused through osmotic minipumps. After two weeks of treatment, rats were tested for behavioral despair and anhedonia using the Forced Swim Test (FST) and the Sucrose Preference Test (SPT) paradigm respectively. Animals were then sacrificed and blood levels of proinflammatory cytokines (IL-1, IL-6, TNF), prostaglandin E2 (PGE2) and corticosterone were measured. In a separate cohort of 24 rats (12 MI and 12 Sham), sleep was recorded after two weeks of post-MI treatment with escitalopram or saline.
Results: In MI rats, behavioral despair and anhedonia were blocked by escitalopram but prolonged sleep latency, short total sleep time and short latency to Paradoxical Sleep (PS) were not; escitalopram decreased PS in Sham rats. TNF, PGE2 and corticosterone plasma levels were higher in MI rats compared to controls. Escitalopram decreased TNF, IL-1, and PGE2 levels in both groups of rats while IL-6 showed no differences whatsoever.
Conclusion: Escitalopram reverses the rat post-MI behavioral syndrome through a mechanism that could involve a reduction of pro-inflammatory cytokines. Escitalopram has only limited effects on sleep disorders in MI rats but reduces PS in control rats.
Acknowledgements: We are grateful to Natural Sciences and Engineering Research Council of Canada and H. Lundbeck A/S for financial support.

T-O-122 MATERNAL MENTAL REPRESENTATIONS AND EMOTIONS CONTEXTUALIZING IMAGES IN NIGHTMARES OF PREGNANT AND NON PREGRANT WOMEN: IS THERE A DIFFERENCE?

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Introduction and Objectives: Nightmares are more frequent during pregnancy, possibly reflecting the abrupt emotional transitions underway at this time. However, no research has prospectively and comparatively examined nightmare content among pregnant and non-pregnant women. We compared maternal mental representations (MMRs; i.e., imagery reflecting maternal relationships) and contextualizing images (CIs; i.e., an image that stands out as especially powerful, vivid, bizarre, or detailed) in prospectively collected nightmares of pregnant and non-pregnant women.
Materials and Methods: Dreams of 12 primiparous (M = 29.08±3.68 yrs; 33.08±4.08 wks of gestation) and 12 nulliparous (M = 29.00±3.52 yrs) healthy women with similar marital status were collected using 14-day home logs. For each dream, women rated (yes/no) if it was a nightmare (i.e. a disturbing dream triggering an awakening). Each nightmare was blindly rated by three judges for #CIs (maximum two images), and for CI valence and intensity (valence: 1 = negative to 9 = positive; intensity: 1 = not at all to 9 = very intense). Nightmares were also evaluated for the presence of MMRs: babies, dreamer as mother/spouse/daughter, spouse, maternal figures, and family. Independent t-tests compared nightmares from 22 primiparous and 9 nulliparous mothers.
Results: Primiparous nightmares contained fewer CIs ($t(29) = -2.83$, $p=0.008$), but were more negative in valence ($t(26) = -2.05$, $p=0.05$) than nulliparous nightmares. No differences were found for image intensity or MMRs.
Conclusion: The occurrence of fewer, but more dysphoric, CIs in pregnant women's nightmare, suggests an intensified process that focuses dreaming intensively on a more limited set of emotional concerns.
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T-O-123 IMPACT OF LONG TERM MEDITATION PRACTICE ON SLEEP: A MATCHED CONTROLLED TRIAL

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Introduction and Objectives: Practice of meditation has shown to have a positive influence on an individual's health and well being. Various meditation practices exist, however very few have been studied for their effects over sleep architecture. Isha yoga is a technique which combines breathing practices, sun salutations (postures), mudras and shoonya (meditation).
Materials and Methods: Whole night polysomnography measures were recorded in 21 male meditators (group mean age ± S.D., 35.14±7.98) with a minimum experience of 3 years in Isha yoga techniques. These meditators were compared to 21 male non meditators (group mean age ± S.D., 35.19±8.18) matched for their age and education. Meditators and non-meditators underwent independent polysomnographic recordings. Recordings were from the F4, C4 and O1 electrode sites (International 10-20 system of electrode placement) referenced to linked earlobes and bipolar electroculography and electromyography sites.
Results: The percentage of time spent in REM sleep was significantly higher in meditators as compared to the non-meditators (Independent samples t-test, $t= -5.346$, $p<0.001$). The REM latency ($t=3.800$, $p<0.001$) and sleep onset latency ($t=2.677$, $p<0.05$) were significantly lower in meditators compared to the non–meditators. Sleep efficiency however not significant was higher in meditators indicative of a better quality of sleep in meditators as compared to non-meditators. The 95% confidence intervals for the difference in REM sleep, REM latency and sleep onset latency between meditators and non-meditators were [-63.42, -28.61], [21.90, 72.02] and [1.57, 12.22] respectively.
Conclusion: These results suggest that consistent practice of Isha yoga techniques appeared to have a positive impact on sleep as signified by better sleep onset latency. Also the higher percentage of REM sleep in meditators signifies better memory consolidation. However, this needs to be further investigated.
Acknowledgements: The authors' gratefully acknowledge the active participation of meditators of Isha yoga in this study.

T-O-124 IMPACT OF PRENATAL MATERNAL BELIEFS ON INFANTS' NIGHTTIME SLEEP ARRANGEMENTS IN THE FIRST 3 MONTHS OF LIFE

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Introduction and Objectives: This study was to explore the correlation of

prenatal beliefs about infant sleep with postnatal nighttime sleep practices, during the first 3 months after birth.
Materials and Methods: 347 eligible women were enrolled at approximately 34 weeks of pregnancy; after delivery 260 healthy infants meeting inclusion criteria were enrolled as study subjects. Prior to delivery, all expectant mothers completed a questionnaire on attitudes towards four aspects of infant sleep. Following delivery, sleep diaries were administered over 3 consecutive nights starting at 10 and 28 days and 2 and 3 months postnatally.
Results: On prenatal survey, 79% of women expressed a preference for the child to sleep in a separate crib in the same room with an adult and 11% anticipated co-sleeping with the child. On post-natal survey, only 38% reported their child slept in an independent crib, whereas 57% reported co-sleeping (prenatal to post-natal kappa = 0.06). Regarding sleeping position, 55% preferred the supine position and 36% preferred putting the infant on the side; postnatally, the respective proportions were 71% and 29% (kappa = 0.16). On when to put the child to sleep, 63% indicated this should happen when the child was drowsy but not yet asleep, whereas 31% indicated the infant should be fully asleep; postnatally, 31% put the child to sleep when drowsy, whereas 64% waited until he/she was fully asleep (kappa = 0.02). Regarding night awakenings, 65% stated they should wait a few minutes before taking action while 33% anticipated taking immediate action; postnatally, the proportions reversed with 76% taking immediate action and only 18% waiting a few minutes before action (kappa = 0.00).
Conclusion: With the one favorable exception of sleep position practices, we conclude that prenatal beliefs are poor predictors of postnatal sleep related practices and that opportunities exist for educational interventions to improve postnatal sleep practices among primiparous Chinese women.

T-O-125 INFANT SLEEP LOCATION: BED SHARING, ROOM SHARING AND SOLITARY SLEEPING AT 6 AND 12 WEEKS POSTPARTUM

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Introduction and Objectives: Parents may have their infant sleep with them in the same bed (bed sharing [BS]), in the same room, but a separate bed (room sharing [RS]), or a separate room in a separate bed (solitary sleeping [SS]); prevalence estimates of these choices are limited. Safe infant sleep recommendations are to practice RS in the first six months, and avoid BS and SS. Given the negative sequelae of sleep loss, effects of infant sleep location (ISL) on sleep should be examined.
Materials and Methods: Healthy first-time mothers (n=246) in a RCT of a sleep intervention provided information on ISL in-hospital, and 6 and 12 weeks postpartum when maternal and infant sleep were measured using actigraphy. Intervention group mothers received training to improve sleep, but no advice related to ISL. There were no significant differences between groups in outcomes, so results were aggregated.
Results: At baseline, 27% planned to BS, 88% planned to RS, and 6% planned to SS to some extent. At 6 weeks, 17% were classified as usually BS, 46% usually RS, 21% usually SS; at 12 weeks rates were 12%, 39%, and 29%. At 6 weeks, 51% reported any BS; this reduced to 41% at 12 weeks. At 6 weeks, usually BS mothers had shorter stretches of sleep than those usually SS (130 minutes vs 156 minutes; p=0.01) and more awakenings than usually RS and SS (11 vs 9 vs 8; p=0.001). At 12 weeks, usually RS mothers had shorter stretches of sleep than those usually SS (163 minutes vs 192 minutes; p=0.04).
Conclusion: BS and SS rates are high across the first three postpartum months and ISL location has effects on maternal sleep. More research is needed to examine ISL across the postpartum year, reasons for ISL choice, and relationship of ISL to objective sleep outcomes for infant, mother, and partner.
Acknowledgements: Funding for the study was provided by the Canadian Institutes of Health Research (CIHR) (MCT 84658). Dr. Stremler is recipient of a CIHR New Investigator Award.

T-O-126 INTERACTIONS WITH BABIES AND TEMPORALITY IN PREGNANT DREAMERS

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Introduction and Objectives: In absence of the subject in previous literature, this study focuses on the level and the valence of interactions with babies in dreams of pregnant compared to nulliparous women along with its temporality (past vs. present features).
Materials and Methods: 12 healthy primipara (29.08±3.68 yrs; 33.08±4.08 weeks of gestation) and 12 healthy nullipara (M=29.00±3.52 yrs) completed 14-day home logs. Three raters blindly evaluated dreams for the level of dreamer/baby interaction (1=not at all vs. 9=very much) and its valence (1=negative vs. 9=positive), the level of characters/baby interaction and its valence, and whether baby was in danger (1=not at all vs. 9=very much). Groups were compared using independent t-tests, in which each variable tested represents sum of scores divided by the total # of dreams recalled. Raters also scored presence/absence of past vs. future features (1-3 scales; 1=one reference vs. 3=the dream takes place in past/future).
Results: Primipara tended to interact less with babies in dreams than did nullipara (t(22)=1,86, p=0.084), but no difference was found for characters/baby interactions (p=0.148). Interactions tended to be more negative between other characters and babies in primiparous dreams (t(22)=2.68, p=0.055), whereas valence of dreamer/baby interactions was not different (p=0.337). Primipara also showed significantly greater danger for babies in their dreams (t(22)=1.65, p=0.034). Though no difference was found for references to the past (p=0.39), primipara made significantly more references to the future (t(22) 2.78 p=0.01).
Conclusion: Pregnant women's dreams displayed fewer dreamer/baby interactions but more negative characters/baby interactions. They also included greater references to the future. Results may reflect the urgent need to deal with preoccupations about the unborn baby and the future, and to regulate associated emotions during this major life transition.
Acknowledgements: Research was supported by the Canadian Institutes of Health Research and the Natural Sciences.

T-O-127 IRON DEFICIENCY ANEMIA (IDA) IN INFANCY MODIFIES NIGHTTIME PLASMA CORTISOL PATTERNS IN 10-YR-OLD CHILDREN

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Introduction and Objectives: IDA in infancy is associated with long-lasting neurodevelopmental consequences including neuroendocrine regulation which are not reverted after successful iron therapy. We previously noted that former IDA (FIDA) children showed slower nighttime increase of cortisol plasma concentration. In order to characterize the dynamics of cortisol profile, we assessed features of plasma cortisol secretory pulses throughout the sleep period time (SPT) in otherwise healthy FIDA and control children.
Materials and Methods: We studied 102 (67 FIDA/35 control) children from an ongoing follow-up study initiated in infancy. All infants received iron therapy and there were no subsequent recurrences of IDA. At 10 years, a nighttime polisomnographic sleep recording and simultaneous blood sampling every 20 min (via catheter) were performed in the laboratory. Plasma cortisol concentration was measured in duplicate by electroquimioluminescence. Secretory pulses were identified and measured throughout the SPT using an autodeconvolution algorhythm (PulseXp®).
Results: Children were 10.2±0.2 years old; 54.9% were males. There were no differences in daytime waking episode duration, WASO, sleep onset time, and total sleep time between groups. The same was also true for frequency and inter-pulse intervals of cortisol secretory pulses. However, their mean concentration and area under the curve were reduced in the FIDA group (p=0.02 and =0.03, respectively).
Conclusion: Our findings show reduced concentration and area under the curve of cortisol secretory pulses in FIDA children in the absence of differences in pulse frequency. We suggest that the lower amount of nighttime cortisol in FIDA children might be due to reduced cortisol secretion.
Acknowledgements: Grants from NIH (HD33487) and Fondecyt (1070668).

T-O-128 OBJECTIVE AND SUBJECTIVE BENEFITS OF PREGABALIN ON MEASURES OF SLEEP AND PAIN IN PATIENTS WITH FIBROMYALGIA AND SLEEP MAINTENANCE DISTURBANCE

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Introduction and Objectives: Sleep problems are common among fibromyalgia patients and contribute towards fibromyalgia-related fatigue and pain. This randomized, double-blind, placebo-controlled, 2-period crossover study sought to assess the effect of pregabalin on objective and subject-rated measures of sleep and daily pain in patients with fibromyalgia.
Materials and Methods: Subjects 18y and older with fibromyalgia were required to satisfy subjective and objective sleep disturbance criteria prior to randomization. Eligible patients were randomized (1:1) to pregabalin (300-450 mg/d) or placebo for crossover Period 1; and vice versa for Period 2. Each crossover period comprised a dose-adjustment (to Day 14 of period) and dose maintenance (to Day 29 of period) phase, with a 2-week taper/washout between periods. Total Sleep Time (TST) was recorded by polysomnography during 2 consecutive nights at end of Period 1 and 2, subject-rated measures of sleep efficacy were recorded daily upon awakening via IVRS including subjective-TST (sTST) and Sleep Quality (from 0["very poor"] to 10["excellent"]), and tiredness (from 0["not tired"] to 10["extremely tired"]) and pain (from 0["no pain"] to 10["worst possible pain"]) due to fibromyalgia.
Results: Of 119 subjects randomized (103[86.6%] female;104[87.4%] white; 48.4y), 102 (85.7%) completed both Periods. Mean duration of fibromyalgia at baseline was 4.2y. Baseline pain was 6.7±1.63 (sequence: placebo[Period 1]–>pregabalin[Period 2]) and 6.6±1.62 (sequence: pregabalin [Period 1]–>placebo[Period 2]). Treatment with pregabalin increased PSG-recorded TST by >25 mins vs. treatment with placebo (LS mean 396.2 vs. 370.6 mins;$P<0.0001$). During all treatment weeks, pregabalin treatment increased sTST vs. placebo treatment (Week 4 difference [95%CI]: +25.4 [15.0,35.9];$P<0.0001$). Pregabalin treatment also improved Sleep Quality (Week 4 difference:+0.89 [0.51,1.26];$P<0.0001$), and reduced tiredness (Week 4 difference:-0.70[-1.08,-0.33];$P=0.0003$) vs. placebo treatment. Pain scores improved (reduced) during all treatment weeks with pregabalin (Week 4 difference:-0.52[-0.90,-0.14];$P=0.008$) vs. placebo treatment.
Conclusion: Fibromyalgia subjects treated with pregabalin recorded and reported clinically-meaningful improvements in measures of sleep, reported reduced tiredness and pain.
Acknowledgements: Supported by Pfizer Inc.

T-O-129 RACE/ETHNICITY, SLEEP DURATION, AND QUALITY OF LIFE: ANALYSIS OF THE BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM

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Introduction and Objectives: Sleep disturbance is independently associated with declining physical and mental health-related quality of life (QOL). We examined whether sleep duration (short and long) is related to QOL and whether short sleep among blacks augurs greater likelihood for dissatisfaction with life.
Materials and Methods: Analysis was based on the Behavioral Risk Factor Surveillance System (BRFSS) data obtained in 2009. BRFSS is a CDC sponsored project and represents the world's largest ongoing, state-specific, randomized survey that measures behavioral risk factors among adults in the United States [mean age=56±16years, female=63%]. Analysis focused on telephone interviews conducted in six representative states, soliciting sociodemographic, health, and sleep data, yielding data for 31,059 respondents. Data analysis was performed using SPSS 18.0.
Results: Prevalence of short sleep (≤5hrs), long sleep (≥9hrs) and dissatisfaction with quality of life among whites and blacks were: 9.8% vs. 18.9%, 11.1% vs. 15.7%, and 5.1% vs. 7.7%, respectively ($p<0.001$). Multivariate adjusted logistic regression analysis showed that short and long sleep durations were associated with dissatisfaction with QOL [OR=2.44, 95% CI=2.10-2.84, $p<0.001$; OR=1.28, 95% CI=1.07-1.54, $p<0.001$, respectively]. Results of regression analysis testing interactions between race/ethnicity and short sleep showed that black short and long sleepers were more likely to report dissatisfaction with QOL, relative to their white counterparts [OR=1.84, 95% CI=1.65-2.06, $p<0.001$ and OR=1.11, 95% CI=0.96-1.29, NS, respectively]. Covariates adjusted in the analyses included age, sex, income, education, marital status, physical activity, smoking and/or alcohol consumption, depression, anxiety, and a history of diabetes, hypertension, heart disease, cancer, or arthritis.
Conclusion: Our analysis indicated that both short and long sleep durations were associated with dissatisfaction with quality of life, but black short sleepers were at increased risk of reporting dissatisfaction with quality of life compared with white short sleepers. These findings are consistent with data suggesting that blacks are at greater risk for metabolic disorders associated with short sleep.
Acknowledgements: Brooklyn Health Disparities Center, Department of Medicine, SUNY Downstate Medical Center, Brooklyn, NY, United States

T-O-130 SLEEP AND QUALITY OF LIFE IN URBAN POVERTY: THE IMPACT OF SLUM-HOUSING UPGRADING

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Introduction and Objectives: Urban poverty is estimated to effect approximately one third of all urban residents in the developing world. In developing countries, more than 900 million people are living in slums. The Latin-American nonprofit organization Un Techo para mi País (UTPMP) defines slums as settlements of eight or more families occupying land and lacking at least one of three basic services: water, electricity or sewage. UTPMP focuses on construction of adequate housing through basic prefabricated 18m^2 modular houses for families living in slums. This study evaluates the transitional impacts on sleep quality and quality of life of slum residents in Buenos Aires, Argentina, where UTPMP works.
Materials and Methods: A total of 30 (Men=36%, Mean age=30,5±9) slum residents on the waiting list for the housing-program were interviewed. The Pittsburgh sleep quality index (PQSI) and WHO quality of life brief scale were administered before and after upgrade. Data about housing conditions, income, education, sleeping conditions, and cardiovascular risk was also collected. Differences were assessed through the McNemar (categorical variables) and Wilcoxon test (numerical variables)
Results: Results showed that sleep quality significantly increased after the housing-program ($z=-4.576$, $p<0.001$). Sleep duration also improved and was significantly increased by about one hour and a half ($z=-3.47$, $p=0.001$). Sharing the bed with at least one child decreased 27% ($x^2=6.125$, $p=0.013$). Self rated life quality improved from "Poor" to "Good" ($z=-4.476$, $p<0.001$).
Conclusion: The housing-program improved sleep and quality of life. However this quantitative data does not inform about the meaning of these behavioral changes. More studies are needed, especially qualitative studies, in order to fully understand sleep and life conditions in the high risk population of the developing countries, and determine what specific actions can be performed to improve them at a basic level.

T-O-131 SLEEP DISTURBANCE IMPAIRS STROKE RECOVERY IN THE RAT

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Introduction and Objectives: There is a lack of experimental evidence supporting the hypothesis that sleep may modulate stroke outcome as suggested by clinical observations. We have previously shown that sleep disturbance (SDis) over 3 days aggravates brain damage in a rat model of focal cerebral ischemia. The aim of this study is to further investigate effects of SDis on long term stroke recovery and neuroplasticity as assessed by neural repairing axonal sprouting, neurogenesis and angiogenesis.
Materials and Methods: 12 hours after initiation of focal cerebral ischemia by permanent occlusion of the distal branches of Middle Cerebral Artery (MCAo), SDis was performed over 3 consecutive days by deprivation of 80% sleep during the 12-h light phase. Control groups included ischemia without Sdis (nSDis), sham/SDis and sham/nSDis. The single pellet reaching test (SPR) was used for assessing sensorimotor function. Axonal sprouting was assessed by anterograde tracing with biotinylated dextran amine (BDA), neu-

rogenesis/angiogenesis was by bromodeoxyuridine (BrdU) labelling along with cell-type markers.
Results: After MCAo the SPR performance dropped to 4% of baseline (100%). At day 35 the recovery in the SDis group was less than 50% whereas in the nSDis group was almost complete. Independent t-tests showed significant difference at day 14 (p=0.031), 21 (p=0.008), 28 (p=0.045) and 35 (p=0.052). There was significant increase (p=0.035) in the damage area in the SDis group (18%±4) compared with the nSDis group (11%±4). The BDA stained area in the contralateral motor cortex and striatum was significantly smaller in the SDis than in the nSDis group. Furthermore there was significant decrease in the number of BrdU positive cells in the peri-infarct area in the SDis group compared with the nSDis group.
Conclusion: SDis has detrimental effects on functional and morphological/structural outcomes after stroke, suggesting a role of sleep in the modulation of brain injury-associated neuroplasticity.

T-O-132 SLEEP DURATION, QUALITY OF LIFE, HABITS AND ACADEMIC SUCCESS IN ADOLESCENTS: RESULTS FROM A PORTUGUESE NATIONAL SURVEY

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Introduction and Objectives: Adolescents sleep shows marked variation in duration and variability. There are known relations between sleep duration and daytime sleepiness, BMI, race, gender, type II diabetes, insulin resistance, specific sleep disorders, health features, pain, cognitive functioning, socioeconomic status, habits and risk taking behaviors. Our aim was to evaluate the influence of sleep duration on adolescents' features related to well being,i.e. age, gender, BMI, nutrition, health, high tech use, adolescents' well-being, life satisfaction, social interactions and academic success.
Materials and Methods: This study is a component of the Health Behaviour in School-Aged Children (HBSC) study (Currie et al2004; Matos et al2006). The Portuguese HBSC included pupils in the 6th, 8th and 10th grades (high school); the mean age was 13.98 years (SD = 1,798). The sample here consisted of 4622 students from randomly chosen Portuguese schools: 52.6% were girls.
Results: Week days sleep duration is curtailed in 38.5% and increased in 5.8% of the students; during weekends there is a substancial increase of those sleeping more than 10 hours (42.6%), together with a persistence of those sleeping less than 7 hours (21.1%). Health is poor in 12.4%; 19.9% complain of frequent headaches and 33.9% of fatigue. Nervousness and irritability were common (29.3 and 26.8%) and depressive symptoms less frequent: feeling low in 20.4%, unhapiness in 15.7% and sadness in 3.3%. Self injuries occurring once or more occurred in15.5%. The rates of academic failure and missing classes were low; 22.9% of the students do not like school.
Conclusion: There were significant negative correlations between sleep duration and age, computer use, BMI, and positive correlations with academic success, physical activity and life satisfaction. The predictors of sleep duration were: physical activity, academic achievement, computer use, life satisfaction, drinking coke and eating sweets. Life satisfaction is an important issue in adolescent sleep studies

T-O-133 SLEEP INTERVENTION THERAPY IN CHILDREN WITH NEURODISABILITIES AFFECTED BY SLEEP DISTURBANCES: A SERVICE EVALUATION

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Introduction and Objectives: To evaluate the impact of a sleep intervention therapy (SIT) in children under twelve years with neurodisabilities affected by sleep disorders.
Materials and Methods: Seventeen families were enrolled in the sleep intervention therapy programme run at the Norfolk and Norwich Scope Association family centre, UK, by May 2010. Of these, four families were excluded: two children became too ill to complete SIT, one family was non-English speaking and one child was over the age of twelve. Twelve questionnaires were posted of which nine were returned (eight families, nine children). The questionnaires' primary aim was to establish parents view of the impact of sleep intervention therapy both on their child's sleep quality and their well being. Informed consent from parents and approval from the University of East Anglia Faculty of Health Committee was obtained.
Results: Median time from completing sleep intervention therapy to answering the questionnaire was 12.4 months. Of the nine children, five were female and four were male. Mean age at enrollment was 3.9 years (range 1.1-9.7years). Post-intervention, eight children (88.8%) had an overall parent-reported improvement to their sleep. Six children improved in all previously affected sleep disturbance index categories. All parents reported some degree of improvement to personal well-being.
Conclusion: This is the first sleep intervention therapy in Norfolk, UK. The results of this evaluation suggest that sleep intervention therapy provides an effective solution to the complex and diverse sleep problems present in these children and these results are consistent with previous research. It is therefore the recommendation of this evaluation that sleep intervention therapy should be made widely available. Further research is required to explore different methods of delivering this therapy.
Acknowledgements: With thanks to Dr Anastasia Bem, Joy Bishop and Dr Christopher Jeanes

T-O-134 SLEEPLESS AND MEDIA SAVVY: THE BI-DIRECTIONAL RELATIONSHIP BETWEEN SLEEP AND MEDIA USAGE IN AUSTRALIAN CHILDREN AND YOUNG PEOPLE

Sarah Blunden. *University of South Australia, Australia*

Introduction and Objectives: Reduced sleep quantity and quality are known to affect behaviour, attention, learning, mood, and appetite and weight status both in the short and long term. One factor shown to reduce sleep quantity and quality of sleep is television viewing, particularly at bedtime as it decreases sleep quality, increases nightmares and changes sleep architecture (Owens, Maxim, McGuinn et al. 1999) The aim of this study was to assess these relationships in Australian children.
Materials and Methods: In two separate studies, 58 children (mean age 8.05, 3.81 range 5-12y), the effect of television viewing on subjectively (sleep diaries) and objectively (actigraph) assessed sleep, school performance and behaviour across weekday and weekend time zones.
Results: In general, on the weekend, the greater the amount of television viewed the shorter the sleep duration ($r= -0.52$, $p<0.01$) and this was particularly true for television viewing at bedtime ($r= -0.49$, $p<0.01$). School performance and aggressive behaviour both had bivariate relationships with television viewing and parental limit setting was a significant mediator in these relationships.
Conclusion: This study confirmed the relationship between sleep and excess media usage both in and out of the bedroom but also acknowledged the importance of parental guidance and limit setting that may impact this detrimental relationship.
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T-O-135 THE COSTS ASSOCIATED WITH SLEEP DIFFICULTIES AMONG PATIENTS WITH FIBROMYALGIA

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Introduction and Objectives: Difficulty sleeping is common among fibromyalgia patients; however, the associated costs are not well understood. This study aimed to assess the costs associated with sleep difficulties among patients with fibromyalgia.
Materials and Methods: Data from the 2009 National Health and Wellness Survey (N=75,000) was used. Only patients reporting physician-diagnosed fibromyalgia were included in the analyses (N=2196). Sleep difficulty symptoms included: difficulty falling asleep, staying asleep, and waking up too early. Patients who regularly experienced $\geq$ 2 of the symptoms (severe sleep difficulties; n=1353) or only one of the symptoms (general sleep difficulties; n=574) were compared with patients reporting no symptoms (n=269) in the past year. Annual direct costs included costs from physician visits, emergency room visits, and hospitalizations. Time missed from work (absenteeism) and impairment at work due to health (presenteeism) were included in annual indirect cost calculations using the Work Productivity and Activity Impairment questionnaire. Generalized linear regression models specifying a negative binomial distribution were conducted, controlling for several potential confounders.

Results: The overall fibromyalgia sample (N=2196) had a mean age of 53.32 (SD=12.63). Patients experiencing severe or general sleep difficulties were significantly more likely to be on disability (severe=28.01% vs. general=23.17% vs. none=14.87%; $p<0.05$) and less likely to possess insurance coverage (87.09% vs. 90.07% vs. 93.68%; $p<0.05$) compared with patients without sleep difficulties. After adjustment for demographic and health characteristics, patients experiencing severe or general sleep difficulties reported higher mean direct costs ($5,947.34 vs. $5,951.51 vs. $4,205.72; $p<0.05$) than patients without sleep difficulties. Patients with severe symptoms reported higher indirect costs ($15,043.48 vs. $11,505.72 vs. $11,852.57; $p<0.05$) than patients without sleep difficulties.
Conclusion: Among the fibromyalgia population, sleep difficulties were independently associated with higher direct and indirect costs. These results suggest effective treatment may be necessary to adequately manage sleep difficulties among patients with fibromyalgia.
Acknowledgements: This study was conducted by Kantar on behalf of Pfizer, which funded the study. Mr. Wagner and Dr. DiBonaventura are full-time employees of Kantar, who were paid consultants to Pfizer in connection with the analysis and development of this manuscript.

T-O-136 THE EFFECTS OF A HIGH SUGAR DIET ON SLEEP QUALITY AND ATTENTIONAL CAPACITY IN PREPUBESCENT GIRLS: A PRELIMINARY STUDY

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Introduction and Objectives: Poor sleep and high sugar intake are common in adolescents. Dietary sugar intake is reportedly higher in children with sleep disturbance (1). This study aimed to objectify these findings and determine whether a high sugar diet affects objective sleep quality and subsequent performance (attentional capacity) in prepubescent girls.
Materials and Methods: Sleep was measured with actigraphy and polysomnography and attention with a psychomotor vigilance task (PVT). The Victorian Cancer Council Food Frequency Questionnaire Diet assessed weekly dietary intake and food intake was strictly controlled during the laboratory stay. Nine healthy female participants aged 10-12 years (mean age: 11years 8.4months) attended a sleep laboratory for two nights using an experimental randomized within subjects design and were given either a standard diet (48g of sugar) or a high sugar diet (90g of sugar).
Results: Sugar significantly decreased time spent in stage one ($p=0.04$) and stage two sleep (0.05) with a trend for more time is SWS ($p=0.07$). Further analyses are underway to assess the cyclic alternating pattern (CAP) of the participants' sleep. Increased dietary sugar initially decreased attentional capacity but increased it after sleep suggesting a mediating effect of sleep.
Conclusion: A high sugar diet has a significant and immediate impact on sleep stages and attentional capacity in prepubescent girls. Further studies need to examine the finer detail of these relationships.

T-O-137 THE EVOLUTION, ROLE AND SCOPE OF COUNSELING SERVICES AT THE SLEEP AND ALERTNESS CLINIC IN TORONTO, CANADA

Dora Zalai. *Sleep and Alertness Clinic, Canada*

Introduction and Objectives: There is a strong relationship between sleep disorders and mental health conditions: sleep disorders may precede, may be the symptom of or may become co-morbid with psychiatric disorders, for example anxiety disorders, depressive disorders or trauma. Additionally, psychological (behavioral, cognitive and emotional) processes may contribute to the onset and perpetuation of sleep disorders. Behavioral sleep medicine is a new, rapidly expanding discipline that encompasses the study and treatment of behavioral and emotional problems associated with sleep disorders. A decade after the foundation of behavioral sleep medicine, "state-of-the-art" sleep laboratories should provide counseling and behavioral sleep medicine interventions for patients seeking comprehensive treatment for their sleep problems.
Results: The Sleep and Alertness Clinic is an independent health care facility with a multidisciplinary team, including professors in psychiatry and a counselor with a medical and psychology background. An open-ended group for people with chronic insomnia and psychiatric disorders and an open-ended support group for people with obesity and sleep problems have been running at the Clinic for more than a decade. With a part-time counselor on board, individual cognitive behavioral therapy for people with insomnia and individual counseling for people with psychiatric disorders has been available since 2009. More recently a short-term insomnia group, a medication group for people with insomnia, CPAP coaching and a narcolepsy support group program have been set up. The next steps of the program development will involve the improvement of the referring process, better co-ordination of patient-flow within the counseling program and facilitation of information-flow between treatment providers. The counseling program fits in the practice that a comprehensive patient-centered care sleep clinics could provide and it could ideally serve as a training center for sleep specialists interested in psychological treatment of sleep disorders.

T-O-138 THE IMPACT OF SLEEP HYGIENE EDUCATION OF THE CAREGIVERS IN INSTITUTIONAL CARE FACILITIES

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Introduction and Objectives: Sleep problems are common among children and implementation of sleep hygiene principles plays an important role in their management. The objective of the study was to examine the impact of sleep hygiene education of the caregivers in institutional care facilities on the sleep of institutionalized children.
Materials and Methods: Sleep patterns and problems were assessed before and after sleep hygiene education of the caregivers in six institutional care facilities in Egypt using the Children's Sleep Habits Questionnaire in the Arabic language.
Results: The sample consisted of 85 children with a mean age of 8.1 ± 1.6 years. There were significant differences in wake-up time ($P<0.001$), duration of nap ($P<0.001$), night-sleep duration ($P<0.001$), and total sleep duration ($P<0.001$) after sleep hygiene education. There was a reduction in the percentage of children who took daytime naps from 33.8% (n=33) to 3.5% (n=3). Bedtime resistance, sleep-onset delay, sleep duration, and sleep anxiety and total scale scores were significantly lower after sleep hygiene education.
Conclusion: Sleep hygiene education of the caregivers had significant positive impact on the sleep of children living in institutional care facilities with improvement in several subscales and the total score and reduction of daytime napping.
Acknowledgements: The author would like to thank the children and the caregivers whose ongoing participation made this study possible.

T-O-139 THE RELATION BETWEEN CENTRAL ADIPOSITY, SLEEP DURATION AND SLEEP QUALITY IN YOUTH

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Introduction and Objectives: The prevalence of childhood obesity has increased almost threefold over the past two decades. Mirroring these trends, total sleep duration has decreased among youth. Recent studies have found decreased sleep duration is linked to higher body mass index (BMI) and obesity in youth. Few studies have obtained measures of central adiposity or sleep quality reports among a pediatric population. Given that central adiposity is more strongly associated with increased metabolic consequences than BMI, it is important to better understand the nature of this association. The aim of the present study was to replicate and extend previous findings on the link between objectively measured indicators of obesity and subjective reports of sleep duration and sleep quality.
Materials and Methods: Participants included 244 youth (46.3% females) aged 8 to 18 years (M=12.66, SD=2.03) who were part of the larger Healthy Heart Project at Concordia University. Central adiposity (waist circumference; M=72.12cm, SD=9.16), hip circumference (M=126cm, SD=90.73), BMI percentile (M=63.37%ile, SD=26.65), and percent body fat (M=22%, SD=9.25) was collected by trained research assistants. Sleep duration was the average difference between self-reported bed- and wake-times over 3 days. Sleep quality was rated on a 10-point Likert scale (1=poor to 10=excellent).
Results: After controlling for age and sex, multiple regression analyses revealed that reported sleep duration was significantly associated with central adiposity ($t=-2.78$, $p<0.01$,) and BMI percentile ($t=-2.07$, $p<0.05$). Interestingly, sleep quality ratings was associated with hip circumference

(t=-2.83, p<0.01), BMI percentile (t=-2.35, p<0.05), and percent body fat (t=-1.85, p=0.06).
Conclusion: Results indicate that central adiposity in youth is linked with shorter sleep duration but not with sleep quality among healthy youth. Those who report poorer sleep quality show greater indices of obesity. Future research should aim to better understand the pathogenic mechanisms underlying the link between sleep and obesity.
Acknowledgements: This work was supported by funding from FQRSC, CIHR, and FRSQ.

T-O-140 WHAT COMPONENTS OF SLEEP EDUCATION ARE NEEDED TO BRING ABOUT BEHAVIOURAL CHANGE

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Introduction and Objectives: The average Australian child is not getting enough sleep, which impacts upon their overall well-being. Sleep education programs aim to improve children's attitudes and knowledge of sleep, therefore mediating changes in sleep behaviour. However, there is a paucity of research assessing sleep education interventions and it is unknown which components of an intervention are needed to result in behavioural changes. According to the Theory of Planned Behaviour, these need to include "intent to change", motivation and salience, in order for behavioural changes to occur. Therefore the current study aimed to assess components of our sleep education program, in order to ascertain if these conditions are met and which is the most influential in eliciting sleep behaviour changes.
Materials and Methods: In a randomized controlled trial, repeated (baseline-post intervention), design, one Year 6/7 class of 11-12 year olds from six schools participated. Four schools were intervention (N=120), two were control (N=60). Participants completed a battery of questionnaires measuring sleep knowledge, sleep hygiene, anxiety, motivation, sleepiness, quality of life and sleep attitudes and beliefs. Sleep duration was measured with actigraphy, as well as self report sleep diaries, each spanning seven days.
Results: Data analysis is currently being undertaken. Given previous studies with ACES programs, it is proposed that participants in the intervention group will significantly increase their sleep knowledge, sleep duration and sleep hygiene compared to the control group. It is also proposed motivation will be a major contributing factor to these increases.
Conclusion: If motivation is found to be a major contributing factor to increases in sleep knowledge, sleep duration and sleep hygiene, it suggests that all future sleep education interventions need to include a motivational component.

Wednesday, September 14, 2011

D: Insomnia

W-D-002 AUDITORY PROCESSING DURING THE TRANSITION TO SLEEP IN PATIENTS WITH SLEEP ONSET COMPLAINTS

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Introduction and Objectives: Chronic insomnia is thought to develop and persist because of heightened sensory and information processing resulting from conditioned CNS activation. Event-related potentials (ERPs) are probes of brain processing which are ideal to investigate information processing during sleep. ERP studies have been inconsistent, possibly because various subtypes of insomnia have been combined in samples. We aimed to investigate auditory processing during the transition to sleep for those with sleep onset complaints. It was expected that N1 would not decrease and P2 and N350 would not increase at sleep onset for patients with insomnia (PI) in the same way as for good sleepers (GS).
Materials and Methods: GSs (n=5) and PIs with difficulty falling asleep (n=4) spent a baseline and experimental night in the lab where a pitch oddball task was delivered. Standard tones were 80% of trials (1000Hz, 50ms, 70dB); pitch targets were 2000Hz; ISI varied 1000-2000ms. Participants responded to target tones as they fell asleep in 3-4 consecutive sleep onset blocks; 10-minutes of wake separated blocks.
Results: PIs had earlier and larger N1 peaks than GSs for both standard and target stimuli in Wake, early Stage1, late Stage 1, and Stage 2 sleep. PIs had larger N350s than GSs to standards in all states. PIs had larger P300s to targets in wake and early Stage1.
Conclusion: PIs with sleep onset complaints showed faster and enhanced encoding of stimuli, as reflected in N1 which was present in wake through Stage 2 sleep. The presence of N350 in wake and its larger amplitude in sleep may indicate PIs were sleep deprived or experiencing greater sleep pressure (diaries indicated lower sleep quality for PIs in the preceding week). A larger P300 in wake, and its presence in early Stage 1, indicates PIs exhibited increased attentiveness to auditory stimuli.
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W-D-003 AUDITORY PROCESSING IN STAGE 2 SLEEP IN PATIENTS WITH SLEEP MAINTENANCE COMPLAINTS

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Introduction and Objectives: Neurocognitive models of insomnia propose it develops and is maintained because of heightened sensory and information processing. Event-related potentials (ERPs) are evoked brain responses that index information processing and attention. Previous ERP studies have been inconsistent, possibly because various subtypes of insomnia have been combined in samples. We explored auditory processing in Stage 2 non-REM sleep across the night for those with sleep maintenance complaints. It was expected that patients with insomnia (PI) would show enhanced processing, i.e., larger N1, smaller P2, and smaller N350 ERPs compared to good sleepers (GS).
Materials and Methods: GSs (n=5) and PIs with difficulty maintaining sleep (n=6) spent a baseline and experimental night in the lab where pitch and intensity auditory oddball tasks were delivered during sleep. Standard tones were 95% of trials (1000Hz, 50ms, 70dB); pitch-deviants were 2000Hz; intensity-deviants were 90dB; ISI varied 1000-2000ms.
Results: N1 was earlier and larger for PIs vs GSs to standard stimuli. P2 was larger for PIs vs GSs for the intensity-deviants only. N350 was larger for PIs vs GSs for standards, but smaller for PIs vs GSs to deviants (more so for intensity-deviants).
Conclusion: As expected, PIs showed some signs of enhanced attention during sleep, e.g., N1 reflected faster and greater encoding. However, PIs also exhibited greater inhibition in some circumstances, possibly due to sleep deprivation (e.g., larger P2 to intensity-deviants, larger N350 to standards). Indeed, diaries indicated lower sleep quality for PIs in the preceding week. For more salient deviants, PIs had smaller N350s than GS, reflecting a failure to inhibit. Thus, both enhanced attention as well as sleep pressure may be at play simultaneously, influencing ERPs in opposing ways. An understanding of cumulative sleep dept in PIs is needed to better understand how this co-exists and interacts with conditioned cortical activation.
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W-D-004 CHARACTERISTICS OF CHRONIC INSOMNIA: A POPULATION-BASED STUDY

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Introduction and Objectives: This study aimed at investigating prevalence, clinical and polysomnographic characteristics of chronic insomnia in Sao Paulo, Brazil.
Materials and Methods: A clustered sample from the EPISONO cohort, a study investigating sleep in Sao Paulo, included 1042 subjects (mean age 42.34+14.39) who completed validated questionnaires and visited the laboratory for full-night polysomnography and other evaluations in 2007. Individuals were classified by symptom subtype (initial, maintenance or early-morning), frequency and chronicity. Chronic insomnia was deter-

mined by two or more symptoms, or by difficulty to maintain sleep, at least 3 days/week and lasting for more than a year. A final fully adjusted model was used to identify main characteristics associated with chronic insomnia.
Results: A total of 308 (29.6%) had no insomnia complaint. Chronic insomnia was found in 31.3% (N=327) of the total sample. The remaining 407 individuals, who were excluded in the final model, had been classified in four different subgroups: those with symptoms occurring no more than once or twice a week (N=128), individuals who had frequent difficulty to initiate sleep or early-morning awakening as their predominant complaint and were thought to present a circadian rhythm disorder (N=58), individuals who had frequent symptoms for no more than a year (N=158) and those who had a chronic complaint absent in the last month (N=62). Mean duration of chronic insomnia was 12.2±10.4 years, varying from 1.7 to 62.0. Compared to good sleepers, chronic insomniacs had four times more chance to present psychiatric symptomatology (OR:4.3, 95%CI:2.3-8.1) and two times more chance to present hypertension (2.1, 1.3-3.6), renal problems (1.9, 1.1-3.3) and sleep latencies of more than 30 minutes (2.4, 1.3-4.7) or wake-after-sleep-onset greater than 60 minutes (2.4, 1.2-4.8) in the PSG.
Conclusion: The majority of insomnia complainers have a chronic condition of more than ten years in average, which is associated with severely impaired health and with objective sleep alterations.
Acknowledgements: This study was supported by AFIP, CNPQ, FAPESP (CEPID).

W-D-005 CLINICAL OUTCOMES OF GROUP COGNITIVE BEHAVIORAL THERAPY FOR INSOMNIA (CBT-I)

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Introduction and Objectives: Chronic insomnia is common in sleep clinic patients and it is associated with high degree of psychiatric and/or medical co-morbidities. Although CBT-I is considered one of the first line treatments, it is still not widely available. Group format can represent a cost-effective approach. We report clinical significance, patient satisfaction and most helpful components of a 7-session CBT-I delivered in group format.
Materials and Methods: 304 consecutive sleep clinic patients (55.8% female; age 41.8±13.3 years) received 8-weeks group CBT-I. Patients completed sleep log daily from baseline (BL; 1 week before Session 1) through the end of treatment (S7). Questionnaires were completed at S1 and at S7 (including treatment satisfaction questionnaire and most helpful elements).
Results: CBT-I resulted in significant improvement. Effect sizes (ES) were 0.52 (18min) for SLL, 0.60 (40min) for WASO, 0.68 (14%) for SE, 0.18 (16min) for TST, and 0.75 for Sleep Quality. ES for measures of mood ranged from 0.56 on POMS to 0.77 on BDI. All components of BAS significantly improved with ES ranging from 0.25 to 1.6. Based on Insomnia Severity Index, 75% of patients no longer had clinical insomnia. 85% of patients rated moderate or higher level of treatment satisfaction. The most helpful components were: learning about sleep and insomnia, maintaining the prescribed rise time, being able to trust my treatment provider, feeling that insomnia is being taken seriously.
Conclusion: Group format is an effective mechanism of treatment delivery, and produces clinically meaningful improvement with high patient satisfaction. Common therapeutic factors such as rapport with treatment provider and imparting hope were identified by patients as the most helpful components and highlight the importance that the therapeutic elements of CBT-I go beyond instructions to change patient's sleep behaviors and cognitions.

W-D-006 COGNITIVE MECHANISMS IN INSOMNIA: A COMPARISON OF COMORBID AND PRIMARY INSOMNIA

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Introduction and Objectives: Different cognitive mechanisms are hypothesized to play a critical role in maintaining insomnia. This study examined whether individuals with insomnia comorbid with a mood or anxiety disorder differed from individuals with primary insomnia on different measures of cognitive processes.
Materials and Methods: Participants were 205 adults (mean age = 50.2 years; 60% women) with an insomnia disorder, including 47 with a comorbid mood or anxiety disorder and 158 without comorbidity. They were enrolled in a CBT trial aimed at assessing mechanisms underlying therapeutic change. This study focused on baseline data and included the following measures: Anxiety and Preoccupation about Sleep Questionnaire (APSQ), Dysfunctional Beliefs and Attitudes about Sleep Scale (DBAS), Thought Control Questionnaire for Insomnia (TCQ-I), Sleep Associated Monitoring (SAMI), Sleep Behaviors Rating Scale (SBRS), and the Insomnia Severity Index (ISI).
Results: The two insomnia groups did not differ with respect to gender, age, insomnia duration, or sleep-incompatible behaviors. However, they differed on the ISI, with the comorbidity group showing higher insomnia severity (M= 19.5 vs. 17.2; $p < 0.001$). Significant group differences were also observed on the APSQ ($p < 0.001$), DBAS ($p < 0.001$), TCQI worry ($p < 0.001$) and cognitive distraction ($p=0.056$) subscales, and most of the SAMI subscales (all ps < 0.05), with higher scores in the comorbidity group, suggesting these patients were more preoccupied, engaged more often in worry and monitoring and had more sleep-related dysfunctional beliefs. All differences remained significant after controlling for insomnia severity. On the other hand, the SAMI calculation and TCQ-I suppression subscales were positively correlated with insomnia severity but not related to comorbidity.
Conclusion: These results suggest that the presence of a comorbid mood or anxiety disorder increases insomnia severity and support the hypothesis that some cognitive mechanisms may be shared across these disorders. These findings have implications for tailoring CBT interventions.
Acknowledgements: Research supported by a National Institutes of Health Research grant (MH079188).

W-D-007 CORRELATION AND CLUSTER ANALYSIS OF SLEEP QUESTIONNAIRES IN AN INSOMNIAC POPULATION

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Introduction and Objectives: This study reports data collected in a sleep medicine centre, as an individual counselling for insomniacs. The objective was to correlate scores obtained among different sleep questionnaires in order to explore different indices of validity. Furthermore, cluster analysis was used to identify sub-populations, including those who dropped out from Cognitive Behavioural Treatment (CBT).
Materials and Methods: Insomniacs were selected for CBT after an established medical diagnosis of primary insomnia. The following tests were administered to all 166 participants: Insomnia Severity Index - ISI, Pittsburgh Sleep Quality Index - PSQI, Dysfunctional Beliefs and Attitudes About Sleep - DBAS 16, and Glasgow Sleep Scale - GSS. Subjective Sleep Efficiency, obtained from PSQI, was collected. Correlation and cluster analysis were performed, together with Chi Square analysis of the adherence to treatment in the sub-population clusters.
Results: The correlation coefficients were significant between all instruments ($p=0.01$), with values from 0.24 to 0.66. Only Subjective Sleep Efficiency did not correlate with DBAS and GSS scores. Cluster analysis used 7 iterations; subjects were subdivided in two clusters which differed mainly with regard to the PSQI scores ($F = 85.655$, $p=0.000$), Subjective Sleep Efficiency ($F = 214.970$, $p=0.000$) and insomnia severity ($F = 19.904$, $p=0.000$). Scores from other questionnaires did not differentiate the two clusters. These clusters showed no significant differences in what concerns treatment adherence ($\chi^2(1) = 0.276$, $N = 103$, $p=0.379$).
Conclusion: Significant correlations among insomnia scales were obtained. Cluster analysis provided interesting results but it remains to be tested whether these clusters are associated with PSG values. With reference to

treatment adherence, there were no differences between the two clusters, which leads us to conclude that other variables such as age, gender, occupation and socio-economic status are important in that regard.

W-D-008 DYSFUNCTIONAL BELIEFS AND ATTITUDES ABOUT SLEEP BOTH PREDISPOSE AND MAINTAIN INSOMNIA DURING THE CANCER CARE TRAJECTORY

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Introduction and Objectives: Insomnia affects up to 60% of cancer patients. Dysfunctional beliefs and attitudes about sleep (DBAS) have been found to be associated with insomnia in the general population and in cancer patients. The goal of this study was to assess to what extent DBAS contribute in predisposing rather than perpetuating insomnia over time in cancer patients.
Materials and Methods: Patients scheduled to undergo surgery for cancer (N = 962) completed the Dysfunctional Beliefs and Attitudes about Sleep scale (DBAS-16) at baseline (T1) and the Insomnia Interview Schedule (IIS) at T1 and 2, 6, 10, 14 and 18 months later. At T1, participants were categorized in one of these three groups based on the IIS: good sleepers, insomnia symptoms or insomnia syndrome.
Results: Chi-square analyses showed that, in good sleepers, a higher DBAS scores at T1 were significantly associated with an increased incidence of insomnia throughout the cancer care trajectory, $\chi^2(2) = 8.33$, p=0.02. In participants with insomnia symptoms at T1, greater baseline DBAS scores were significantly associated with a higher persistence of insomnia between two time assessments throughout the 18-month follow-up, $\chi^2(2) = 8.93$, p=0.01. Conversely, lower baseline DBAS scores were significantly associated with higher remission rates, $\chi^2(2) = 5.91$, p=0.05. Finally, in participants who had an insomnia syndrome at T1, greater DBAS scores were significantly associated with greater insomnia maintenance between two time assessments throughout the cancer care trajectory, $\chi^2(2) = 6.68$, p=0.04.
Conclusion: DBAS appear to be involved both in the development and maintenance of insomnia in the context of cancer, while lower levels of DBAS appear to facilitate insomnia remission. These results highlight the relevance of integrating cognitive therapy in the treatment of insomnia.
Acknowledgements: This study is supported by a training award and a grant from the Canadian Institutes of Health Research.

W-D-009 EFFECT OF CLONAZEPAM ON EXECUTIVE FUNCTION IN INSOMNIA PATIENTS

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Introduction and Objectives: Executive functions (EF) are cognitive processes that allow one to transform thinkings and feelings into actions; and they are mainly related to success in task solving. Executive attention, inhibition, working memory, planning, mental flexibility and self monitoring are the most studied EF. Sleep is essential for central nervous system and an optimal well being during awake; therefore insomnia and its treatment with clonazepam has been related to cognition and psychomotor impairment.
Materials and Methods: The aim was to compare EF between 30 healthy controls, 30 Inadequate Sleep Hygiene patients (ISHp) and 30 Clonazepam Dependent Insomnia patients CDIp (subjects for each group, paired by age, escolarity and body mass index). Respectively, spatial Incompatibility paradigm, stop/signal task, n-back paradigm and London Tower test were used to evaluate executive attention, inhibition, working memory and planning. Also, switch task paradigm was used to evaluate thinking flexibility and mistakes in self monitoring.
Results: We found that both insomnia groups showed significantly worse performance in working memory, thinking flexibility, and mistakes in self monitoring. Also, ISHp had a significant decrease in inhibition. CDIp showed a significant deficiency in planning and executive attention.
Conclusion: Our results suggest that despite the etiology, insomnia patients shared common deficiencies in EF such as deficiencies in working memory or thinking flexibility; but ISHp had specific deficiencies in inhibition that could be provoked by central nervous system hyperarousal that has been related to impulsivity. CDIp showed specific deficiencies on executive attention and planning that could be caused by amnesia and sedation related to clonazepam.
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W-D-010 EMPIRICAL VALIDATION OF THE INSOMNIA SEVERITY INDEX IN PRIMARY CARE SETTINGS: PRELIMINARY RESULTS

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Introduction and Objectives: Although insomnia is a prevalent complaint that has important consequences on health and quality of life, it is still undiagnosed and untreated in primary care settings. Brief, valid and reliable instruments are needed to facilitate the screening of insomnia in general practices. This study examined the psychometric indices of the Insomnia Severity Index (ISI) to identify individuals suffering of insomnia in a primary care setting.
Materials and Methods: A heterogeneous sample of 301 patients was recruited in six general practice clinics of Quebec and completed the ISI. Of those 301 participants, 42 also participated to a clinical interview administered by phone, which included the Insomnia Diagnostic Interview (IDI), generally used for the diagnosis of insomnia. Comparisons were made between ISI total score and the diagnosis derived from the IDI. Receiver operator characteristic (ROC) analyses were used to determine the optimal cut-off score that correctly identifies individuals with insomnia.
Results: Of the 42 participants, 31% received a diagnosis of insomnia. The results suggested that a cut-off score of 14 provided the best balance between sensibility (84.6%) and specificity (82.8%). The rate of correctly classified participants was 83.3%.
Conclusion: These preliminary results suggest that the ISI could be an interesting screening instrument with patients consulting in primary care settings. Further research is necessary to continue the validation of the ISI in this context. A further step would be to promote the utilization of the ISI among primary care clinicians.

W-D-011 EVALUATION OF THE EFFECTIVENESS OF MINDFULNESS BASED COGNITIVE THERAPY TO TREAT INSOMNIA

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Introduction and Objectives: Psychophysiological insomnia is characterized by sleep difficulties and/or hypervigilance at bedtime. These mental and physiological conditions may lead to sleep deprivation, quite independently from pathologies like anxiety or depression. Although cognitive behavioral therapy has been shown effective in the treatment of psychophysiological insomnia, some individuals do not respond to this type of treatment. It therefore seems important to explore new types of intervention that could augment the effectiveness of current accepted treatment. Mindfulness approaches that encourage acceptance of the condition without judgment are increasingly mentioned as being effective in treating diverse physical and psychological health issues, by reducing stress associated with those conditions (Hofmann, Sawyer, Witt, & Oh, 2010). It is therefore suggested that mindfulness based cognitive therapy (MBCT; Segal, Williams, & Teasdale, 2002) could help diminish insomnia by focusing on certain cognitive factors related to insomnia.
Materials and Methods: A pre-experimental, pre-test protocol with a post-test and three month follow-up was used to measure the effect of a group mindfulness based cognitive therapy intervention of eight sessions on 12 participants (all female) with a mean age of 54. Self-monitoring, self-report questionnaires, and objectives sleep measures were used.
Results: The intervention had a positive effect on subjective evaluation participants made of their sleep and identified gains were maintained after three months. Also, two factors related to the maintenance of insomnia: dysfunctional beliefs and attitudes about sleep and mental control strategies evolved favourably during treatment and observed improvements were still present at follow-up. However, the intervention had no effect on objective measures of sleep.
Conclusion: The results of this study suggest that mindfulness based cog-

nitive therapy constitutes an interesting approach for the treatment of insomnia, because it decreases the impact of cognitive factors that tend to maintain this condition.

W-D-012 IS INSOMNIA ASSOCIATED WITH THE OCCURRENCE OF INFECTIONS IN CANCER PATIENTS? RESULTS FROM A LONGITUDINAL STUDY

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Introduction and Objectives: The psychoneuroimmunological model proposes that psychological factors, such as stress and depression, can have an impact on health through immune downregulation. Sleep impairments have also been found to be related to a greater vulnerability to developing respiratory infections, but this question has yet to be investigated in cancer patients, in whom insomnia is a significant problem, affecting up to 60% of them. The aim of this study was to evaluate the role of insomnia in predicting the occurrence of infection episodes and symptoms in cancer patients throughout their treatment trajectory.
Materials and Methods: Patients scheduled to undergo surgery for cancer (N = 962) completed a structured interview to assess symptoms of infectious illness as well as the Insomnia Interview Schedule at three time points: at baseline (T1), as well as 2 (T2) and 6 (T3) months later. At each time point, patients were categorized into the following three groups: insomnia syndrome, insomnia symptoms, good sleepers.
Results: Mixed-model analyses revealed a significant between-groups difference on the occurrence of infection episodes, $F(2,1578) = 3.43$, $p=0.03$, and symptoms, $F(2,1578) = 3.23$, $p=0.04$, at T3, but not at T1 and T2. Specifically, the presence of an insomnia syndrome was associated with a significantly greater number of infection episodes and symptoms in patients, as compared to the other two groups.
Conclusion: These findings suggest that there is a relationship between the presence of an insomnia syndrome and the risk of infections in cancer patients, but only during cancer treatments. Although more research is needed on this issue, it would appear that insomnia potentiates the risk of developing infections during cancer treatments.
Acknowledgements: This study was supported by a training award held by both the first and the second authors from the PORT program and by a grant held by the fourth author from the Canadian Institutes of Health Research (MOP – 69073).

W-D-013 LONGITUDINAL ASSOCIATIONS BETWEEN CORTISOL LEVELS AND INSOMNIA IN PATIENTS TREATED FOR PROSTATE CANCER

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Introduction and Objectives: In the general population, studies have found a relationship between insomnia and hyperactivity of the hypothalamo-pituitary-adrenocortical (HPA) system, but it is not clear whether hypercortisolemia is a risk factor or a consequence of insomnia. As part of a larger longitudinal study, this investigation aimed to assess whether increased cortisol levels are a better predictor of insomnia at a subsequent time point than the reverse path (insomnia predicting higher cortisol) in patients with prostate cancer.
Materials and Methods: Sixty men scheduled to receive radiation therapy for prostate cancer, with or without androgen deprivation therapy (ADT), were assessed prior to receiving any treatment (baseline) and at seven additional times over a period of 16 months (1, 2, 4, 6, 8, 12, and 16 months) using the Insomnia Severity Index and plasma levels of cortisol. Data were analyzed using mixed modeling regressions controlling for temporal dependency and treatments received (with vs. without ADT).
Results: Greater insomnia symptoms at one time point were significantly predicted (beta=0.94) by insomnia symptoms, $t(308)=46.91$, $p<0.001$, and cortisol levels (beta=0.07), $t(308)=3.36$, $p=0.001$, at the previous assessment. Conversely, higher cortisol levels at one assessment were significantly predicted by cortisol levels at the previous time point (beta = 0.25), $t(293)=4.79$, $p=0.001$, marginally predicted by insomnia symptoms assessed at the same time (beta=0.11), $t(293)=1.90$, $p=0.06$, but not significantly predicted by insomnia symptoms at the preceding time point, $t(293)=0.38$, $p=0.70$.
Conclusion: Longitudinally, cortisol levels better predicted insomnia severity than insomnia severity predicted cortisol levels in patients treated for prostate cancer. Although replication of these findings is warranted, it would appear that interventions aiming at reducing the stress levels which are associated with HPA hyperactivity could contribute to preventing the development of insomnia in prostate cancer patients.
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W-D-014 MEMORY COMPLAINTS AND OBJECTIVE PERFORMANCE DEFICITS IN INDIVIDUALS WITH INSOMNIA

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Introduction and Objectives: While a significant proportion of individuals with insomnia report memory problems, studies examining the relationship between these complaints and objective memory performance are scarce. The aim of this study was to examine differences in objective memory performance in individuals with insomnia with or without memory complaints.
Materials and Methods: Participants were 25 adults (mean age = 44.4; 56.0% women) with primary insomnia who completed a battery of questionnaires and neuropsychological tests including the Multifactorial Memory Questionnaire (MMQ) and the California Verbal Learning Test – II (CVLT-II). The MMQ includes 3 scales assessing 1) contentment with memory, 2) subjective memory ability, and 3) use of memory strategies. Using the median score of the whole sample for each MMQ subscale as a cut-off score, participants were classified as being either satisfied ($x>44$; n=13) or dissatisfied (n=12) with their memory, having good ($x>53$; n=13) or poor (n=12) memory ability, and using ($x>30$; n=12) or not using (n=13) memory strategies. T-tests were computed to compare individuals with and without each type of memory complaint on CVLT-II scores normalized for age, gender and education.
Results: Participants reporting poor memory ability performed significantly ($p<0.05$) worse than those reporting good memory ability on measures of delayed recall, long-delay retention and recognition. Participants reporting the use of more memory strategies performed significantly better on long-delay retention than those reporting fewer strategies. There was no significant difference between individuals who were satisfied and those who were dissatisfied with their memory.
Conclusion: Distinct types of memory complaints were differentially associated with objective memory performance in individuals with insomnia. Complaints pertaining to memory ability were associated with lower performance in measures assessing the long-term storage process of newly learned verbal information, whereas self-reported use of memory strategies appeared related to improved performance on these measures.
Acknowledgements: Supported by the Canadian Institutes of Health Research

W-D-015 NOCTURNAL INSOMNIA SYMPTOMS AND DAYTIME FUNCTIONING IMPAIRMENTS

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Introduction and Objectives: The relationship between nocturnal insomnia symptoms and reported daytime consequences remains poorly understood. This study examined whether the type and severity of diurnal symptoms varied according to the type of nocturnal insomnia complaint.
Materials and Methods: Participants were 514 adults (mean age = 46.9; 70% women) selected from a larger population-based sample taking part in a longitudinal study of insomnia. Responses to the Insomnia Severity Index (ISI) and Pittsburgh Sleep Quality Index (PSQI) were used to classify participants into one of five groups based on the nature of insomnia symptoms: (1) difficulty initiating sleep (early; N=75), (2) difficulty maintaining sleep (middle; N=55), (3) early morning awakenings (late; N=75), (4) mixed (N=206), or (5) non-restorative sleep (NRS; N=103). Participants completed measures of daytime fatigue and sleepiness, depression and anxiety symptoms, and quality-of-life. Group differences were tested using ANOVAS with multiple range tests for post-hoc comparisons.
Results: Individuals with middle and late insomnias did not differ significantly from each other on any of the daytime indicators. Few significant

differences were observed between the NRS, mixed, and early insomnia subgroups, but these subgroups were generally more impaired during the day than individuals with middle or late insomnia. For example, they reported being more fatigued than the middle and late subgroups and reported more anxiety and depression symptoms than the middle subgroup. In general, individuals with NRS reported poorer quality of life (e.g., energy and mental health subscales) than other subgroups, which did not differ from each other. No group difference was observed with respect to sleepiness.
Conclusion: These findings indicate that the nature and severity of daytime impairments vary as a function of insomnia symptoms, with NRS and mixed insomnia complaints being associated with more severe impairments. Future research should examine whether treating different nocturnal symptoms produce different outcomes on daytime symptoms.
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W-D-016 PATIENTS' ATTRIBUTIONS ABOUT THE CAUSES OF INSOMNIA

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Introduction and Objectives: This study investigated the possibility that the 'folk theories' or attributions a patient holds about their disorder may impact their treatment preference. This is important because treatment preference may influence engagement and compliance with treatment which, in turn, will impact outcome. Insomnia is the focus as it is prevalent and associated with significant impairment of quality of life. Moreover, there are various treatment options.
Materials and Methods: Participants were 69 patients with chronic insomnia. They completed the 'Causal Attributions of My Insomnia Questionnaire' (CAM-I), a questionnaire evaluating potential causal explanations/attributions about insomnia on Likert-type scales (1 = very likely; 7 = very unlikely). Several other assessment instruments were administered as part of a larger treatment study (e.g., Duke Interview for Sleep Disorders, SCID-I).
Results: Of 12 factors rated, emotions and thinking patterns were most commonly endorsed as 'contributing to insomnia' (60% and 58% of patients, respectively, endorsed these factors as 'very likely'). Patients were reasonably confident that targeting these factors in treatment would alleviate their insomnia (emotions M = 5.96; SD = 1.38; thinking patterns M = 6.00; SD = 1.25). Percentage of patients who rated that a psychological treatment could help varied from 30% for genetic factors to 59% for emotions. Patients who rated that a biological treatment could help varied from 19% for environmental factors to 40% for biochemical factors. Those who endorsed thinking patterns ($t=6.57$, $p<0.001$), environment ($t=4.50$, $p<0.001$), scheduling ($t=4.29$, $p<0.001$) and emotions ($t=5.76$, $p<0.001$) as likely contributors were more confident that a psychological than biological treatment would help. Surprisingly, no contributing factor assessed (hormones, arousal, genetics) were endorsed as more likely to be alleviated by a biological treatment.
Conclusion: Patient's attributions influenced treatment choice. Patients were more confident in psychological treatments over biological treatments.
Acknowledgements: 5R01MH079188-02.

W-D-017 PHARMACOKINETIC PROFILE OF A MODIFIED RELEASE FORMULATION OF ZALEPLON (SKP-1041) 10.0 MG, 15.0 MG, AND 20.0 MG IN ADULTS WITH PRIMARY SLEEP MAINTENANCE INSOMNIA

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Introduction and Objectives: A novel formulation of zaleplon (SKP-1041) that releases active drug via proprietary Geoclock® technology has a pharmacokinetic profile consistent with drug release during the middle hours of the night. The present study evaluated the pharmacokinetics of a single dose of SKP-1041 10.0, 15.0, and 20.0 (2x10.0) mg in adults with insomnia characterized by middle-of-the-night awakenings.
Materials and Methods: This was a phase II, multicenter, randomized, double-blind, double-dummy, placebo-controlled study. For pharmacokinetic testing, patients received a single dose of SKP-1041 10.0, 15.0, or 20.0 (2x10.0) mg at bedtime; to maintain the double-blind, patients who received the 10.0- or 15.0-mg dose also received a placebo capsule. Blood was drawn for determination of plasma zaleplon concentrations predose and hourly to 10 hours postdose. Pharmacokinetic parameters were determined by standard non-compartmental methods. Statistical analyses were done using SAS General Linear Models.
Results: Pharmacokinetics were evaluated for 45 patients (15 males, 30 females; age 24 – 64 years). Dose distribution was 10.0 mg, n=17; 15.0 mg, n=13; 20.0 mg, n=15. Median time to maximum zaleplon plasma concentration (Tmax) was 4 hours postdose and was not different among doses. Mean elimination half-life of zaleplon was 1.52, 1.65, and 1.47 hours for the 10.0, 15.0, and 20.0 mg doses, respectively. Maximum plasma concentration (Cmax) was dose-proportional: 17.9, 25.3, and 34.4 ng/mL for the 10.0, 15.0, and 20.0 mg doses, respectively. Total area under the plasma concentration curve (AUC) was also dose-proportional (56.5, 77.4, and 135.3 ng/mL x hr). Normalization of Cmax and AUC for dosage eliminated these differences.
Conclusion: All three doses of SKP-1041 produced essentially identical delayed release of zaleplon, with median Tmax at 4 hours postdose. Cmax and AUC were dose proportional, indicating linear pharmacokinetics of zaleplon from SKP-1041 in this dose range.

W-D-018 POLYSOMNOGRAGHY IN CHRONIC INSOMNIA: SHOULD IT BE ROUTINELY PERFORMED?

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Introduction and Objectives: The diagnosis of insomnia is mainly clinical and therefore PSG is not considered in the routine evaluation of chronic insomnia (Littner et al 2003; Kushida et al 2005). Furthermore, PSG recording in insomnia faces two important limitations: 1) the requirement for one habituation night with the consequent increase in costs and waiting lists; 2) the interference of medication upon sleep macro and microstructure and the possibility of rebound insomnia. The objectives of this study were: 1)to perform a single night PSG without medication modification; 2) to evaluate sleep perception and apply general and specific sleep questionnaires; and 3) to evaluate the benefits of PSG in chronic insomnia in terms of diagnostic improvement and treatment recommendation.
Materials and Methods: 250 patients (70% females) presenting to the SMC with chronic insomnia complaints were recorded at the sleep lab with type I PSG; medication, whenever present, was not discontinued. Patients completed standard sleep and insomnia questionnaires. PSG recordings evaluation included macro and microstructure analyses, conventional cardio-respiratory-EMG, and temporal evolution, sleep cycle duration, patterns of PSG abnormality. The benefits obtained by PSG were categorized in perception evaluation, diagnostic change/improvement, and treatment impact. Descriptive statistics and cluster analysis were used.
Results: PSG was normal in 0.5% of the patients; increased fast activity and sleep stages abnormalities occurred in 20% of the cases and temporal profiles were abnormal in 30%. The occurrence of other sleep disorders was frequent: Periodic limb movements: 36%; parasomnias: 15% and apneas: 12%; other disorders were also detected: cardiac (7%). PSGs could be mainly differentiated by severity; however, six subtypes of PSG abnormalities were detected. The impact of PSG upon treatment occurred in 70% of the patients.
Conclusion: The benefits obtained with PSG in chronic insomnia are high and clinically relevant, even when a single night recording is performed, and should be considered as routine test.

W-D-019 POTENTIAL PROTECTIVE FACTORS IN INDIVIDUALS VULNERABLE TO STRESS-RELATED INSOMNIA

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Introduction and Objectives: Previous studies have suggested individual differences in vulnerability to experience insomnia under stressful conditions. This vulnerability has been associated with maladaptive stress coping strategies and hyperarousal among good sleepers but not necessarily among individuals with insomnia. The present study examined potential factors

that might differentiate individuals with and without insomnia among those with a high vulnerability to stress-related insomnia.
Materials and Methods: Participants were 847 adults (mean age = 47.3 years; 73.3% women) selected from a larger population-based sample enrolled in a longitudinal study of insomnia. They were selected for the present analysis on the basis of their high vulnerability to stress-related insomnia as assessed with the Ford Insomnia Response to Stress Test (score higher than 21). Among those, two groups were formed based on their sleep status: Good Sleepers (n = 509) and Insomnia Syndrome (n = 338). Dependent variables were trait anxiety, arousal predisposition, stress perception and coping strategies, and beliefs and attitudes about sleep.
Results: A MANCOVA controlling for age and a past episode of insomnia revealed that Good Sleepers with high vulnerability to stress-related insomnia were significantly less anxious (eta2 = 0.22), less predisposed to activation (eta2 = 0.07), appraised life's events as less stressful (eta2 = 0.18), and endorsed fewer dysfunctional beliefs about sleep (eta2 = 0.15) compared to individuals with an Insomnia Syndrome and a high vulnerability to stress-related insomnia. The Good Sleepers group also relied less on emotion-focused strategies (eta2 = 0.06), but more on task- (eta2 = 0.04) and avoidance-oriented strategies (eta2 = 0.02).
Conclusion: Lower levels of anxiety, perception of stress, and arousal predisposition, and less dysfunctional beliefs about sleep might be protective against chronic insomnia among individuals otherwise vulnerable to stress-related insomnia. A longitudinal design is needed to test more rigorously this hypothesis.
Acknowledgements: This research was supported by the Canadian Health Research Institutes (#42504).

W-D-020 PREDICTORS OF CHRONIC USE OF HYPNOTICS AMONG CANCER PATIENTS

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Introduction and Objectives: Hypnotic are by far the most commonly used treatment for insomnia. A Canadian study showed that the use of hypnotic and tranquillizers was approximately three times higher among cancer patients than in the general population. However, little is known about chronic use of hypnotics in the cancer population and factors that are associated with it. The aim of this study was to identify predictors of chronic use of hypnotic among cancer patients.
Materials and Methods: In the context of a larger epidemiological research, 962 cancer patients scheduled to undergo surgery were recruited and 921 completed all relevant information for this study. During the peri-operative period (T1), the patients completed a demographic and medical questionnaire, the Insomnia Interview Schedule, the Insomnia Severity Index, the Physical Symptoms Questionnaire, the Hospital Anxiety and Depression Scale, the List of Life Events, and the EORTC Quality of Life Questionnaire-C30. Also, the patients gave information about their hypnotic consumption on 6 occasions: at T1, as well as 2, 6, 10, 14, and 18 months later. The patients were categorized into the following four groups: no hypnotic use during the course of the study, hypnotic users at 1 to 2 time points, hypnotic users at 3 to 5 time points, and hypnotic users at all time points. The patients who used a hypnotic at 3 time points or more were considered chronic users.
Results: Multiple regressions identified the following predictors: older age (p=0.0002), prostate cancer (p=0.01), difficulties falling asleep (p=0.002), early awakenings (p=0.02), anxiety (p=0.02), and past psychological difficulties (p=0.003).
Conclusion: Patients who are older, who have difficulties falling asleep or waking up too early, who are more anxious, and who had psychological difficulties have a higher risk to use hypnotic on a chronic basis, while prostate cancer patients have a lower risk than other cancer patients.
Acknowledgements: This study was supported by training awards held by the first author from the Canadian Institutes of Health Research (CIHR) and the Psychosocial Oncology Research Training and by a research grant held by the second author from the CIHR (MOP-69073).

W-D-021 PROFILING THE SIDE-EFFECTS OF SLEEP RESTRICTION THERAPY FOR INSOMNIA

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Introduction and Objectives: Sleep Restriction Therapy (SRT) is one of the most effective components of cognitive behavioural therapy for insomnia. It is also one of the most challenging; previous work from our group revealed the presence of potent side-effects and implementation difficulties during week one of treatment. Here, we report the number and nature of side-effects experienced by patients on a weekly basis over the course of a 4-week SRT intervention.
Materials and Methods: Seventeen patients (12 female; Mean age=44.2) meeting criteria for primary insomnia have completed the SRT protocol. The intervention involves one main session to deliver rationale/SRT instructions, and four subsequent brief interactions to review sleep efficiency. Patients completed the Epworth Sleepiness Scale (ESS) at baseline, weeks 1, 2, 3, and 4, and a side-effects inventory at the end of weeks 1, 2, 3 and 4, asking them to check whether they had experienced 14 specified symptoms as a consequence of SRT.
Results: Insomnia severity, measured with the ISI, significantly decreased from baseline to post-treatment [Medians=19 v. 8, $p<0.01$]. ESS scores demonstrated a main effect of time ($p<0.05$), significantly increasing from baseline (Median=4) during weeks 1 (Median=6, $p<0.05$) & 2 (Median=7, $p<0.05$), while showing a non-significant decrease at weeks 3 (Median=6) & 4 (Median=5). For number of side-effects, there was a trend towards an effect of time (p=0.066). Side-effects were common during weeks 1 (Median=7) & 2 (Median=8), tending to dissipate during weeks 3 (Median=6) & 4 (Median=5, $p<0.05$). The five most commonly reported side-effects (week 1) were fatigue/exhaustion (91%), extreme sleepiness (89%), impaired memory (73%), reduced energy/motivation (73%) and difficulty concentrating (73%).
Conclusion: This preliminary work tentatively indicates that SRT is associated with negative side-effects and increased sleepiness, both of which appear maximal within the first two weeks. It is also clear that side-effects, while reduced in number, are still present four weeks into treatment.
Acknowledgements: This work is supported in part by the Chief Scientist Office, Scottish Government.

W-D-022 SLEEP PERCEPTION INDEX IN INSOMNIA COMPLAINT ASSOCIATED TO DEPRESSION SYMPTOM IN A POPULATION-BASED SAMPLE

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Introduction and Objectives: The mechanism involved in sleep perception is not widely known, especially regarding the participation of depression. In this study we evaluated the perception of sleep in patients with and without the complaint of insomnia, presenting or not with symptoms of depression, in a population-based sample from Sao Paulo, Brazil.
Materials and Methods: We studied 1042 volunteers aged 42±14ys (55% women) who participated in a survey on sleep habits, complaints and disorders. Questionnaires were conducted face-to-face and a polysomnography (PSG) was performed in the laboratory. The sleep perception index was defined by the subjective sleep perception in the morning after PSG divided by the total sleep time obtained in the exam. Insomnia diagnosis was defined by an algorithm based on the DSM-IV, and including items from three questionnaires: The Pittsburgh Sleep Quality Index, the Insomnia Severity Index and the UNIFESP Sleep Questionnaire. Depression was determined by a cut-off of twenty in the Beck Depression Inventory (BDI).
Results: We found a modest but significant negative correlation between the sleep perception index and the BDI (r= -0.08; p=0.021). A total of 126 individuals classified with insomnia adequately fulfilled the BDI and 25% of them were categorized with depression. Insomniacs independent of being depressed presented the same sleep perception on average (0.94; p=0.89). We did observe, however, that the perception of sleep in non-insomniacs was lower among depressed individuals than in non-depressed (0.93 versus 1.05; p=0.07).
Conclusion: Depression is a factor that by itself may interfere with sleep perception. Since insomniacs presented with lower sleep perception, depression was not important to worsen perception in these individuals.
Acknowledgements: AFIP, CNPQ, FAPESP (CEPID).

W-D-023 THE CLINICAL RELEVANCE OF REDUCING NIGHT-TO-NIGHT SLEEP VARIABILITY IN PRIMARY AND COMORBID INSOMNIA

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Introduction and Objectives: Sleep variability across nights presumably causes frustration and distress among insomnia sufferers. However, there are few studies quantifying this construct and investigating its clinical relevance. Herein we developed an index of night-to-night sleep variability using sleep diary (SD) and actigraphy (ACT) outcomes and examined its relationship to perceived sleep quality.
Materials and Methods: Participants were 40 primary (PI) and 41 comorbid (CMI) insomnia sufferers (11 women, Mage = 54.2 years) enrolled in a treatment study. SD and ACT measures of onset latency, wake after sleep onset, total sleep time and sleep efficiency were computed daily for 2-weeks at baseline, post-treatment and 6-month follow-up. For each measure, an acute change was defined as a decrease or increase in successive observations that equalled or exceeded the value for the 90th percentile of the distribution of the night-to-night changes for all participants. Within the individual, the number of acute changes per assessment period was divided by the total number of observations, so that a probability of acute change (PAC) was derived for each individual at baseline, post-treatment and follow-up. Participants also completed the Pittsburgh Sleep Quality Index (PSQI) at each time period. Correlations between changes in PAC and PSQI scores were then examined within each diagnostic group.
Results: Among PI sufferers, only changes in SD-derived sleep onset latency variability were associated with changes in PSQI scores across assessment periods, r=0.41, Ps<0.01. Within the CMI group, all SD-derived sleep variability measures were associated with PSQI scores (all rs>0.33, Ps<0.01). None of the ACT-derived variability indexes was associated with the PSQI scores.
Conclusion: Reductions in subjective sleep variability across time are associated with improvements in perceived sleep quality, and these associations seem stronger within the CMI group. Reducing night-to-night sleep variability may itself be seen as an improvement by individuals suffering from insomnia, especially for patients with comorbid mental disorders.

W-D-024 THE SLEEP PERCEPTION INDEX IN INSOMNIA COMPLAINT ASSOCIATED WITH ANXIETY: A POPULATION-BASED STUDY

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Introduction and Objectives: The perception of sleep is an important biologic parameter especially in insomnia. The participation of anxiety in sleep perception is not known. The objective of our study was to evaluate the perception of sleep in patients with and without the complaint of insomnia, presenting or not with symptoms of anxiety, in a population-based sample from Sao Paulo, Brazil.
Materials and Methods: We studied 1042 volunteers aged 42±14ys (55% women) who participated in a survey on sleep habits, complaints and disorders. Questionnaires were conducted face-to-face and a full-night polysomnography (PSG) was performed in the laboratory. The sleep perception index was defined by the ratio between the total sleep time perceived by the patient and the total sleep time obtained by PSG. Insomnia diagnosis was defined by an algorithm based on the DSM-IV and including items from three questionnaires: The Pittsburgh Sleep Quality Index, the Insomnia Severity Index and the Sao Paulo Federal University Sleep Questionnaire. Anxiety was determined by a cut-off of twenty in the Beck Anxiety Inventory (BAI).
Results: A total of 132 individuals classified with insomnia adequately fulfilled the BAI and 29% of them were categorized with anxiety. Anxious insomniacs tended to present worse sleep perception than insomniacs without anxiety (0.84 versus 0.97; p=0.035). On the other hand, in individuals without insomnia, we found no significant difference between those with and without anxiety (1.01 versus 1.06; p=0.66).
Conclusion: Even though individuals with insomnia and with increased anxiety symptomatology seem to frequently underestimate the amount they sleep, our study shows that anxiety symptomatology by itself it is not determinant of sleep perception.
Acknowledgements: AFIP, CNPQ, FAPESP (CEPID).

W-D-025 THE SLEEP-IMPROVING EFFICACY OF MIND-TRANQUILIZATION CARING EXERCISE ON FEMALE PATIENTS WITH INSOMNIA

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Introduction and Objectives: Based on the health preserving role of meridian, we explore the sleep-helping massage called mind-tranquilization caring exercise. In order to make clear whether the efficacy of the exercise is confirmed. We designed a cross-over study described below.
Materials and Methods: The study was conducted at the sleep medicine center of Guang'anmen Hospital, CACMS. 20 female patients who are diagnosed as primary insomnia according to ICSD (2005) are included into our study. They are divided randomly into 2 groups. The first group did exercise for the first week and then only listened to soft music for the second week. The other group listened to the music only for the first week and then did the exercise for the second week. The cross-over time point is after the first week. Sleep condition are evaluated with PSQI and SPIEGEL sleep questionnaire at the beginning, after 1 week and after 2 weeks. Then data were analyzed with SPSS 13.0.
Results: Statistics demonstrated that mind-tranquilization caring exercise has a definite improving effect on insomnia: after 1 week, compared to only music group, the sleep quality improves significantly (P<0.05), PSQI score of exercise group (Mean 10.4; SD 1.65), only music group (Mean 13.5, SD 2.3); SPIEGEL score of exercise group (Mean 11.2; SD 1.3); Only music group (Mean 14.5, SD 2.7). After 2 weeks, there is no significant difference between two groups.
Conclusion: From the statistics of the first week, we can find that compared to music only group, the efficacy of mind-tranquilization caring exercise is clear. However, after 2 weeks, there is no significant difference between two groups. We suppose that lack of the wash-out before measure exchange may be influencing the result. On the other hand, to draw further conclusions, the enlargement of the sample size is required.
Acknowledgements: Thanks to the 20 participants who help us accomplish the study.

W-D-026 THE TIMING OF SLEEP DISTURBANCES RELATIVE TO HOT FLASHES IN BREAST CANCER PATIENTS: WHAT PRECEDES WHAT?

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Introduction and Objectives: Hot flashes (HFs) and insomnia are common among breast cancer patients. Although a number of women complain of being awakened by HFs, available studies conducted among healthy women show that awakenings tend to preceed HFs rather than follow them, thus questioning the role of HFs as a trigger for sleep disturbances among breast cancer patients. This study aimed to explore the most typical timing of sleep disturbances relative to HFs in women who had completed their primary treatments for a first diagnosis of breast cancer within the previous three months.
Materials and Methods: Fifty-six participants wore an ambulatory measure of sternal skin conductance and polysomnography for a home-based nighttime recording of HFs and sleep. Sleep indices collected in the 5-minute period before HFs (baseline), as well as during (HF onset) and after (HF plateau) the increase in sternal skin conductance were compared using linear mixed models.
Results: The probability that an awakening or a stage change to a lighter sleep occurred was significantly greater during the HF onset (11%) as compared to the HF plateau (6%), t(343) = 2.78, p=0.02, while differences with the baseline period (9%) were non-significant. There were significantly greater sleep disturbances during the HF onset or plateau as compared to the baseline: greater percentage of wake time, F(2,351) = 114, p=0.000, lower percentage of stage 2, F(2,351) = 75, p=0.000, and lower percentage of REM sleep, F(2,351) = 4.3, p=0.01.
Conclusion: Sleep disturbances tend to occur concurrently with the HF onset among breast cancer patients. These findings are consistent with

the hypothesis that these two nocturnal symptoms are manifestations of a higher-order mechanism involving the central nervous system.
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W-D-027 THE UNDERLYING MECHANISMS OF COGNITIVE BEHAVIOURAL THERAPY FOR INSOMNIA: SLEEP RESTRICTION AS AN IN VIVO EXPOSURE PROCEDURE

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Introduction and Objectives: Cognitive behavioural interventions are considered the primary treatment of choice in chronic insomnia. Studying the underlying working mechanisms will be helpful in further optimizing the effectiveness of the treatment. Here, we investigate whether the positive effect of sleep restriction, as part of the program, is in essence the result of exposure to the situation patients fear the most: not being able to sleep as much as they consider sufficient.
Materials and Methods: 11 people with insomnia (IN, mean age = 48y) and 8 good sleepers (GS, mean age = 25y) participated. All joined an educational session and a session in which they were instructed sleep restriction (SR), based on their personal average total sleep time the week before (IN group) or on the average total sleep time in the insomnia group (GS group). Anxiety and mood scales and sleep diaries were used.
Results: The educational session resulted in a decrease in anxiety in the IN group ($p<0.05$), not in the GS group. The SR session, was followed by a significantly higher level of anxiety ($p<0.05$) and somatic arousal ($p<0.01$) in the IN as compared to the GS group. One week later, no significant difference in mood and anxiety between the two groups was present anymore. There was no significant correlation between the reduction in anxiety and the final treatment effect.
Conclusion: The hypothesis that sleep restriction acts as a form of exposure in vivo to the anxiety of not getting sufficient sleep, seemed to be confirmed. Indeed, the initially higher levels of anxiety following sleep restriction in the insomnia as opposed to the control group, normalised one week later. However, the reduction in anxiety after one week of sleep restriction, a reflection of desensitisation after exposure, was not significantly related to the therapeutic effect on sleep.

W-D-028 TYPES OF INSOMNIA AND COGNITIVE EVENT-RELATED POTENTIALS (ERPS): ACTIVATION AND INHIBITION PROCESSES AT NIGHT

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Introduction and Objectives: Chronic insomnia has been hypothesized to result from conditioned arousal or the inability to initiate normal sleep processes. ERPs N1 and P2, reflecting respectively attention and inhibition, are useful index of arousal levels. The objective of this study is to compare N1 and P2 behaviours in two types of insomnia individuals (psychophysiological 'Psy-I'; paradoxical 'Para-I') and in good sleepers (GS) during the night.
Materials and Methods: Participants were 30 Psy-I, (mean age=40.9 y), 28 Para-I (mean age=39.7 y) and 30 GS (mean age = 35.8 y). Following a multi-step clinical evaluation, participants underwent four consecutive nights of PSG recordings (N1 to N4). ERPs were recorded all night on N4. Auditory stimuli consisted of 'standard' (70 dB, 2000 Hz, 0.85 probability) and 'deviant' auditory tones (90 dB, 1500 Hz, 0.15 probability). The ISI was 2 s. Stage 2 was subdivided in early (2E) and late (2L) portions of the night.
Results: One tailed T-tests were used to test dependent variables (amplitudes and latencies) in each stage of sleep. Significance levels were set at 0.05. N1 amplitude differed significantly between Psy-I and Para-I in 2L, $t(39) = 1.73$ and REM sleep, $t(36) = 1.68$, N1 being larger in Para-I than Psy-I at both times. The amplitude of P2 also significantly differed between GS and Para-I in 2E, $t(47) = -2.36$ and REM, $t(39) = -1.85$ as well as between Psy-I and Para-I in 2L, $t(37) = -1.79$ and REM, $t(39) = -2.06$, P2 being larger in Para-I than in GS and Psy-I on all occasions.
Conclusion: Paradoxical insomnia individuals are more disturbed by auditory stimulation than good sleepers and psychophysiological insomnia individuals. Although hyperarousal appears to persist during sleep, inhibition deficits, expressed by an inability to disregard irrelevant stimuli, are more likely to affect paradoxical insomnia individuals than psychophysiological insomnia individuals.
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W-D-029 USING RHYTHMIC STIMULATION IN BEHAVIORAL TREATMENT OF CHILDREN SLEEP-ONSET INSOMNIA TYPE

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Introduction and Objectives: The main type of behavioral treatment of children's insomnia is "graduated extinction with minimal check". However, up to 30-40% of parents find this method unacceptable, difficult to implement with a high frequency of relapses. It can be explained by the fact that graduated extinction only suppresses inappropriate behavior stereotype without a formation and consolidation of required behavioral model. The aim: to propose intervention directed to formation of necessary behavioral model.
Materials and Methods: Our method includes a rhythmic stimulation (metronome and surf sounds with/without repetitive night-lamp glare) during falling asleep, clear daily routine (fixed wake-up time and day sleep duration) in addition to extinction. Participants were 53 children aged 7-18 months with sleep-onset insomnia type. We analyzed sleep onset durations, night wake-up rates and degree of parents interventions to soothe their babies during the night on third, 7th, 14th and 30th treatment days into two groups: first – 26 children, received graduated extinction; second – 27 children, received rhythmic stimulation intervention.
Results: On the third treatment day falling asleep durations were significantly decreased in both groups, but this parameter was less in the second group ($13,2\pm2,5$ vs.$29,9\pm4,4$ min, $p<0,05$) and was on 30th day $8,1\pm2,5$ vs.$4,6\pm3,1$ min ($p<0,05$). Night wake-up rates were significantly decreased in both groups on the 7th treatment day without differences between the groups. But in the second group parents interventions were reduced from 100% to 33,3%, 18,5% and 3,7% on third, 14th and 30th treatment days. Whereas in first group a reduction was from 100% to 65,4%, 53,8% and 14,3% on third, 14th and 30th treatment days ($p<0.05$). Failure (2,3% vs.21,3%) and relapses (11,5% vs.38,4%) rates were significantly less in the second group.
Conclusion: Using rhythmic stimulation significantly increases the efficacy and parents acceptability of behavioral treatment of insomnia in young children.

W-D-030 WHAT TYPES OF HOT FLASHES ARE ASSOCIATED WITH SLEEP DISTURBANCES IN BREAST CANCER PATIENTS?

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Introduction and Objectives: Insomnia is highly prevalent in breast cancer patients and may in part be the result of the development of hot flashes (HFs) due to chemotherapy and hormone therapy. Inconsistent results have been found on the relationship between HF frequency and standard polysomnographic (PSG) sleep parameters. However, it is possible that other characteristics of HFs such as their intensity and duration better account for PSG-assessed sleep impairments. Moreover, quantitative sleep EEG (spectral power) may be more sensitive to HFs. This cross-sectional study aimed at assessing the relationship between objectively-recorded HFs and sleep disturbances in women who had completed their primary treatments for a first diagnosis of breast cancer within the previous 3 months.
Materials and Methods: Fifty-six participants wore an ambulatory measure of sternal skin conductance and PSG for a home-based nighttime recording of HFs and sleep. Partial Spearman correlations were computed between HF characteristics, and PSG and spectral measures of sleep.

Results: HF frequency was not significantly associated with any PSG variable (r= -0.18 to 0.21), but was significantly associated with increased slow (r=0.28) and delta EEG activity (r=0.32). Slower HF onset and longer HF duration were significantly associated with a greater total wake time, a poorer sleep efficiency, a higher number of awakenings of more than 1 and 3 minutes and a shorter duration of REM sleep during the first third of the night (r= -0.50 to 0.48).
Conclusion: Slower and longer HFs appear to contribute more to sleep alterations than HF frequency. It would be interesting to investigate whether these types of HFs are also perceived by the patients as being more bothersome.

I: Sleep Breathing Disorders

W-I-031 OSA SEVERITY PREDICTS PERFORMANCE IN THE SIX-MINUTE WALKING TEST OF INDIVIDUALS WITH MORBID OBESITY

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Introduction and Objectives: Both obstructive sleep apnea (OSA) and obesity may reduce exercise performance. The observed performance reduction in the 6-min walk test (6-WT) by OSA patients may be attributable to varying degrees to the presence of obesity and OSA. We hypothesized that OSA severity, besides obesity, influences the performance in the 6-WT. The objective of this study was to investigate the correlations between OSA, obesity, and distance covered in the 6-WT.
Materials and Methods: We recruited individuals being evaluated for bariatric surgery in obesity treatment centers. Exclusion criteria were: age > 40 years, health-related changes or complaints in the last month, diabetes mellitus, cardiovascular conditions, except controlled hypertension; nervous system diseases, and any condition interfering with locomotion, besides obesity. All participants underwent the 6-WT and unattended portable type III polysomnography (SomnoCheck, Weinmann, Germany) at home. The severity of OSA was determined by the apnea-hypopnea index (AHI).
Results: Twenty-seven volunteers, 12 men, age= 28±6 years, BMI= 53±8 kg/m^2, AHI= 22±23/h were included. The average distance covered on the 6-WT was 435±75 m. AHI (Spearman's rho= -0.44; p=0.022) and BMI (rho= -0.39; p=0.048) presented significant correlations with the distance covered in 6-WT. Controlling for gender, age, and BMI, OSA severity was an independent predictor of the distance covered in the 6-WT modeled in a stepwise multiple linear regression (adjusted r2=0.23; p=0.007).
Conclusion: These results, from a sample of morbidly obese individuals, disclose the considerable influence of OSA severity in the performance on the 6-WT. The reduction of walked distance attributable to OSA should be considered, besides the effect of obesity, in the functional capacity assessment of patients with morbid obesity. Further studies in larger samples are necessary to confirm these preliminary findings about the influence of OSA on exercise capacity.

W-I-032 18 MONTH ASSESSMENT OF 54 PATIENTS REFERRED FOR TREATMENT OF ANTI-SOCIAL SNORING (AHI ≤30/HR) WITH A CUSTOM MANDIBULAR REPOSITIONING DEVICE (MRD)

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Introduction and Objectives: 54 patients referred by ENT/Respiratory departments of Medical Specialist Group, Guernsey, Channel Islands, UK for treatment with novel, custom-made, adjustable, traction based MRD (ResMed Narval CC® MRD). Primary objective: evaluation of snoring reduction Secondary objective: effect on OSA related symptoms, treatment compliance and side-effects.
Materials and Methods: Research conducted in private General Dental Practice in collaboration with ENTs/Respiratory physician according to best clinical practice, including symptomatic based appliance titration and regular communication with referring physician and patient's General Medical Practitioner. All underwent initial polygraphy by referring physician to exclude severe OSAS.
Results: 39 patients (M:F ratio 1.6:1)completed the whole protocol. Averages: Age 51 years - sd ±11. Pre –treatment BMI 27.7 Pre- treatment AHI 11.8/hr After 18 months: Snoring measured by TSS reduced for all patients (11.8 (±3.2) to 2.8 (±2.8)) Daytime somnolence measured by ESS reduced from 7.6 (±4.2) to 4.7 (±3.0) ESS reduced for 33 patients, marginally increased in 5 patients and in 5 remained unaltered. 16 patients with high ESS ≥10, ESS decreased from 12.3 (±4.4) to 6.3 (±3.1). Most commonly reported OSA related symptom was violent snoring which woke the patient from sleep (61%). This disappeared in 92%. Favourable effects on the frequency of witnessed apnoeas, choking during sleep, nocturia and morning headache were noticed. Treatment compliance high. Average reported appliance wear 6.3 nights/week. 82% of patients wore the device every night. Side Effects No detrimental effects upon TMJ detected. 80% had no occlusal changes.
Conclusion: ResMed Narval CC® MRD effective both in terms of snoring and EDS reduction. Well tolerated with no impact on TMJ function and minimal impact upon occlusion.
Acknowledgements: Dr D Beaumont, Dr R Vowles, Dr W Anees, and Mr A Zacher.

W-I-034 ADHERENCE TO CPAP AFTER 18-MONTHS TREATMENT IN OBSTRUCTIVE SLEEP APNEA PATIENTS: EFFECTS ON COGNITION AND QUALITY OF LIFE

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Introduction and Objectives: Obstructive Sleep Apnea (OSA) determines cognitive dysfunctions and diminished quality of life (QoL) mainly caused by sleep fragmentation and intermittent ipoxemia. Literature data on improvement after treatment are still mixed. Adherence to PAP treatment although effective, still remains a challenge for patients. Aims of the study were to evaluate neurocognitive functions and QoL in a consecutive group of OSA patients at baseline (BL) compared to age and education-matched normal controls and changes after 18-months of fixed PAP treatment (FU) with C-flex (Philips/Respironics). Changes were correlated with objective adherence to treatment.
Materials and Methods: 70 males (mean age 51.2±10.3) with severe OSA (mean AHI=55.3±22.6) and 15 healthy controls. Neurocognitive functions (attention, vigilance, memory, executive functions, visuo-constructional abilities), sleepiness, mood and QoL (SF36 and FOSQ) were evaluated at BL and at FU. At FU objective compliance to PAP (hours of use per night and % of days of use) were assessed by EncorePro software.
Results: 10 patients were excluded for low compliance to PAP within the 18-months observation period. At BL patients showed significantly lower scores than controls in all neurocognitive domains ($p<0.001$) as well as in FOSQ ($p<0.001$) and in the general health subscale of SF36. At FU an overall significant improvement of cognition (all domains), QoL, sleepiness and mood was observed. At FU mean compliance to PAP was 6.1±1.1 hrs and % of days of use 88.5±15.1.
Conclusion: Our data showed that cognitive functions and QoL, all impaired when compared to controls at BL, significantly improved at FU when patients, if adherent to the device, were able to reach the same scores of controls. Adherence to PAP can be considered the trigger of improvement both in QoL and cognition but still remains a challenge for both patients and physicians.
Acknowledgements: Study supported by Philips Respironics.

W-I-035 ADHERENCE TO CPAP TREATMENT: DIFFERENCES BETWEEN COMPLIANT AND NON-COMPLIANT PATIENTS

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Introduction and Objectives: Objetives: 1)To study the adherence to CPAP treatment, analyzing the differences between compliant and non-compliant patients. 2)To evaluate the degree of recognition of non-compliance by patients.
Materials and Methods: The study evaluated 102 patients diagnosed with OSAHS by polysomnography or respiratory polygraphy with indication of CPAP. The required pressure was determined by an overnight automatic titration at home. Actual treatment time was recorded using the ratio (hours/day) for the last quarter and those who had a ratio greater than 3.5 were considered compliant. In addition to anthropometric characteristics, somnolence (Epworth scale) and sleep parameters (AHI, SpO2 and CT90), we also considered the prescribed pressures, sleep hours, the declared use of CPAP, availability of humidifier, family support and use of CPAP for short trips or vacations.
Results: A total of 74 patients (73%) were classified as compliant versus 28 (27%) who were non-compliant. In contrast to the latter group, compliant patients had greater AHI (50±23 h-1 vs. 38±21 h-1, p=0,015), lower nightly mean SpO2 (88±10% vs. 91±4%, p=0,046) and greater CPAP pressure (9±1 cm^3 H2O vs. 8±1 cm^3 H2O, p=0,005) and habitual sleep time (7,5±1.6 h vs. 6,7±1,1h p=0,012). Patients who lived with someone had a greater degree of compliance than alone (80% vs. 40%; p=0.013). Using a multiple logistic regression model, living alone was the only determinant of non-compliance that was retained (r2=0.169, p=0,035). Only 27% of the noncompliant patients recognized their noncompliance, with a difference between actual and declared hours of use of 4,6±1,7 hours. Patients who lived alone recognized their non-compliance more than those who lived with someone (67% vs. 27%, p=0,031). No other variables related to non-compliance recognition were identified.
Conclusion: Therapeutic compliance was greater in patients with more severe OSAHS. Most noncompliant patients did not recognize their non-compliance. The lack of family support was a main determinant of non-compliance.

W-I-036 ADIPOCYTE FATTY ACID-BINDING PROTEIN SERUM LEVEL IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA SYNDROME TREATED BY CONTINUOUS POSITIVE AIRWAY PRESSURE

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Introduction and Objectives: Adipocyte fatty acid-binding protein (A-FABP) is produced by adipocytes and macrophages and an increased level of A-FABP is connected with a higher incidence of metabolic syndrome and cardiovascular diseases. Obstructive sleep apnea (OSA) is a common sleep-related breathing disorder. A positive correlation between the severity of OSA and the serum level of A-FABP has been shown. The aim of the study was to find if treatment by continuous positive airway pressure (CPAP) leads to a decrease in the AFABP level.
Materials and Methods: 81 patients (70 men), average age 53.5±10.1 years, with OSA were treated by CPAP. Anthropometric and laboratory assessment of A-FABP level was carried out on these patients at the beginning, after one month and after one year of CPAP treatment.
Results: Before CPAP treatment BMI was 37.9±12.0, Epworth sleepiness scale 10.83±5.06, oxygen desaturation index (ODI) 58.15±23.61, apnea-hypopnea index (AHI) 54.06±22.26, average night saturation 88.71±4.58, saturation under 90% SaO2 (t 90) 38.03±25.29. The level of AFABP was 39.8 mg/l. After one month of CPAP treatment ODI was 12.87±16.72, AHI 7.06±9.26, average night saturation 92.23±8.59, t 90: 6.24±15.46, A-FABP 32.0 mg/l (all Wilcoxon paired test values p<0,001). After one year of CPAP treatment was ODI was 10.63±10.32, AHI 6.73±5.8, average night saturation 93.34±2.35, t 90: 7.10±18.27, A-FABP 25.1mg/l (all p<0,01).
Conclusion: The treatment of OSA patients by CPAP also positively affects the A-FABP level. Reduction of the A-FABP level can play a positive role in the reduction of cardiovascular complications of OSA (it affects the regulation of lipid metabolism, has a significant role in glucose homeostasis and there is a positive correlation between A-FABP level and the index of insulin resistance).

W-I-037 ASSESSMENT OF UPPER AIRWAY DYNAMIC PROPERTIES USING STERNAL PHRENIC NERVE MAGNETIC STIMULATION IN AWAKE SUBJECTS AND IN OBSTRUCTIVE SLEEP APNEA PATIENTS

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Introduction and Objectives: To assess upper airway (UA) dynamic properties, magnetic stimulation of the phrenic nerve (MSPN) is usually performed at cervical level or bilaterally and anteriorly at the neck base (BAMPS). We hypothesized that UA dynamic properties could be effectively assessed by MSPN performed at sternal level (a-MS).
Materials and Methods: Instantaneous flow, pharyngeal and mask pressures were recorded in 12 healthy awake subjects and in 3 obstructive sleep apnea (OSA) patients in whom esophageal pressure was also recorded. In normals, end-expiratory MSPN were applied randomly at the 7th cervical vertebrae (C7-MS) and at ST. In OSA patients, twitch stimuli were applied randomly using BAMPS and a-MS.
Results: In healthy, the percentage of flow-limited twitches was higher with MSPN at ST (a-MS: 33% and C7-MS: 2%; P<0.0001). For non flow-limited twitches, maximal inspiratory flow was 36% higher (P<0.001) and isoflow UA resistance was lower at ST (0.6±0.1 and 0.9±0.1 cmH2O.L-1.s respectively; P=0.02). Maximal inspiratory flow of flow-limited twitches was 78% higher (P=0.05) and isoflow UA resistance tended to be lower at ST (0.9±0.3 and 1.8±0.7 cmH2O.L-1.s; P=0.09). In OSA patients, 70% of BAMPS and 77% of a-MS twitches were flow-limited. For the non flow-limited twitches, maximal inspiratory flow was similar between BAMPS (739.2±192 ml.s-1) and a-MS (676.2±185 ml.s-1) in spite of lower peak esophageal pressure with the latter (-9.7±5.5 cmH2O and -4.7±1.4 cmH2O respectively). This pattern was amplified for flow-limited twitches, the maximal inspiratory flow being lower (819.7±141.5 ml.s-1 and 1026±150.7 ml.s-1) and peak esophageal pressure higher (-12.3±0.6 cmH2O and -8.2±1.6 cmH2O) for BAMPS compared to a-MS. UA theoretical closing pressure determined by the flow/pressure relationship was -9.3±1 cmH2O for BAMPS and -7.9±1.6 cmH2O for a-MS.
Conclusion: a-MS could be a practical approach for assessing UA dynamic properties in awake subjects and in OSA patients. The 2 procedures may differ in the generated upstream resistance.
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W-I-038 ATYPICAL CAUSES OF OBSTRUCTIVE SLEEP APNEA IN OTO RHINO-LARYNGOLOGICAL PRACTICE

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Introduction and Objectives: We present three cases that rarely cause obstructive sleep apnea (OSA); they occurred at the Sleep Disorders Centre of the Ear Clinic at Tartu University in 2006–2010.
Case Report 1: Lingual thyroid. A 52-year-old male: progressive daytime sleepiness, snoring, and sleep apnea. The patient had already been diagnosed with lingual thyroid years ago. The thyroid function tests were within normal limits. Midline mass, over 3×2 cm in size, could be palpated on the posterior tongue base, with a high Mallampati score (Class 4). The patient's Epworth Sleepiness Scale 14, BMI 37 kg/m^2. The patient underwent polysomnography, AHI was 49. In order to evaluate the possibility of surgery, the patient underwent CT of the head and the neck and radionuclide scanning by means of 99m technetium pertechnetate to evaluate the activity of thyroid tissues. The study revealed that there were no normal thyroid tissues in the neck. AutoCPAP relieved obstructive events (average AHI: 1.4).
Case Report 2: Tongue hemangioma. A 25-year-old male: snoring, and progressive sleep apnea. He had a congenital hemangioma involvng the neck, oral cavity, and tongue with a high Mallampati score (Class 4). The patient's ESS 7; BMI was 29 kg/m^2. The patient underwent PSG, AHI was 81.

aCPAP relieved obstructive events (average AHI: 32). The patient underwent transarterial catheter embolization, followed by repeated PSG, AHI was 48. aCPAP relieved obstructive events (average AHI: 7.4).
Case Report 3: Adenoma hypophysis. A 63-year-old male: snoring, and progressive sleep apnea, macroglossia with a high Mallampati score (Class 4). The patient's ESS 16; BMI was 26 kg/m^2. The patient underwent PSG, AHI was 83 per hour of sleep. aCPAP relieved obstructive events (average AHI: 4.5). During the treatment the patient was diagnosed with adenoma hypophysis and underwent surgery.
Conclusion: In same cases OSA patients need multidisciplinary diagnostics and treatment.

W-I-039 AUTOMATED SLEEP APNEA SYNDROME RECOGNITION FROM ECG RECORDINGS IN HEART FAILURE PATIENTS

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Introduction and Objectives: Sleep Apnea Syndrome (SAS) is associated with cadiovascular morbidity. The prevalence of this syndrome in heart failure population reaches 50%. The gold standard for diagnosis is polysomnography wich is an expensive procedure. Thus, efforts are made to developp alternative methods to detect SAS. A promising method, validated in subject without cardiac pathologies, consists to analyse the ECG-derived respiration (EDR) recorded overnight. The goal of the present study was to evaluate the possibility to detect the presence of SAS using EDR method in patients suffering from cardiac failure.
Materials and Methods: Thirty nine (n=39) heart failure subjects with complete overnight polysomnography diagnosis (AHI$<$15: n=11, 15$\leq$AHI$<$30 n=15, AHI$\geq$30 n=13; central, obstructive and mixed apneas) with an ECG recording, were included (age: 63.8$\pm$16.6 years, weight: 82.4$\pm$22 kg, height: 172.1$\pm$6.3 m). An algorithm based on R-peak artefacts rejection and Fourier spectral analysis of the EDR signal was developped to determine the presence of SAS (choosen thresold: AHI $>$ 15 for SAS+). The method was validated on the 70 recordings of the MIT apnea database and then applied to the set of heart failure patients.
Results: The developped method indicates an accuracy of 97.1% for the MIT database. For heart failure patients, the method permitted to recognize 27 out of 28 SAS+ and 9 out of 11 SAS- (sensibility = 96.4%, specificity = 81.8%, accuracy = 92.3%). Interestingly enough, it was possible to diagnose 7 out of 8 SAS+ patients with a pacemaker and 2 out of 2 SAS+ patients with atrial fibrillation. Also, detection was possible for central and obstructive apnea sydrome.
Conclusion: The EDR method to detect SAS is thus applicable in heart failure patients, and could be easily implemented in routine 24h-ECG analysis for preventive evaluation. Further studies in larger population should specify explanations for diagnosis mistakes to increase the accuracy.

W-I-040 BP VARIATION STUDY ON OSA PATIENTS WITH AND WITHOUT HYPERTENSION

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Introduction and Objectives: Obstructive sleep apnea (OSA) and hypertension (HT) are conditions that coexist in many patients. Although their association has been documented, most studies target OSA patients with HT. Our understanding of the implications of OSA, HT and the circadian BP variation is still not clear enough. Our earlier study had shown abnormal BP variation among patients with OSA and HT, so this study was aimed at comparing BP variations among OSA patients with and without HT.
Materials and Methods: All subjects completed a full night PSG and 24-h ambulatory blood pressure monitoring (24h-ABPM). Data were collected in subjects who met the inclusion criteria. A total of 51 participants (37 males and 14 females) were enrolled in the study. They were divided into two groups (no significant difference found between groups) according to HT diagnosis, 24 in HT group and 27 in non-HT group. Basic information, BMI, AHI, night-time SaO2min, average nocturnal SaO2, BP and 24h-ABPM data were recorded.
Results: Analysis of ABPM in the HT group showed that 33% of subjects had dipping profile (i.e., 10-20% fall in nocturnal BP), 50% had non-dipping (i.e., less than 10% fall), and 17% had a reverse-dipping (i.e., 0% at most fall in nocturnal BP); in the non-HT group, there were 33% dipping, 48% non-dipping and 19% reverse-dipping respectively. Statistic analysis shows no significant difference on the tendency of abnormal BP variation between the two groups.
Conclusion: Since ABPM assesses cardiovascular risk and target organ damage, and both groups are prone to abnormal BP variation, OSA may cause abnormal BP variation even before patients are diagnosed with HT. OSA can be considered as an individual risk factor for abnormal BP variation and target organ damage. ABPM should be recommended to OSA patients with or without HT.

W-I-042 CUMULATIVE PARASYMPATHETIC SYSTEM ACTIVITY COULD BE USED IN EVALUATING OBSTRUCTIVE SLEEP APNEA

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Introduction and Objectives: Although the autonomic nervous system plays a key role in mediating cardiovascular changes during obstructive sleep apnea (OSA), parasympathetic nervous system (PNS) activity during sleep apnea has not yet been sufficiently investigated. This study is to discuss the relationship between PNS activity and OSA.
Materials and Methods: Polysomnography recording was carried out in 76 patients (71 male and 5 female) with OSA. Cumulative PNS activity during sleep for each patient was derived from time series data of Electrocardiogram and analyzed by coarse graining spectral analysis of heart rate variability. The correlation between cumulative PNS activity and apnea-hypopnea index (AHI) was then discussed.
Results: Cumulative PNS activity and PNS peaks during sleep were low but significantly correlated with OSA severity ($r = -0.344$, $p < 0.005$; and $r = -0.266$, $p < 0.05$ respectively), and a linear regression equation could be established. Furthermore, significant correlation was also observed in the adult groups and in the moderate and severe groups, but not in the juvenile and the elderly and mild groups.
Conclusion: These findings indicated that PNS function was obviously influenced by OSA during sleep. Cumulative PNS activity level might also serve as a useful parameter for the evaluation of OSA.
Acknowledgements: This study was partially supported by the Program for Development of Innovative Research Team in the First Affiliated Hospital of Nanjing Medical University.

W-I-043 DIAGNOSIS AND ASSESSMENT OF SURGICAL TREATMENT OF PATIENTS WITH CONGENITAL MALFORMATIONS OF THE MANDIBLE

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Introduction and Objectives: Sleep breathing disorders like obstructive sleep apnea syndrome (OSA) in children with Pierre Robin sequence can be extremely severe and require urgent surgical operation for elimination to serious physical and psychoneurological complications. Objectives: To evaluate the sleep respiratory disturbances in children with Pierre-Robin sequence with minor clinical symptoms of disease; To assess the influence of surgical treatment using the compression-distraction osteogenesis on sleep breathing.
Materials and Methods: 12 Children aged 6 to 11 months were investigated. The first group of 7 children had minor clinical symptoms. The function of breathing in sleep in pre-operative period was estimated in this group. In the second group of 5 children respiratory function after surgery was assessed. A sleep study was conducted using the cardiorespiratory monitoring and polysomnography.
Results: Moderate and severe obstructive sleep apnea was observed in 6 of the 7 children of the first group. The average level of blood saturation was 97$\pm$0,4%, but there were episodes of pronounced oxygen desaturation up to 84$\pm$6%. In the second group OSA was not observed in 3 of the 5 children, mild OSA was observed in one child and anther child had severe

OSA. The average blood saturation during sleep was 98.3±0.3%, the peak value of desaturation was not below 90%. The structure of sleep during polysomnography was characterized by the right balance of NREM and REM sleep and no problem of EEG arousal. A child with severe OSA continued orthodontic treatment.
Conclusion: All children with Pierre Robin sequence require examination of sleep at night independently of the clinical manifestations. Postoperative overnight sleep examination clearly demonstrates the efficiency of the surgical treatment by removal of sleep respiratory disorders in children with Pierre Robin sequence.

W-I-045 DISTRACTION OSTEOGENESIS (DO) WITH MAXILLOMANDIBULAR ADVANCEMENT AS A TREATMENT FOR OBSTRUCTIVE SLEEP APNEA (OSA)

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Introduction and Objectives: Positive Airway Pressure (PAP) is the most effective treatment for Obstructive Sleep Apnea (OSA), but is not tolerated by all patients. Maxillomandibular Advancement (MMA) is an alternative treatment for OSA but allows a limited advancement of the bone (up to 10mm). We concomitantly utilized Distraction Osteogenesis (DO) to further advance the maxillary and mandibular arches by gradual surgical elongation. We hypothesized that DO would be a viable option for OSA treatment.
Materials and Methods: A retrospective chart review of patients undergoing DO was conducted. Polysomnographic variables were obtained from studies performed at baseline as well as following maximum distraction. These variables included AHI, in both REM (AHI-R) and NREM sleep (AHI-NR), minimal O2, body mass index (BMI) and Epworth Sleepiness Scale scores (ESS).
Results: A total of 16 subjects (1 woman), mean age 44.1±11 years (range 17.6-62.8) with a BMI at baseline of 37.0±6.5 (range 25.3-47.1) were included in the analysis. At baseline PSG, the mean AHI was 78.9±24.5 (range 26.5-115), with a nadir SpO2 of 94.4±3.3% (range 84-97%) and a mean ESS of 11.9±4.7 (range 5-21). The mean NREM-AHI was 77.9±19.9 (range 42-107), and the mean REM-AHI was 55.8±33.7 (range 9-128). The post-op PSG was performed a mean of 54.4±47.7 days (range 24-217) after maximum advancement. Post-operative BMI was 33.20±5.4 (range 23.25-42.39). The mean follow up AHI was 13.7±12.7 (range 1-45.1), SpO2 94.2±2.4% (range 89-98%) and ESS 9.6±6.8 (range 0-24). The mean NREM-AHI was 11.7±13.43 (range 1-41.1), and the mean REM-AHI was 22.9±21.4 (range 0-64.6). Post-operatively there was a significant decrease in AHI (mean 13.7±12.7; $p<0.0001$), NREM-AHI (mean 11.7±13.43; $p<0.0001$). For 8 subjects with pre and post REM-AHI there was a decrease with a p=0.59. There were no significant differences in SpO2 or ESS.
Conclusion: DO is a viable option for the treatment of OSA, mainly due to improvement of the NREM-AHI.

W-I-046 DOES UPPP HAS AN IMPACT ON METABOLIC SYNDROME IN PATIENTS WITH OSAS?

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Introduction and Objectives: Obstructive sleep apnea has been associated with metabolic syndrome (MS) and its various components. The aim of the present study was to study the prevalence of metabolic syndrome and its various components in patients with obstructive sleep apnea and to evaluate the impact of uvulopalatopharyngoplasty on metabolic syndrome.
Materials and Methods: A three-year retrospective chart review of patients referred to an ENT department in a tertiary care setting for sleep disordered breathing. A total of 134 patients met the inclusion criterion and were enrolled for the study. The diagnosis of MS was established according to National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III)
Results: The mean age of the sample was 47±9 years, mean body mass index (BMI) and Epworth sleepiness scale (ESS) was 37.23±8.23 and 11, respectively. According to the AHI, the patients were divided in two groups, OSAS (AHI = 64±34.6, n= 91) and controls (AHI=4.46±1.34,n=43). A total of 83 (61.9%) patients met criteria of MS. The incidence of MS was significantly higher in patients with OSAS (72.5%) vs controls (39.5%) ($p<0.001$). Using logistic regression analysis, the components of MS which showed statistical significance were a fasting glucose of >100mg/dl (p=0.002) and a high blood pressure ($p<0.032$). A total of 69 patients underwent UPPP. The prevalence of MS in this subgroup of patients before and at 6 months follow up after surgery was 71.0% and 60.87% which was not statistically significant. The only component of MS which showed statistically significant improvement was blood pressure ($p<0.001$).
Conclusion: There is a high incidence of metabolic syndrome in patients with OSAS. At 6 months follow up, UPPP did not have a significant effect on the prevalence of MS. The only component which showed a significant improvement was blood pressure.

W-I-047 EFFECT OF CONTINUOUS AIRWAY PRESSURE TREATMENT ON SYMPATHETIC NERVOUS ACTIVITY AND DAYTIME FUNCTION IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA

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Introduction and Objectives: The aim of the present study was to evaluate sleep and life quality and night and daytime disorders in OSAS patients before and after 3-month aCPAP treatment.
Materials and Methods: 88 men and 22 women with OSAS (age 55.6±10.2; apnea-hypopnea index 49.3±24.7, oxygen saturation 89.8±5.3%, slow-wave sleep 8.2±7.9%, mean BMI 37.9±6.4 kg/m^2, Effort sleepiness scale 11.5±4.7) and the same patients after 3-month aCPAP treatment. OSAS was diagnosed by polysomnography. Before aCPAP treatment the patients completed a ten-point visual scale questionnaire about how the sleep-related problems had affected them (no change – significantly impaired) for each of the following activity areas: 1) work-related activity; 2) social life activity; 3) family and home related activity. The question about quality of life was evaluated on a ten-point scale before and after aCPAP treatment. After aCPAP treatment the patients completed a questionnaire on a three-point scale (decrease, no change, increase), how the aCPAP treatment changed the night and daytime disorders.
Results: We found that sleep problems affect work-related (5.0±2.8) and family and home (5.0±3.0) related activities rather than social life activity (3.6±2.8) in patients. The quality of life of apnea patients improved after aCPAP treatment (7.4±1.6) by comparison with the situation before aCPAP treatment (3.6±1.3), $p<0.01$. AHI with aCPAP treatment was 7.3±7.9 in the patients. Sleep and daytime disorders, such as: nocturnal urination (62%), nocturnal tachycardia (38%), nocturnal sweating (47%), snoring (88%), nocturnal breathing disorders (85%), nocturnal coughing (31%), headaches (38%), pain (24%), morning fatigue (91%) decreased, and daytime sleepiness (83%) and quality of sleep (94%) improved in patients after aCPAP treatment.
Conclusion: aCPAP treatment decreased disorders related to sympathetic activity and cognitive dysfunction in apnea patients.
Acknowledgements: SF0180125s08.

W-I-048 EFFECTIVENESS OF TREATMENT OF SLEEP DISORDERS BREATHING IN PEDIATRIC PATIENTS

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Introduction and Objectives: Deviation of nasal septum, tonsillar, adenoid and inferior turbinate hypertrophy is one of the most common causes for disorder breathing. Medical treatment produces often very little improvement. The aim of this study was to evaluate the temperature-controlled radiofrequency submucosal volumetric tissue reduction (RFVTR) method combined with correction of nasal septum in children with snoring and sleep disorder breathing.
Materials and Methods: We followed 82 children, 3 to 15 years of age, with a case history of oral breathing, snoring and restless sleep (Pediatric Sleep Questionnaire). All patients presented with tonsillar, adenoid and inferior turbinate hypertrophy, 20 of them had nasal septum deformity. The surgery procedure was performed with different combination. All the patients underwent RFVTR. Adenoidectomy with RFVTR of inferior turbines and correction of deviation nasal septum were performed in 20 children. Adenoidectomy and RFVTR of tonsils were performed in 30 children. Adenoidectomy with RFVTR of tonsils and inferior turbines were performed in 32 of 82 children.

Results: All children were reviewed in the 7th and 14th days and 1 month and 6 months after surgery. Assessment of results was based on the visual analog scores (VAS) 0-10 score system. All the patients postoperative noted significant improvement of their nasal breathing. Outcomes showed snoring reduction in 79 (96.3%) patients, sustained increases in oropharyngeal size in 75 (91.5%) patients. All these changes improved sleep quality in all patients.
Conclusion: The results of this study demonstrate that for recovery of the nasal breathing disorders it was necessary to perform combinative surgical procedures and for avoiding postoperative complications in pediatric patients to use RFVTR method is recommended. RFVTR is an effective method for the reduction of turbinate and tonsillar hypertrophy and for the treatment of sleep disorders breathing in children.

W-I-049 EFFECTS OF INTERMITTENT HYPOXIA IN MOUSE HIPPOCAMPUS AND CEREBELLUM AFTER 35 DAYS

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Introduction and Objectives: Obstructive sleep apnea (OSA) causes morphological brain alterations. Acute exposure to mild levels of intermittent hypoxia (IH) during periods up to 30 hours damages more than 90% of the Purkinje cells. Reactive gliosis occurs in central nervous system degenerative diseases and after injury. Because OSA is a chronic condition, the reactions to long-term exposure to IH should be investigated. We investigated the effect of IH simulating severe OSA during 35 days on neurons of mice hippocampus and Purkinje cells.
Materials and Methods: We exposed Balb/c mice to 35 days of IH (n=8) or sham IH (SIH; n=8), alternating 30 seconds of progressive hypoxia to a nadir of 6% FIO2, followed by 30 seconds of room air insufflation. During 8 hours of the light period, the rodents underwent 480 cycles of hypoxia/reoxygenation, equivalent to an apnea index of 60/hour. The animals were euthanized and the brains were removed and placed overnight in 10% formalin at 4°C. Sagital 10μm thick brain sections were cut and stained for hematoxylin and eosin (HE). Distinguished features were: cariolisis, picnosis, cariorrexis, and gliosis. Two blinded observers evaluated all slides.
Results: In the IH group, 88% of the examined Purkinje cells presented irreversible lesions while in the SIH group similar findings were seen in 47% of the Purkinje cells ($p<0.01$). Hippocampal irreversible lesions were observed in the dorsal hippocampal commissure next to the third ventricle. The IH group showed 36% of damaged cells in this area, while the SIH group had damage in 18% of the examined neurons. Preliminary analysis indicates that reactive gliosis predominated in the IH group with 20-30% more glial cells. No neurofibrillary or amyloid deposits were observed.
Conclusion: In the first experiment on the consequences of intermittent hypoxia in mice lasting 35 days, the preliminary finding of a chronic nature was perilesional reactive gliosis.
Acknowledgements: Research was funded by FIPE-HCPA (Brazil).

W-I-050 EXPIRATORY THRESHOLD LOADING IN OBESITY AND OBSTRUCTIVE SLEEP APNEA

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Introduction and Objectives: Increasing lung volume protects against upper airway obstruction, and increasing positive end-expiratory pressure (PEEP) has been shown to reduce obstructive sleep apnea (OSA) severity. Given that obesity may contribute to reduce lung volume, and that PEEP may be particularly helpful in this subgroup with OSA, the purpose of this study was to investigate the role of self-titrated expiratory threshold loading on end-expiratory lung volume (EELV) and severity of OSA in obese patients.
Materials and Methods: A prospective, randomized, single-blind, sham-controlled crossover study with twelve obese patients recruited from the Kingston General Hospital Sleep Disorders Laboratory. Patients participated in two overnight polysomnograms (threshold and sham). Lung volume changes were determined by calibrated respiratory inductance plethysmography (RIP), and lung volume recruitment was achieved by having patients wear a fullface mask attached to a two-way non-rebreathing valve, with the expiratory tubing immersed in a column of water. Prior to both overnight studies, each patient's expiratory threshold load was titrated to tolerance with an increase in resting EELV of $>$ 500mL.
Results: Data is currently available for 7 patients (4M, 3F), mean age 52 $\pm$ SD 15.7 years, mean BMI 34 $\pm$ SD 5.9 kg/m^2. Patients had a mean increase in EELV of 484 $\pm$ SD 58.4 mL. The mean AHI fell significantly with threshold loading, (threshold 16 $\pm$ SD 7.8 events/hr versus sham 43 $\pm$ SD 21.6 events/hr), p=0.015, and the percentage of REM sleep increased significantly, (threshold 11$\pm$SD 9.1% versus sham 4 $\pm$ SD 5.3%), p=0.021. There were no significant differences found in total recording time, total sleep time, and percentage of time spent supine.
Conclusion: Expiratory threshold loading, sufficient enough to increase EELV by just 500mL, reduces OSA severity and is tolerated by obese patients. Lung volume recruitment is a potentially valuable therapeutic avenue for the treatment of OSA in obese patients.
Acknowledgements: This research was funded by the William M. Spear Endowment Fund, Queen's University.

W-I-051 IMMEDIATE AND OVERNIGHT RECUMBENCE-DEPENDENT CHANGES OF NECK CIRCUMFERENCE IN OBESE AND NON-OBESE SUBJECTS

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Introduction and Objectives: Studies have shown that overnight changes in neck circumference (NC) correlate with the reduction of leg fluid volume and with severity of obstructive sleep apnea (OSA). Studies investigating the role of immediate postural changes of neck circumference in OSA were not found. The present study aimed to evaluate the relationship of OSA severity with recumbence-related changes in neck circumference, immediately and overnight, in obese and non-obese subjects.
Materials and Methods: In 45 male patients undergoing polysomnography for suspected OSA, 23 non-obese and 22 obese, the following circumferences were measured before and after sleep: neck, calves and ankles, while standing and supine. Circumference changes were calculated by the difference between standing and recumbent positions (immediate change) and between before and after sleep (overnight change). These changes were correlated with apnea-hypopnea index (AHI) and minimum oxygen saturation (SaO2min) obtained from full-night in-laboratory polysomnography.
Results: The overnight change in the NC is larger in obese (0.7$\pm$0.6 cm) than in non-obese subjects (0.4$\pm$0.7 cm), but non-significant (p=0.2. The immediate change in the NC was significantly higher in obese (1.8$\pm$1.2cm) than in non-obese individuals (1.1$\pm$0.7cm; p=0.01). A quadratic correlation of immediate change in NC with AHI (r=0.51; p=0.02) was observed in obese subjects. The overnight change in neck circumference was correlated neither with AHI nor with SaO2min. No significant correlations were seen between overnight changes in neck circumference and AHI or SaO2min. Neither immediate nor overnight changes were significant in non-obese subjects. The results remained unchanged after controlling for common confounders in multivariate analysis.
Conclusion: In obese subjects, OSA severity correlates with the increase in neck circumference occurring immediately after assuming recumbence, suggesting that immediate fat tissue displacement plays a role in the pathogenesis of OSA. This finding extends the complexity and implications of neck circumference changes.
Acknowledgements: Research was funded by FIPE - HCPA (Brazil).

W-I-052 IMPACT OF MANDIBULAR ADVANCEMENT DEVICE ASSOCIATED WITH CPAP INTERFACE ON UPPER AIRWAY MECHANICAL PROPERTIES ASSESSED BY PHRENIC NERVE STIMULATION IN OBSTRUCTIVE SLEEP APNEA PATIENTS: PRELIMINARY RESULTS

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Introduction and Objectives: During CPAP therapy, nasal mask (NM) is the first line interface but full-face mask (FF) can be used when oral leaks impair CPAP effectiveness. However, constraint on the chin and straps' traction are prone to push the mandible posteriorly and therefore alter upper

airway (UA) mechanical properties. In contrast, mandibular advancement device (MAD) associated with nasal-CPAP may reduce UA resistance and could become an alternative to FF. We hypothesize that MAD associated with NM could reduce UA resistance compared to NM or FF. Objective: To compare, during wakefulness, the effects of interface without/with MAD (NM, NM+MAD, FF) on UA mechanical properties during CPAP therapy using a magnetic phrenic nerves stimulation (PNS) paradigm.

Materials and Methods: Six OSAS patients (37±8 years, BMI=34.6±4.1 kg.m-2, AHI=47.3±30/h) were enrolled. PNS-twitches were characterized by measuring airflow, pharyngeal pressures (nasopharynx, velopharynx, hypopharynx) and pharyngeal resistance for each interface modality at 6, 8 and 10 cmH2O CPAP levels in random order. UA collapsibility was estimated by flow/driving pressure relationship analysis. Comparisons were performed using two-way repeated measures ANOVA.

Results: Maximal flow was significantly higher with NM+MAD (p=0.05) compared to FF and NM regardless of CPAP level. Hypopharyngeal resistances, assessed at maximal flow, tended to decrease with NM+MAD (p = 0.1). At 8 cmH20, the percentages of twitches with flow limitation were 100%, 54% and 93% with NM, NM+MAD and FF respectively. At 10 cm H2O, these percentages were 67%, 40% and 77%.

Conclusion: MAD associated with NM reduces UA resistance and collapsibility during CPAP therapy. When associated with a NM, MAD could significantly decrease the effective pressure level during CPAP therapy, thus reducing the risk for mask leaks.

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W-I-053 IMPACT OF OBSTRUCTIVE SLEEP APNEA ON GLUCOSE METABOLISM AND FREE FATTY ACIDS: SEX DIFFERENCES

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Introduction and Objectives: Obstructive sleep apnea (OSA) is an independent risk factor for the metabolic syndrome, and is more prevalent in men than women. The objective of this study was to determine if there are sex differences in the impact of OSA on glucose metabolism and free fatty acids.

Materials and Methods: Seventy-eight non-diabetic men and women with BMI >27 kg/m^2 had an overnight polysomnogram followed by a 2-hour 75-gram oral glucose tolerance test with sampling every 30-min. Samples were assayed for glucose, insulin, C-peptide, and free fatty acids (FFA).

Results: Twenty-eight men and 20 women had OSA (74% versus 50%; $p<0.05$). The presence of OSA was associated with prediabetes (impaired fasting glucose and/or impaired glucose tolerance) in 15% of women but 43% of men ($p<0.05$). Fasting levels of glucose, insulin, C-peptide, FFA and HOMA-IR were not affected by the presence of OSA, after controlling for age, BMI and sex. In men, but not in women, the presence of OSA delayed the return to baseline of glucose levels (timing of maximum glucose: 61±4 min in men with OSA versus 36±7 min in men without OSA; p=0.015 for OSA x sex interaction). OSA had an adverse impact (p=0.028) on 60-min glucose values (women [adjusted mean±SE]: 137±8 versus 126±8mg/dl; men: 162+6 versus 127±11 mg/dl) after controlling for age and BMI. HOMA-IR values tended to be higher in subjects with OSA, irrespective of sex. The severity of OSA, as quantified by the Apnea-Hypopnea Index (AHI) was associated with higher levels of FFA during the OGTT in men but not in women (interaction of sex x AHI: $p<0.02$).

Conclusion: OSA has a significant adverse impact on glucose and FFA metabolism which is more severe in men than in women, after controlling for age and BMI.

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W-I-054 IMPAIRMENT OF RENAL FUNCTION IN OVERWEIGHT PATIENTS WITH OBSTRUCTIVE SLEEP APNEA AND HYPERTENSION

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Introduction and Objectives: Microalbuminuria (MAU) and glomerular filtration rate (GFR) reveal a state of renal dysfunction; obstructive sleep apnea (OSA) further promotes the development of hypertension (HP) and renal impairment. The aim of the present study has been to investigate the relationship between renal dysfunction and HP in overweight patients with OSA.

Materials and Methods: Twenty two overweight subjects were enrolled in this study from the outpatient OSA unit (86.4% male; apnea hypopnea index [AHI] of all subjects was above 5 h-1). Patients were divided into two groups according to the presence of HP: Group A-11 hypertensive patients with office blood pressure (BP) values of 151±22/95±10 mmHg and Group B-11 patients without HP with BP values of 121±7/78±4 mmHg. MAU and GFR were compared between A and B groups. OSA was documented with polysomnography. Urinary albumin excretion (UAE) was assessed by albuminuria and MAU. Polysomnography and office BP measurement were performed on all patients. GFR was calculated according to the Cockcroft-Gault formula.

Results: Groups were comparable by sex, age (46.5±12.3 years vs 43.8±14.2 years, respectively) and body mass index (38.4±8.0 vs 34.1±4.9 kg/m^2, respectively). Levels of mean UAE and GFR tended to be greater in Group A; 76.6±122.2 vs 23.3±48.6 mg/L (p=0.193) and 120.9±34.7 vs 101.8±19.9 ml/min*1.73m^2 (p=0.129), respectively. In the partial correlation model UAE related with diastolic BP in Group A (p=0.012). UAE and GFR were negatively correlated in Group B (p=0.037), but not in Group A. BP level was an independent predictor for UAE based on a linear regression analysis in Group A (R2=0.493; p=0.016).

Conclusion: The study suggests that hypertensive overweight OSA subjects demonstrated a significant interaction between UAE and diastolic BP. The observed association between BP levels and MAU may provide an insight into UAE related risk evaluation in hypertensive overweight patients with OSA.

W-I-055 INFLUENCE OF THE RESPIRATORY PARAMETERS ON CARDIOVASCULAR AUTONOMIC MODULATION DURING NREM SLEEP STAGE IN PATIENTS WITH ARTERIAL HYPERTENSION AND OBSTRUCTIVE SLEEP APNEA

Ani Aleksanyan, Gevorg Podosyan, Aida Matevosyan, Parounak Zelveian. *Center of Preventive Cardiology, Armenia*

Introduction and Objectives: Sleep-disordered breathing is associated with an altered sleep stage-specific sympathovagal balance determined by nocturnal respiratory disturbance and hypoxia. In patients with arterial hypertension (AH) and concomitant obstructive sleep apnea (OSA), disturbance of the autonomic control may be potentiated. We investigated whether specific alterations in autonomic cardiac modulation during NREM sleep, is associated with respiratory parameters in patients with OSA and AH.

Materials and Methods: We studied overnight polysomnographies of 21 untreated patients (95.2% male, mean age 46±11.3y, mean body mass index 34.9±4.9 kg/m^2) with OSA (average apnea-hypopnea index 54.9±29.6h-1) and AH (mean level of blood pressure 146.2±21.5/96.4±8.5 mmHg). In order to assess the effect of above mentioned parameters the oxygen desaturation (OD), snore time (ST), apnea-hypopnea episodes during NREM (NREM index), average oxygen saturation (AOS) total, AOS NREM were estimated. Cardiovascular autonomic control during NREM sleep was estimated by spectral analysis of heart rate variability – very-low-frequency (VLF 0.003-0.04 Hz), low-frequency (LF 0.04-0.15 Hz), and high-frequency (HF 0.15-0.4 Hz), the LF/HF ratio representing the sympathovagal balance. Relationship between above mentioned parameters were estimated by Pearson correlation analysis.

Results: Were observed significantly negative correlation between AOS total, AOS NREM and sympathovagal balance, but OD and NREM index were significantly correlated both with sympathetic activity and altered sympathovagal balance. The OD was significantly correlated with VLF. Results are presented below. VLF LF HF LF/HF NREM index .332 .653(**) -.156 .597(**) AOS total -.330 -.381 .231 -.452(*) AOS NREM -.344 -.373 .230 -.441(*) ST -.135 -.244 -.133 -.150 OD .477(*) .827(**) -.158 .742(**) *p<0.05, **p<0.01

Conclusion: The nighttime oxygen desaturation and apnea-hypopnea events during NREM sleep stage may be considered as the most important determinants of autonomic disregulation in the direction of sympathetic activation during NREM sleep in patients with AH and OSA.

W-I-056 INTERMITTENT HYPOXIA AFFECTS UNCOUPLING PROTEIN 1 EXPRESSION

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Introduction and Objectives: Sleep apnea leads to intermittent hypoxia (IH) and is associated with weight gain. Mice and rats exposed to IH reduce body weight and decrease brown adipose tissue (BAT) wet weight. BAT dissipates energy as heat in the non-shivering thermogenesis. The uncoupling protein 1 (UCP1) saves energy generating heat instead of synthesizing ATP at the mitochondria. We hypothesized that weight loss under IH occurs due to changes in BAT affecting UCP1 expression.
Materials and Methods: During 35 days, Balb/c mice were exposed to IH and to sham IH (SIH). To simulate sleep apnea, the IH system alternates 30 seconds of progressive cage hypoxia to a nadir of 6% in oxygen concentration, followed by 30 seconds of room air insufflation. In 8 hours daily, the animals were exposed to a total of 480 cycles of hypoxia/reoxygenation. Twenty-three rodents in IH and SIH groups were anesthetized and euthanized after 35 days of experiment. Eight mice were returned to their standard cages without intervention for 2 weeks of recovery from IH (RIH) before euthanasia. Interescapular BAT was dissected and immediately frozen. Housing temperature varied between 22.5 and 24.5°C. Expression of UCP1 mRNA was measured from the BAT specimens by real-time PCR.
Results: Median (50th percentile) and percentiles (25th-75th percentiles) of the UCP1 mRNA levels in the IH, SIH, and RIH groups were 0.007 (0.0002-0.65), 1.32 (0.49-11.94), and 0.25 (0.095-8.37), respectively. Difference between groups IH and SIH was significant ($p=0.006$); no significance was reached between IH vs. RIH ($p=0.078$) and SIH vs. RIH ($p=0.242$).
Conclusion: IH during 35 days in a mice model of sleep apnea diminishes the expression of UCP1 mRNA. Two weeks of recovery do not seem to reverse completely the expression of the UCP1. Weight loss under IH may be related to energy unbalance caused by reduction in UCP1 activity.
Acknowledgements: Research was supported by FIPE – HCPA (Brazil).

W-I-057 INTERMITTENT HYPOXIA ELEVATES BRAIN WATER CONTENT AND DECREASES AQUAPORIN 1 IN MOUSE CEREBELLUM

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Introduction and Objectives: Patients with sleep apnea syndrome exhibit cerebral morphological changes. Aquaporins are membrane proteins responsible for the transport and the balance of water content in the brain. Changes in aquaporin 1 expression in the cerebellum have been reported in pregnancy. Little attention has been dedicated to the role of aquaporins in sleep apnea-related brain alterations. The present study aims to quantify aquaporin 1 levels in mouse hippocampus and cerebellum as well as to determine the brain water content.
Materials and Methods: We exposed C57BL mice to 35 days of intermittent hypoxia (IH; n=17) or sham intermittent hypoxia (SIH; n=18), alternating 30 seconds of progressive hypoxia to a nadir of 6% FIO2 with 30 seconds of room air insufflation. During 8 hours of the light period, the rodents underwent a total of 480 cycles of hypoxia/reoxygenation, equivalent to an apnea index of 60/hour. Brains of 6 IH and 6 SIH animals were dissected, weighted while wet and placed in an oven at 95°C during 48 hours. Percent brain water content was calculated. Levels of aquaporin 1 were measured using an ELISA test.
Results: The mean brain wet weight and brain water content were higher in the IH group (respectively 0.48±0.004 g and 79.7±0.11%) than the SIH group (respectively 0.46±0.008 g and 76.8±0.52%; $p<0.01$). The average aquaporin 1 level in the cerebellum was higher in the SIH group (4.5±0.79 ng/mL) than in the IH group (3.9±0.48 ng/mL; $p=0.01$). No significant difference was found between the two groups for the aquaporin 1 in the hippocampus.
Conclusion: Exposure to intermittent hypoxia during 35 days in a mice model of sleep apnea increases wet weight and water content of the brain while reducing cerebellar aquaporin 1 levels. The relationship between sleep apnea and central nervous system structural alterations may involve downregulation of aquaporin 1 activity.
Acknowledgements: Research was funded by FIPE-HCPA (Brazil).

W-I-058 INTERRELATIONSHIP BETWEEN SLEEP PARAMETERS AND CARDIOVASCULAR AUTONOMIC MODULATION DURING NREM SLEEP STAGE IN PATIENTS WITH ARTERIAL HYPERTENSION AND OBSTRUCTIVE SLEEP APNEA

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Introduction and Objectives: The sleep stage-specific shift of cardiac autonomic modulation such as decreased sympathetic tone and increased parasympathetic tone during NREM sleep is strongly altered in patients with obstructive sleep apnea (OSA). In patients with OSA alteration of autonomic control may be potentiated in the presence of arterial hypertension (AH). The aim of this study is to assess the interrelationship between the NREM sleep stage cardiovascular autonomic modulation and sleep parameters in OSA patients concomitant with AH.
Materials and Methods: We studied overnight polysomnography from 21 untreated patients (95.2% male, mean age 46±11.3y, mean body mass index 34.9±4.9 kg/m^2) with OSA (average apnea-hypopnea index (AHI) 54.9±29.6 h-1) and AH (mean level of blood pressure 146.2±21.5/96.4±8.5 mmHg). In order to assess the effect of the above mentioned parameters: the total sleep time (TST), total arousals index (TAI), respiratory arousals (RA), sleep efficiency (SE (%)), sleep structure (S1 (%), S2 (%), S3, S4 (%), REM (%) of TST), was estimated. Based on recordings of brain waves and the analysis of their characteristic patterns it is possible to distinguish five sleep phases. Cardiovascular autonomic control during the NREM sleep was estimated by spectral analysis of heart rate variability – very-low-frequency (VLF) 0.003-0.04Hz, low-frequency (LF) 0.04-0.15Hz, and high-frequency (HF) range 0.15-0.4Hz, the LF/HF ratio represented the sympathovagal balance. Relationship between above mentioned parameters were estimated by Pearson correlation analysis.
Results: Significant correlation were observed between: S1 (%) TST and parasympathetic activity (HF) ($r=0.509$, $p<0.05$), S2 (%) TST and sympathetic activity (LF) ($r=0.471$, $p<0.05$), TAI and sympathetic activity (LF) ($r=0.459$, $p<0.05$), sympathovagal balance (LF/HF) ($r=0.457$, $p<0.05$), TST and sympathetic activity (LF) ($r=0.458$, $p<0.05$). Between other parameters any significant correlation was not detected.
Conclusion: NREM sleep stage cardiovascular autonomic dysregulation, especially sympathetic activation is closely related with transient arousals, but not with respiration related arousals.

W-I-059 OBJECTIVE ASSESSMENT OF SLEEP DISTURBANCES DURING GESTATIONAL DIABETES: A CASE CONTROL STUDY

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Introduction and Objectives: Gestational diabetes (GDM) occurs in 2-9% of pregnancies increasing the risk of perinatal morbidity. While diabetes is associated with snoring and sleep disorders, this case-control study explores whether GDM is associated with a higher prevalence of sleep disturbances in pregnant women.
Materials and Methods: One night of home complete polysomnography (PSG) is performed in cases and controls selected among healthy women screened for GDM by oral glucose tolerance test (OGTT) between 24 and 32 wks of gestation. Subjective sleep quality is assessed via Pittsburgh Sleep Quality Index (PSQI), which includes self-reported snoring and sleep time (RST).
Results: To date, we have studied 13 cases (age=31.1±5.7 y; pre-pregnancy BMI=25.8±3.5 kg/m^2; primiparous=92%) and 11 controls (age=31.5±3.4 y; pre-pregnancy BMI=27.1±4.3 kg/m^2; primiparous=91%). 27% of cases and 20% of controls reported snoring ≥;3 times/wk with apnea-hypopnea index (AHI) values of 2.6±2.3/h and 4.5±3.1/h respectively. Minimal O2 saturation was 85.8±18.4% in cases and 86.4±6.7% in controls, while the desaturation index was 1.9±2.4/h in cases and 1.0±1.0/h in controls. Recorded total sleep time (TST) by PSG was 6.4±0.7 h and 6.8±1.2 h, while reported RST

in the PSQ was 7.3±1.6 h and 7.3±1.2 h in cases versus controls respectively. Snoring, AHI, minimal O2 saturation and desaturation index, TST, RST, sleep efficiency, and total PSQI scores were not significantly different between groups. Pre-pregnancy BMI but not gestational weight gain since the beginning of the pregnancy was negatively correlated with RST (r=-0.4; p=0.04).

Conclusion: Our preliminary data suggest no significant differences in either sleep-disordered breathing or other objective or subjective measures of sleep quality, between women with versus without GDM.

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W-I-060 POLYSOMNOGRAPHY VARIABLES, SYMPTOMS AND MORBIDITY IN OBESE PATIENTS. A COMPARISON BETWEEN OBESE WITH AND WITHOUT SLEEP APNEA

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Introduction and Objectives: Frequent symptoms in OSAHS are habitual snoring, sleepiness, fatigue, depression, nocturnal awakening and respiratory pauses. The frequency of these symptoms in obese patients without OSAHS is unknown. In this study we established polysomnography variables, symptoms, and morbidity in obese patients with and without OSAHS.

Materials and Methods: Fifty-six obese patients (20 men, 36 women) referred by suspected OSAHS were included, if they gave the informed consent and have not drug addictions, hypothyroidism, or were under medication that may affect sleep. Medical status regarding hypertension and diabetes was established. Patients were 32.2±9.6 y.o. with BMI=45.8±6.6 kg/m^2, Polysomnography (PSG) was performed under two consecutive nights followed by Multiple Sleep Latency Test (MSLT). Patients completed: the Sleep Disorder Questionnaire (SDQ), Epworth Sleepiness Scale (ESS), Beck Depression Inventory (BDI) and Fatigue Severity Scale (FSS). Patients were classified according to the Apnea–Hypopnea Index (AHI) in two groups: OSAHS-Group (AHI ≥5, n=28) and non-OSAHS-Group (AHI <5, n=28). Groups were matched by sex, age and BMI.

Results: The OSAHS-Group had AHI=33.0±25.3, whereas non-OSAHS-Group was 2.1±1.5. OSAHS-Group had more light sleep (stage N1%=15.4±7.8 vs.10.6±3.8, P=0.005) and increased number of sleep transitions (187.0±45.7 vs.160.9±27.6, P=0.02). MSLT score for OSAHS-Group was 5.5±4.3 vs. 6.2±4.3 for non-OSAHS-group, P=0.50. Also subjective sleepiness score (ESS) did not differ, OSAHS-Group=9.8±4.5 (50%, ESS>10) vs. 8.9±4.8 (32%, ESS>10), P=0.50. OSAHS-Group reported higher snoring score (SDQ21=4±1 vs. SDQ21=3±1, P=0.014), and a higher depression (BDI=18.7±10.5 vs. BDI=12.6±9.4, P=0.027) than non-OSAHS-group. There were not differences in the fatigue level. The OSAHS-Group had higher frequency of hypertension (77.8%) than non-OSAHS-Group (43.5%), P=0.027. The proportion in diabetes was about the same between groups.

Conclusion: MSLT sleepiness is highly prevalent in obesity, even without OSAHS. ESS underestimates sleepiness level in obese. OSAHS induces more light sleep, and sleep transitions. Patients with OSAHS have more snoring frequency and depression level. The hypertension is more frequent in the obese with OSAHS.

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W-I-061 PORTABLE MONITORING FOR OSAS DIAGNOSIS

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Introduction and Objectives: OSAS is a prevalent disease and requires complementary test for the diagnosis. Portable Monitoring for OSAS diagnosis can be performed at patient's home and is less expensive than polissonography. The Portable Monitoring type 2 has few data in the literature. The objetive is comparing attended in the lab and unattended at home test for OSA diagnosis using a Portable Monitoring type 2 equipment.

Materials and Methods: 15 patients were selected using one Protocol with evaluation and physical examination directed for OSAS. All the patients were had 02 Portable Monitoring with 02 channels EEG, EMG, EOG, nasal cannula, plesthimography thorax and abdomen belts, position, pulse and oxygen saturation in consecutive dates, one at home - non assisted - and other in the lab – assisted – using the same equipment – Embletta X100. We randomized the sample. We compared all the sleep summary data and the AHI. The sleep analysis was performed by an observer blinded to study conditions.

Results: We analyzed data from 11 men and 4 women. The mean age was 42 years old and the mean BMI was 26,6. 9 patients (6 men and 3 women) started at home and 6 in the lab (5 men and 1 woman). The mean sleep efficiency at home was 80% and in the lab 72%. We observed AHI 0-5: 5 at home and 4 in the lab, 05-15: 05 home and 6 lab, 15-30: 2 home and 3 lab and over 30: 3 home and 2 lab, T student 0,31 inter samples. We calculated the Pearson's Correlation 0,870798 and Kappa 0,64 for the AHI.

Conclusion: In our preliminary results, we concluded that Portable Monitoring assisted in the lab compared to non assisted at home has a good correlation and can be an option for OSAS diagnosis

W-I-062 PREDICTING EFFECTIVE CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP) FOR SLEEP APNEA

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Introduction and Objectives: Predicted effective CPAP can be used as a starting point for CPAP titration, or for initial treatment when titration is impractical, unsuccessful or involves unacceptable delay. The predicted effective CPAP can be derived from formulas, but these can be difficult to validate and require calculations. The simplest and most time-efficient approach is to predict the effective CPAP based only on clinical information and the results of diagnostic polysomnography, without using any formula. The objective of this study was to compare predicted effective CPAP obtained from clinical data and diagnostic polysomnography results (without using any formula), to effective CPAP determined by CPAP titration.

Materials and Methods: Subjects of 28 consecutively reviewed adult CPAP titration studies at a sleep laboratory were initially included. All subjects had previously undergone clinical evaluation and diagnostic polysomnography. Four subjects were excluded due to inconclusive results. For each of the 24 remaining subjects, the effective CPAP was predicted (Ppred) using data from the history and physical examination and results of the diagnostic polysomnogram, relying only on clinical experience and familiarity with polysomnographic techniques in the laboratory, without using any formula. The Ppred was correlated with the effective pressure determined by the CPAP titration study (Peff). The technicians involved with each study were unaware of the Ppred, thus avoiding technician bias.

Results: Peff ranged from 5 to 14 cm H2O. Ppred correlated significantly with Peff (r=0.726, P≤0.0001). Ppred was equal to Peff for 8 (33.3%), within ±1 cm H2O for 13 (54.2%) and within ±2 cm H2O for 17 (70.8%) of the 24 subjects.

Conclusion: Assuming sufficient clinical experience and familiarity with polysomnographic techniques, effective CPAP can be predicted with reasonable accuracy from clinical data and the results of diagnostic polysomnography, without using any formula.

W-I-063 PREDICTORS OF MEDIUM-TERM ADHERENCE DURING CPAP TREATMENT: A STUDY WITH ADHERENTS AND INTERMITTENT USERS

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Introduction and Objectives: Adherence to CPAP treatment is a dynamic variable which measurement needs to take in consideration the context, time and patient's experience. This study aimed to identify predictors of adherence to CPAP in Obstructive Sleep Apnea Syndrome (OSAS) patients at a second follow up time (between 3 to 6 months).

Materials and Methods: 125 OSAS patients who received CPAP treatment at a Sleep Disordered Breathing Clinic of a University Hospital (Age: M=53.2 SD= 9.83) participated in the study. Seventy five intermittent users (defined as CPAP use ≥4h/night and <90% of the total treatment days) and fifty adherent patients (defined as CPAP use ≥4h/night and >90% of the total

treatment days) participated in the study and underwent a standardized protocol. Assessment included psychological evaluation to assess quality of life (SAQLI) and determinants of nasal CPAP compliance, which included variables from the social cognitive theory (self-efficacy, results expectancies, social support and knowledge) and transtheoretical model (decision balance index and process of change). All the instruments had been adapted to the Portuguese population.
Results: A logistic regression was performed. Results showed that adherence to CPAP was best predicted by higher quality of life and self-efficacy perception, age under 53, being referred to treatment by a physician or by spouse and frequent processes of change. The model explained 42.5% of variance (Nagelkerke R2=0.425).
Conclusion: Results emphasize the need to include self-efficacy, to focus on quality of life as a result of CPAP treatment and also how important physician or spouse's referrals are. It is therefore important that general physicians reinforce OSAS patients to CPAP treatment.

W-I-064 PREVALENCE OF SNORING AND APNEA EPISODES DURING SLEEP IN YEREVAN ADULT POPULATION DERIVED FROM TELEPHONE INTERVIEW SURVEY

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Introduction and Objectives: To determine the prevalence of snoring, breathing pauses during sleep in Yerevan adult population.
Materials and Methods: The Berlin questionnaire was used to assess the presence of snoring and apnea episodes. The survey was conducted by telephone interview. Participants were selected by taking random numbers. The number of participants was elected by using sample size determination for estimating a proportion, and was also taken into account approximate estimated prevalence of apnea, which is 5% and probable error margins 1%. The population quantity that had to be surveyed was 1825 people, from which 1503 [mean age 45.1±15.8 years, 521 (34.7%) male] were used in the analysis, the rest (322) of them either refused to answer or their questionnaires were insufficient. So from all calls made the success rate was about 82.4%. We divided our sample into 6 groups in 10y intervals. Statistical analyses were estimated by Pearson "chi-square".
Results: In the analyzed population 37.2% reported regular snoring and 5.5% reported apnea episodes during sleep. In our study snoring is associated with male rather than female gender (50.3% vs 30.2% respectively; $p<0.0001$) and apneas (13.7% vs 1.1% respectively; $p<0.0001$). Due to our results the regular snoring has correlation with age groups in both sex (X2=42.7 for male, X2=106.8 for female, $p<0.0001$), the prevalence of snoring is getting higher with the increase of age. There were not any correlations between apnea episodes and age groups, but in female population (X2=3.82; p=0.046) aged over 45 years we found high prevalence of apnea episodes, rather than in age below 45 years.
Conclusion: Snoring is highly prevalent in Yerevan male population. Despite world data regarding age and apnea interrelationship, we did not find any correlation between them.

W-I-065 RADIOTELEMETRY FOR STUDYING NEONATAL RESPIRATION DURING SLEEP IN TERM AND PRETERM OVINE MODELS

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Introduction and Objectives: Wireless equipment is being increasingly used in research for monitoring multiple physiological signals in freely moving animals. However, most studies on neonatal respiration are currently performed in newborn mice or rats. While these sophisticated techniques are being rapidly developed, simultaneous recording of numerous biopotentials are yet impossible in rodent models, due to size limitation. This led us to design and study unique term and preterm ovine models, using radiotelemetry for recording numerous biopotentials. The aim of the present communication is to report our experience with our custom-made radiotelemetry system in studying neonatal respiration in lambs.
Materials and Methods: Chronic surgical instrumentation under general anaesthesia is performed in all lambs in order to implant indwelling catheters (for monitoring fluid or air pressures) and electrodes (for monitoring biopotentials). Following postoperative recovery, all catheters and electrodes are connected to our radiotelemetry system housed in the lamb's jacket.
Results: Our current system is comprised of 3 different transmitters: 1) one transmitter with 12 channels for EMG (x 8), ECG, EEG, EOG and ground; 2) one transmitter for abdominal and thoracic movements, nasal flow and 2 respiratory or arterial pressures; 3) one transmitter for O2 saturation (SpO2, pulse wave). The combined radiotelemetry system allows us to perform prolonged polysomnographic recordings, comprising up to 18 simultaneously signals over a period of 16 h/day.
Conclusion: To our knowledge, our radiotelemetry system offers the highest number of physiological signals, which can be recorded simultaneously and wirelessly throughout the various states of alertness. Its contribution has proven invaluable to the study of respiration in our models of premature birth, reflux laryngitis, postnatal exposure to cigarette smoke, respiratory syncytial virus infection or nasal ventilation, which are all relevant to neonatal respiratory problems.
Acknowledgements: Supported by the Canadian Institutes for Health Research and the Canada Research Chair in Neonatal Respiratory Physiology.

W-I-066 SLEEP APNEA ATTENUATES THE EFFICIENCY OF A LIFESTYLE INTERVENTION PROGRAM IN VISCERALLY OBESE MEN

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Introduction and Objectives: Excess visceral adiposity and sleep apnea are two conditions independently associated with cardiovascular diseases. The two conditions are often combined and are believed to interact in a vicious circle. Objectives: 1) To test the relative contribution of changes in visceral adiposity and cardiorespiratory fitness to changes in sleep breathing disorders, 2) To compare the response of viscerally obese men with or without sleep apnea syndrome to a one-year healthy eating, physical activity/exercise intervention program.
Materials and Methods: Seventy seven men, selected on the basis of increased waist circumference ($\geq$90 cm), and dyslipidemia (triglycerides$\geq$1.69 and/or HDL-cholesterol$<$1.03 mmol/L), participated in this study. Body composition and fat distribution were assessed by DEXA/computed tomography and sleep breathing disorders by home-based polygraphic recording. Cardiorespiratory fitness, plasma cardiometabolic risk markers, fasting lipoprotein-lipid profile and oral glucose tolerance test were assessed.
Results: After the one-year lifestyle intervention, the oxygen desaturation index decreased (-3±13 events/hours), in relation with improvement in cardiorespiratory fitness ($r=-0.40$, $p<0.05$), but not with the reduction in visceral adiposity. The higher the baseline oxygen desaturation index and time spent under 90% saturation, the lesser were the reductions in fat mass and visceral adiposity as well as the improvement in glucose/insulin homeostasis indices after one year, despite similar compliance to the program.
Conclusion: A one-year healthy eating, physical activity/exercise intervention program is efficient to manage nocturnal desaturations of viscerally obese men through cardiorespiratory fitness improvement. However, having an elevated number of nocturnal desaturations at baseline impedes the metabolic improvements associated with the lifestyle intervention program.
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W-I-067 SLEEP DISORDERED BREAHING AND FERTILITY: A PUTATIVE RELATIONSHIP?

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Introduction and Objectives: Obstructive sleep apnea (OSA) is characterized by collapse of the upper airway in sleep, resulting in sleep fragmentation, and hypoxemia. The apnea hypopnea index (AHI) and respiratory disturbance index (RDI) are two measures used to quantify OSA severity. Affecting an estimated 11% of premenopausal women, studies show this condition may alter menstrual cycles and lower levels of estradiol, progesterone

and 17 hydoxyprogesterone. Consequently, some have speculated this may affect fertility. Miscarriage, the abrupt spontaneous loss of a pregnancy usually before 12 weeks of pregnancy, is estimated to occur in 12-24% of pregnancies. Frequently, the cause is unknown. The aim of this study was to assess whether OSA would increase the risk of having a miscarriage.
Materials and Methods: 70 Female patients under the age of 52 years with at least one pregnancy referred to the Royal Ottawa Mental Health Center Sleep Disorders Clinic were assessed with a retrospective chart review. Clinical history was obtained regarding demographic information and a history of miscarriages. All women included also completed an overnight polysomnography. Women were divided into two groups; those with a history of miscarriages and those without; results were analysed to determine whether those women with a history of at least one miscarriage would have a higher frequency of sleep disordered breathing events as measured by RDI and AHI.
Results: Using a t-test, there was no significant difference in RDI for women with a history of miscarriage (n=35) compared to those without miscarriages (n=35, p=0.41). Results showed that while there was a slight trend towards a higher AHI in patients with a history of miscarriage, the difference was not statistically significant (p=0.18).
Conclusion: The study suggests that OSA may not be strongly associated with miscarriages. The small sample size and the retrospective nature of the research, however, limits the generalisability of these findings.

W-I-068 SLEEP DISORDERED BREATHING AND SHIFT WORK: THEIR ASSOCIATION WITH IMPAIRED QUALITY OF LIFE

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Introduction and Objectives: Sleep disordered breathing (SDB), and in particular obstructive sleep apnea syndrome (OSAS), have a known negative impact on mental health and quality of life. Shift work (SW) is increasingly being studied as an important factor of deterioration in the same areas. In the health workers combine both risk factors on a regular basis. Our objective was to evaluate the combination of both risk factors and their association with quality of life.
Materials and Methods: We conducted a cross-sectional study of health workers in a public hospital in the city of Santiago. As part of an occupational health program, we applied the SF-36 health survey and the Berlin Questionnaire. Workers were classified into four risk groups and evaluated using standard ANOVAs.
Results: We studied 201 workers of both sexes, with an average age of 45.5 ($\pm$12.1) years. In the study group 96 (47.8%) had high risk score of OSAS in Berlin Questionnaire, and 92 (43.8%) were employed in rotating shift system (RS) night. The groups formed were: normal schedule and low risk (NS/LR) (n = 63), normal schedule and high risk (NS/HR) (n = 46); rotating shift and low risk (RS/LR) (n = 42), and rotating shift and high risk (RS/HR) (n = 50). The results show lower scores in all domains of quality of life in groups at high risk of OSAS. The results for summary measures of SF-36 were as follows. Health Physics: NS/LR = 74.15 ($\pm$16.23), NS/HR = 62.79 ($\pm$19.45), RS/LR = 69.66 ($\pm$18.41), RS/HR = 56.11 ($\pm$23.2); ($p<0.000$). Mental Health: NS/LR = 72.16 ($\pm$20.25), NS/HR = 61.43 ($\pm$23.39), RS/LR = 69.68 ($\pm$23.55), RS/HR = 57.98 ($\pm$26.63); ($p<0.007$).
Conclusion: Our results show that in health workers SDB is highly prevalent and combined with RS night becomes associated with a further deterioration in the quality of life.

W-I-069 SLEEP DISORDERED BREATHING IN TIA/ISCHEMIC STROKE: EFFECTS ON SHORT- AND LONG-TERM OUTCOME AND CPAP TREATMENT EFFICACY - SAS CARE STUDY

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Introduction and Objectives: The SAS CARE 1 study is planned to verify if SDB has a detrimental 3 months effect on cardiovascular functions and markers after AIE; The SAS CARE 2 study is designed to address if treatment of SDB with CPAP reduces the combined rate of mortality, stroke, cardiovascular events (myocardial infarction/revascularisation/instable angina/hospitalisation for heart insufficiency) over a 24 months period in patients after AIE.
Materials and Methods: SAS CARE 1 (n=200) is an open, prospective trial in patients with AIE admitted in a Stroke Unit. SAS CARE 2 (preliminary phase n=200) is an open, randomised, 5-arm parallel group, prospective, partially interventional, controlled study in patients with AIE within the last 90 days or previously screened in SAS CARE 1. After baseline assessment (3 months) patients will be classified according to their AHI. All patients with moderate-severe obstructive and sleepy SDB (AHI $\geq$20, ESS score $\geq$10) will receive CPAP treatment. Patients with moderate-severe obstructive and non-sleepy SDB (AHI $\geq$20,ESS score $<$ 10) will be randomised to receive CPAP treatment or not.
Results: So far 33 patients have been recruited in SAS CARE 1: 68% of patients presented an AHI $>$10, and 40% with AHI $>$ 20; 52% had obstructive SDB, 42% central and 40 mixed SDB; 18 patients were already included in SAS CARE 2: 58% had an AHI $>$ 10 and 52% with AHI $>$ 20, 90% had obstructive SDB and 10% had central SDB.
Conclusion: Current recruitment status corresponds to expectations and let us anticipate by December 2011 the inclusion of n=100 in SAS CARE 1, n=100 in SAS CARE 2 with n=30 randomized patients. Population characteristic of SAS CARE reflects the previously reported high frequency of SDB in patients in the acute phase of AIE, with persistence of primarily obstructive SDB in the subacute phase of stroke.
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W-I-070 SLEEP HYPERHIDROSIS AS AN INDICATOR OF SLEEP BREATHING DISORDERS IN CHILDREN

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Introduction and Objectives: Nowadays, sleep breathing disorders (SBD) are seen as a serious problem during childhood, mainly because they may have consequences for the entire life. Snoring or apnea may sometimes be difficult to acknowledge since caretakers are also sleeping when children present the symptoms. We hypothesized that sleep hyperhydrosis could be an easier sign for caretakers to recognize, and might be a good indicator of SBD, facilitating early diagnosis and intervention. Our objective was to verify if children with SBD also presented sleep hyperhydrosis.
Materials and Methods: We studied 21 children (mean age 8. 33$\pm$1. 52 years, 15 boys) referred to our sleep service. Children's inclusion followed all individuals admitted with complaints of sleep breathing disorders, and ages varying from 4 to 16 years old. Patients with neurological or psychiatric disorders, respiratory diseases, or using any kind of medications that could influence sleep parameters were excluded. We used the Sleep Disturbance Scale for Children (validated in Brazil) to detect sleep hyperhydrosis and polysomnography to detect SBD.
Results: 18 children presented SBD and among them, 9 were referred to have sleep hyperhydrosis. The 3 children without SBD did not present sleep hyperhydrosis ($p<0.05$).
Conclusion: Results seem to show that sleep hyperhydrosis may be an indicator of sleep breathing disorders in children and should be consid-

ered when diagnosing respiratory problems during sleep. More studies are needed with larger samples in order to confirm these data.

W-I-071 SLEEP LABORATORY TESTING REFERRALS IN CANADA

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Introduction and Objectives: Polysomnography is the gold standard diagnostic test for sleep apnea. We sought to assess the predictors of sleep laboratory testing referral in Canada.
Materials and Methods: The Public Health Agency of Canada developed the 2009 Sleep Apnea Rapid Response survey, a supplement to Statistics Canada's Canadian Community Health Survey, to provide national information on prevalence, risk (based on the STOP tool), and diagnosis of sleep apnea. A sub-sample of 8647 respondents aged 18 years or older was included in this study from a total sample of 9523 respondents aged 12 years or older. Predictors of self-reported sleep laboratory testing referral were assessed using log-linked binomial regression modelling.
Results: An estimated 77% of adult Canadians with reported diagnosed sleep apnea, and 5% of adults at high risk of obstructive sleep apnea (OSA) reported being referred to a sleep laboratory for overnight testing. Significant predictors ($p<0.05$) of sleep laboratory testing referral were being male, being middle aged, a BMI in the overweight or obese range, 1 or more of 5 chronic conditions (hypertension, heart disease, diabetes, stroke, mood disorder), and having a regular medical doctor. Symptoms of sleep apnea, including snoring, tiredness, and observed apnea were significant predictors ($p<0.05$) of sleep laboratory testing referral, with observed apnea being the strongest predictor. Individuals from regions other than Ontario were less likely to report testing referrals ($p<0.05$).
Conclusion: Individuals at high risk of OSA and those reporting symptoms of sleep apnea were more likely to report sleep laboratory referral compared to those not at risk and not reporting symptoms; however, 23% of individuals with reported diagnosed sleep apnea and 95% of Canadians at risk of having OSA did not report testing referral. The significance of region in predicting reported testing referral is consistent with the distribution of sleep testing facilities across the country.

W-I-072 SLEEP-DISORDERED BREATHING IN A PEDIATRIC COHORT WITH ARNOLD-CHIARI MALFORMATIONS

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Introduction and Objectives: Data on Arnold Chiari (AC) malformations and its significance in children are limited. Our objective was to describe the polysomnographic, clinical and radiologic features of children with AC malformations.
Materials and Methods: A retrospective review was performed of the polysomnograms (PSG) of children with AC malformations at Sick Kids Hospital Toronto, Canada between January 2006 and June 2011. All studies were performed in a pediatric sleep laboratory and conducted and scored according to the American Academy of Sleep Medicine 2007 guidelines. Children were excluded if PSGs were only performed after decompression surgery or the initiation of mechanical ventilation. The medical record was reviewed and demographic data, neurological symptoms, sleep symptoms and MRI results were obtained. Patients were then grouped into the following categories: neurological symptoms or sleep symptoms, asymptomatic, and asymptomatic but with complex histories (co-morbidities in addition to their AC malformation).
Results: Baseline polysomnographic data was available for thirty-nine children (19 male). The mean (SD) age was 7±4.1 years. Thirty-one (79%) patients had Type I AC malformations. Eighteen (46%) children had either obstructive or central sleep apnea, 13 (33%) had obstructive sleep apnea, 12 (31%) had central sleep apnea. Hypoventilation was observed in three children. Twenty-eight children had either neurological or sleep symptoms at the time of the polysomnogram. Of the 22 children with normal sleep studies, 7 (32%) were asymptomatic; all seven of these children did not have medical co-morbidities.
Conclusion: This study confirms that sleep-disordered breathing occurs in almost 50% of children with AC malformations referred for polysomnogram, with obstructive and central sleep apnea occurring in almost equal numbers. Although predicting the presence of sleep-disordered breathing is difficult when symptoms are present, our data suggests that in asymptomatic children without medical co-morbidities, polysomnograms may not be needed. However, larger studies are needed to confirm this finding.

W-I-073 STUDY OF THE RELATIONSHIP BETWEEN SERUM URIC ACID AND SLEEP-DISORDERED BREATHING

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Introduction and Objectives: 1) Determine if there are correlations between uric acid and sleep parameters. 2) Evaluate if uric acid readings differ depending on the severity of OSAHS and whether uric acid can be considered a marker of intermittent hypoxia in patients studied for suspected OSAHS.
Materials and Methods: A sleep study was conducted (respiratory polygraphy or polysomnography) on 110 patients referred for the first time to a sleep-disordered breathing clinic during which serum uric acid was measured. In addition, anthropometric parameters and Epworth scale measurements were recorded.
Results: Included 110 patients: 55±12 years of age, BMI 30,4±6,1 kg/m^2, neck circumference 42±7 cm, Epworth scale 11±10, AHI 33,6±26.3h-1, mean SpO2 91±8%, CT90 23±29%, minimum SpO2 76±14%, DI 35±27 h-1. The mean value for uricemia was 5,85±1,31 mg/dl. In men (n=74), this value was 6,1±1,2 mg/dl, and in women (n=27) it was 5,1±1.3 mg/dl. There were significant differences between patients with OSAHS (6,5±1,2mg/dl) and no OSAHS (5,5±1,3 mg/dl), ($p<0,001$). Using a Pearson correlation analysis, significant correlations were found between uricemia with AHI (r=0.253), SpO2 med (r=-0.235), SpO2 min (r=-0.291), AI (r=0.263) and anthropometric measures: BMI (r=0.316) and neck circumference (r=0.252). To evaluate whether uricemia varies according to the degree of severity, we differentiated three groups: 1) AHI ≤5, 2) IAH >5-30, and 3) AHI >30. The mean uric acid levels from the groups were: 1) 5,3±1,5 mg/dl), 2) 5,5±1,2 mg/dl and 3) 6,3±1,2 mg/dl. Using an analysis of variance and a Bonferroni post hoc test, significant differences were found between groups 1 and 3 (p=0,035) and groups 2 and 3 (p=0,015).
Conclusion: 1) Significant positive correlations were found between uricemia and AHI, AI, BMI and neck circumference and negative correlations with SpO2 med and SpO2 min. 2) Values of uricemia in plasma increased as the severity of OSAHS increased. Uric acid readings may be considered markers for intermittent hypoxia.

W-I-074 THE CHARACTERISTICS OF SLEEP-DISORDERED BREATHING WITH AGE IN PRE-MENOPAUSAL WOMEN

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Introduction and Objectives: The prevalence of SDB in pre-menopausal women is quite low but both age and BMI are significant risk factors for SDB. So authors tried to identify the characteristics of SDB with age in premenopausal women
Materials and Methods: A total of 89 subjects (mean 33 years, median 34, range 20-45 years) referred to Sleep medicine center, Stanford University CA, USA for diagnostic PSG between June, 2010 and February, 2011 were enrolled retrospectively. Physical examination, medical/surgical history and full-night PSG were obtained from all subjects. All subjects were divided into 2 groups, younger group (age between 20 and 30 years) and older group (age between 31 and 45 years)
Results: BMI was significantly different between the two groups but the distribution of SDB according to severity of AHI was similar without significant difference. Compared to the younger group, the older women reported more frequently snoring, witnessed apnea, and excessive movement during sleep but for daytime symptoms, both groups did not show any significant

differences. In comparison of PSG parameters between 2 groups, older women showed the percentage of S3 and REM decreased but the percentage of S2 sleep increased. The older group also showed mean arterial oxygen in each stage was significant low and AHI, Non-REM AHI, Supine AHI were well correlated with ODI and DI.
Conclusion: Even in pre-menopausal women, night symptoms and PSG parameters continue to be aggravated with age. But pre-menopause women are less likely to be aware of the progression of SDB because of lack of the change in daytime symptoms with age.

W-I-075 THE IMPACT OF SLEEP CONSULTATION PRIOR TO A DIAGNOSTIC POLYSOMNOGRAM ON CPAP ADHERENCE

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Introduction and Objectives: Polysomnograms (PSGs) are routinely ordered by non-sleep specialists. However, it is unknown whether a sleep specialist consultation prior to a diagnostic PSG influences adherence to continuous positive airway pressure (CPAP) therapy. Thus, our goal was to quantify the impact of the referring physician specialty — sleep specialist vs. non-sleep specialist — on objective CPAP adherence.
Materials and Methods: The study setting was an accredited outpatient sleep center (University of Chicago) in a large urban center in the United States. CPAP was set up at home and objective adherence was remotely monitored during the first 30 days of therapy. Physicians who ordered PSGs were divided into 2 groups: sleep specialists and non-sleep specialists. This study included 403 patients with obstructive sleep apnea who had CPAP adherence data available.
Results: Mean (± standard deviation) age was 52.5±14 years; 47% were men and 54% were African American. Mean daily CPAP use was greater in patients who were referred by sleep specialists (n=105; 279±179 min/day) compared to patients referred by non-sleep specialists (n=298; 219±152 min/day, p=0.005). In the linear regression model adjusting for several covariates, only two predictors were significantly associated with CPAP adherence. A sleep specialist consultation prior to the diagnostic PSG was associated with 58.2 minutes more per day (p=0.002) and African American race was associated with 56.0 minutes less per day (p=0.002) of CPAP use.
Conclusion: In this cohort study, CPAP adherence was significantly higher with a sleep specialist consultation prior to the diagnostic PSG. In addition, African American race was associated with worse adherence to therapy. A better understanding of predictors of CPAP adherence may be useful in identifying patients that may benefit from a sleep specialist consultation prior to ordering a diagnostic PSG.

W-I-076 USE OF BILEVEL IN A PATIENT WITH OSAS - A CASE REPORT

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Introduction and Objectives: The CPAP and BILEVEL are the principal therapy for Obstructive Sleep Apnea Syndrome (OSAS). The purpose of this study was to evaluate the impact of BILEVEL treatment for OSAS on quality of life.
Materials and Methods: Patient N.A., male, aged 72, was referred to FUABC for OSAS diagnostic investigation. The FUABC Sleep lab includes a multidisciplinary team: neurologist, a respiratory doctor, ORL and physiotherapist. The patient had the following co-morbidities: IAM-ICO,DM,HAS,RGE,AVC. During the consultation, the patient's spouse reported snorts of high intensity everyday, memory deficits, excessive daytime sleepiness, a sedentary lifestyle, tiredness, and apathy. The physical examination revealed Tonsils grade I, also Malampaty classification, Class IV, Medianizados, Uvula Thick Pillars and long Tongue Demarcated. Total score on the Epworth scale was 18, suggesting excessive daytime sleepiness. On 17/12/2008, baseline polysomnography showed the following results: ES: 96.6% IA/h: 63.6, S1, S2: 3%: 17.8% S3/4: 0.7% 18.3%, REM, SAT MINO2: 60%. On 28/08/09, polysomnography with Bilevel showed the following results: ES: 92.9%, IA/h: 13.7, S1, S2: 5.3%: 33.1% S3/4: 30.9% 30.7%, REM, SAT O2: 70% MIN., PRESSURE BIPAP: 22 x 17 cmh20.
Results: On 24/09/09 patient was asked to use Bilevel with oronasal mask, with pressure of 18 × 14 cm H2O for better adaptation, as well as weekly follow-up with team physiotherapist. After a month of use of the instrument, the patient returned and reported important improvements of diurnal symptoms with eight hours/night of Bilevel use. On 12/05/10, patient reported significant improvements in symptoms, and was well adjusted to the appliance, with improvement of AVD, practicing physical activity five days week.
Conclusion: This case report highlights the usefulness of multidisciplinary follow-up and Bilevel treatment to improve quality of life in a patient with major OSAS.

W-I-077 USEFULNESS OF PHRENIC NERVE STIMULATION TO PREDICT EFFICIENCY OF MANDIBULAR ADVANCEMENT DEVICE WHEN ANALYSING CHANGES IN FLOW-LIMITATION SITES IN SLEEP APNEA PATIENTS

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Introduction and Objectives: The success rate of mandibular advancement devices (MAD) is lower than that of CPAP in the treatment of obstructive sleep apnea. Furthermore, it is not possible to predict accurately patients who will improve. Phrenic nerve stimulation (PNS) is a useful tool to characterize upper airway (UA) mechanical properties during wakefulness. This study aims at comparing the influence of MAD-induced changes in limitation site assessed by PNS on treatment efficacy.
Materials and Methods: 15 sleep apnea patients (14 males, age 51±9 years, BMI 28.4±4.0 kg/m^2, AHI 28±13 n/h) participated in the study. PNS experiment took place during wakefulness before completing a conventional MAD home titration procedure. Airflow, velo- and oro-pharyngeal pressures were measured. PNS was applied at end expiration during nose breathing without MAD and following MAD progressive advancement until maximum tolerance and/or mandibular protrusion. MAD efficiency was assessed by a polysomnography at the end of the home titration.
Results: Stimulation consistently induced inspiratory flow limitation (IFL) at the oro- and/or velo-pharyngeal levels in all but one subject. Five subjects had exclusive oro- IFL at baseline and this pattern did not change with MAD. Three of these improved their AHI with MAD (complete or partial success). Ten subjects had velo- IFL at baseline. In seven of them, PNS-induced velopharyngeal IFL was no more observed with MAD-induced protrusion. In these ones, treatment success was observed in five. MAD success was seen in only 1/3 subjects whose PNS-induced velo- IFL persisted with MAD.
Conclusion: MAD can effectively modify the site of UA collapse as assessed by PNS. Subjects whose PNS-induced velopharyngeal IFL is abolished with MAD are prone to get improvement of sleep apnea with MAD.

W-I-078 USING CARDIAC VARIABLES AS AN INNOVATIVE METHOD FOR SCREENING OSA

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Introduction and Objectives: Obstructive sleep apnea (OSA) is a serious sleep disorder associated with an increased risk of morbidity and mortality. With all this recognition, OSA still remains undiagnosed and, consequently limiting the access to treatment for patients in need. Polysomnography (PSG) is the standard sleep examination procedure, although it is expensive and requires longer waiting lists in limited sleep facilities. The goal of this study was to assess the utility of a new algorithm in screening for OSA.
Materials and Methods: Subjects were 15 healthy volunteers (Mean ± SD: age = 37.7±5.6 yr; BMI = 22.7±1.8; neck circumference = 37.9±2.1) and 57 recently diagnosed OSA patients (age = 48.2±12.9 yr; BMI = 34.4±8.4; AHI = 31.8±26.3). Using a bioimpedance cardiac monitor, patients were tested alternating 3 periods of normal breathing with two-30 sec apnea episodes to simulate OSA conditions. Subjects were receiving points based on prevalence of the following: low resting myocardial contractility, low stroke volume at 90 sec after apnea, high neck circumference, high BMI and increased age. Subjects with a total score higher than 3 were "diagnosed" as having OSA. The investigator performing the scoring was blinded to the PSG diagnosis performed by a certified sleep technician.
Results: The assigned score was different between groups (OSA = 3.5±1.1; healthy = 0.8±0.9, $p<0.0001$) and correlated positively with the presence of OSA ($r=0.7$, $p<0.0001$). The sensitivity and specificity of this new algorithm was 0.80 and 0.93, respectively.

Conclusion: Values from a non-invasive cardiac test, together with simple anthropometric values, may represent a viable method for screening OSA and delineate high-risk patients that require immediate treatment. Future research is needed to determine the score's accuracy in a larger population.
Acknowledgements: Research supported by NeuMeDx Inc.

W-I-079 WAIST CIRCUMFERENCE VS. WAIST-TO-HEIGHT RATIO FOR THE PREDICTION OF APNEA SEVERITY

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Introduction and Objectives: Waist circumference (WC) is a predictor of obstructive sleep apnea (OSA). Waist-to-height ratio (WHR) has been reported as a better predictor than WC for diabetes and cardiovascular risk in the majority of studies. No study has compared the performance of WC and WHR in the prediction of the apnea-hypopnea index (AHI). Yhe objective was to compare the diagnostic performance of the WC and the WHR in the prediction of AHI greater or equal to 5/h and greater or equal to 30/h.
Materials and Methods: We analyzed retrospectively data from 4009 overnight polysomnographies performed in men and women aged 18-80 years. Before the full-night baseline polysomnography the measurement of the WC was done, at the midpoint between the lower costal rib and superior iliac crest, in men and women with suspected OSA.
Results: Combining data obtained from 2597 male and 1412 female subjects, WC ($r=0.53$; $p<0.001$) and WHR ($r=0.52$; $p<0.001$) were moderately correlated with the AHI. All areas under the receiver-operating characteristic curve (AUC-ROC) tested were significant ($p<0.001$) and larger for women than for men. Among men, AUC-ROC to predict AHI $\geq$5/h for WC (0.67) was similar to the AUC-ROC for WHR (0.66); the AUC-ROC for WHR was slightly, but significantly greater than for WC to predict AHI $\geq$30/h. Among women, AUC-ROCs for WC and WHR to predict AHI $\geq$5/h (0.73 and 0.73) and IAH $\geq$30/h (0.8 and 0.8) were equal. Cutoff points of WC to predict AHI $\geq$5/h and AHI $\geq$30/h, for men, were, respectively, 98cm and 100cm. Cutoff points of WC AHI $\geq$5/h and AHI $\geq$30/h, for women, were, respectively, 84cm and 92cm.
Conclusion: Diagnostic performance of WC and WHR is indistinguishable. Correcting WC for height seems to aggregate no advantage in the OSA investigation. The cutoff points for mild and severe OSA are virtually identical for men (98cm and 100cm). For women, the difference (84cm and 92 cm) may have clinical usefulness.

W-I-080 WEIGHT AND COGNITION: THE MEDIATING ROLE OF SLEEP DISORDERED BREATHING

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Introduction and Objectives: Academic success involves the ability to use cognitive skills in a school environment. Poor academic performance has been linked to disrupted sleep such as that from sleep disordered breathing. Further, growing evidence suggests poor sleep is associated with the risk for obesity. Weight management problems like binge eating are linked to executive dysfunctions, which fosters the relationship between obesity and adverse neurocognitive outcomes. We hypothesize that the weight-cognition association is mediated by sleep disordered breathing.
Materials and Methods: Children aged 6 to 10 years were recruited from the community, and underwent an overnight sleep study and physical examination of height and weight. The next morning a neuropsychological battery including the Differential Abilities Scale (DAS), assessing cognitive abilities, was administered. A recursive mediating model was fitted in a complete dataset of 351 children's verbal, nonverbal and spatial abilities. Indicators for weight were the Body Mass Index (BMI=weight/meters2) and for sleep disordered breathing the Apnea Hypopnea Index (AHI/hrTST).
Results: Mean age of the sample was 7.9 ± 0.8 years, median AHI/hrTST was 0.8 (Q1:0.3 and Q3: 1.7) and BMI was 17.5 (Q1: 15.6 and Q3: 20.8). Children's general cognitive abilities fell in normal range and were 100.8 ± 13.5 (Q1:91 and Q3:109). The model fit was very good: Chi-square (12)=11.2, p=0.512 with RMSEA=0.00 and AIC=59.2. Increased weight predicts increased sleep disordered breathing (p=0.012). Increased sleep disordered breathing had adverse cognitive effects ($p<0.001$). The direct effect was -0.20 ($p<0.001$) whilst when mediated by sleep disordered breathing a 0.55 fold increased risk was found.
Conclusion: Children with weight problems partially mediated by sleep disordered breathing have a significant decrease in cognitive abilities. As a result, obese children should be routinely monitored for sleep disordered breathing in order to prevent future learning deficits.

K: Technology/Technical

W-K-081 EFFICACY OF DETECTING SEIZURE ACTIVITY DURING OVERNIGHT PSG USING AN EXTENDED EEG MONTAGE VERSUS STANDARD PSG MONTAGE

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Introduction and Objectives: Sleep disorders are typically diagnosed using a standard polysomnogram (PSG). When clinically indicated, a seizure montage may be applied which includes additional EEG electrodes. At SickKids this involves 10 extra EEG leads, however the exact number may vary between institutions. There is no current pediatric data available to assess the added utility of a seizure montage in detecting seizure activity over and above a standard montage. Given the increased discomfort to the patients, in addition to the extra preparation time required for the technologists to perform such a study, this question is particularly relevant. Objectives of this study: 1) To evaluate the prevalence of seizure activity on the PSGs performed in a single institution. 2) To compare the standard montage to a seizure montage in detecting EEG abnormalities during sleep.
Materials and Methods: PSGs performed with a seizure montage over the past three years were reviewed and analyzed. Data collected included patient demographics, diagnosis at admission, indication for a sleep study, indication for a seizure montage, as well as all pertinent overnight PSG data. The presence or absence of epileptiform activity when viewing both the standard and seizure montage was reviewed and compared. All PSGs were scored by a registered sleep technologist according to the 2007 AASM guidelines.
Results: 13 PSGs with seizure montages were reviewed. Of these, 10/13 (77%) had some prior history of a seizure disorder, and 4/13 (31%) had abnormal EEG data detected during their PSG with seizure montage. Abnormalities on the EEG were detected on both the standard and seizure montage in all of these patients.
Conclusion: There is limited additional information from PSGs performed with a seizure montage as abnormal EEG data can usually be obtained from a standard montage. More strict criteria are required for determining when to perform a seizure montage study in children.
Acknowledgements: Tara Beattie, Research Assistant.

W-K-082 EVALUATING HEALTH CARE DELIVERY MODELS FOR SLEEP RELATED BREATHING DISORDERS (SRBD) USING HOME SLEEP TESTING (HST) AND AUTOMATIC SELF-ADJUSTING POSITIVE AIRWAY PRESSURE (APAP)

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Introduction and Objectives: Sleep laboratory capacity usually represents the rate-limiting step SRBD health care delivery. To evaluate the expense and dynamics of different health care delivery models we introduced HST and APAP into a real clinical setting and monitored results.
Materials and Methods: Data from 4000 consecutively referred patients, half before and half after introducing HST and APAP into our clinical setting provided input to models presented here. 88% of referrals were for suspected SRBD (98% male, mean age 58 years). We recorded polysomnograms (PSGs) with Grass digital systems and HSTs with Respironics Stardust cardiopulmonary devices; we used Respironics and ResMed APAPs. Nurses and respiratory therapists provided HST and APAP patient education, training, setup, follow-up, and data extraction.
Results: We modeled four SRBD-care paradigms: 1) PSG-diagnosis followed by full-night PSG-titration (traditional), 2) PSG-diagnosis and titration on

a single night, 3) HST-diagnosis followed by full-night PSG-titration, and 4) HST-diagnosis with home APAP-titration (excluding patients with lung, heart, neuromuscular, or stroke, morbid obesity, status-post ENT surgery, or sleep-SaO2s below 85%). Economic analysis used current reimbursement rates ($709 for PSG, $727 for PSG-titration, and $110 for HST). We used "splitability" as a severity surrogate measure. Using HST-diagnosis reduced cost (compared to traditional approach) by more than $500K per 2000 referrals (even with 0%-splitability). If population was 50%-splitable, the saving neared $1M. Adding judicious APAP-titration reduced 0%-splitable population by >$300K and a 50%-splitable population by >$400K. However, as important is that waiting time for care delivery declined dramatically with HST and APAP use.

Conclusion: Our SRBD care models predicted operational costs and waiting time- two critical health care delivery factors. In most public institutions, capacity increase takes time; therefore, being able to project patient volume, operating expense, and efficiency (as we introduced HST-diagnosis and APAP-titration) greatly helped us justify resource allocation as we redesigned our evolving sleep program.

W-K-083 ISCORE: AN SYSTEM FOR GRADING HOME SLEEP TEST INTERPRETABILITY

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Introduction and Objectives: As home sleep testing (HST) becomes more common for diagnosing sleep related breathing disorders (SRBD), we need quality control monitoring techniques. To this end, we developed an HST interpretability grading system.

Materials and Methods: Key HST recording channels include airflow (AF), respiratory-effort (RE), oximetry (OX), and snoring-sounds (SN). HSTs are usually recorded unattended, without real-time monitoring; consequently, data loss occurs when sensors malfunctions or detach. To augment interpreter' comments concerning HST technical quality, we developed an "interpretability" grading system. We tested it on 500 HSTs using AASM scoring (with 4%-desaturations hypopnea criteria).

Results: An iScore-10 indicates AF-RE-OX-SN or AF-RE-OX are intact. Patterns from this array can diagnose obstructive (OSA) and central sleep apnea (CSA). iScore-9 indicates AF-OX-SN or AF-OX are present and patterns can reveal apnea and hypopnea, albeit of unknown type (SN can sometimes provide an EF-surrogate allowing OSA recognition). iScore-8 indicates AF-RE-SN or AF-RE are present. If sufficient apnea (not hypopnea) occur, OSA or CSA diagnosis is possible. iScore-7 indicates AF-SN presence and can diagnose unknown-type SRBD if sufficient apnea occur (SN may help identify OSA). iScore-6 indicates AF-only is intact and can diagnose unknown-type SRBD if sufficient apnea occur. iScores-5 and below may suggest SRBD but are not diagnostic (details for these rules are omitted here due to word-limit). To apply the system, one divides recordings hourly. If half (or more) of each hour meets criteria, the appropriate iScore is assigned for that segment. Hourly segments are summed and averaged to calculate a final grade. Overall, 9.2 was our sample's mean iScore and all records graded below 5.0 were repeated (with repeat mean=7.7).

Conclusion: The iScore grading system was easily applied and quantitatively indexed HST technical adequacy. Indices also provided quality control indicators for tracking program operation. iScores may be useful to assess staff-performance, recording equipment, and diagnostic certainty.

W-K-084 LONG-TERM MANAGEMENT OF SNORING AND OSA

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Introduction and Objectives: Millions of bed partners are bothered by habitual snoring every night. Snoring is also an indicator for obstructive sleep apnea (OSA), and up to 80% of OSA patients are yet to be diagnosed. Even after a correct diagnosis, a lack of motivation could lead to therapy abortion in both snorers and patients with a mild to moderate OSA. More than half of these are so-called positional patients with snoring and OSA predominately in the supine position. We are therefore developing an innovative long-term monitoring system for snoring and OSA, with an integrated positional therapy.

Materials and Methods: By only using an accelerometer attached to a headband we were able to detect important parameters such as snoring, breathing and sleeping position. In addition, a biofeedback signal was integrated to enable an intelligent positional therapy in those identified as positional patients. In a first trial we tested an automatic detection of snoring and obstructive events developed in Matlab.

Results: Simultaneous measurements with headband and polysomnography were conducted on seven patients in a sleep clinic so far. The results indicate that an estimation of snoring and obstructive events is possible with the accelerometer attached in a headband.

Conclusion: Based on the collected data we will continue to optimize the measurement system. Our goal is to enable a reliable and comfortable multiple-night screening, as well as regular, on-going follow-ups at home. Those identified as positional patients can initially try out the integrated biofeedback therapy, which has also shown positive results in the first trials. In that way, an objective monitoring of positional therapy, but also weight loss, oral appliances and other therapy approaches, can be done to motivate patients and regularly report on therapy efficiency.

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W-K-085 TOWARDS CONTACTLESS SCREENING OF SLEEP-DISORDERED BREATHING

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Introduction and Objectives: The prevalence of sleep-related breathing disorders (SRBD) in general practice attenders with a fatigue complaint is rather high. In screening and analysis of SRBD, reliable monitoring of respiration plays a crucial role. The current medical practice in screening for SRBD involves a setup which combines respiration monitoring in the polysomnography (PSG) setup. PSG is regarded as the golden standard to objectively measure sleep and screen for a wide variety of sleep disorders. However, this obtrusive monitoring requires attachment of highly uncomfortable set of sensors and wires to the skull and the body to ensure accurate and reliable measurements. In contrast to above mentioned setup we propose a mobile, contactless, fully automatic, video based, respiration monitoring system (VBRMS). The advantages of the proposed system include: (1) contactless measurement of respiration, (2) possibility for long term monitoring of respiration patterns in the home situation.

Materials and Methods: Eleven healthy sleepers (5 females, 6 males) were monitored overnight with PSG including the piezo respiratory effort chest and abdominal belts. An infrared-sensitive camera and pattern projector were employed to monitor the chest movements of the sleeping subjects. A dedicated algorithm to extract the breathing waveform was designed and tested.

Results: High agreement between the video-based system and the reference belt derived respiration rates were achieved with an overall performance of 96% and 95% for video-abdomen and video-chest belts respectively. This agreement compares favorably with the 97% agreement between the two reference signals abdomen-chest. A solid performance of the VBRMS throughout all test subjects and different conditions such as thick blankets and different body positions is observed.

Conclusion: The proposed VBRMS can successfully compete with state-of-the-art respiratory belts to monitor a sleeping person's breathing pattern while reducing medical cost and allowing the patient to sleep in the natural sleeping environment without sensors attached to the body.

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W-K-086 USING HEALTH INFORMATION TECHNOLOGY AND THE STOP QUESTIONNAIRE AS A SELF-DIRECTED AND COST EFFECTIVE STRATEGY TO SCREEN FOR OBSTRUCTIVE SLEEP APNEA

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Introduction and Objectives: Obstructive sleep apnea (OSA) is prevalent and under-diagnosed in obese patients. The "STOP" questionnaire is a simple validated self-administered screening tool consisting of 4 "yes/no" questions. "Yes" answers to 2 questions or more identify individuals at high risk of having OSA. Geisinger is a health care system in rural Central Pennsylvania

with integrated electronic medical records servicing 2.6 million people in 43 counties.

Materials and Methods: Using an internet-based portal through which patients can review their Electronic Health Record (EHR), schedule appointments, and receive communication, ambulatory patients with a body mass index (BMI) >40 and without a diagnosis or prior evaluation for sleep apnea were invited once to complete the "STOP" questionnaire. Patients who screened positive were then contacted to schedule a sleep medicine evaluation.

Results: 143,303 adult users of the interactive electronic portal were screened. Notifications were sent to 2,283 eligible patients. 279 (12%) completed and submitted their answers. 122/279 (44%) were identified as being at high risk for having OSA. The information technology (IT) staff spent a total of 159.25 hours at a cost of $5,967.69 ($37.47/hr). The cost breakdown was as follows: questionnaire $2,307.28 (39%); broadcast $208.86 (3%); self-scheduling $2,124.83 (36%); and project management $1,326.72 (22%). The cost was $0.03 to screen each electronic portal user and $2.61 for each eligible patient. Each IT work hour did impact 900 portal users and 14 eligible patients.

Conclusion: This study suggests that the STOP questionnaire can be applied as a valuable cost effective OSA screening tool in obese ambulatory patients using health information technology in institutions or health care systems with large mature EMR. Efforts to increase patient response rate should be further investigated.

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L: Restless Legs Syndrome (RLS) and Movement Disorders in Sleep

W-L-087 CHARACTERIZATION OF BTBD9 HOMOLOG KNOCKOUT IN C.ELEGANS

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Introduction and Objectives: Restless legs syndrome (RLS) is a common neurological movement and sleep disorder. Two genome wide association studies have associated a common gene, BTBD9, to this disorder. BTBD9 is a protein of unknown function that contains two highly conserved protein domans, a BTB/POZ domain and a BACK domain. BTBD9 has several homologous proteins across species, including C05C8.6 in C. elegans, with a 40% protein homology. C05C8.6 consists of 5 exons and 4 introns and is expressed in the head neurons, intestine, pharynx and seam cells. The function of C05C8.6, like BTBD9, is unknown.

Materials and Methods: A strain of worms containing a knockout of this gene, tm3719, has been previously generated by the National BioResource Project by removing part of the second intron and second exon. After backcrossing, we examined the mutant strain for egg-laying deficiency and activity.

Results: We have found that the mutant strain have alterations in egg-laying behavior and activity levels.

Conclusion: The mutant strain of worm will help to develop an understanding of the function of BTBD9 and potentially the underlying pathophysiology of RLS. Future studies will be conducted on the mutant worm's synaptic plasticity and chemotaxis.

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W-L-088 COMPARISON OF THE MEDIBYTE® PORTABLE MONITOR WITH POLYSOMNOGRAPHY FOR RECORDING LIMB MOVEMENTS IN SLEEP

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Introduction and Objectives: Objective assessment of Restless Legs Syndrome (RLS) lacks convenient, efficacious methods to evaluate periodic limb movements (PLMs) outside of the sleep laboratory. The purpose of this study was to establish whether the auxiliary EMG channel of a type 3 portable monitor validated for screening of obstructive sleep apnea (OSA) - Braebon Medibyte®, could be utilized to accurately record PLMs, and to assess the reliability in comparison with polysomnography (PSG).

Materials and Methods: 1) Due to a lower than recommended EMG sampling frequency, the Medibyte® (250 Hz) was compared to standard surface EMG (1000Hz) for recording of repeated contractions of bilateral tibialis anterior in a sample of 5 healthy female adults, mean age 24.6 (±6.6). (2) The device was tested simultaneously with PSG in overnight sleep studies at Kingston General Hospital with 17 participants, mean age 56.2 yrs (±11.8), referred for screening of sleep disorders.

Results: (1) Medibyte®/EMG comparison demonstrated that the device accurately recorded 100% of tibialis anterior contractions (60/participant). (2) The mean PLM Index (wake and sleep) by PSG was 13.0±18.1; Medibyte was 17.0±16.0 (NS). Good association of PLM numbers recorded by the two methods was shown by Pearson's correlation (r = 0.76). Intraclass Correlation Coefficient between the two measures for absolute agreement was 0.74. Bland-Altman analysis showed a mean difference between measures of 4.1±12.1 with 95% limits of agreement in PLM Index of 27.7 to -19.6. This large interval reflects the small sample size and the great variation in PLM Index.

Conclusion: The Medibyte® EMG channel accurately records muscle contractions. These preliminary data suggest that there may be sufficient agreement between PLM Index collected by Medibyte® and PSG to support the use of the Medibyte for measurement of PLMs. More participants are being recruited

W-L-089 DIFFERENCE IN SENSORY SYMPTOMS OF RESTLESS LEGS SYNDROME (RLS) RELATED TO TEMPERATURE CHANGE

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Introduction and Objectives: Restless legs syndrome (RLS) is a sensorimotor disorder characterized by an urge to move the legs and most RLS patients experience uncomfortable sensation of the legs. Worsening or relief of RLS symptoms related to temperature change is sometimes experienced, however, this phenomenon has rarely been discussed. The aim of the study was to elucidate whether the temperature or seasonal change could alter the severity of RLS symptoms.

Materials and Methods: Fifty-two consecutive RLS patients (21 males and 31 females, mean age: 59.1 SD 16.0) who consulted Hiroshima Sleep Center were included in the study. Seasonal difference in sensory symptoms of RLS, temperature conditions that worsen or relieve the symptom, and dose of medical treatment for RLS were investigated.

Results: RLS symptoms worsened at summer in 19% of the patients and worsened at winter in 17% of the patients. Patients with summertime worsening experience relief of the symptom in cooler condition in 60% and worsening of the symptom in warmer condition in 40%. Patients with wintertime worsening experience relief of the symptom by bathing in 33% and worsening of the symptom in warmer condition in 44%, especially when their legs got warmer with a heating device. Among the 14 patients with seasonal worsening under medication for more than a year, 8 patients required to increase the dose of medication when their symptoms were worse due to seasonal change.

Conclusion: Our study showed that severity of RLS symptom could alter with seasonal or temperature change. Seasonal worsening of the symptoms may mimic augmentation and should be differentiated.

W-L-090 DISEASE-SPECIFIC QUALITY OF LIFE (QOL) IN RESTLESS LEGS SYNDROME (RLS): VALIDATION OF THE QOL-RLS QUESTIONNAIRE

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Introduction and Objectives: RLS is associated with functional impairments of activities of daily living and quality of life. New data on the validity and reliability of the disease specific QoL-RLS questionnaire for measuring quality of life (QoL) are presented.
Materials and Methods: The QoL-RLS self-rating questionnaire includes 12 items, using 6 categories from 0 = "no impairment" to 5 ="very severe impairment" (total score: 0-60). One item requests global QoL. Further items are related to (a) consequences of the RLS symptoms on sleep, activities of daily living, mood and social interactions, (b) the consequences of disturbed sleep on everyday life, (c) consequences of pain and side effects as well as to (d) the evaluation of coping behavior.
Results: Evaluation was performed with the pooled data of four clinical trials on efficacy of different dopamine agonists (893 subjects). Construct validity: A factor analysis resulted in a two factors solution ("impairment by symptoms" and "burden of symptoms") explaining 56.67% of the variance. Reliability: The QoL-RLS total score showed a high internal consistency (Chronbach's alpha = 0.89). Convergent validity: Mean baseline correlations to the IRLS total score (0.67) and its sub-scale "Symptom Impact" (0.73) were high. Change from baseline to end of treatment correlated with change in the IRLS total score at 0.75. Discriminant validity: The QoL-RLS total score was different ($p<0.0001$) for three severity classes according to the Clinical Global Impression severity scale at baseline (moderate, severe, very severe).
Conclusion: The QoL-RLS questionnaire is a valid and reliable instrument which reflects RLS patients' subjective impairment of well-being and activities of daily living due to RLS symptoms and concomitant features. Because of high internal consistency and sensitivity for change over time the QoL-RLS total score is qualified to be used as a patient report outcome endpoint in clinical trials.

W-L-091 DURING THE DAYTIME IN RESTLESS LEGS. A SURVEY ON 224 PATIENTS

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Introduction and Objectives: One of the diagnostic criteria of Restless Legs Syndrome (RLS) is the worsening of the symptoms in the evening or night. The presence of daytime symptoms has been subject to limited investigation. The objectives of this study were to evaluate the prevalence of daytime symptoms and to characterize the clinical aspects of these symptoms in treated RLS patients.
Materials and Methods: This is a descriptive epidemiological survey, with 224 RLS patients. Demographic data, current RLS medication, presence of sudden unexpected RLS symptoms ("break-through" crisis), their intensity, frequency, start time and the efficacy of the current medication in the prevention of this crisis was evaluated through a specific questionnaire, designed for this purpose. All of the patients were asked to perform a Suggested Immobilization Tests (SIT) at their home during the day and additional information about the presence of symptoms at home after 1 hour of immobility, was gathered.
Results: Breakthrough crisis before 18:00 hours was registered in 67.4% of the patients. These episodes had a daily frequency in 41.3% of the cases. The mean intensity of the crisis in the Visual Analogue Scale was 6.8 (SD 2.12). During the home based SIT, 65% of the patients presented RLS symptoms before 16:00 hours, which is 35% of the total number of patients medicated with an additional dose of RLS medication before 18:00 hours.
Conclusion: This is the first study to describe daytime RLS symptoms as a far more prevalent clinical phenomenon than initially reported. Furthermore, administration of RLS medication during the afternoon was not sufficient to prevent these episodes. Due to the disease progression and/or to the medication used, there might be a circadian propensity for symptoms to occur earlier in the afternoon. The unexpected nature of the breakthrough symptoms has important consequences for the management of RLS, suggesting the convenience of a daily prophylaxis.

W-L-093 OBSERVATIONAL STUDY OF RESTLESS LEGS SYNDROME (RLS) AND SUBSEQUENT CARDIOVASCULAR (CV) RISK USING US CLAIMS DATA

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Introduction and Objectives: Published data suggest an association between RLS and CV risk. We investigated risk of major CV events amongst RLS patients using US observational administrative claims data (IMS Pharmetrics®).
Materials and Methods: A 2-year matched retrospective cohort study was performed on a dataset containing longitudinal records on demographics, diagnoses, procedures, providers, prescriptions and claims. Patients with clinical diagnoses of RLS at two or more visits before December 2005 were continuously enrolled between January 2006 and December 2007. RLS patients were matched 1:1 by age, gender and comorbidities (including hypertension) to patients without RLS. CV diagnoses were recorded for the 2-year observation period. Relative risks (RR, 95% CI) for specific outcomes by study group were computed.
Results: 3485 RLS patients were matched to 3485 healthy controls. Mean age was 55 years; female/male ratio was 2.34. 33% of the patients with RLS received $\geq$1 dopamine agonist. Overall, the most common CV diagnoses during follow-up were hypertension (48%), cardiac dysrhythmias (9.3%), chronic ischemic heart diseases (8.5%), occlusion and stenosis of cerebral arteries (2.81%), cardiomegaly (2.50%), and hypertensive heart disease (2.43%). There was a 12% increase in RR versus healthy controls for developing any CV event during follow-up ($p<0.01$). RR (95% CI) for CV events by category were, in decreasing order: other forms (non-ischemic) of cardiovascular diseases, 1.33 (1.20; 1.47); cerebrovascular diseases, 1.31 (1.12; 1.53); disease of the pulmonary circulation, 1.29 (0.86; 1.92); ischemic heart diseases, 1.20 (1.06; 1.35); diseases of the arteries, 1.12 (1.01; 1.43); and hypertension, 0.99 (0.84; 1.03).
Conclusion: These data suggest that there is a significant association between a diagnosis of RLS and subsequent records of major CV conditions. This study provides a basis to consider RLS as a distinct risk factor in addition to hypertensive disease, and confirms the need for early diagnosis of RLS to monitor patients for subsequent development of serious CV events.
Acknowledgements: This study was supported by UCB Pharma SA.

W-L-094 PREVALENCE OF RESTLESS LEG SYNDROME (RLS) AND PHYSICAL THERAPY ASSOCIATION IN SAUDI POPULATION

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Introduction and Objectives: Restless Leg Syndrome (RLS) is a common neurological sleep disorder but mostly misdiagnosed. Its prevalence and characteristics in the Saudi population aren't well defined. The aims of this research are to study the prevalence and characteristics of RLS in the Saudi population, in addition to investigate if there is a positive impact of Physical Therapy on RLS symptoms.
Materials and Methods: Well-designed structured questionnaire was distributed among 412 randomly selected individuals from Jeddah area. RLS diagnosis was based on subjective agreement with four criteria proposed by the International Restless Leg Study Group. Other physical therapy awareness, previous treatment and demographic data were also collected.
Results: The mean age of all participants was 31.80 years ($\pm$ SD 12.04), 216 (52.4%) of the participants were female. The mean body mass index (BMI) of RLS individuals was (27.45 kg/m^2) ($\pm$ SD 7.6), and the mean BMI in normal was 25.84 ($\pm$ SD 9.7). The RLS group had significantly higher mean weight (OR 4.41, (CI 0.07-8.7), $p = 0.04$). Seventy two (17.5%) of the participants had RLS with no significant differences in the mean age. Among patients with RLS,48.6% were practicing home exercises compared

to 56.3% in normal individuals. 21% of RLS patients used cold packs and portable electrotherapy at home to alleviate RLS discomfort. 11 (15.5%) went for physical therapy (p=0.04) and 10 of these (90.9%) reported significant subjective improvement (p=0.031). The majority (68.1%) of RLS individuals never sought medical attention for this problem (P<0.0001).
Conclusion: RLS symptoms seem to be more prevalent in our community (17.5%) than other communities. RLS symptoms are more common in obese individuals, while anemia and diabetes are associated with the disease prevalence. Physical therapy and exercises were shown to improve RLS symptoms. However, most RLS patients are not aware of its potential positive impact. Poor disease awareness is common and significantly delays RLS treatment.

W-L-095 REPEATED SIT TESTS OVER 6 MONTHS OF TREATMENT WITH EITHER DOPAMINE AGONISTS OR OPIOID

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Introduction and Objectives: Longer-term treatment of RLS has been found to produce significant augmentation of the RLS symptoms with dopamine but not opioid treatment. The suggested immobilization test (SIT) may provide an objective marker of RLS severity that might be an early indication of augmentation.
Materials and Methods: Patients on stable RLS treatment with either dopamine agonists or opioids entered the study provided they took only evening medications. SITs were scheduled at 4:00 and again at 5:45PM at baseline and then at months 1, 2, 4, 6, 9 and 12 after the baseline. Sensory scores from 1-10 were obtained every 5 minutes during the test. Diphenhydramine 25 mg orally was taken 45 minutes before the start of the second SIT on baseline, 6 months and 12 month. SIT test-retest was determined by repeated days at baseline for half the subjects
Results: Preliminary data are from: 11 opioid and 25 dopamine patients for 4 months, 23 dopamine and 9 opioid for 6 months. Repeated baseline scores correlated well (r=0.074) but were generally slightly lower on day 2 than 1 (p=0.07). The average SIT Sensory scores showed continuous increases from month 1 to month 6 for dopamine but not opioid patients. The differences from baseline were significantly greater for the dopamine than the opioid patients at month 4 (p=0.024) but not for the smaller sample at month 6 (p=0.12). The sensory scores consistently increased at months 2, 4 and 6 (where available) for 8 dopamine and 1 opioid patient and was worse after diphenhydramine. Augmentation was noted for one of these 8 dopamine patients
Conclusion: The SIT sensory data indicate possible increased RLS severity over 4 to 6 months of treatment with dopamine agonists but not opioids.
Acknowledgements: This research was supported by an unrestricted grant from GlaxoSmithKline.

W-L-096 RESTLESS LEG SYNDROME (RLS) IN CHILDREN AND YOUTH WITH NEURODEVELOPMENTAL CONDITIONS – A CLINICALLY MISSED DIAGNOSIS AGGRAVATING THE CHALLENGING BEHAVIOUR OF UNDERLYING CONDITIONS?

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Introduction and Objectives: Sleep related day- and nighttime symptoms may not be recognized in children with neurodevelopmental conditions, as the underlying condition is usually associated with developmental delay and challenging behaviour. Results of clinical sleep assessments suggest that optimizing our understanding before triaging patients for further diagnostic/therapeutic care would be helpful.
Materials and Methods: We developed a reproducible inexpensive video monitoring solution, which can be sent out via courier for home-based over-night-video-sleep-studies. Prerequisites: 1) Low cost/physical bulkiness/weight, durability for infrared-light camera and netbook; 2) synchronized audio/video software with live time-stamp, constant frame-rates, automatic splitting of the recordings into multiple smaller files; 3) internet connection for remote access from the research lab to facilitate home setup.
Results: We are describing clinical symptoms, including behavioural patterns (facial expression and movements) during restful daytime activities and before falling asleep in 15 patients with autism spectrum disorder, fetal alcohol spectrum disorder, cerebal paresis, and/or diagnosis of genetic disorders (Down syndrome, di-George, cri-du-chat etc.). All patients had significant difficulties with falling asleep and maintaining sleep, and all patients have developed movement related skills which are considered to be unusual for the underlying condition, e.g. dancing for a 7 year old boy with Down syndrome, gymnastics for a 4 year old girl with di-George syndrome.
Conclusion: RLS related discomfort/urge-to-move/pain seems to be the main cause of difficulties falling asleep, aggravated by periodic limb movement related sleep disturbances. Children may develop movement based abilities and/or extreme adaptive movement strategies (trampoline jumping until collapsing) to overcome difficulties falling asleep, which are interpreted as part of their challenging behaviour. History and analysis of behavioural patterns seems to be key in non-verbal patients and/or patients with intellectual disability. Our observations open a new causality related diagnostic/therapeutic care option.
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W-L-097 RESTLESS LEGS SYNDROME IN THE GEORGIAN INDIVIDUALS HAVING EPILEPSY: RESULTS OF A QUESTIONNAIRE STUDY

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Introduction and Objectives: Restless legs syndrome (RLS) is a cause of sleep disturbances that exacerbate epileptic seizures. The pilot study on the prevalence of RLS among the Georgian general population showed the expected prevalence of 11%. Here we report about the distribution of RLS in the epilepsy patients living in Georgia.
Materials and Methods: The questionnaire for RLS (Allen RP, 2003) was filled out by the 115 patients with epilepsy (56 males and 59 females, 18-76 years of age). Epilepsy was diagnosed based on multidisciplinary investigations (consultation of an epileptologist/neurologist, neuropsychological testing and EEG-recordings). The subjects were divided into two groups: treated (T) with antiepileptic drugs (AEDs) (n=55) and untreated - newly diagnosed (ND) epilepsy (n=60) never taken antiepileptic medications before. T-group patients had been taking various AEDs (Carbamazepine, n=41; Valproate, n=10; others, n=4) at admission to the Institute of Neurology and Neuropsychology (INN). The questionnaire is based on the current IRLSSG diagnostic criteria (following appropriate onwards-backwards English-Georgian translation). Data analysis was performed by SPSS statistical software, version 13.0.
Results: The overall prevalence of RLS among the epilepsy outpatients having all four screening questions positive was 15.7% (n=18) with no significant gender difference (women 16.9%, men 14.3%). Three screening questions positive (possible RLS) were distributed in 22.6% (26) of total sample, more female 27.1% (16) than male 17.9% (10) patients, and sleep initiation difficulty was reported by 14.8% of the patients. The differences were not statistically significant between the T and ND epilepsy patients suffered from RLS.
Conclusion: The distribution of the RLS symptoms in epilepsy patients is higher than in the general Georgian population and is not depending on AEDs. It is important to prevent seizure exacerbation and sleep deterioration through the correct diagnosis and treatment of the RLS in persons with epilepsy.

W-L-098 RESTLESS LEGS SYNDROME IS A COMMON FINDING IN MULTIPLE SCLEROSIS AND DOES NOT CORRELATE WITH BRAIN DAMAGE

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Introduction and Objectives: Restless legs syndrome (RLS) is a frequent

neurological disorder affecting up to 10% of the general population. Recently, multiple sclerosis (MS) was identified as a common cause for secondary RLS, the prevalence ranged from 13.3 to 37.5%. The aim of our study was to evaluate the prevalence of RLS among Czech patients with MS and to compare the extent of brain damage between patients with and without RLS using magnetic resonance imaging (MRI).
Materials and Methods: Each patient underwent a semi-structured interview and brain MRI. A patient was considered to be affected by RLS if all four standard criteria had ever been met in their lifespan. Lesion load (LL), brain atrophy and brain parenchymal fraction (BPF) were assessed.
Results: A total of 765 subjects (553 females, 211 males, mean age 36.54, ± SD 9.5) with multiple sclerosis were included in the study. The diagnosis of RLS was confirmed in 245 subjects (32.1%, 95% CI 28.7-35.4%. Patients suffering from both MS and RLS were significantly older (38.6 vs. 35.6 years), had longer durations of MS symptoms (11.0 vs. 8.2 years) and had higher EDSS score (2.9 vs. 2.3). Quantitative MRI data were obtained in 385 patients without RLS and 215 patients with RLS. We found no difference between the two groups in the whole brain lesion load, brain atrophy and brain parenchymal fraction, despite the fact that we were able to replicate the correlation of these data with clinical parameters of MS.
Conclusion: RLS is a common finding in patients with multiple sclerosis and MS should be considered amongst symptomatic forms of RLS. RLS is more prevalent in advanced stages of MS, but does not correlate with MRI markers of brain damage. Therefore, further studies with the spinal cord MRI are necessary to disclose the ethiopatogenesis.
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W-L-099 RESTLESS LEGS SYNDROME: IS IT A FUNCTIONAL PERIPHERAL NEUROPATHY?

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Introduction and Objectives: The current definition of Restless Legs Syndrome (RLS) from the "International Restless Syndrome Study Group (IRLSSG)" is: 1) An urge to move the legs that is usually accompanied by or caused by uncomfortable and unpleasant sensations in the legs; 2) The urge to move or unpleasant sensations begin or worsen during periods of rest or inactivity, such as lying or sitting; 3) The urge to move or unpleasant sensations are partially or totally relieved by movements such as walking or stretching, as long as the activities continue; 4) The urge to move or unpleasant sensations are worse in the evening or night than during the day or only occur in the evening or night. The main objective is to present evidence that RLS may be a functional peripheral neuropathy.
Materials and Methods: Review of the literature.
Results: RLS pathogenesis coincides with a disequilibrium between thyroid hormones (TH) and dopamine (DA) and is supported by the following evidence: 1) Hyperthyroidism can incite symptoms of RLS; 2) The thyroid stimulating hormone "evening-surge" (TES) coincides with worsening of RLS symptoms in the evening; 3) DA is a well-recognized antagonist to TH; 4) DA agonists alleviate Restless Legs Syndrome symptoms. As there is no anatomic damage in patients with RLS, it is logical to assume that the disease is functional in origin. As DA counteracts TH; as elevated TH can incite symptom of RLS; and as DA ameliorates RLS symptoms, it is logical to assume that symptoms of RLS ensue when TH is not sufficiently modulated by DA. As TH levels increase in early evening, as the evening worsening of RLS symptoms, it is possible that the fourth criterion, which helps to define RLS diagnosis, is secondary to the TES.
Conclusion: RLS may be considered a functional peripheral neuropathy.

W-L-100 RESTLESS LEGS SYNDROME: PATIENTS WITH EXCESSIVE DAYTIME SLEEPINESS

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Introduction and Objectives: Sleep onset and sleep maintenance insomnia belong, together with Periodic Leg Movement during Sleep (PLMS), to the most frequent symptoms in Restless Legs Syndrome (RLS). Despite the reduced sleep time reported by these patients, excessive daytime sleepiness (EDS) is not a common complaint, as just one third of the patients report its presence.
Materials and Methods: Twenty two patients diagnosed with primary or secondary RLS underwent a clinical evaluation in a specialized clinic. The clinical examination included a detailed sleep history and severity scales. The procedures performed during the study were a Suggested Immobilization Test (SIT) followed by polysomnography. Those patients with a score higher than 10 on the Epworth Sleepiness Scale (ESS), were also evaluated by Multiple Sleep Latency Test (MSLT).
Results: Two groups were defined depending on the Epworth scale score: Group A (ESS score >10 points, 9 patients) and group B (ESS <10 points, 13 patients). No significant differences were found between both groups on sleep architecture or on any other polysomnographic variables (t-test, Mann-Whitney Test). Furthermore, for the group complaining of daytime sleepiness, the mean sleep latency on the MSLT was well within the normal range (mean: 18,1min; SD: 7,3). The mean values of the sleep latency, total sleep time and sleep efficiency were as follows for group A: 21,4min (SD 28,9), 301,9min (SD 47,8), 75,7% (SD 12,5) and for group B: 33,8min (SD 39,8), 228min (SD 97,7), 60,7% (SD 21,7).
Conclusion: Despite the significantly reduced total sleep time, objective daytime sleepiness is a rare phenomenon in RLS probably due to a "hyperarousal" phenomenon. Patients complaining of subjective daytime sleepiness do not differ in the objective measurements of night and daytime sleep from RLS patients without daytime sleepiness.

W-L-101 RESULTS OF A GERMAN SURVEY OF SYMPTOMS AND MEDICATION USE IN PATIENTS WITH RESTLESS LEGS SYNDROME (RLS)

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Introduction and Objectives: A survey of adults with idiopathic RLS was conducted to gain a patient perspective of symptom occurrence and control, and treatment effectiveness.
Materials and Methods: A patient questionnaire was developed to investigate duration of disease, occurrence of RLS symptoms and symptom control, as well as an individual assessment of treatment effectiveness. The questionnaire was distributed to members of the German Restless Legs Foundation and also offered to German field-based neurologists for distribution among their patients. Missing values were treated as missing: percentages were calculated based on all returned questionnaires. Multiple answers were allowed.
Results: 741 questionnaires were completed and included in the analysis. Median treatment duration of participants was 6 years (median age: 69 years, 72% female). Of 651 patients reporting use of at least one medication, treatment comprised mainly dopamine receptor agonists (70%) and levodopa preparations (48%); 59% took drugs from only one RLS treatment class and 41% received combination therapy using different classes. Daytime symptoms were experienced by 69% of patients. If patients took medication during the day, administration was in the morning in 27%, at noon in 25% and in the afternoon in 24%. Although 80% of patients cited an improvement in their quality of life as a result of RLS medication, overall 70% regarded their current pharmacological therapy as not sufficient; 42% believed they needed additional medication at another point in time and 38% would like to take higher doses.
Conclusion: This patient survey indicates that there is an unmet need in RLS pharmacotherapy since most patients felt insufficiently treated or required more than one medication. A high proportion of patients reported symptoms also during the day, showing that RLS should not be considered a disease associated only with evening/night-time symptoms, and suggests a need for long-acting pharmacological symptom control. These data need to be confirmed by larger prospective, epidemiological studies.
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W-L-102 SEARCHING FOR SILENT STROKES IN MAGNETIC RESONANCE IMAGING OF PATIENTS WITH RESTLESS LEGS SYNDROME AND CONTROLS

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Introduction and Objectives: There is increasing indirect (epidemiological, clinical and neurophysiological) evidence that patients with restless legs syndrome (RLS) might be at increased risk of hypertension, heart disease, and stroke. For this reason, the aim of this study was to evaluate whether RLS is an independent risk factor for cerebral microvascular ischemic disease (MVD) when other potential risk factors for stroke are controlled.
Materials and Methods: Twenty-eight patients with RLS and 25 age- and sex-matched normal control subjects were included. All patients had normal neurological exam and no previous history of stroke; both patients and controls had no risk factors for stroke, including hypertension, hyperlipidemia, coronary artery disease, diabetes and excessive tobacco use. A Neurology stroke specialist (MM) blinded to the experiment scored the volume of cerebral MVD (Digital Image Analysis, Image J program, version 1.37).
Results: All parameters (total MVD area and volume, and number of MRI slices with MVD) tended to be higher in RLS patients; however, they approached but did not reach statistical significance. In addition, we plotted each variable against age and a positive correlation was found between our measures and age in both groups of subjects. This type of plot also showed that differences between the two groups might be more evident after the age of 55-60 years.
Conclusion: The more pronounced age-related increase in MVD in RLS might indicate that years of repeated transient heart rate/blood pressure rises accompanying periodic leg movements during sleep are needed in order to develop a cerebral MVD involvement exceeding the amount expected for age. The results of this exploratory study are encouraging because they seem to confirm the initial hypothesis and deserve to be expanded to a larger group of patients and controls; a power analysis indicates that we need approximately to double the number of subjects to reach statistical significance in the older age group.

W-L-103 SENSITIVITY AND SPECIFICITY OF A SELF-ADMINISTERED SURVEY IN SPANISH FOR RESTLESS LEGS SYNDROME (RLS)

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Introduction and Objectives: The International Restless Legs Syndrome Study Group sets four diagnostic criteria for restless legs syndrome (RLS). Nevertheless, RLS false positive diagnosis occurred in $\geq$10% of individuals reporting previously established criteria. Several studies of prevalence have been conducted in different populations using different tools for assessment. We previously published the first study of RLS prevalence in a series of individuals from Argentina, based on a self-administered survey. The aim of this study is to evaluate the sensitivity and specificity of the ad hoc survey.
Materials and Methods: Surveys were distributed to literate individuals who visited our institution's outpatient clinic as either patient or a patient companion. Once the survey was completed, each individual was evaluated by a movement disorders expert who confirmed the diagnosis of RLS. The expert opinion was employed as the gold standard. An independent observer classified the subjects based on expert opinion and the results of the survey. A third professional carried out the statistical analysis with the G-stat 2.0 program.
Results: Of 150 surveys returned, 143 were evaluated, 56.64% of the sample were females, and mean age was 62.42$\pm$15.35 years (range 21-87 years). A positive self-administered RLS survey was reported by 36 individuals; however, 22 of them were diagnosed as RLS by the expert. No patient with a negative survey was determined as RLS by the expert. Survey sensitivity was 100% and specificity was 88.43%.
Conclusion: Considering the high sensitivity of this survey, it appears to be a useful tool for RLS screening in our population.

W-L-104 SLEEP IMPROVEMENT WITH ROTIGOTINE TRANSDERMAL SYSTEM IN PATIENTS WITH MODERATE-TO-SEVERE IDIOPATHIC RESTLESS LEGS SYNDROME (RLS): RESULTS FROM TWO 6-MONTH PLACEBO-CONTROLLED TRIALS

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Introduction and Objectives: Two placebo-controlled trials (SP790: NCT00136045; SP792: NCT00135993) demonstrated rotigotine efficacy in RLS, based on IRLS and CGI-1. Significant improvements in sleep quality were demonstrated at all rotigotine doses tested versus placebo, measured by the Medical Outcomes Study (MOS) sleep scale (Trenkwalder et al. Lancet Neurol 2008; Hening et al. Mov Disord 2010). The current analysis evaluated temporal aspects of sleep improvement and attainment of optimal sleep.
Materials and Methods: Following titration (SP790: 3 weeks, SP792: 4 weeks), patients (SP790 [n=447]; SP792 [n=494]) received transdermal rotigotine (0.5 [SP792 only], 1.0, 2.0 or 3.0 mg/24h) or placebo for up to 6 months. Patients completed the MOS questionnaire at baseline and monthly maintenance visits.
Results: In both trials, mean change from baseline scores in MOS parameters most relevant to RLS symptoms showed improvement with rotigotine versus placebo following dose titration (sleep disturbance [items 1, 3, 7, 8] [SP790/SP792: -22.3/-24.5 vs -10.7/-20.3 for placebo]; sleep adequacy [items 4, 12] [20.6/16.1 vs 8.0/12.4]; sleep problems Index II [items 1, 3-9, 12] [-18.0/-18.0 vs -9.2/-14.2]) and were maintained over 6-months' maintenance. Sleep quantity (item 2) increased following rotigotine dose titration versus placebo in SP790 (by 0.82 vs 0.41 hours/night) and was maintained thereafter, but remained similar between SP792 treatment groups. There was little between-treatment difference in other MOS category scores. The proportion of rotigotine- and placebo-randomized patients achieving MOS-defined optimal sleep increased from baseline to end of maintenance (EOM) in SP790 (rotigotine, 18.9% [59/312] baseline vs 34.4% [101/294] EOM; placebo, 19.6% [21/107] vs 28.3% [28/99]) and SP792 (rotigotine, 32.1% [124/386] vs 49.8% [157/315]; placebo, 23.5% [23/98] vs 38.6% [32/83]). All data are descriptive.
Conclusion: More patients achieved optimal sleep with rotigotine versus placebo. For parameters of MOS most relevant to RLS symptoms, benefits of rotigotine versus placebo were observed by the end of dose titration and maintained consistently over 6 months.
Acknowledgements: These studies were supported by UCB BioSciences GmbH and UCB Biosciences Inc., delegated by Schwarz Pharma Ltd, Ireland.

W-L-105 SYMPTOM SEVERITY RATING IN RESTLESS LEGS SYNDROME (RLS): VALIDATION OF THE RLS-6 SCALES

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Introduction and Objectives: The RLS-6 scales have been used as efficacy endpoints to assess relief from symptoms in various clinical trials for different RLS treatments. New data on the validity and reliability of the RLS-6 scales are presented.
Materials and Methods: The RLS-6 scales are 6 global self-rating scales using 11 numerical categories from 0 = "no symptoms" to 10 = "maximum" severity. Four scales assess the severity of RLS "at bedtime", "during the night", "during daytime when at rest", and "during daytime when engaged in activities". Additionally, two scales request patients' "satisfaction with sleep", and severity of "daytime tiredness/sleepiness". All scales are evaluated separately, no total or sub-scale scores are intended.

Results: Evaluation was performed with the pooled data of four clinical trials on efficacy of different dopamine agonists (893 subjects). Convergent validity: Mean baseline correlations between the RLS-6 items and the International RLS Severity Rating Scale (IRLS) total score were highest for "severity during the night" (0.65) and smallest for "severity during the day when engaged in activities" (0.38). For change from baseline to LOCF correlations were similar, ranging from 0.30 (severity during the day when engaged in activities) to 0.74 (severity during the night). Discriminant validity: All RLS-6 scores were different ($p<0.0001$ for all tests) for three severity classes according to the Clinical Global Impression severity scale at baseline (moderate, severe, very severe). Reliability: There was a high test-retest-reliability on the basis of a one day interval, ranging from 0.63 (satisfaction with sleep) to 0.96 (severity at bedtime).
Conclusion: The RLS-6 scales show a high convergent and discriminant validity. The scales are able to identify changes over time and their test-retest-reliability is high. In addition to the IRLS scale, the RLS-6 scales may point to special qualities of treatments, like influence on daytime symptoms and can be used in diaries.

W-L-106 UNILATERAL VS BILATERAL RESTLESS LEGS SYNDROME! A COMPARATIVE OBSERVATIONAL STUDY OF 195 PATIENTS

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Introduction and Objectives: RLS remains underdiagnosed, often due to the variability in the description of symptoms by patients. Our anecdotal experience suggested that patients with classical RLS, manifesting unilateral symptoms, are occasionally seen. Objective: This study was planned to systematically evaluate clinical, investigational features that would serve to differentiate unilateral versus bilateral RLS.
Materials and Methods: All patients diagnosed with RLS during an 8-year period, attending the Sleep disorders clinic, AIIMS, were studied. Clinical assessment was carried out by a structured and standardized data collection format that incorporates diagnostic criteria proposed by the IRRLSG of the NIH. Investigations included; a hemogram, serum Ferritin, liver and kidney function tests and nerve conduction studies with sympathetic skin response recording, for all patients. Other investigations were tailored according to clinical suspicion. To identify features that differentiate patients with unilateral RLS from those with bilateral RLS, the Mann Whitney or the Fisher's exact tests were used, as applicable.
Results: Among 195 patients, 161 (69M, 92F) with bilateral and 34 (12M, 22F) with unilateral features of RLS (mean age of 42 years + 10-14) were enrolled. Variables significantly differentiating unilateral from bilateral RLS group, were RLS being secondary versus primary (44 v/s 55% in unilateral; 76% v/s 23% in bilateral) (OR 4.2, CI 2-9); positive family history (36% in bilateral, 11% in unilateral) (OR 2.6, CI 1.1-8) and abnormality on brain or spine MRI (10/15 patients- 66% unilateral, 1/9 patients -11% bilateral) (OR 16, CI=1.5-166). All other features were similar in both groups.
Conclusion: Unilateral RLS is not uncommon (17%) and although the clinical features resemble bilateral RLS, this entity is likely to be secondary, less likely to be familial, and more likely to be associated with an identifiable structural abnormality on brain or spine imaging. Presentation with unilateral features of RLS should prompt a search for a secondary cause.
Acknowledgements: Anupama Gupta, Jyoti Katoch and Md Afsar, for their untiring help. Dr. Kalaivani for assistance with statistical analysis.

W-L-107 VALIDATION OF THE MULTIPLE SUGGESTED IMMOBILIZATION TEST (M-SIT): A SLEEP LABORATORY TEST FOR THE ASSESSMENT OF SEVERITY OF RESTLESS LEGS (WILLIS-EKBOM DISEASE)

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Introduction and Objectives: The severity of restless legs syndrome (RLS) is normally evaluated by means of rating scales. However, their validity is limited due to the fact that they rely exclusively on subjective assessment and memory recall, do not evaluate motor dysfunction, and do not control on physical activity. The objective of this study was to validate the Multiple Suggested Immobilization Test (m-SIT), a new test that measures RLS severity at different times during the day while the patient is awake and resting.
Materials and Methods: The m-SIT consisted of seven 60-min SITs performed every 2 hours between noon and 1AM, followed by polysomnography. During each single SIT, the patient reclined for one hour, was instructed to remain quiet and move the legs only to alleviate symptoms. Periodic leg movements (PLMW) were recorded and a Numerical Symptoms Severity Scale (NSSS) on sensory discomfort (range 10-0) was completed every 10 minutes. 19 RLS patients underwent the m-SIT on two consecutive days while on treatment, and 1-3 days following discontinuation. The procedure was performed once in 10 healthy controls.
Results: The m-SIT showed adequate discriminant-, convergent- and criterion validities. It differentiated patients from controls (mean NSSS: 2.13 vs. 0, $p<0.001$; PLMW: 62.28 vs 6.06, $p<0.001$) and discerned untreated from treated patients both for sensory (NSSS mean score (SD): 15.90 (18.2); $p<0.001$) and motor symptoms (PLMW index: 30.1 (38.4), $p<0.01$). Furthermore, NSSS scores covariated well with other severity scales (IRLS, JHS, RLS-6, Pearson's $r>0.5$), and proved reliable on retest. Interestingly, 26.3% of the patients who scored negative for daytime symptoms on RLS-6 or JHS were symptomatic on m-SIT.
Conclusion: This study shows that the m-SIT is valid and reliable to evaluate RLS severity and treatment response, and might become useful in clinical trials. Furthermore, it might be of particular use to identify break-through crises during the daytime.

O: Other

W-O-109 A CHINESE QUESTIONNAIRE-BASED SURVEY: SLEEP MEDICINE AWARENESS IN PRIMARY CARE

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Introduction and Objectives: Numerous published articles emphasized sleep studies. However, it remains to be discussed whether sleep disorders have drawn enough attention from physicians in primary care. We conducted this survey, aiming to assess their knowledge, opinion and clinical awareness regarding sleep medicine.
Materials and Methods: The sample was from primary care centers and consisted of 35 physicians (12 males and 23 females, aged 28 to 49 years). Data for the study were collected by means of questionnaires for sleep medicine. One questionnaire included 5 questions, where they were asked to write down 1) the exact names and the definitions of sleep diseases that they know; 2) disciplines related to sleep disorders; 3) normal sleep cycle of adults; 4) PSG related knowledge and 5) national and/or international academic associations of sleep medicine. A total of 34 participants returned completed surveys.
Results: Statistical analysis showed only 26.5% of the participants could name at least 2 sleep disorders correctly, 41.2% only got one right answer and 32.4% didn't know any correctly. The question about PSG showed that only 17.6% participants knew a little while 82.4% participants knew nothing correctly.
Conclusion: Our study shows a severe lack of knowledge regarding sleep medicine even at a basic level. It can be implied that community patients with sleep disturbances may not be given medical tests or recommended to clinics accordingly. Alarmed by the lack of knowledge of sleep associations, it is necessary to arrange more academic activities and focus on propaganda. Compared with congresses, sleep studies, academic exchange and publications, to generalize the knowledge of sleep medicine should be considered equally important, so that sleep medicine can be better developed.

W-O-110 ACTIGRAPHIC VARIABLES IN PATIENTS WITH CIRRHOSIS AND ITS ASSOCIATION TO APATHY AND DEPRESSION

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Introduction and Objectives: Sleep disturbances have been reported in cirrhosis patients. Actigraphy is a method that utilizes a miniaturized computerized writswatch-like device to long-term monitor and collect data generated by body movements and allows indirect estimation of sleep and wakefulness based on motor activity. The aim of this exploratory study was establish the relationship between apathy, depression, and sleepiness to circadian parameters of sleep-wake behaviors in patients diagnosed with cirrhosis.
Materials and Methods: Cross-sectional study was conducted with a total of 16 female patients diagnosed with cirrhosis. Patients using antidepressant drugs or any other drugs that could alter sleep, or had psychiatric diagnosis were excluded. The patients answered the following questionnaires: personal and demographic data, sleep hygiene index (SHI), Hamilton Anxiety Scale (HAS), Beck Depression Inventory (BDI), the Geriatric Depression Apathy-Scale (GDAS) and Epworth Sleepiness Scale (ESS). Actigraphic recordings were performed for seven consecutive days with the method of zero crossing, in epoch of one minute.
Results: The patients had a mean age of 52±11 years, with a BMI of 26±7 kg/m^2. Cosinor analysis showed for the circadian parameters a period of 23.9±0.25 h, with mean activity=111.81±21.23 a.u., acrophase=15.75±1.83 h, and amplitude=79.3±18.9 a.u. The sleep actigraphic parameters measured were as follows: total sleep time 7.1±2.3 h, sleep latency 13.2±7.5 min, sleep efficiency 80.5±11.8%, wake after sleep onset 98.2±47.4 min, nap time 35.1±31.6 min. The amplitude of circadian cycle negatively correlated with GDAS (rho= -0.60, P=0.01), BDI (rho= -0.64, P=0.009), and SHI (rho= -0.66, P=0.004), but amplitude was not significant related to HAS or sleepiness.
Conclusion: Patients with cirrhosis have a low level of activity associated to symptoms of apathy and depression that involve alterations in sleep hygiene but not to sleepiness level.

W-O-111 ANTIOXIDANTS TO PREVENT LIVER DAMAGE IN MICE EXPOSED TO INTERMITTENT HYPOXIA

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Introduction and Objectives: Sleep apnea causes intermittent hypoxia (IH). It has been demonstrated that IH causes oxidative stress and liver damage. Antioxidants can prevent oxidative damage but their effect has not been tested in a model of sleep apnea. Objective: To investigate the effect of the use of the antioxidants melatonin (MEL- 200μL/kg) and N-acetylcysteine (NAC- 10mg/kg) to prevent liver damage and oxidative stress in mice subjected to IH during 35 days.
Materials and Methods: 72 male mice, Balb-C, adults were divided into six groups (sham IH - SIH, SIH + MEL, SIH + NAC, IH, IH + MEL and IH+NAC). During 35 days, a gas mixture reduced the FIO2 in the cages during 30 seconds to a nadir of 6%, followed by 30 seconds of room air insufflation, totaling 480 cycles over eight hours. From day 21 on, the intra-peritoneal injection of vehicle (VEH) and antioxidants was started. On the 35th day, the rodents were euthanized and the following markers were measured: liver enzymes AST (U/L), ALT (U/L) and alkaline phosphatase (ALP; U/L), lipoperoxidation (LPO; nmol/mg prot), and liver antioxidant activity of superoxide dismutase (SOD-USOD/mg prot). The results are expressed as mean ± SE.
Results: Liver enzymes increased significantly under IH+VEH ($p<0.05$). AST and ALT in the IH+MEL group and only ALT in the IH+NAC group were significantly reduced. A significant increase in the LPO was seen in the IH+VEH group (0.71±0.2 - $p<0.05$) versus SIH+VEH group (0.4±0.1). LPO was reduced in IH+MEL and IH+NAC groups ($p<0.01$). SOD, was reduced in the IH+VEH group ($p<0.001$) and increased in IH+MEL and IH+NAC groups ($p<0.01$).
Conclusion: Mice exposed to intermittent hypoxia simulating severe sleep apnea, during 35 days, exhibit liver damage and oxidative stress. Administration of antioxidants reduces liver damage, suggesting a protective effect, in special, of melatonin.
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W-O-112 ARCHITECTURE OF NOCTURNAL SLEEP IN CHILDREN WITH FRONTO-TEMPORAL LOBE EPILEPSY

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Introduction and Objectives: Polysomnographic investigation of night sleep is important for the differentiation of the disease and its optimal treatment, even more, it will enable us to study the influence of epilepsy on the night sleep architecture.
Materials and Methods: The study was done on 15 patients, aged 4-12 years. EEG recordings were done in parallel with EOG, EMG, PLM, ECG, respiration SPO2. The night sleep was recorded for 9-13 hours.
Results: The common pattern of EEG for all three groups is cluster-like high amplitude (300-400 mkv) sharp peak-waves and poly-peaks with bilaterally synchronous discharges, also unilateral single events in the frontal and temporal parts of hemispheres. This common background for all group patients with disturbed sleep structure varies in groups so that the degree of disturbance is lower in the first group, there is a tendency to normalization in the second group, and the disturbance degree is the highest in the third one. The sleep structure has the following features in the group I: The stage 2 and the stage 3 are weakly reduced, REM sleep is close to the norm margins. The group II is characterised by the slight reduction in REM sleep and the stage 3; the stage 2 is remarkably reduced, prolonged is the wake. The group III patients are characterised by the remarkable increase of the stage 2 and the REM sleep (with REM behavioural disorders: leg jerks and screaming) while the stage 3 is omitted.
Conclusion: The investigation shows that the night sleep disturbances in the epileptic patients are side effects of the main disease and the proper management of epilepsy is required to normalize their sleep.

W-O-113 AUTOMATIC ANALYSIS OF DREAM REPORTS CAN DETECT DREAMER'S GENDER

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Introduction and Objectives: This study aimed to improve current quantitative techniques of dream analysis with a more efficient and objective artificial intelligence method for automatic analysis. Known as "machine learning", a text-mining software was developed to analyze dream reports for target and associated words that differentiated the dreams of males from females. Hypothesized gender predictors were based on previous literature concerning both dream content and written language features.
Materials and Methods: Dreams of 200 adolescent Anglophones (100 males and 100 females) were drawn from an on-going normative study of Canadian dreams. From all of the dreams reported by these participants, 144 male dreams were within a word limit of 60 to 500 words. These reports were matched for length with 144 female dreams; as such, there was no significant mean difference in dream length. Following this, two male and two female undergraduate students were asked to read all 288 dreams and to determine the dreamer's gender to the best of their ability. Also, a computer model was trained to score the gender of the dreamer using 66% of the dream reports. The remaining 34% of dream reports were used to test the model's accuracy.
Results: Results showed that the average agreement between human judges' rating of the dreamer's gender was 74.6%. Pair wise percent agreement ranged from 70.6% (κ=0.41) to 77.9% (κ=0.557). In comparison, the machine learning model indicated a percentage of gender predictability of 74.3% and a Cohen's kappa score (κ) of 0.492 (chance is 50%, with κ=0.00). The best artificial intelligence model for gender classification involved word association, linguistic inquiry and word count (LIWC), and word progression.
Conclusion: As hypothesized, this model demonstrated that it can successfully predict the gender of the dreamer from dream reports, with the human judges being slightly better on average.

W-O-114 CLUSTER ANALYSIS OF EEG ASYMMETRIES AND CONTENTS OF DREAMS IN NORMAL SUBJECTS

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Introduction and Objectives: Imaging motor, sensorial, emotional and cognitive activities in humans is a longstanding and unfinished quest (Maquet 2000; Schwartz, Maquet 2002). In dreams analyses several EEG correlations were found: a reduced coupling between frontal and perception regions (Corsi-Cabrera et al., 2003); visual activities and alpha attenuation (Bertolo et al., 2003), reduced delta activity and dream length (Palagini et al., 2004); reduced alpha power and mentation recall (Esposito et al., 2004); emotions and alpha asymmetry (Daoust et al., 2008); sharing properties of dreams and lucid dreaming in the low frequency bands (Voss et al., 2009); frontal alpha asymmetries recognized as a measure of physical and emotional distress during sleep (Flo et al., 2011). Objectives The objectives were 1) Dreams EEG mapping according to content; 2) EEG asymmetries in frequency bands and dream contents correlations; 3) Classification by cluster analysis the EEG asymmetries and the dream contents.
Materials and Methods: Eight adult normal subjects (4 males) without medical or psychiatric disorders and medication were recorded for 2 consecutive nights; PSG included 21 EEG channels. REM awakenings dreams were collected. Dream contents were evaluated by the Hall van Castle method and the 5 minutes EEG prior to the awakening were selected and submitted to conventional frequency analysis. Asymmetries were evaluated in Fp2/Fp1, F4/F3, F8/F7, C4/C3, P4/P3, T4/T3, O2/O1. Analysis included: each subject, each dream and groups. Analysis of variance, correlation and cluster analysis were used.
Results: Forty four dreams were evaluated (5.5 per subject, min 1; max 10). Asymmetries in frequency bands varied among subjects and with dream contents: characters, emotions, success, visual, rational- fast and low bands; activities, verbal, objects - fast bands; failure – low bands. Cluster analysis of the EEG asymmetries provided 2 clusters, while cluster analysis of dream contents could only identify a single cluster.
Conclusion: EEG frequency bands vary among subjects and according to dream contents; the effect is enhanced by the corresponding left/right asymmetries in the different electrode regions.

W-O-115 DEVELOPMENT OF A PATIENT TRACKING AND REPORTING SYSTEM

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Introduction and Objectives: Precise patient tracking – following the patients through the whole treatment cycle from referrals, through sleep studies to the follow-up appointments- is essential for the purposes of achieving high quality care delivery, quality control, adherence to professional regulations and informed management decisions making. We have developed an electronic patient tracking and reporting system meeting the above criteria.
Results: The development of the tracking system has been a continuous process where the management, the project manager and the secretaries have been working with a software developer in a team to create tailor-made software incorporating the specific pattern of the patient flow and the entire patient and treatment related information relevant to patient care and business management in the sleep clinic. Everyone in contact with patients – secretaries, technicians, physicians- continuously update the system so that it shows real-time information and generates up-to-date reports. In addition to the system displaying real-time numerical and graphical summary of patient history and status, administrators are able to generate and present monthly business reports to the management. The purpose of these analyses is to increase operational efficiency and to maintain strict adherence to the professional standards and regulations. Specifically, reports contain information and analyses on referrals, consults as well as sleep studies broken down by referral month. Besides, ad hoc reports (e.g. physicians referring over X patient per month) help to increase operational efficiency.
Conclusion: This poster will show the type of information generated and the conclusion that can be drawn from such information as well as some informed decisions that can be made to improve patient care and sleep clinic management.

W-O-116 DIFFERENT 10-DAY TEMPORAL PATTERNS OF DREAMS ABOUT SLEEP LABORATORY AND VIRTUAL REALITY MAZE EXPERIENCES: ASSOCIATIONS WITH TEMPORALLY PATTERNED CHANGES IN DREAMED LOCUS OF CONTROL

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Introduction and Objectives: Several studies have shown that target experiences are re-expressed as elements of dream content according to a distinct bimodal temporal pattern: appearance/day-residue, disappearance, reappearance/dream-lag. We attempted to replicate this pattern with two distinct target experiences to determine if dream timing and content would differentially reflect these events.
Materials and Methods: 26 healthy volunteers slept 1 night in the laboratory, where they underwent a virtual reality maze task and then kept home dream journals for 10 days. Dreams were scored for maze and laboratory elements; and for the locus of control (LOC) of dreamed events.
Results: Analyses were limited to subjects whose dreams had the highest incidences of maze/laboratory elements (N=13; median split). An ANOVA with journal days (2-day totals) as a 4-level repeated measure revealed that frequency of laboratory elements followed a quadratic trend (p=0.039), with most elements on days 1+2, fewest on days 5+6 and 7+8, and a resurgence on days 9+10. Frequency of maze elements also followed a quadratic trend (p=0.082), with fewest elements on days 1+2 and days7+8, and most on days 3+4 and days 5+6. LOC scores were more external for days with most laboratory elements (day 1: M=6.13) compared with days with fewest elements (day 5: M=4.13, t=2.84, p=0.013). An opposite trend was obtained for maze elements (day 1: M=5.38, day 5: 4.00, t=2.06, p=0.066).
Conclusion: Laboratory elements in dreams followed the typical pattern with both immediate and delayed incorporation effects. Maze elements showed an inverse pattern. That laboratory incorporations were paralleled globally by more external LOC, but maze incorporations by more internal LOC, is consistent with the suggestion that two distinct memory mechanisms underlie the processing of interpersonal (laboratory) and spatial (maze) experiences.
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W-O-117 DREAMING: NONSENSE OR NOT NONSENSE, THAT IS THE QUESTION – WHAT ANCIENT EGYPTIANS USED TO SEE IN THE MORNING (1)

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Introduction and Objectives: Dreaming is a sleep related phenomenon consisting predominantly of image perception. Free dream production/memorization is most prolific during the late sleep period/early morning, the peak of REM-sleep. Interest in a popularized Egyptian culture, termed Egyptomania, is widespread. Reasons of this prevalent phenomenon remain basically unexplained. The Egyptian culture highly relied on imagery expression, including the extensively picture using hieroglyphic script. Appreciation of nonverbal, pictorial communication seems evident in this culture. Relations between dreaming and Egyptian use of imagery are investigated.
Materials and Methods: Egyptian linguistic structures, etymology, dream reports, dream books and classical night-literature are examined for information about dreaming. The vast text-image corpus of the night-literature extensively documents a highly complex nightly netherworld, called Duat. Delineated as a hidden afterlife existence among the gods, the dead and numerous perils, it is also of utmost importance for daily regeneration of human life.
Results: The Egyptian concept Duat, a nightly netherworld, is etymologically related to Duau, the morning. The highly elaborate assertions on the life regenerating meta-world Duat seem to be inspired by dreaming as an early morning experience. They may be best explained as a textual manifestation of individual and collective dream experience within a dream-wake-continuum culture.
Conclusion: Dreams have been of high interest and have been experienced

as significant in the Egyptian culture. Analyzing Egyptian night-literature and language structures may be helpful in improving awareness of dream semantics and pictorial logic. The extraordinary fascination of the Egyptian culture to the general audience may be explained by yet unconscious effects on these capacities. Intentional use of dream experience in the Egyptian culture is of further scientific interest in somnology. (1) Tribl-GG: Dream as a constitutive cultural determinant. IJoDR 2011,4,24-30 http://archiv.ub.uni-heidelberg.de/ojs/index.php/IJoDR/article/view/9075/2923

W-O-118 DYSPHORIC DREAM EMOTION IS ASSOCIATED WITH SLEEP DURATION AND RISE-TIME DIFFERENTIALLY FOR HEALTHY WOMEN AND MEN

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Introduction and Objectives: The finding that greater eveningness is associated with more nightmares among women but not men (Nielsen, 2010, J.Biol.Rhythms;25:53-62) suggests the more general possibility that dysphoric dream emotion is a function of either longer sleep or later rise-times. We examined this in the home-recorded dreams of healthy volunteers.
Materials and Methods: Thirteen men and 24 women (Mage=25.0±4.4) kept sleep/dream logs for 4 days prior to and 10 days after sleeping in the laboratory. They recorded bed- and rise-times, and rated quality of sleep, morning mood and 10 distinct emotions in dream content. Sleep duration and mean negative dream emotion (NDE) were calculated from these ratings. Correlations were computed separately by sex for all dreams and day-by-day across subjects (n=14 days maximum).
Results: In both sexes, longer sleep correlated with both positive mood (M: r129=0.27, p=0.002; W: r329=0.12, p=0.026) and sleep quality (M: r141=0.20, p=0.016; W: r329=0.20, p=0.000). For women, longer sleep correlated positively with NDE (r160=0.16, p=0.007), fear (r160=0.16, p=0.007) and disgust (r160=0.16, p=0.007). For men, longer sleep correlated negatively with fear (r68=-0.38, p=0.001). Partialing out bed- and rise-times did not eliminate these effects. Day-by-day correlations for women produced similarly positive NDE x sleep duration correlations for 11 of 14 days; these were highest for pre-lab day 3 (r18=0.45, p=0.058) and post-lab days 1 (r12=0.62, p=0.031), 7 (r15=0.76, p=0.001) and 10 (r13=0.56, p=0.045). There were too few men for this analysis.
Conclusion: Results conceptually replicate the Nielsen (2010) findings in that greater dysphoric emotion was associated with longer sleep and later rise-times for women but not men. It is thus possible that women's dysphoric dreaming becomes more chronic when their sleep duration and rise-times become chronically entrenched in an eveningness chronotype. In sharp contrast, men's dysphoric dreaming may be more likely with short sleep and early rise-times.
Acknowledgements: Funded by CIHR, SSHRC, and FRSQ.

W-O-119 FASTING BLOOD GLUCOSE AND SLEEP QUALITY IN NON OVERWEIGHT VERSUS OVERWEIGHT NON DIABETIC PATIENTS PRESENTING WITH SLEEP COMPLAINTS

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Introduction and Objectives: There is a well known association between glucose metabolism impairment and sleep problems among overweight patients but this relationship is not so clear with regard to non overweight persons. The aim of this study was to evaluate the relationship between fasting blood glucose and sleep quality in non overweight versus overweight non diabetic patients presenting with sleep complaints.
Materials and Methods: The study included 20 non overweight (6 males) and 19 overweight (10 males) patients presenting to a sleep clinic in order to perform a diagnostic PSG. Pittsburgh Sleep Quality Index (PSQI) and Epworth Sleepiness Scale (ESS) were applied. Sleep parameters were obtained by polysomnography and blood glucose (FBG) levels were taken from a validated blood glucose monitoring system.
Results: The mean age was 46.9±12.8 in the non overweight patients and 54.7±8.9 in the overweight patients with a body mass index of 22.1±1.9 and 30.7±4.9, respectively. FBG levels were higher in overweight group (111±19 mg/dl versus 99±16 mg/dl) although 1/4 of patients without overweight had FBG levels over 110 mg/dl. PSQI and ESS showed no differences between the two groups. Both N1 sleep stage and sleep latency to REM were increased in overweight patients (16±16.8% and 182±125 min) compared to those with normal weight (9.1±6.6% and 135±62 min). FBG levels were positively associated with N1% (p=0.02) and negatively associated with N3% (p=0.03) but only for the non overweight group.
Conclusion: The finding that 25% of non diabetic non overweight patients have increased levels of fasting blood glucose and the correlations with a more superficial sleep makes plausible the hypothesis that impaired glucose regulation can play a subliminal role in sleep dysfunction.

W-O-120 HORMONAL PROFILE, THE PROGINS POLYMORPHISM, AND ERECTILE DYSFUNCTION: DATA FROM A SLEEP POPULATION-BASED SURVEY

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Introduction and Objectives: PROGINS is a progesterone receptor polymorphic variant that acts as a risk-modulating factor in several disorders in women. Data regarding the influence of this polymorphism on the pathogenesis of male related disorders are limited. The aim of this study was evaluated a potential association among the hormonal profile, PROGINS polymorphism, and erectile dysfunction (ED) complaints in a large population-based sample in Sao Paulo, Brazil.
Materials and Methods: 449 men were enrolled in this study. General information was obtained through interviews and blood sample was collected for DNA extraction and PROGINS genotyping.
Results: Progesterone, prolactin, testosterone, and estradiol levels did not differ between the genotype groups (T1/T1 and T1/T2+T2/T2). No significant genotypic or allelic differences were found between individuals with ED complaints and controls. Multivariate logistic regression analyses including age, body mass index, hypertension, diabetes, apnea-hypopnea index, and genetic ancestry estimation, as well as the PROGINS polymorphism, confirmed the lack of association between the T2 allele carriers and the risk of ED (odds ratio = 0.80; 95% confidence interval = 0.40-1.62).
Conclusion: This is the first study to demonstrate the genotypic and allelic frequencies of the PROGINS polymorphism in a large population-based sample of men. The results do not support a direct role for the PROGINS polymorphism in the risk of developing ED; however, further examination of other variants within PR gene will be necessary to completely rule out an effect.
Acknowledgements: AFIP and FAPESP (no. 07/50525-1 to R.S-S., no. 09/01030-5 to T.A.A. and CEPID no. 98/14303-3 to S.T.). M.L.A., L.R.B., and S.T. are recipients of the CNPq fellowship.

W-O-121 HOW ARE SLEEP DIFFICULTIES EXPERIENCED IN COUPLE RELATIONSHIPS IN QUEBEC (CANADA) AND IN FORTALEZA (BRAZIL)?

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Introduction and Objectives: Sleep is a natural, biological and individual phenomenon, and also a social one. The lifetime of most adults will include thousands of nights of shared sleeping with another adult (Rosenblatt, 2006). However, bed sharing among couples is still poorly understood. The present study explores the experience of sleep difficulties in everyday life of Canadians and Brazilians couples focusing on possible cultural variations.
Materials and Methods: Five heterosexual couples without children aged between 24-50 years were recruited in each cultural context (Quebec-Canada/Fortaleza-Brazil). At least one partner reported having sleep problems. Participants attended two research meetings one week apart: 1) completion of self-report questionnaires (PSQI & DAS-16), and 2) in-depth, semi-structure couple interview. During the seven days between both meetings, partners wrote separately and each morning free reports about their previous night of sleep. This material was also discussed during the couple interview.
Results: Preliminary interview results for couples from Quebec City showed that bed sharing with a good night's sleep is experienced as a "challenge" in the relationship of a couple. According to Quebecers, sleep difficulties can be a daily source of individual and shared frustration in everyday

life. However, strategies used to cope with sleep difficulties seem to vary from one couple to another. Preliminary interview results for couples from Fortaleza showed that anxiety/worries related to socio-economic issues and the stress experienced in professional life intensified sleep difficulties in everyday life. Nevertheless, they seem to get nearly used to the situation despite negative impacts on their quality of sleep and global life.
Conclusion: Suffering related to sleep difficulties can be experienced individually or shared in the couple relationship. However, these preliminary qualitative results still need to be related, in both cultural contexts, to the quantitative results from the sleep quality index and the dyadic adjustment scale.

W-O-122 LONGITUDINAL ASSOCIATIONS BETWEEN QUALITY OF MOTHER-INFANT INTERACTIONS AND CHILDREN'S SLEEP AT PRESCHOOL AGE

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Introduction and Objectives: In line with propositions that children's sleep is dependent upon the emotional quality of parent-child relationships, the current study aims to examine the prospective and longitudinal links between the quality of mother-infant interactions and preschoolers' sleep.
Materials and Methods: Three dimensions of maternal behavior were considered with 60 mother-child dyads: maternal mind-mindedness assessed at 12 months during a mother-infant free-play sequence, maternal sensitivity rated at 12 months based on observations performed throughout a 1.5 hour home visit, and maternal autonomy support assessed at 15 months based on a 10-minute problem-solving situation. These three maternal behavioral dimensions were coded with well-validated observational rating systems, and coders reached excellent inter-rater agreement. Children's sleep was assessed at 3 and 4 years using a sleep diary completed by mothers during three consecutive days. To focus on development of sleep patterns, we also controlled for infant sleep, concurrent to the assessment of mother-infant interactions.
Results: Results indicated that after controlling for family SES and child daycare attendance, the overall quality of maternal behaviors during mother-infant interactions (composite score) was related to children getting higher proportions of night time sleep at preschool age ($r=0.34$, $p<0.05$). Maternal sensitivity, in particular, was related to an increase in proportions of night time sleep between infancy and preschool age ($r=0.31$, $p<0.05$), indicating enhanced sleep consolidation in children initially exposed to higher-quality mother-infant interactions.
Conclusion: These findings add importantly to the literature in suggesting that early maternal behaviors are related to sleep consolidation in preschoolers.
Acknowledgements: Special thanks go to the participating families of the Grandir Ensemble project who generously opened their homes to us.

W-O-123 LONGITUDINAL LEARNING-DEPENDENT CHANGES IN REM SLEEP FOLLOWING AVOIDANCE LEARNING

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Introduction and Objectives: Both animal and human studies have demonstrated learning-dependent sleep changes following the acquisition of a variety of tasks. The present study examined the longitudinal (1 week) changes in sleep architecture in rats following acquisition of a two-way shuttle avoidance task.
Materials and Methods: Male Sprague-Dawley rats (n=19) were trained in the shuttle avoidance task in 4 blocks of 25 trials across 2 days (50 trials/day) and were retested 1 week later (25 trials). After an acclimatization period, the rats were recorded polysomnographically (EEG, EMG) for 10 consecutive days. Baseline recordings (Day 1) were taken for 24-hr prior to training. Subjects were recorded on the training days (Day 2 & 3) and for 1-week post-training (Days 4-10). At retest, the subjects with at least 60% avoidances were labeled Learners (n=5) and the remaining as Non-learners (n=14). Spearman's rank correlation coefficients were computed between the percent change from baseline in the proportion of REM/SWS and task performance (i.e., the number of correct trials/latency sum; 1 = poorest learner, 19 = best learner) for the final recording day (1-week post training). In addition, Mann-Whitney tests were performed to test group differences in the proportions of REM/SWS change from baseline on the final recording day.
Results: A significant positive relationship was found between task performance at retest and the percent change from baseline in the proportion of REM/SWS at 1-week post-training, $r_{rank}(17) = 0.48$, $p<0.05$. Furthermore, the Mann-Whitney test revealed a significant difference in the change in proportion of REM/SWS at 1-week post training between the learning ($M = 47.31$, $SD = 65.59$) and non-learning groups ($M = -8.67$, $SD = 35.55$), $U = 11$, $p<0.05$.
Conclusion: The results of this study suggest that learning-dependent changes in sleep architecture are evident long after avoidance task acquisition.

W-O-124 LUNG AND LIVER DAMAGE IN MICE SUBJECTED TO INTERMITTENT HYPOXIA - A SLEEP APNEA MODEL

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Introduction and Objectives: Sleep apnea promotes intermittent hypoxia, leading to oxidative stress and inflammation. Aim: To investigate the extent of pulmonary and hepatic injury in mice subjected to intermittent hypoxia (IH).
Materials and Methods: We exposed two-month old male C57bl6 mice to IH (n=6) or to sham IH (SIH; n=6) in sealed acrylic chambers. The gas system controlled by a timer insufflated a mixture of N2 (90%) and CO2 (10%) for 30 seconds reducing oxygen concentration from 21 to 6%. Afterwards, room air was insufflated during 30 seconds. The cycles were repeated during eight hours daily, simulating sleep apnea. After 35 days of IH the animals were euthanized. Lung and liver samples were collected for assessment of lipid peroxidation (nmol/mg prot), superoxide dismutase (SOD – USOD/mg prot), catalase (CAT – nmol/prot) and expression of NF-κB by p65 portion by western blotting (AU).
Results: The IH group showed significantly higher lipid peroxidation in both lung (mean±SD. IH: 5.1±0.3; SIH; 4.7±0.3) and liver (IH: 3.6±0.3; SIH: 3.0±0.4). SOD was significantly lower in lung (IH, 4.6±0.55; SIH: 7.2±2.4) and higher in liver of the IH group (IH, 5.9±1.7; SIH, 3.1±1.3). CAT activity was significantly higher in both lung (IH: 3.5±0.3; SIH: 2.6±0.5) and liver (SIH: 0.9±0.3; IH: 1.9±0.8). In the evaluation of NF-κB by its p65 portion, we found a significantly higher expression in IH in both lung (IH: 4.1±0.7, SIH: 0.5±0.5) and liver (IH: 0.7±0.1 SIH: 0.1±0.01).
Conclusion: These results suggest that the IH can induce lung and liver damage possibly by the involvement of oxidative stress and activation of NF-κB.
Acknowledgements: FIPE-HCPA, UFRGS, PIBIC/UFCSPA, ULBRA.

W-O-125 MONITORING DAILY SLEEP QUALITY AND SELF-PERCEPTIONS OF COGNITION AND AFFECTIVE EXPERIENCES IN UNIVERSITY STUDENTS

Christina Fung, Michelle Nguyen, Catherine Wiseman-Hakes, Angela Colantonio. *University of Toronto, Canada*

Introduction and Objectives: Students have long been reported to have inconsistent sleep patterns in response to academic demands and lifestyle. However, there is a paucity of research about the relationship between daily fluctuations of sleep quality and self-perception of cognition and affective experiences amongst university students. The goal of this study was to longitudinally examine the relationship between daily subjective sleep quality and daytime function amongst university students.
Materials and Methods: The Daily Cognitive-Communication and Sleep Profile (D-CCASP) was administered to a convenience sample of university students for four weeks. Spearman rank (rs) correlation coefficient was used to determine the relationship between daily ratings of sleep quality to other domains of the D-CCASP.
Results: Fifty-six students participated in this study (46 females, 10 males, Mean age = 21.9). Mean duration of sleep was 6.38 hours. There were significant positive correlations between mean ratings of sleep quality and mood ($r_s=0.715$, $p<0.01$); attention ($r_s=0.564$, $p<0.01$); memory ($r_s=0.570$, $p<0.01$); and language processing ($r_s=0.565$, $p<0.01$) on the D-CCASP. Of

note, preliminary analysis of self-reported external factors such as exams, assignments, and health issues negatively correlated with sleep quality and other domains on the D-CCASP.
Conclusion: University students experience irregular sleep quality patterns and consequent negative effects on perceived cognitive and communication functions when exams and assignments are due. Education is warranted to increase awareness of the negative impact of poor sleep quality on daytime function. Specifically, sleep hygiene may optimize the quality of sleep, with the goal of improving academic performance and reducing mood issues for students.
Acknowledgements: This study was supported by a CIHR Fellowship in Clinical Research and the Toronto Rehabilitation Institute.

W-O-126 NIGHT TIME DRIVING – AN UNDERESTIMATED RISK

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Introduction and Objectives: According to the statistics of the Austrian Federal Ministry of Interior, 548 persons died in road accidents in 2010; in 28 traffic casualties sleepiness was suspected to be the main reason. Nevertheless, the percentage of deadly road accidents caused by sleepiness might be much higher. Studies on nocturnal driving behaviour are rare and in nearly all of them driving simulators were used. It is still unclear if results obtained in an artificial surrounding are representative for real-life driving. The current investigation examines nocturnal driving behaviour at testing site under realistic conditions.
Materials and Methods: The investigation addresses two basic questions: How frequent are driving lapses during night time and does a 30-minute break after 90 minutes of driving have positive effects on the driver's performance? Drivers were healthy subjects (n= 60; mean age: 40.8a ±7.03; 26 females), with an advanced driving routine and no history of severe traffic accidents, driving their own car on a test site between 2.00 and 4.00 am. Half of the group was allowed to take a break after 90 minutes of driving. Videometry, polygraphy and GPS-loggers were used to monitor driving performance. Subjective ratings of sleepiness and well-being were obtained before and after driving, as were reaction-time, attention and concentration.
Results: Ratings of sleepiness at 4.00 am were significantly higher only in the non resting group. Attention and the number of errors increased significantly in both groups, but reaction time showed no changes. Interestingly, the number of driving lapses was very low in the resting as well as in the no resting condition.
Conclusion: Two hours of night time driving without a break increases subjective ratings of sleepiness but does not result in severe driving lapses. One might speculate that night time driving under realistic conditions yields results that differ from those obtained with driving simulators.
Acknowledgements: The authors would like to thank Dr. Grossegger (B.E.S.T.-medical Systems) and SOMNOmedics for their technical assistance in the project.

W-O-127 PARENTING AT MIDNIGHT: PRELIMINARY VALIDATION OF THE PARENTS' NIGHT-WAKING THOUGHTS AND AFFECT QUESTIONNAIRE

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Introduction and Objectives: Measures of parents' cognitions have advanced our understanding of infants' sleep. No comparable measures exist specifically for use with parents of preschool-aged children. The Parents' Night-waking Thoughts and Affect Questionnaire (PNTQ), a self-report measure of what parents think and feel when their preschool-aged child wakes during the night, was developed to address this need.
Materials and Methods: Items were created based on literature review, parent interviews, expert review, and clinical experience. 203 mothers (M age = 32 years) of preschool-aged children (M age = 3.4 years, range 2-5) completed the PNTQ and measures of: parents' agreement with night-waking strategies, parenting stress, well-being, and night-waking. Confirmatory Factor Analyses (CFA) were conducted, convergent validity of the PNTQ subscales was examined, and associations between PNTQ subscales and children's night-waking were explored.
Results: The 4 subscales of the PNTQ: positive thoughts about limit-setting, positive thoughts about active comfort, concerns about limit-setting, and negative affect were an acceptable fit to the data [robust CFI = 0.90; robust RMSEA = 0.06 (90% C.I. = 0.05, 0.07)]. Internal consistency were solid (α = 0.68-0.87, mean inter-item rs = 0.35-0.56). Support for convergent validity included: PTNQ negative affect subscale was correlated with parenting distress ($r=0.41$, $p<0.001$), and the PTNQ positive thoughts about limit-setting subscale was correlated with agreement with limit-setting in hypothetical night-waking vignettes ($r=0.53$, $p<0.001$). PTNQ subscales were correlated with parents' reports of children's night-waking (e.g., PTNQ negative affect correlated with greater night-waking frequency, r=0.20, and parents' perceptions of sleep as problematic, r=0.48; both $p<0.001$).
Conclusion: The PNTQ is a promising measure of thoughts and affect related to night-waking experienced by parents of preschool-aged children.
Acknowledgements: This research was funded through a research grant provided by the Children's Health Research Institute. Dr. Coulombe was supported by a Social Sciences and Humanities Research Council of Canada doctoral research award, and by CIHR.

W-O-128 PRELIMINARY VALIDATION OF A NEW INSTRUMENT FOR MONITORING SLEEP, WAKEFULNESS AND DAYTIME FUNCTION: DAILY COGNITIVE-COMMUNICATION AND SLEEP PROFILE

Christina Fung, Michelle Nguyen, Catherine Wiseman-Hakes, Angela Colantonio. *University of Toronto, Canada*

Introduction and Objectives: There is a paucity of measures that are sensitive to daily fluctuations in sleep, wakefulness, and daytime function. The Daily Cognitive-Communication and Sleep Profile (D-CCASP) monitors daily fluctuations in cognitive and communication functions in relation to subjective sleep quality. Despite its use in clinical practice, the psychometric properties of the D-CCASP have not yet been evaluated. The objective of this study was to evaluate the reliability and validity of the D-CCASP in a normative sample.
Materials and Methods: This study involved the administration of the D-CCASP to a convenience sample of young adults for two 2-week blocks, interspersed with a 2-week rest period. Upon completion, participants also completed the Pittsburgh Sleep Quality Index (PSQI) to analyze criterion validity of the D-CCASP. Internal consistency, test-retest reliability, and criterion validity were calculated by Cronbach's alpha coefficient, Intraclass Correlation Coefficient (ICC), and Spearman rank (rs) correlation coefficient, respectively.
Results: Fifty-six university students participated in this study (46 females, 10 males, Mean age = 21.9). Preliminary analysis showed moderate internal consistency (Cronbach's alpha = 0.706) and test-retest reliability (ICC = 0.700, $p < 0.001$) among mean ratings of sleep quality on the D-CCASP. There were significant correlations between mean ratings of sleep quality and all domains on the D-CCASP (rs = 0.564-0.730, $p < 0.01$). Criterion validity was established between mean sleep quality ratings in the D-CCASP and PSQI (rs = 0.410, $p < 0.01$).
Conclusion: The D-CCASP is a reliable and valid tool to monitor daily sleep quality and related perceived mood and cognitive communication function over time among a normative sample of young adults.
Acknowledgements: This study was supported by a CIHR Fellowship in Clinical Research and the Toronto Rehabilitation Institute.

W-O-129 PROVIDING SLEEP SERVICES TO THE INDIGENT: AN ANALYSIS

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Introduction and Objectives: Patients may not receive sleep medicine services due to lack of insurance coverage which may result in devastating health and work-related consequences. We reviewed our experiences after initiating an indigent sleep medicine service.
Materials and Methods: We established a relationship with two local indigent healthcare clinics: J.C. Lewis and St. Mary's Health Centers in Savannah Georgia. We offered to evaluate patients for sleep disorders at no charge. From October 2009 to December 2010 we evaluated 17 well screened patients with formal sleep medicine consultation and home sleep testing. If the home study indicated significant sleep apnea, patients were titrated

with AutoPAP for 3 weeks. Based on AutoPAP results CPAP was initiated with planned follow-up.
Results: Seventeen patients were evaluated (71% male, age = 48.6±8.87). Eleven patients had evidence of sleep apnea (AHI = 50.7±29.49). CPAP was initiated in 10 patients (pressure = 14±3.89 cmH2O). We assessed adherence in 8 patients (hrs/night = 3.59±1.58 on 67.6±26.43% of nights). Following consultation and workup, 8 patients returned for follow-up. Labor and professional costs were approximately $4,620. Since most PAP equipment given to patients was donated to us, our equipment costs were minimal. Lost equipment costs were approximately $1,500 - three of our AutoPAP devices were not returned. Expected revenue, had we been billing, would have been approximately $18,722.
Conclusion: We believe it is feasible to provide sleep services at modest cost to an indigent population. We believe the cost is worth the benefit derived. The most difficult aspect of this program has been patient follow-up. This population is often highly mobile and difficult to contact. Despite this, it would be of interest to see if this model could be replicated in other communities.
Acknowledgements: We are grateful for the support of our equipment vendors and patients who donated equipment and supplies to our program.

W-O-130 SLEEP AND HEALTH-RELATED QUALITY OF LIFE IN SOUTH AUSTRALIAN YEAR 6-7 CHILDREN BEFORE AND AFTER A SLEEP EDUCATION PROGRAM

Sarah Blunden, Hayley Etherton, Gabrielle Rigney. *University of South Australia, Australia*

Introduction and Objectives: Initial studies have indicated school-based sleep education programs (SEP) can increase sleep knowledge and outcomes within adolescent populations. Blunden (2007a & 2007b) found that sleep knowledge significantly increased and Kira et al. (2010) found sleep duration significantly improved (all $p < 0.05$) following the ACES SEP. Whether this SEP can also improve health-related quality of life (HRQoL) is yet to be established. This project aims to improve children's sleep duration, efficiency (time in bed minus time awake) and HRQoL by implementing a school-based SEP.
Materials and Methods: This study is a randomised control trial. South Australian metropolitan schools (N=4) were randomly selected and assigned as either intervention or control groups. Participants (N=120, aged 11-12 years) will complete the Child Health Utility 9D (CHU9D) and those randomly selected (N=60) will also wear actigraphy monitors for one week to measure sleep duration and efficiency. Parents will complete a demographic questionnaire for their child. The SEP is teacher delivered and sessions run 1/week for four weeks with an optional fifth week on relaxation available. Groups will be assessed at baseline and then 5-6 weeks later following the SEP. Data collection is ongoing. Between groups analysis will evaluate the effectiveness of the intervention.
Results: It is expected that participants in the intervention groups will increase their overall sleep time and efficiency after the sleep education program. Subsequently, participants in the intervention groups will also report improved HRQoL.
Conclusion: Should significant improvements be found it would be recommended that sleep education programs be introduced into schools in order to improve student's sleep and HRQoL in a simple and cost-effective manner.

W-O-131 SLEEP COMPLAINTS AND QUALITY OF LIFE IN GYNECOLOGICAL CANCER PATIENTS

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Introduction and Objectives: Women diagnosed with gynecological cancer often present with sleep complaints. Moreover, it has been suggested by previous work that these type of complaints are strongly correlated with uncontrolled pain. Sleep disturbance can influence patient's well-being self-awareness and quality of life, and we can anticipate a clinically relevant impact in a vulnerable population experiencing pain and distress. Furthermore, it may be helpful to know if sleep complaints precede or follow the diagnosis or treatment stage of illness in order to better inform management. The objectives of this study are to assess gynecological cancer patients' views about sleep and quality of life at the first gynecologic consultation in a central hospital.
Materials and Methods: Cross-sectional study. Sample of 36 women presenting to their first appointment in a central hospital gynecological cancer outpatients clinic, recruited consecutively. Individual brief interviews were performed. Two self-completion questionnaires were used: EORTC-QLQ 30 scale for quality of life and Pittsburg Sleep Quality Index (PSQI).
Results: Population's age and education years (mean + SD) were 57+19,33 and 6,1 +3,7 respectively. Fifty percent reported fairly bad or very bad sleep quality (mean PSQI component 1 =1,44+0,9) and 30% were on sleep enhancing medication. Sample's mean sleep efficiency was 75,6%+23%. The more distressful sleep disturbances were having to get out of bed to use the bathroom (component 5 question b score mean = 2,19+1,2) and pain (component 5 question i score mean= 1,58+1,4). PSQI total score mean was 9,3+4,9. Global health status' mean was fair.
Conclusion: Pain and sleep disturbance are common complaints in women presenting with gynecological cancer. Future follow-up cohort studies might help to clarify how these complaints progress and which patients may benefit from early intervention.

W-O-132 SLEEP IN MIGRAINE AND TENSION TYPE HEADACHE IN CHILDREN: PRELIMINARY STUDY

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Introduction and Objectives: A relationship between migraine headaches and sleep disturbances has been suggested in both adults and children. Clinical studies performed in adult populations indicate that certain headache types may be related to specific sleep stages, but there is a lack of research examining the relationship between primary headache and sleep in children. The aim of the study was to evaluate sleep disturbances in children with migraine and tension type headache (TTH).
Materials and Methods: We evaluated nocturnal polysomnography (PSG) in 20 Migraine children and 11 TTH subjects. PSG records were manually scored. We used Fast Fourier Transformation to deconstruct EEG signals into primary frequency bands of beta, alpha, theta, and delta frequency domains. We analyzed central EEGs (C3-A2) and occipital EEGs (O2-A1) in first episodes of N1, N2, N3 and REM sleep. Epochs containing artifact were removed. The spectral power of each frequency domain for each sleep state was compared between Migraine and TTH children.
Results: On Sleep Macrostructure, sleep latency was significantly longer in children with migraine (19.2min) than in TTH (11.6min) (p=0.048), N2 latency was longer in migraine (21.6min) than in TTH (13.0min) (p=0.028). The REM sleep latency was significantly shorter in children with migraine (100.4min) than in TTH (153.2min) (p=0.011). The children with migraine had a mean of 5 REM periods vs. 4 periods in TTH. In persons with Migraine, theta power was significantly higher in REM sleep, than in TTH patients. In central EEGs migraine children had 22.0% theta power vs. 14.5% for TTH children. In occipital EEGs migraine children had 18.9% theta power vs. 12.6% for TTH children.
Conclusion: It is necessary to conduct further research on a larger group of patients with headaches in order to better correlate the prevalence of sleep disorder symptoms with the type of primary headache and daytime functioning.

W-O-133 SYMPTOMS CLUSTER IN PERSONS WITH MULTIPLE SCLEROSIS AND THEIR IMPACT ON SLEEP DISORDERS

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Introduction and Objectives: Multiple sclerosis (MS) is one of the most common neurological disabling conditions among young adults. Patients with MS often experience several concurrent symptoms, called a cluster symptom, which is believed in comparison to a single symptom, to have a stronger effect on disease consequences such as sleep disturbance. The objective of this study was to examine the existence of symptom cluster of

pain, spasticity, anxiety, and bladder dysfunction, and its association with sleep disturbance in individuals with MS.
Materials and Methods: Study population was a centre-stratified random sample of persons registered at the 3 MS clinics in Montreal including 139 women and 49 men. To assess the average pain intensity 0-10 numeric rating scale (NRS), to estimate spasticity the Ashworth Scale, to measure sleep disturbance Pittsburgh Sleep Quality Index (PSQI), and to determine anxiety the Hospital Anxiety and Depression Scale (HADS) were used. To measure bladder dysfunction, participants were asked to respond to the question "How many times do you usually wake up to go to the bathroom after you have fallen asleep at night?" SAS statistical software was used to run the analysis.
Results: Forty one percent of the sample identified sleep disorder as a symptom (average age 43±10 yrs; 73% F; mean EDSS= 3±4; average year of onset= 9±5). Cluster analysis initially identified four subgroups of MS patients differing in experiences of pain, spasticity, anxiety, and bladder dysfunction. In addition, analysis of variance later indicated that the four subgroups differed in sleep disturbance, unrelated to patients' age, gender, and disability level. The subgroup with lowest scores on symptoms had the lowest sleep disturbance, whereas the subgroup with the highest scores on the symptoms had the worst sleep disturbance.
Conclusion: This study provides preliminary support for pain, spasticity, anxiety, and bladder dysfunction as a symptom cluster that correlates with sleep disorder in persons with MS.
Acknowledgements: CIHR - The Frederick Banting and Charles Best Doctoral Research Award.

W-O-134 THE PREDICTIVE VALUE OF PEDIATRIC SLEEP HEALTH ON PEDIATRIC BEHAVIOR

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Introduction and Objectives: This study investigates the relation between parental reported sleep disorder symptoms and behavioral difficulties in their children. It assesses the impact of poor sleep health on poor behavior.
Materials and Methods: The Pediatric Sleep Questionnaire for parents and the Rutter Behavior Scale A for parents were mailed to the families of 795 children, aged 8-9 years who were second grade students in Tartu City and County, Estonia. Completed questionnaires for 607 students were returned for a response rate of 76%: 262 children were from Tartu City; 345 from Tartu County; 294 were female (48%), 313 male (52%). The study was approved by the Tartu University Review Committee on Human Research; all data was coded for privacy. Multiple regression analysis (the Statistica 10 software package) analyzed the relation between sleep health and behavior scores. Sleep health questions were scored for degree of sleep difficulty; a high Rutter score indicated behavioral difficulties.
Results: The sleep health score accounted for 18.8% of the variance in the behavioral score. R2 was 0.1879; the F test was 16.58. The sleep health variables with the greatest predictive power were: restless sleep (b^*=0.190); child crying during the night (b^*=0.145); snoring (b^*=0.126); bed time resistance (b^*=0.107). The p-value = 0.00000005.
Conclusion: The results indicate that sleep health has a clear, although perhaps not overwhelming impact on poor behavior. Poor sleep quality accounted for 18.8% of poor behavior, suggesting that other factors are at play. Further, parental feelings may lead to under reporting of sleep and behavioral difficulties. Nevertheless, the results suggest that better sleep health will improve children's social behavior, leading to improved child, and family health.

W-O-135 THE PSYCHOMETRIC DEVELOPMENT OF AN ATHLETE SLEEP SCREENING QUESTIONNAIRE: PROCESS & METHODS

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Introduction and Objectives: The present study was designed to develop, validate and test the reliability of a subjective sleep screening questionnaire for elite athletes – the Athlete Sleep Screening Questionnaire (ASSQ).
Materials and Methods: Sixty elite athletes from the Canadian Sport Centre – Calgary were randomly selected to participate in the study. Phase I: Thirty athletes completed a self-report sleep screen (SRSS): Pittsburgh Sleep Quality Index (PSQI), Adjusted Neck Circumference (ANC), Athlete Morningness/Eveningness Scale (AMES) followed by a structured clinical interview (SCI)) with a sleep physician. Phase II: SRSS was revised (AMES and ANC were replaced with the Composite Scale of Morningness and the Maislin Apnea Risk Index, respectively; the Insomnia Severity Index was included). Clinical outcomes (referral to a sport or sleep physician or sleep education) were attached to the results of the SRSS and SCI.
Results: Phase I revealed a concordance rate of 57% and 53% between the SRSS and the SCI for the AMES and PSQI, respectively; no better than chance. Adjustments were made to the SRSS and to the method and process of testing the psychometric properties for Phase II. These adjustments included categorization of sleep factor domains and items of inquiry within the domains.
Conclusion: While the method for screening sleep disturbance and sleep-related impairment in athletes cannot rely on current screening tools, the process for developing a reliable screening tool must rely to some extent on the standard domains of interest and items of inquiry found within these tools. The process of validating and testing the reliability of the method is the focus of our current research with the goal of developing an ASSQ that will guide clinical practice for this special population.
Acknowledgements: The authors would like to thank the Canadian Olympic Committee and Own The Podium for funding this project.

W-O-136 THE ROCKY SLEEP TRIAL: A BEHAVIORAL SLEEP INTERVENTION FOR 6-8-MONTH-OLD INFANTS

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Introduction and Objectives: Infant behavioral sleep problems affect between 20 and 30% of infants and can contribute to adverse developmental outcomes. Interventions directed at changing parents' behaviors have reduced infant night waking. Short-term group interventions to improve infant sleep have not been tested. To assess effects of short-term group interventions, our primary question was: Are parents who have infants with behavioral sleep problems and randomized to a cognitive-behavioral sleep intervention versus those randomized to a safety intervention more or less likely to have their child wake less frequently per night by actigraphy and to identify their infants as having a severe sleep problem?
Materials and Methods: Trial aimed at parents of 6-8-month old infants (waking and crying $>2\times$ at night, 4 days a week). Follow-up data collection planned at 6 and 24 weeks. 253 families were recruited through health units; 6-week data collection (questionnaires, sleep diaries, and actigraphy) concluded in April, 2011. Experimental and control groups received either a 2-hour teaching session on sleep or safety and 2 weeks of bi-weekly telephone support delivered by Public Health Nurses.
Results: From baseline to 6 weeks both groups demonstrated significant decreases ($P<0.0001$ - using paired t-tests) in numbers of wake episodes per night, with a mean decrease of 1.2 (95% C.I. 0.7 to 1.8) in control and 1.3 (95% C.I. 0.7 to 2.0) in the experimental arm. There was no statistically significant difference in between-group decreases (P=0.8, unpaired t-test) with a difference of means of 0.1 (95% C.I. -0.8 to 1.0).
Conclusion: Lack of significant differences indicate further analyses should explore parents' perceptions of infants' sleep problem severity (analysis forthcoming). Infants may have been waking and self-soothing, which parents could interpret as sleep improvement.
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W-O-138 EMOTION REGULATION AND SLEEP PHYSIOLOGY: BREAKING THE LINK BETWEEN NEGATIVE EVENTS AND SLEEP DISTURBANCE

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Introduction and Objectives: Despite a long history of interest in emotion regulation as well as in the mechanisms that regulate sleep, the relationship between emotion regulation and sleep is not well described.
Materials and Methods: To get insight in this relationship, we examined the effects of pre-sleep painful emotion (i.e., a failure-experience), moderating effects of induced emotion regulation in the recovery from the experience and the effects in shaping sleep physiology assessed by polysomnography (EEG).
Results: As hypothesized, results indicate that participants who received experiential emotion regulation showed less fragmentation of sleep by a longer Total Sleep Time, higher Sleep Efficiency with more % REM sleep and Slow Wave Sleep than participants who received analytical emotion regulation. For the group of participants who received experiential emotion regulation, due to its regulatory effect, sleep parameters did not differ between the baseline and the failure night. By contrast, analytical emotion regulation was associated with more Awakenings, more % Time Awake, more Waso (Awake after Sleep Onset), and a longer Latency to Slow Wave-Sleep in comparison with experiential emotion regulation.
Conclusion: In the recovery of a painful experience, a beneficial effect of experiential emotion regulation has been observed on sleep physiology, compared to cognitive analytical emotion regulation.

W-O-140 SLEEP CHARACTERISTICS OF CHINESE RURAL POPULATION BY PSQI

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Introduction and Objectives: To describe the sleep characteristics of Chinese adults in rural area.
Materials and Methods: Pittsburgh Sleep Questionnaire Index (PQSI) was applied to evaluate the sleep quantity and quality in Chinese adults (1049 men and 776 women) in rural area. PSQI global score and seven component scores were compared by gender and age groups. The association of demographic measurements with sleep quality were assessed.
Results: Women were more likely to report poor sleep quality and sleep disturbance than men. Older subjects scored higher in seven components of sleep quality than younger. Low education level, Depressive and Restless leg symptoms were relevant to unfavorable sleep score. Use of Sleep medicine was rare in this rural population.
Conclusion: Gender, age, education, depressive and restless symptoms were significant factors related sleep quality.
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