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Vigilance

Volume 24, number / numéro 1 **Fall / Automne 2015**

IN THIS ISSUE/ DANS CETTE ÉDITION

Vigilance is the official newsletter of the Canadian Sleep Society (CSS)
Vigilance est le bulletin officiel de la Société canadienne du sommeil (SCS)

The Canadian Sleep Society (CSS) / Société Canadienne du Sommeil (SCS) is a professional association of clinicians, scientists and technologists formed in June 1986 to further the advancement and understanding of sleep and its disorders through scientific study and public awareness.
La Société canadienne du sommeil (SCS) est une association professionnelle de cliniciens, de scientifiques et de technologues mise sur pied en juin 1986 afin de favoriser l'avancement des connaissances et la compréhension du sommeil et des troubles qui l'affectent par la recherche scientifique et la sensibilisation du grand public.

This issue is mainly devoted to the CSS 7th Annual Meeting, held in Toronto on September 2015.
Cette édition est surtout axée sur le 7e congrès annuel de la SCS qui s'est tenu à Toronto en Septembre 2015.

Pictures by /Photos par J. Morin, S. Laventure and / et S. Fogel

Report on the last scientific meeting / Rapport sur le dernier congrès

Kimberly Cote, Ph.D. and John Peever, Ph.D.

The 7th Congress of the Canadian Sleep Society (CSS), held in Toronto September 25th-27th, 2015, was a great success with 814 delegates gathering to share discoveries, network with colleagues, and learn about the latest innovations and technologies in the sleep field.

The society's Distinguished Scientists Award was given to Eliot A. Phillipson, Sir John and Lady Eaton Professor of Medicine Emeritus, University of Toronto for his seminal contributions to the field of sleep and breathing in both health and disease. He gave an engaging keynote address that captured the history of a field, entitled, "**From a Sleeping Dog to National Programs: Evolution of Sleep and Breathing in Canada**".

Five other keynotes addresses included:

Consequences of Sleep Apnea: The More We Dig, the More We Find
Dr. David Gozal, M.D., Herbert T. Abelson Professor, University of Chicago

Sleep Disturbances, Obesity and Diabetes: Interacting Epidemics
Dr. Eve Van Cauter, PhD; Frederick H. Rawson Professor, Sleep, Metabolism and Health Center (SMAHC), Department of Medicine, University of Chicago

Too Many Teens get too Little Sleep: Impact on Adolescent Mental and Physical Health
Dr. Dean W. Beebe, PhD, ABPP; Cincinnati Children's Hospital Medical Center

Role of Hypocretin (Orexin) in Narcolepsy, Parkinson's and Normal Behavior
Dr. Jerome Siegel, PhD; UCLA, VAGLAHS

REM Sleep Behaviour Disorder: The Royal Path to Neuroprotective Treatment
Dr. Ron Postuma, MD, Associate Professor, Department of Neurology, Montreal General Hospital

There were also 3 oral presentation sessions, and 12 symposia (S), including:

Oral Session 1: Mechanisms of Sleep and Rhythms
Chairs : Lia Oskui and Ben Rusak

Oral Session 2: Sleep in Medical Conditions
Chairs : Kevin MacDonald and Jimmy Fraigne

Oral Session 3: Sleep & Cardiorespiratory Function
Chairs : Garret Horton and Richard Horner

S1: Clinical and Basic Science Perspectives on Narcolepsy
Chairperson: Brian Murray, Sunnybrook Hospital

S2: New Insights into the Physiology and Function of Sleep Spindles in Humans
Chairperson: Stuart Fogel, Brain & Mind Institute, Western University

S3: OSA Management in the Era of Individualized Care: Evidence-based Methods for Selecting Treatment Alternatives
Chairperson: Colin Shapiro, University of Toronto, Sleep & Alertness Clinic; Sleep Research Laboratory, Toronto Western Hospital; Youthdale Child & Adolescent Sleep Clinic, Toronto

S4: Restless Legs Syndrome & Periodic Limb Movements: Emerging Links with Vascular Disease
Chairperson: Mark Boulos, University of Toronto and Sunnybrook Health Sciences Centre; Co-Chairperson: Tetyana Kendzerska, University of Toronto

S5: Perioperative Complications of Obstructive Sleep Apnea
Chairperson: John Fleetham, University of British Columbia

S6: The Challenge of assessing Children's Sleep: Critical Analyses of Tools
Chairperson: Roger Godbout, Université de Montréal

S7: Innovative Approaches to Better Reach Medical Patients with Insomnia
Chairperson: Josée Savard, Université Laval

S8: Sleep-Disordered Breathing and Cardiometabolic Function
Chairperson: John Kimoff, McGill University

S9: Sleeping too Close Together: Paediatric Obesity and Obstructive Sleep Apnea

Chairperson: Indra Narang, The Hospital for Sick Children

S10: Breathing across Sleep-Wake States: From Basic Neurobiology to the Pathophysiology of Sleep-disordered Breathing
Chairperson: Gaspard Montandon, University of Toronto; Co-Chairperson: Indra Narang, The Hospital for Sick Children

S11: Recent Canadian Discoveries in Circadian Rhythms and Sleep
Chairperson: Valerie Mongrain, Université de Montréal

S12 : Sleep in Pregnancy and the Postpartum
Chairperson: Robyn Stremler, University of Toronto and The Hospital for Sick Children

The conference program also included a full day technologist program and student program, and a Dental Sleep medicine program throughout. Prior to the conference, a CME program for physicians was offered focusing on insomnia and CBTi training, and a public lecture was given at the Toronto Public Library by Dr. Richard Horner of the University of Toronto on "Why We and Other Living Things Sleep". The conference also included a number of social events including an opening reception at Trinity church featuring Niagara wines by Pillitteri, a wine-and-cheese poster session, and a student and technologist pub night. As well, a history video was also recorded, showcasing 30 years of stories by our past-presidents.

THE CSS IS PROUD TO ANNOUNCE AWARDS PRESENTED AT THE CONFERENCE, INCLUDING:

Roger Broughton Young Investigator Award Winners
The Roger Broughton Young Investigator Award honours the contributions of Dr. Roger Broughton, founding President of the Canadian Sleep Society (1986-88), and one of the founding figures of Canadian sleep research. The award is given to a scientist for important early career research contributions, rather than a single submitted abstract or paper. This year's winners were Jean-Philippe Chaput and Thanh Dang-Vu.

JEAN-PHILIPPE CHAPUT, PhD

Dr. Chaput is a researcher at the Children's Hospital of Eastern Ontario Research Institute and an Assistant Professor in the Department of Pediatrics at the University of Ottawa. He holds a Junior Research Chair in Healthy Active Living and Obesity Research. His research focuses on obesity prevention and the adoption of a healthy lifestyle. He is also interested in new determinants of obesity such as lack of sleep and mental stress.

THANH DANG-VU, MD, PhD

Thanh Dang-Vu earned his M.D. in 2004 at the Université de Liège, in Belgium. He then completed his residency in Neurology and a Ph.D. in Biomedical Science in the same university. He did a post-doctoral fellowship in the department of Neurology at the Massachusetts General Hospital and Harvard Medical School in Boston. He completed a second postdoctoral fellowship at the Center for Advanced Research in Sleep Medicine at the Université de Montreal and Hôpital du Sacré-Coeur de Montréal. He is currently a CIHR New Investigator and a FRQS Research Scholar. Dr Dang-Vu is also an attending neurologist and a researcher at the Institut Universitaire de Gériatrie de Montréal (IUGM), affiliated with the University of Montreal, and an Adjunct Professor of Neurology and Neurosurgery at McGill University.

Student Outstanding Achievement Award

This award is for the scientific merit of a single publication by a student in the field of sleep research. Funding for these awards is made through the CSS student fund – thank you to CSS members who made contributions to the student fund with their CSS registration.

This year's award was presented to **Kevin P. Grace** for his innovative publication: *Endogenous Cholinergic Input to the Pontine REM Sleep Generator Is Not Required for REM Sleep to Occur*. [The Journal of Neuroscience, 22 October 2014, 34(43): 14198-14209; doi: 10.1523/JNEUROSCI.0274-14.2014].

STUDENT ABSTRACT PRIZE WINNER – Zoltan Torontali, University of Toronto

Abstract Title: *Activation of the REM sleep circuit induces cataplexy in wild-type mice*

TECHNOLOGIST ABSTRACT PRIZE WINNER : Debra Medin, RPSGT

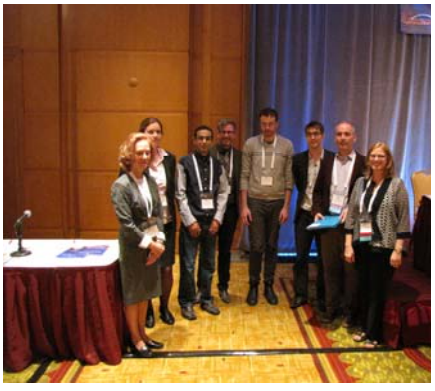
Abstract Title: *Impact of Standardized Phone Follow-up on PAP Adherence in Obese Adolescent Patients with Obstructive Sleep Apnea.*

Canadian Sleep Society (CSS) / Institute for Circulatory and Respiratory Health (ICRH) Student Travel Awards

Each year the CSS and the Institute of Circulatory and Respiratory Health (ICRH) jointly sponsor TRAVEL AWARDS in order to recognize outstanding Canadian research contributions made by students and postdoctoral fellows in the field of sleep research.

Congratulations to the recipients of the 2015 CSS/ICRH Student Travel Awards ($1000 each):

- Soufiane Boucetta, Concordia University
- Jimmy Fraigne, University of Toronto
- Benjamin Gaudet-Fex, Université de Montréal
- Tetyana Kendzerska, University of Toronto
- Dillon McKenna, University of Toronto
- Melodee Mograss, Concordia University
- Thaïna Rosinvil, Hôpital du Sacré-Coeur de Montréal; Université de Montréal
- Matthew Snow, University of Toronto
- Zoltan Torontali, University of Toronto



Sleep and Biological Rhythms Toronto - Symposium Support

Sleep and Biological Rhythms Toronto is a CIHR-funded research and training program, which provided support for speakers in the symposia on *Clinical and Basic Science Perspectives on Narcolepsy*, and *Recent Canadian Discoveries in Circadian Rhythms and Sleep.*

Please find the published abstracts for the poster presentations delivered at the 7th Congress of the CSS in Toronto enclosed in this issue of *Vigilance*.

Thank you to everyone who made the conference a success, including the speakers and delegates, and the numerous working committees. As well, we would sincerely like to thank all of the sponsors and exhibitors that make our biennial conference possible.

See you in Calgary (April 27th-May1st, 2017)!!

Le 7e Congrès de la Société canadienne du sommeil (SCS) qui s'est tenu à Toronto du 25 au 27 septembre 2015 a été un grand succès avec les 814 délégués qui se sont réunis pour partager leurs découvertes, réseauter avec des collègues et en savoir plus sur les dernières innovations et technologies dans le domaine du sommeil.

Le Prix du scientifique émérite de la Société a été décerné à Eliot A. Phillipson, professeur émérite de médecine de la Chaire Sir John et Lady Eaton de l'université de Toronto, pour ses contributions fondamentales au domaine du sommeil et de la respiration dans la santé et la maladie. Il a fait un discours liminaire qui a cerné l'histoire d'un domaine intitulé : « **From a Sleeping Dog to National Programs: Evolution of Sleep and Breathing in Canada** ».

Les cinq autres allocutions liminaires comprenaient :

Consequences of Sleep Apnea: The More We Dig, the More We Find Dr David Gozal, MD., professeur Herbert T. Abelson, Université de Chicago

Sleep Disturbances, Obesity and Diabetes: Interacting Epidemics
Dr Eve Van Cauter, Ph. D.; professeur Frederick H. Rawson, Centre de sommeil, de métabolisme et de santé (SMAHC), Département de médecine, Université de Chicago

Too Many Teens get too Little Sleep: Impact on Adolescent Mental and Physical Health
Dr Dean W. Beebe, PhD, ABPP; Cincinnati Children's Hospital Medical Center

Role of Hypocretin (Orexin) in Narcolepsy, Parkinson's and Normal Behavior
Dr Jerome Siegel, Ph. D.; UCLA, VAGLAHS

REM Sleep Behaviour Disorder: The Royal Path to Neuroprotective Treatment
Dr Ron Postuma, MD, professeur agrégé, Département de neurologie, Hôpital général de Montréal.

Il y a aussi 3 séances de présentation orale (PO) et 12 symposiums (S), y compris :

PO 1 : Les mécanismes du sommeil et des rythmes
Présidents : Lia Oskui et Ben Rusak

PO 2 : Le sommeil dans les pathologies
Présidents : Kevin MacDonald et Jimmy Fraigne

PO 3 : Le sommeil & la fonction cardiorespiratoire
Présidents : Garret Horton et Richard Horner

S1 : Perspectives des sciences fondamentales et cliniques sur la narcolepsie
Président : Brian Murray, Hôpital Sunnybrook

S2 : De nouvelles perspectives sur la physiologie et la fonction des fuseaux de sommeil chez l'homme
Président : Stuart Fogel, Brain & Mind Institute, Université Western

S3 : Gestion du SAOS à l'ère des soins personnalisés : des méthodes factuelles pour la sélection des options thérapeutiques
Président : Colin Shapiro, Université de Toronto, Sleep & Alertness Clinic; Laboratoire de recherche sur le sommeil, Toronto Western Hospital; Youthdale Child & Adolescent Sleep Clinic, Toronto

S4 : Syndrome des jambes sans repos et mouvements involontaires des membres : nouveaux liens avec les maladies vasculaires
Président : Mark Boulos, Université de Toronto et Centre des sciences de la santé Sunnybrook; Coprésident : Tetyana Kendzerska, Université de Toronto

S5 : Complications périopératoires de l'apnée obstructive du sommeil
Président : John Fleetham, Université de la Colombie-Britannique

S6 : Le défi que pose l'évaluation du sommeil chez l'enfant : analyses critiques des outils
Président : Roger Godbout, Université de Montréal

S7 : Des approches novatrices pour mieux atteindre les patients souffrant d'insomnie
Président : Josée Savard, Université Laval

S8 : Les troubles respiratoires du sommeil et la fonction cardiométabolique
Président : John Kimoff, Université McGill

S9 : Le sommeil trop espacé : l'obésité pédiatrique et l'apnée obstructive du sommeil
Président : Indra Narang, l'hôpital pour enfants malades

S10 : Respiration à travers les états de veille-sommeil : de la neurobiologie fondamentale à la physiopathologie des troubles respiratoires du sommeil

Président : Gaspard Montandon, Université de Toronto; Coprésident : Indra Narang, l'hôpital pour enfants malades

S11 : Récentes découvertes canadiennes sur les rythmes circadiens et le sommeil
Président : Valérie Mongrain, Université de Montréal

S12 : Dormir pendant la grossesse et le post-partum
Président : Robyn Stremler, Université de Toronto et l'hôpital pour enfants malades

Le calendrier de la conférence comprenait également un programme d'une journée pour les technologues et un programme pour les étudiants et un programme de médecine dentaire du sommeil. Avant la conférence, un programme de FMC a été offert aux médecins. Le programme était axé sur l'insomnie et une formation de TCC. Le Dr Richard Horner de l'Université de Toronto a tenu une conférence publique à la bibliothèque publique de Toronto sur le thème : « Pourquoi nous et les autres êtres vivants dormons ». La conférence comportait aussi un certain nombre d'activités sociales dont une réception d'ouverture à l'église Trinity church Niagara avec des vins de Pillitteri, une présentation par affiche de vins et fromages et une soirée au pub pour les étudiants et les technologues. En outre, une vidéo de l'histoire a été enregistrée. Elle retraçait les 30 ans d'histoires de nos anciens présidents.

La SCS est fière d'annoncer les prix qui seront remis lors de la conférence, notamment :

Les lauréats du prix Roger pour jeune chercheur
Le prix Roger Broughton pour jeune chercheur honore la mémoire du Dr Roger Broughton, président fondateur de la Société canadienne du sommeil (1986-1988), un des pionniers de la recherche sur le sommeil au Canada. Ce prix est décerné à un scientifique en début de carrière pour souligner l'importance de ses contributions sur le plan de la recherche plutôt que pour la soumission d'un seul article ou résumé. Jean-Philippe Chaput et Thanh Dang-Vu sont les lauréats de cette année.

JEAN-PHILIPPE CHAPUT, Ph.D.

Dr Chaput est chercheur à l'Institut de recherche de l'Hôpital pour enfants de l'est de l'Ontario et professeur adjoint au département de pédiatrie de l'Université d'Ottawa. Il est titulaire d'une chaire de recherche junior sur les saines habitudes de vie et l'obésité. Ses recherches portent principalement sur la prévention de l'obésité et l'adoption d'un mode de vie sain. Il s'intéresse également aux nouveaux déterminants de l'obésité tels que le manque de sommeil et le stress mental.

THANH DANG-VU, MD., Ph.D.

Thanh Dang-Vu a obtenu son doctorat en médecine (M.D.) en 2004 à l'université de Liège, en Belgique. Il a ensuite effectué une spécialisation en neurologie et un doctorat en sciences biomédicales (Ph.D.) à la même université. Il a effectué un premier stage postdoctoral au département de neurologie du Massachusetts General Hospital (Harvard Medical School) à Boston, ainsi qu'un second stage postdoctoral au Centre d'études avancées en Médecine du Sommeil à l'Université de Montréal et à l'hôpital du Sacré-Cœur de Montréal. Il est actuellement un nouveau chercheur des IRSC et un chercheur financé par le Fonds de recherche du Québec – Santé (FRQS). Dr Dang-Vu est aussi neurologue traitant et chercheur à l'Institut Universitaire de Gériatrie de Montréal (IUGM) affilié à l'Université de Montréal et professeur auxiliaire de neurologie et de neurochirurgie à l'Université McGill.

Prix d'excellence pour étudiant
Ce prix vise à souligner l'excellence scientifique d'un article publié par un étudiant dans le domaine de la recherche sur le sommeil. L'octroi de prix se fait par le biais du fonds étudiant de la SCS – nous remercions les membres de la SCS qui ont versé des contributions au fonds étudiant au moyen de leur adhésion à la SCS.

Cette année, ce prix a été décerné à **Kevin P. Grace** pour sa publication novatrice : *Endogenous Cholinergic Input to the Pontine REM Sleep Generator Is Not Required for REM Sleep to Occur*. [The Journal of Neuroscience, 22 octobre 2014, 34(43) : 14198-14209; doi : 10.1523/JNEUROSCI.0274-14.2014].

LAURÉAT DU MEILLEUR RÉSUMÉ D'ÉTUDIANT : Zoltan Torontali, Université de Toronto
Le titre du résumé : *Activation of the REM sleep circuit induces cataplexy in wild-type mice*

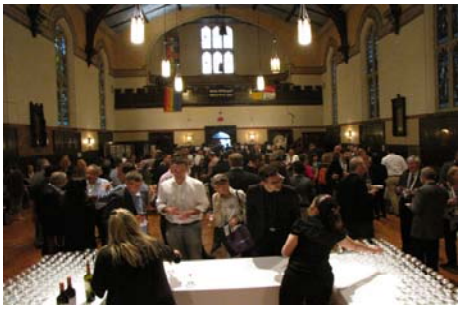
LAURÉAT DU MEILLEUR RÉSUMÉ DE TECHNOLOGUE : Debra Medin, RPSGT
Le titre du résumé : *Impact of Standardized Phone Follow-up on PAP Adherence in Obese Adolescent Patients with Obstructive Sleep Apnea.*

Bourses de voyage pour étudiants de la Société canadienne du sommeil (SCS) et de l'Institut de la santé circulatoire et respiratoire (ISCR)
Chaque année, la SCS et l'Institut de la santé circulatoire et respiratoire (ISCR) commanditent conjointement des BOURSES DE VOYAGE afin de reconnaître les contributions remarquables à la recherche canadienne des étudiants et des titulaires d'une bourse postdoctorale dans le domaine de la recherche sur le sommeil.

Félicitations aux récipiendaires des bourses de voyage de la SCS/ISCR pour l'année 2015 (1 000 $ chacun) :

- Soufiane Boucetta, Université Concordia
- Jimmy Fraigne, Université de Toronto
- Benjamin Gaudet-Fex, Université de Montréal
- Tetyana Kendzerska, Université de Toronto
- Dillon McKenna, Université de Toronto
- Melodee Mograss, Université Concordia
- Thaïna Rosinvil, Hôpital du Sacré-Cœur de Montréal; Université de Montréal
- Matthew Snow, Université de Toronto
- Zoltan Torontali, Université de Toronto

Sleep and Biological Rhythms Toronto — appui aux colloques
Sleep and Biological Rhythms Toronto est un programme de recherche et de formation financé par les IRSC qui fournit un appui aux conférenciers des colloques portant sur les thèmes *Clinical and Basic Science Perspectives on Narcolepsy* et *Recent Canadian Discoveries in Circadian Rhythms and Sleep.*



Veuillez trouver les résumés publiés pour les présentations par affiches soumis au 7e Congrès de la SCS à Toronto inclus dans ce numéro de *Vigilance*.

Merci à tous ceux qui ont contribué à la réussite de la conférence, y compris les orateurs et les délégués ainsi que les nombreux comités de travail. De plus, nous tenons sincèrement à remercier tous les commanditaires et exposants qui rendent possible la tenue de notre conférence biennale.

Rendez-vous à Calgary (du 27 avril au 1 mai 2017)!

Calendar Of Events / Calendrier des évènements

May 12 – May 14, 2016 / 12-16 Mai 2016
1st International Conference on Sleep Spindling
Budapest, Hungary
http://www.sleepspindles.com/

June 11-15, 2016 / 11-15 juin 2016
SLEEP 2016, Denver, Colorado, USA
http://www.sleepmeeting.org/

September 13-16, 2016 / 13-16 septembre 2016
European Sleep Research Society Congress
Bologna, Italy
http://www.esrs-congress.eu/esrs2016/home.html#&panel1-1

Jul 2 – Jul 6, 2016 / 2 – 6 juillet 2016
10th FENS Forum of Neuroscience
Copenhagen, Denmark

April 28- 30, 2017 / 28 au 30 avril 2017
Canadian Sleep Society 8th Meeting, Calgary, AL
http://www.canadiansleepsociety.ca

October 7-11, 2017 / 7-11 octobre 2017
World Sleep Congress 2017
Prague, Czech Republic
http://worldsleepcongress.apps-1and1.com/

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Abstracts' book / Livre des résumés

Contents / Contenus

Reference of your publication can be taken from this issue (example: Kendzerska, T., Grewal, M. & Ryan, C.M. Utility of acoustic pharyngometry in the diagnosis of obstructive sleep apnea. P7, *Vigilance*, 24, 1, page 25).

La référence de votre écrit peut être tirée de ce numéro (exemple: Kendzerska, T., Grewal, M. & Ryan, C.M. Utility of acoustic pharyngometry in the diagnosis of obstructive sleep apnea. P7, *Vigilance*, 24, 1, page 25).

ORAL SESSIONS / SESSIONS ORALES

O1-Socioeconomic Gradient Exists for PSG-derived Sleep in Children and Adolescents

Jarrin, Denise Christina, Noel, Neressa & Jennifer McGrath
Pediatric Public Health Psychology Laboratory, Concordia University

OBJECTIVE: Sleep may underlie the robust socioeconomic gradient in health. Pathophysiological trajectories suggest this socioeconomic gradient emerges early in life. During childhood and adolescence, parental socioeconomic position is associated with poor sleep. Interestingly, youth's perception of their own social status relative to peers (i.e., subjective socioeconomic position) is also linked to poorer sleep quality and lower quantity, based on self- and parent-report. Less is known about the relation between subjective socioeconomic position and objective sleep measures, based on polysomnograpic indices. The aim was to investigate whether socioeconomic gradients exist for objective sleep parameters in youth. METHOD: Youth, aged 8 to 17 years (N=95; Mage=13.0, SD=2.0; 45.3% female), and their biological parents were recruited for the Healthy Heart Project. Parental socioeconomic position was derived from household income and education; subjective socioeconomic position was based on the Social Status Scale-Youth Version. Objective sleep was derived from a modified at-home polysomnography. Sleep parameters included total sleep time (TST), sleep onset latency (SOL), sleep fragmentation (arousals), and time spent in rapid-eye movement (REM) and deep and light non-REM sleep. RESULTS: Analyses were grade-stratified due to school start differences; all analyses controlled for age, sex, anthropometrics, puberty, anxiety, depression, and parental socioeconomic position. Among children, lower subjective socioeconomic position was associated with longer SOL (β=-.57, p=.041). Among adolescents, lower subjective socioeconomic position was associated with shorter TST (β=.27, p=.065), longer SOL (β=-.22, p=.080), less fragmentation (β=.28, p=.063), shorter deep non-REM (β=.23, p=.076), and longer light non-REM (β=-.23, p=.072). CONCLUSIONS: Socioeconomic gradients were observed for multiple sleep measures in youth. Subjective socioeconomic position was associated with pediatric sleep initiation, maintenance, duration, and architecture, above and beyond the contribution of parental socioeconomic position. Future research should consider investigating whether lower perceived social standing may be linked to pre-sleep worry or negative cognitions that interfere with sleep.

O2-Topography of the quantitative REM sleep EEG in normal aging.

Gaudet-Fex, Benjamin, Latreille, Véronique, Lafortune, Marjolaine, Rosinvil, Thaïna, Gaudreault, Pierre-Olivier, Lina, Jean-Marc, Gagnon, Jean-François & Carrier, Julie
Center for Advanced Research in Sleep Medicine, Hôpital du Sacré-Coeur de Montréal

Introduction: A study evaluating the topography of quantitative electroencephalography (qEEG) during rapid-eye movement (REM) sleep showed that patients with Alzheimer's disease had a slower REM sleep EEG compared to age-matched healthy controls especially in temporal, parietal and frontal derivations. However, less is known on REM sleep qEEG topography during normal aging. The aim of this study is to compare the quantitative EEG topography of REM sleep in young, middle-aged and elderly subjects. Methods: Power spectral analysis of REM sleep EEG was performed for forty-six young (20-30yo), 38 middle-aged (40-60yo), and 16 elderly (60-70yo) subjects on prefrontal, frontal, central, parietal and occipital derivations. Absolute power in the delta, theta, alpha and beta frequency ranges were computed from 60 seconds of artifact-free REM sleep EEG signal. The EEG slowing ratio (delta + theta/alpha +beta) was also calculated.
Results: Compared to young subjects, both middle-aged and elderly subjects showed lower REM delta power for all derivations but this effect was less prominent in the prefrontal area. The elderly subjects displayed lower theta power than young subjects. Elderly subjects also presented lower power in alpha and beta but only for the occipital derivation. Compared to young subjects, middle-aged and older subjects showed a smaller EEG slowing ratio. Discussion: Contrary to the REM EEG slowing reported in Alzheimer's patient, normal aging was associated with a faster REM sleep EEG

ratio, supporting the notion that REM sleep slowing in dementia does not reflect “accelerated” aging. Further research should evaluate links between age-related changes in REM sleep EEG and cognition.

O3-The causal role of NREM2 sleep in sequential motor memory consolidation

Laventure, Samuel[1], Fogel, Stuart[2], Albouy, Geneviève[3], Lungu, Ovidiu[1], Sayour, Chadi[1], Sévigny-Dupont, Pénélope[1], Carrier, Julie[1] & Doyon, Julien[1]
1.*Université de Montréal, 2. Western University, 3. Katholieke Universiteit Leuven*

Numerous investigations have convincingly demonstrated that sleep plays a critical role in motor sequence learning consolidation. Yet there is no consensus regarding the sleep stages implicated in this type of memory consolidation. Evidences indicate that NREM2 sleep, and spindle activity in particular, are critical for motor memory consolidation to occur, but most of those studies are only correlational in nature. To probe the possible causal role of NREM2, we conditioned a first group of participants (n = 25) with a rose-like odor during learning of a sequence of finger movements, and re-exposed them to the odor during NREM2 sleep (Cond-NREM2). A second group (n = 23) was conditioned with the same odor and was re-exposed during REM sleep (Cond-REM). Finally, a third group (n = 28) was not conditioned, but was exposed to it during NREM2 sleep (NoCond). All subjects were retested in the morning. We found significant difference of gains in performance between the experimental groups. More precisely, the Cond-NREM2 group had significantly higher gains in performance than both, Cond-REM and Nocond groups. Also, Cond-NREM2 showed significant increases in sleep spindles characteristics when comparing periods of sleep before and during stimulation. We found that the change in frequency of sleep spindles during stimulation mediated the relationship between our experimental groups and the offline gains. These findings strongly suggest that NREM2 sleep is causally implicated, through the activity of sleep spindles, in the consolidation of motor sequence memories.

O4-Endogenous Cholinergic Input to the Pontine REM Sleep Generator Reinforces, but Does Not Initiate, Transitioning into REM Sleep

Grace, Kevin[1], Vanstone, Lindsay[2] & Horner, Richard[3]
1. University of Toronto, Department of Medicine, 2.University of Toronto, Department of Physiology, 3.University of Toronto, Departments of Physiology and Medicine

Initial theories of rapid eye movement (REM) sleep generation posited that induction of the state required activation of the pontine subceruleus (SubC) by cholinergic inputs. Although the capacity of cholinergic neurotransmission to contribute to REM sleep generation has been established, the role of cholinergic inputs in the generation of REM sleep is ultimately undetermined as the critical test of this hypothesis (local blockade of SubC acetylcholine receptors) has not been performed. We used bilateral microdialysis in freely behaving rats (n = 32), instrumented for electroencephalographic and electromyographic recording, to pharmacologically manipulate neurotransmission locally in the SubC and to modulate the activity of SubC cholinergic afferents located in the pedunculopontine tegmental nucleus. As predicted, combined microperfusion of D-AP5 (glutamate receptor antagonist) and muscimol (GABAA receptor agonist) in the SubC virtually eliminated REM sleep. However, REM sleep was not reduced by scopolamine (cholinergic receptor antagonist) microperfusion in this same region, at a concentration capable of blocking the REM sleep enhancing effects of activating SubC cholinergic afferents. This result suggests that transmission of REM sleep drive to the SubC is acetylcholine-independent. Although SubC cholinergic inputs are not majorly involved in REM sleep generation, they may perform a minor function in the reinforcement of transitions into REM sleep, as evidenced by increases in non-REM-to-REM sleep transition duration and failure rate during cholinergic receptor blockade. Importantly, selective activation of SubC cholinergic afferents resulted in a decrease in non-REM-to-REM sleep transition duration and failure rate that was blocked by simultaneous cholinergic receptor antagonism in the SubC. Cholinergic receptor antagonism also attenuated the normal increase in hippocampal θ oscillations that characterize REM sleep. Using computational modeling,

we show that our in vivo results are consistent with a mutually excitatory interaction between the SubC and cholinergic neurons where, importantly, cholinergic neuron activation is gated by SubC activity.

O5-Fast sleep spindles in SWS but not sleep quality relate to verbal cognitive abilities
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Spindles are one of the few electrophysiological markers of general cognitive abilities. However, spindles also serve to protect sleep from being disrupted by external stimuli. Given this dual function of spindles – for both sleep quality and related cognitive abilities – it remains to be investigated whether there is a link between sleep quality and IQ; thus addressing the question of whether spindles per se relate to IQ, or good quality sleep, in general. We hypothesized that there will be a positive correlation between spindle density and Reasoning IQ (RIQ), independent of sleep quality. A single night of polysomnography (age 19-29) was sleep stage scored and spindles were automatically detected. In addition, (N=10) subjects completed the Cambridge Brain Sciences test battery to measure Verbal IQ (VIQ), RIQ and short-term memory. Surprisingly, spindles in stage 2 sleep did not significantly correlate with IQ. However, spindle amplitude at Cz, Pz and density at Pz during SWS were positively correlated with VIQ ($r(8)=0.654$, $p=0.04$; $r(8)=0.727$, $p=0.017$; $r(8)=0.67$, $p=0.035$, respectively). A follow-up regression analyses revealed that the VIQ subtests together accounted for a significant proportion of variability in VIQ ($F(3,6)=5.44$, $p=0.038$), and Digit Span was uniquely related to fast spindle amplitude in SWS over-and-above the other VIQ subtests ($sr=0.82$, $p=0.008$). As predicted, measures of sleep quality (e.g., total sleep, sleep efficiency, awakenings) did not correlate with any IQ measures, nor did sleep spindles correlate with sleep quality. Here we demonstrate that fast spindles during SWS correlated with VIQ, suggesting that SWS spindles may have a unique function for verbal cognitive abilities, particularly those that rely on verbal working memory. While spindles serve a protective function from external stimuli, which would be related to sleep quality, measures of sleep quality were unrelated to IQ, suggesting that the relationship between spindles and IQ is not merely an epiphenomenon.

O6-Rhythm, routine, and reason: Circadian markers relate to intellectual ability
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Electrophysiological markers of sleep (e.g., spindles) are associated with cognitive abilities measured by intelligence quotient (IQ) tests. However, circadian rhythms influence sleep. It remains to be investigated whether sleep per-se or circadian factors may account for inter-individual differences in IQ. Here, we investigated whether IQ (e.g., short-term memory (STM), Reasoning IQ (R-IQ), Verbal IQ (V-IQ) and total IQ (T-IQ)) were associated with circadian markers. We hypothesized that circadian rhythm strength and consistency would be associated with IQ scores. Subjects (N=17; age 20-26) completed the Cambridge Brain Sciences (CBS) tests, Morningness-Eveningness questionnaire (M-E) and underwent five days of actigraphy. CBS subtests were combined into STM, V-IQ, and R-IQ scales. Analysis of actigraphic data quantified circadian rhythmicity (acrophase; amplitude; mesor), bed/wake time and sleep duration. Measures were grouped into: IQ scores (STM; V-IQ; R-IQ; T-IQ), circadian typology (continuous M-E scores; morning-evening types), circadian rhythmicity (acrophase; amplitude; mesor), sleep routine, and routine consistency (circadian rhythmicity variability; sleep routine variability). Multiple regressions were performed on each IQ score, for each data type (e.g., typology; rhythmicity; routine consistency). Time of IQ testing was accounted for as a covariate. Routine consistency accounted for a significant proportion of inter-individual variability in T-IQ ($F(8,16)=3.62$,$p=0.044$), with mesor variability ($sr=-0.55$,$p=0.010$) and amplitude variability ($sr=0.42$,$p=0.035$) being the strongest predictors. Rhythmicity accounted for variability in R-IQ ($F(4,16)=3.98$,$p=0.028$) and T-IQ ($F(4,16)=3.35$,$p=0.046$). Circadian rhythmicity and consistency were associated with T-IQ and R-IQ, but not V-IQ or STM; suggesting that deviation from normal circadian rhythms is negatively associated with cognitive ability, particularly reasoning. Given the correlational

nature of this preliminary study, future studies could experimentally manipulate circadian and sleep-related effects to uncover how circadian factors might influence the relationship between the features of sleep (e.g., spindles) and IQ to better disentangle the relationship between sleep, circadian rhythms and cognitive abilities.

O7-Heart rate variability during wake and sleep in typically developing and autistic individuals: Effects of age range.

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Introduction. Sleep influences the autonomic nervous system (ANS) so that sympathetic activity is higher during rapid-eye movement (REM) sleep and parasympathetic activity is higher during non-REM sleep. Moreover, the sympathovagal tone is higher in the morning. Typically developed children (TD) are reported to have higher heart rate variability than adults. Studies suggest a sympathetic-parasympathetic disequilibrium in people with autism spectrum disorder (ASD). This research tested if cardiac activity is different in TD and ASD individuals and if differences are sensitive to vigilance state and age of participants. Methods. 17 adults with ASD (22.0±3.7 years), 17 TD individuals (21.7±4.0 years), 13 children with ASD (10.2±2.1 years) and 13 TD children (10.2±2.0 years) were recorded for two consecutive nights in a sleep laboratory. Wake ECG was sampled for 5 minutes before and after sleep and during REM sleep. Heart rate variability (HRV) parameters were extracted: total spectral power (TSP), absolute values of low (LF: sympathetic tone) and high (HF: parasympathetic tone) frequency spectral powers, LF/HF ratio, and normalized values of low (LFnu) and high (HFnu) frequency spectral power. Groups and moments were compared with ANOVAs. Results. TSP, LF, HF, LFnu and LF/HF were higher in the morning than evening for all groups ($p<0.05$) while HFnu was lower ($p<0.05$). During REM sleep, children had lower LFnu and LF/HF, and higher HFnu than adults, while ASD children had a higher HF than ASD adults (no differences between TD groups). Conclusion. Morning values of sympathetic activity, parasympathetic activity and cardiac variability were higher in all four groups compared to evening, suggesting the same sleep effect in all participants. During REM sleep, relative influence of sympathetic activity was higher in adults than children while only children with ASD showed higher parasympathetic activity than adults with ASD. These results suggest developmental particularities of the parasympathetic system in autism.

O8-Relationships between children sleep disturbances and placement conditions: A foster care study.

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Introduction. Children placed in foster care are at heightened risk of short- and long-term maladjustment but little is known about their quality of sleep. Methods. Foster mothers of 25 children (19 boys) aged 3-7 years completed questionnaires on parenting stress and on children sleep (total sleep time at night and during the day, behavior at bedtime and during the night). The sleep questionnaire also yielded three indices: 1) Non-restorative sleep: waking-up, sleepiness after awakening, tiredness during the day, falling asleep during the day; 2) Poor sleep: difficulty falling asleep, difficulty getting back to sleep, anxious at night/afraid of darkness; 3) Parasomnia: body rocking, sleep bruxism, enuresis ($\geq$ 5 years), bad dreams/nightmares, night terrors, irregular breathing. History of maltreatment and placement conditions were retrieved from the Child Protection Services records. Results. Pearson correlation analyses showed that foster children with shorter

nocturnal sleep duration were placed at a significantly earlier age. There was a significant positive correlation between non-restorative sleep and the number of placements as well as parental stress. Foster children showing more behavioral sleep difficulties were more likely to have experienced sexual abuse and to have a foster caregiver with greater parenting stress. Children having more indices of parasomnias were placed at a younger age and were living with their foster caregivers for a longer period. Foster children sleep was not related to past experiences of physical abuse (other than sexual abuse) or type of foster family. Otherwise, there were no significant associations between child sleep and age or socio-demographic variables. Correlation analyses on sleep variables among themselves showed that children with more indices of parasomnias had marginally less hours of sleep at night; we found no other associations between sleep variables, suggesting that they capture different sleep constructs. Conclusion. These findings provide an opportunity to uncover how foster children experiences are related to sleep disturbances.

O9-Circadian desynchrony in adolescents and young adults with depression

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Introduction: Disruptions in the synchrony of circadian rhythms have been hypothesized to play a role in the pathophysiology of affective disorders. Considering the marked phase delay often characteristic of mood disturbances during youth, this study investigated whether adolescents and young adults with depression present abnormal circadian phase angles, and whether atypical phase angles are linked to more severe clinical symptoms. Methods: Ninety-seven outpatients with depression between 14 and 34 years of age underwent actigraphy monitoring and a semi-constant routine protocol during which salivary melatonin (DLMO) was measured every 30minute from 6hour prior to habitual sleep time until 2hours past habitual sleep time. Continuous electrocardiogram (ECG) and CBT, and morning cortisol were also monitored. The Hamilton Depression Rating Scale, the Young Mania Rating Scale and the Social and Occupational Functioning Assessment Scale were administered. Results: Compared to controls, the depression group had shorter phase angle between melatonin, CBT and ECG rhythms, and tended to have shorter phase angle between sleep onset and DLMO, but these effects were no longer significant after controlling for age. In the depression group, 27.3% of participants had an inverted phase angle between sleep and melatonin. Depressed patients who had an inverted phase angle had significantly shorter phase angles between melatonin, cortisol, CBT and ECG rhythms. Higher hypomania symptoms correlated with a shorter phase angle between the rhythms of ECG and sleep. Lower socio-occupational functioning correlated with a shorter phase angle between sleep onset and DLMO and tended to correlate with a shorter phase angle between melatonin and cortisol. Conclusion: In adolescents and young adults with depression presenting atypical time relationship between melatonin and sleep, the internal timing across the circadian rhythms of melatonin, cortisol, cardiac and temperature rhythms was found to be significantly altered. This circadian desynchrony was linked to worse symptoms and socio-occupational functioning.

O10-Activation of the REM sleep circuit induces cataplexy in wild-type mice

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Introduction: Cataplexy is the abrupt onset of muscle paralysis during wakefulness and is a debilitating symptom of narcolepsy. It is hypothesized that cataplexy results from inappropriate recruitment of the subcoeruleus (SubC) circuit that normally causes REM sleep paralysis. Here, we aimed to determine if targeted activation of the SubC would trigger cataplexy in wild-type mice. Methods: We infused 400nL of adeno-associated virus harbouring a modified muscarinic G-protein coupled receptor (AAV-HSYN-hM3D(Gq)-mCherry) into the left/right SubC regions of 12 wild-type mice. Clozapine-N-oxide (CNO, 5mg/kg) was used to activate SubC neurons expressing hM3D(Gq) receptors. Behavioral states were

analyzed for 3-hrs following CNO administration. These animals were compared to 9 narcoleptic mice (i.e., hypocretin knockout mice). Results: Activation of the SubC caused repeated episodes of muscle paralysis and behavioural arrests during otherwise normal wakefulness. These episodes appear identical to cataplexy attacks in narcoleptic mice. SubC stimulation produced on average 60 episodes of cataplexy, in comparison to the 6 episodes seen on average in narcoleptic mice in 3-hrs of recording (CNO-induced vs. hypocretin-/- ; n=9; t-test; $p<0.05$). The muscle paralysis, number of phasic twitches, length of cataplexy periods and spectral analysis were identical between narcoleptic mice and CNO-induced conditions ($p>0.05$). One unexpected finding was that SubC activation abolished NREM sleep expression for 20-hrs following CNO administration (saline vs CNO; $p<0.05$). Conclusions: Our results support the hypothesis that the activation of the SubC region promotes cataplexy. SubC activation triggers cataplexy episodes in healthy mice indistinguishable from cataplexy expressed in narcoleptic animals. Additionally, SubC stimulation prevents NREM sleep expression, suggesting SubC neurons may function to inactivate the neuro-circuitry underlying NREM sleep.

O11-Are age-related modifications in spindle characteristics linked to markers of white matter integrity?

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Introduction: In normal aging, sleep spindles and white matter integrity undergo important changes. The goal of this study was to investigate the role of magnetic resonance imaging (MRI) white matter diffusion modifications in age-related reduction in spindle density and amplitude. Methods: Thirty young (20-30yo) and 32 middle-aged subjects (50-70yo) underwent a night of polysomnographic recording and a 3T MRI acquisition including a diffusion sequence. Spindles were automatically detected on artefact-free non-rapid eye movement (NREM) sleep on F3 and P3 (linked-ears). Tract-Based spatial statistics was used for voxelwise white matter diffusion analyses. Fractional anisotropy (FA), mean diffusivity (MD), axial diffusivity (AD) and radial diffusivity (RD) were measured. Mediation analyses were performed to estimate whether white matter diffusion markers could explain age-related effect on spindle characteristics. Results: Compared to the young, older participants showed lower spindle density and amplitude in F3 and P3. When controlling for the effects of age, decreased F3 spindle amplitude was associated with increased RD bilaterally in the frontal lobe ($p<0.05$). Crucially RD in these regions was increased in older subjects ($p<0.05$). Mediation analysis revealed that increased RD in frontal areas partially explains age-related effect on sleep spindle amplitude ($p<0.05$). No effect was found for other diffusion variables. Conclusion: Our results indicate that alterations in white matter diffusion are associated with age-related modifications of specific spindle characteristics. Further analyses will estimate whether markers of white matter integrity may explain age-related changes in other spindles characteristics and NREM sleep oscillations.

O12-Brain Structural Abnormalities associated with Rapid Eye Movement Sleep Behaviour Disorder in Parkinson's disease

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Introduction: Previous structural neuroimaging data in rapid eye movement sleep behavior disorder (RBD) have used limited sample sizes and reported inconsistent results. We used Deformation-Based Morphometry (DBM) analyses of Magnetic Resonance Imaging (MRI) data to detect neurostructural abnormalities associated with RBD in a large sample of Parkinson's disease (PD) patients. Methods: We compared DBM differences between 69 PD with RBD (PD+RBD), 240 PD patients without RBD (PD-RBD) and 138 healthy controls (HC). Presence of RBD was based on the RBD Screening

Questionnaire. MRI data were extracted from the Parkinson's Progression Markers Initiative (PPMI) database. DBM analyses were conducted on T1-weighted MRI images, and FDR thresholded at $t \geq 2$. Results: RBD was associated with smaller volumes in the pontomesencephalic tegmentum (PMT), thalamus, and putamen. Higher volumes were found in the superior temporal, cingulate, and lateral prefrontal cortices, as well as in the olfactory tract and bulb. No differences were found between the PD+RBD and PD-RBD groups in the substantia nigra, hippocampus or precentral gyrus, where comparisons between HC and PD already showed low volume observed in these regions with PD. Conclusion: The present study highlights specific neural abnormalities associated with RBD in PD, in line with the key role of nuclei in the PMT for the control of muscle tone during REM sleep. They are also in agreement with the altered olfaction and depressive symptoms observed in PD+RBD. Structural alterations of the substantia nigra were found in PD, but independently from RBD.

O13-EEG signatures associated with sedation and respiratory depression by morphine in young patients following elective surgery

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Introduction: Opioid drugs are widely used as analgesics, but present side-effects such as sedation and life-threatening respiratory depression. Although opioid drugs have potent side-effects, our understanding of their mechanisms of action on cortical activity, arousal, sleep and respiratory systems is limited, especially in young patients who are more sensitive to opioid drugs. Aim: To evaluate the impact of opioid medication on electroencephalography (EEG) and respiration in children following elective surgery. Methods: Children undergoing ear surgery without a history of respiratory disorders were recruited from the ENT clinic. Following surgery, as per standard clinical care, the participants stayed overnight for pain relief (morphine), hydration and clinical observation. They had a polysomnogram (PSG) performed on the night following surgery to evaluate their response to morphine. The PSG data was then processed to extract EEG spectral properties and respiratory activity, and data was compared before (baseline) and after nighttime morphine administration. Results: A total of 8 children received morphine with mean age of 14.8 ± 2.8 years. The dose of morphine ranged between 5-10 mg and the average dose was 0.17 ± 0.04 mg/kg. By comparing data before and after morphine, we observed that morphine reduced arousal and induced a sedative state similar to slow-wave sleep characterized by increased low electroencephalogram (EEG) frequencies and decreased high frequencies ($P<0.05$, $n=8$). These changes in EEG were accompanied by breathing rate depression (by 9.5%, $P=0.034$, $n=8$). We found a significant correlation between the ratio of high/low EEG frequencies, which quantifies the level of arousal, and the severity of respiratory rate depression ($n=8$, $R=0.726$). Conclusion: Although the doses of morphine were moderate, it induced significant respiratory depression and sedation, with respiratory depression more severe when patients were in states of reduced arousal due to the sedative properties of morphine.

O14-Impact of Standardized Phone Follow-up on PAP Adherence in Obese Adolescent Patients with Obstructive Sleep Apnea

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Introduction: Obesity in children is increasing worldwide, and obstructive sleep apnea (OSA) is common in obese adolescents. Importantly, untreated OSA carries a significant risk of long-term morbidity for cardio-metabolic disease. Since adenotonsillectomy does not cure OSA in a significant number of obese youth, positive airway pressure (PAP) therapy is required. Although PAP is an effective therapy, adherence rates are suboptimal in this population. This study prospectively evaluated PAP adherence rates in obese youth with OSA following a program of regular, standardized follow-up phone calls by a respiratory therapist (RT). Methods: Obese youth were prospectively recruited from sleep clinic and were prescribed PAP after PAP initiation with simultaneous

polysomnogram (PSG). Adherence was evaluated prospectively for 6 months by a respiratory therapist through PAP usage downloads as well as through a standardized questionnaire administered by telephone: weekly for the first month, bi-weekly for the second month, and then monthly until six months of PAP therapy. Issues described by patients and caregivers as barriers to PAP adherence were met with targeted resolution. PAP adherence at one month was compared to PAP adherence at 6 months. Results: Nine obese subjects were prescribed PAP therapy for the treatment of moderate to severe OSA. The mean age and the mean BMI of the PAP treatment group were 14.3 years and 39.4 kg/m2, respectively. The mean number of follow-up phone calls was nine. At one month, the average nocturnal PAP use over a 30-day period was 3.11 hours. The average hours of PAP used nightly during the sixth month was 3.70 hours. Conclusions: Obese youth with OSA did not demonstrate improved PAP adherence over a six-month period despite regular phone follow-up by a RT. Persistent barriers to PAP adherence included poor mask tolerance, reluctance to use PAP while away from home, and late night schedules which rendered PAP use too taxing.

015-Intermittent optogenetic activation of the locus coeruleus triggers respiratory motor plasticity

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BACKGROUND: Intermittent airway obstruction – similar to OSA - induces a long-lasting increase in genioglossus muscle activity in anaesthetized rats. This form of respiratory plasticity is known as long-term facilitation (LTF) and relies on a noradrenergic mechanism within the hypoglossal motor pool. Noradrenergic neurons in the locus coeruleus (LC) are hypothesized to play a role in producing LTF because they are activated by LTF and they project to the hypoglossal motor pool. Here, we used optogenetics to intermittently stimulate the LC to determine if noradrenergic neurons in this brainstem nucleus play a functional role in producing LTF of the genioglossus muscle. METHODS: To test the role of the LC in mediating LTF, we bilaterally infused 600nL of adeno-associated virus containing light-sensitive opsins (AAV5-hsyn-ChR2(H134R)-mCherry). EMG signals from the genioglossus muscle was used to determine if optical activation of the LC produces LTF. The LC was optically stimulated with short blue light pulses (5ms) at 5 Hz (10x 15s separated by 1 minute). Only animals with histological verification of ChR2/mCherry expression in the LC were used for analysis. RESULTS: Before optically stimulating the LC, we wanted to demonstrate that noradrenergic LC neurons are indeed active during LTF. We found that intermittent airway obstructions (10, 15s apneas) triggered genioglossus LTF as well as an 83% increase in c-fos within the LC (n=5, control vs LTF, $p<0.001$). Next, we wanted to determine if intermittent stimulation of noradrenergic LC neurons would induce LTF that was similar in nature to apnea-induced LTF. We found that intermittent optical stimulation of the LC triggered a 31% increase in inspiratory activity of genioglossus muscle (n=4). It remains to be determine how constant (i.e., not intermittent) LC stimulation influences genioglossus activity. CONCLUSION: These results support our hypothesis that noradrenergic LC neurons underlie the induction of apnea-induced LTF.

016-Simplifying the Diagnosis of Sleep Apnea after Stroke: Evaluation of Five Simple Screening Tools

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INTRODUCTION: Obstructive sleep apnea (OSA) is common after stroke and, left untreated, is associated with recurrent vascular events, poor functional outcomes, and long-term mortality. Despite its high prevalence, OSA often remains underdiagnosed after stroke. Simple, paper-based screening tools have the potential to reliably detect patients requiring further work-up for post-stroke OSA, however, limited work has examined the use of such tools. The purpose of our study was to evaluate the clinical utility of the 4-Variable Screening Tool (4V), Epworth Sleepiness Scale, SOS score, STOP-BANG questionnaire, and Berlin questionnaire in determining which patients are at highest risk of

clinically-relevant obstructive sleep apnea (CR-OSA) after stroke. METHODS: We studied 54 patients (mean age 67.9±14.5 years, 48% male, mean BMI 28.3±6.8 kg/m2) who had sustained a stroke within the past 180 days. All patients underwent ambulatory sleep monitoring using the ApneaLink Plus device, which has been validated against polysomnography, as well as completed the simple paper-based screening tools within 72 hours. CR-OSA was defined as an apnea-hypopnea index (AHI) ≥15 (moderate-to-severe OSA) or an AHI ≥5 with a lowest nocturnal oxygen desaturation ≤88% (mild OSA with significant desaturation). The area under the curve (AUC), sensitivity and specificity for detecting CR-OSA were computed for each of the screening tools. RESULTS: Thirty-two patients (59.3%) were found to have CR-OSA using the ApneaLink Plus. The 4V had the greatest AUC (0.84, p=0.001); using a cut-off of 7, the sensitivity and specificity were 88.9% and 69.2%, respectively. The total score on the STOP-BANG also demonstrated significant results in detecting CR-OSA, but AUC (0.70, p=0.04), sensitivities and specificities were lower. CONCLUSIONS: Our results suggest that the 4V, and other tools that examine similar variables, may be helpful to screen for OSA within 180 days after stroke. Such tools may assist in determining which patients would most benefit from further evaluation for OSA after stroke.

017-Sleep duration and cardiometabolic risk scores: a cross-sectional study

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BACKGROUND: Studies examining the relationship between sleep duration and metabolic syndrome have found a U-shaped association, where 7 h was often used as the referent, and the outcome was modelled as a binary variable. The continuous relationship between sleep duration and cardiometabolic risk remains to be elucidated. OBJECTIVE: 1) To determine the continuous relationship between cardiometabolic risk and sleep duration; and, 2) identify the sleep duration associated with the lowest cardiometabolic risk. METHODS: Data from the 2005-12 National Health and Nutritional Examination Survey was used (N=8,827; 20 y or older). Sleep duration was obtained from the Sleep Disorders Questionnaire, and were categorized as ≤3, 4, 5, 6, 7, 8, 9, and ≥10 h per night. HDL cholesterol (HDL), insulin, fasting plasma glucose (Glu), triglycerides (TG), body max index (BMI), waist circumference (WC), systolic blood pressure (SBP) and diastolic blood pressure (DBP) were standardized first. Then, the cardiometabolic risk score for each participant was calculated using the following formula: -zHDL + zInsulin + zGlu + zTG + (zBMI + zWC)/2 + (zSBP + zDBP)/2. RESULTS: 7 h of sleep was associated with the lowest cardiometabolic risk score (-0.31 (95% CI: -0.44, -0.18)). Four and 5 h of sleep per night were associated with significantly higher cardiometabolic risk scores (95% CI): 0.64 (0.30, 0.99); and 0.32 (0.08, 0.56), respectively. Six, 8, 9, and ≥10 h of sleep per night were not associated with significantly elevated cardiometabolic risk scores (95% CI): 0.12 (-0.02, 0.27), -0.07 (-0.20, 0.07); -0.22 (-0.51, 0.08); and, 0.54 (-0.05, 1.14), respectively. CONCLUSION: Our finding suggests that the sleep duration of 7 h per night is associated with the lowest cardiometabolic risk. Studies using objective measures of sleep duration would help further clarify this association.

018-White Matter Microstructural Changes in Obstructive Sleep Apnea

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Obstructive sleep apnea (OSA) is characterized by frequent respiratory pauses during sleep. These lead to intermittent hypoxemia, sleep fragmentation, and vascular changes, which could be followed by macro- and microstructural changes of the cerebral white matter (WM). Thus, we aimed to study WM integrity using a visual scale and diffusion tensor imaging (DTI) in older OSA individuals. Magnetic resonance imaging (MRI) sequences (T1-weighted Multi-Echo MPRAGE; DTI) were acquired for 21 newly diagnosed and untreated OSA subjects (1F; 65.0±5.6 years old; apnea-

hypopnea index [AHI]: 33.6±12.4 events/hour) and 21 healthy control subjects (3F; 63.7±7.1 years old; AHI: 3.4±2.3 events/hour). WM hyperintensities were used as a measure of WM macrostructure, which was evaluated in 12 OSA and 14 controls using the Complex Scheltens Visual Rating Scale. Maps of DTI indices were used as a correlate of WM microstructure integrity and calculated for each subject. They included fractional anisotropy (FA), mean diffusivity (MD), axial diffusivity (AD) and radial diffusivity (RD). Groups were compared using t-tests with $p<0.05$ corrected for multiple comparisons. Despite no between groups difference for WM hyperintensities, several group differences were observed for DTI indices. More specifically, OSA subjects had reduced FA compared to controls in frontal, parietal and temporal WM tracts, the corpus callosum and the corticospinal tract. They also had global reductions of MD and AD compared to the controls. No between groups difference was observed in RD. Older OSA subjects showed widespread WM microstructural changes without macrostructural changes. The present pattern of reduced diffusivity assessed by DTI suggests cellular swelling and/or axonal injury, which are well-known acute reaction to hypoxia involved in hypoxic neural injury. This altered WM integrity in our newly diagnosed OSA subjects may reflect an acute state that could lead to long-term axonal and myelin damage and associated cognitive decline.

POSTERS / AFFICHES

P1-Optogenetic manipulation of REM sleep circuitry

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INTRODUCTION: It remains unclear which neuronal circuit and neurotransmitter mechanism triggers REM sleep. Glutamatergic neurons in the subcoeruleus (SubC) are active during REM sleep and are anatomically well positioned to control the muscle atonia and cortical activity that defines REM sleep, but it is unknown if these neurons actually influence or generate REM sleep. Here, we aimed to determine how optogenetic activation and inhibition of glutamatergic SubC neurons impacts REM sleep. METHODS: To control the neuronal activity of the SubC neurons, we bilaterally infused 200nL of an adeno-associated viral vector (AAV) containing either a light-sensitive excitatory opsin (AAV-EF1α-DIO-ChETA-eYFP) or a light-sensitive inhibitory opsin (AAV- EF1α-DIO-ARCH-eYFP) into the SubC of 6 mice containing cre-recombinase in glutamatergic cells (Vglut2-cre mice). Animals were instrumented for EEG and EMG recordings. Neurons were stimulated with short blue light pulses (5ms) at 1 and 10Hz either independently of behavioral state or specifically during REM sleep. In another set of animals, neurons were inhibited continuously during all behavioral states or specifically during REM sleep with green light (532 nm). Only animals that had histological verification of eYFP expression in the SubC region were used for analysis. RESULTS: We found that semi-chronic activation (i.e., 10-ms on, 90-ms off) of SubC neurons at 10Hz or 1Hz did not affect REM sleep amounts. However, specific 10Hz stimulation during REM sleep prolonged the duration of REM sleep episodes by 45±9% ($p<0.05$). Continuous inhibition throughout all behavioral states for 3-hr led to a 79±12% decrease in REM sleep amounts ($p<0.05$). Finally, specific inhibition of SubC neurons during REM sleep shortened the duration of REM sleep episodes by 84% decrease ($p<0.01$). CONCLUSION: These results support the hypothesis that glutamatergic SubC neurons are involved in controlling REM sleep.

P2-Electroencephalographic and Molecular Responses to Sleep Loss in Mutant Mice for EPHA4

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Introduction: Optimal sleep is ensured by a complex regulation involving a circadian and a homeostatic process. Sleep is hypothesized to depend on mechanisms controlling synaptic strength. The receptor EphA4 is an adhesion molecule implicated in the regulation of synaptic function and plasticity. The aim of the study is to elucidate the impact of sleep deprivation [SD] on electrophysiological markers of sleep in mutant mice for EphA4, and to investigate the effect of SD on the expression of EphA4 and on gene expression in EphA4 knockout [KO] mice. Methodology: 1) Vigilance state (wakefulness, non-rapid eye movement [REM] and REM sleep) durations were measured using electroencephalography [EEG] in mice lacking EphA4 (generously provided by K. Murai and bred on site). Vigilance states were analysed during 24h baseline and after a 6 hour SD. 2) Mice from 3 genotypes (wild-type, heterozygous and homozygous EphA4 KO mice) were submitted to SD followed by quantitative PCR [qPCR] and microarray measurements of gene expression in the forebrain. 3) The expression of EphA4 and its partners was measured by qPCR after a 6h SD in the cortex [CTX], hippocampus [HP], and a thalamic/hypothalamic [TH/H] region) Results: 1) KO mice for EphA4 have less REM sleep than wild-type mice but have a similar response to SD. 2) The absence of EphA4 did not significantly impact on SD-dependent increase in Bdnf, Per2, Homer1A, Fos and Arc, but alters the expression of an enzyme involves in epigenetic regulation. 3) The expression of EphA4 and its partners was not changed by SD in the CTX or HP. However, SD significantly increased EphA4 mRNA in the TH/H region. Discussion: These results suggest that sleep loss increases EphA4

expression in the thalamus or hypothalamus, but that the electrophysiological response to SD is preserved in the absence of EphA4.

P3-Enhanced thalamic GABAAR-mediated spill-over inhibition promotes electrocortical signatures associated with induction of NREM sleep and anesthetic-induced loss-of-consciousness

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Introduction: Modulation of thalamic GABAergic signaling can trigger state-associated changes in electrocortical activity. There are three types of GABAA receptor (GABAAR)-mediated inhibition: tonic (i.e., extrasynaptic), phasic (i.e., synaptic), and spill-over which requires synaptic and extrasynaptic GABAARs. Importantly, the alterations in thalamic activity elicited by the general anesthetic etomidate require both synaptic and extrasynaptic GABAARs in-vitro. Here we test two hypotheses in-vivo: 1)enhanced thalamic spill-over inhibition elicits changes in electrocortical activity that resemble those elicited by etomidate; 2)thalamic T-type Ca2+ channels, which promote 1-4Hz signaling, do not mediate the changes in electrocortical activity elicited by enhanced spill-over inhibition. Methods: EEG and EMG recordings were collected from freely-behaving wild-type and δGABAAR knock-out mice (Gabrd-/-) during bilateral microperfusion of DS2 (100μM; n=9 wild-type and 8 Gabrd-/-), etomidate (30μM; n=7 wild-type), or THIP (50μM; n=9 wild-type) into the thalamic ventrobasal complex in the absence and presence of TTAP2 (300μM). Results: Microperfusion of the extrasynaptic δGABAAR positive allosteric modulator DS2, which promotes spill-over inhibition, into the thalamus elicited changes in electrocortical activity in wild-type, but not Gabrd-/- mice. During NREM sleep, DS2 and etomidate: (i)increased 8-12Hz and 12-30Hz power, (ii)decreased 1-4Hz power, and (iii)increased spindle-like oscillations in wild-type mice. Blockade of T-type Ca2+ channels with TTAP2 did not affect the changes in electrocortical activity elicited by DS2 or etomidate. Both DS2 and etomidate enhanced the transient increase in 14-20Hz power identified during transitions into NREM sleep, an electrocortical signature that has previously been associated with induction of NREM sleep and anesthetic-induced loss-of-consciousness, and were both further associated with increased NREM sleep. Importantly, the effects identified with DS2 were not recapitulated with THIP, a δGABAAR agonist. The effects elicited by THIP required T-type Ca2+ channels. Conclusions: Enhanced thalamic spill-over inhibition can elicit electrocortical signatures associated with induction of NREM sleep and anesthetic-induced loss-of-consciousness.

P4-P3a evidence of consciousness following acoustic change during REM sleep

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Certain potentially-relevant auditory stimuli occurring outside the focus of attention can trigger an attention switch from the task-at-hand to the distracting auditory event. Such attention capture may result in an “intrusion into consciousness”, eliciting a positive-going event-related potential, P3a. This is thought to reflect the switching of attention and the subsequent conscious awareness of the auditory event. This study examines these processes during an unconscious state, natural sleep. There is some evidence that certain deviant stimuli can elicit a P3a, particularly during REM sleep. These studies employ oddball paradigms. A major problem is that the time to collect data using oddball paradigms can be very long because the deviants occur so rarely. A multi-feature “optimal” paradigm allows for data collection when testing times are limited (during REM sleep). The present study examines the processing of six deviants using the optimal paradigm. The amplitude of the P3a was expected to vary among the different deviants during the waking state. Would a similar variation in P3a amplitude also be observed during sleep? During wakefulness, only white noise and environmental sounds elicited a significant P3a. During stages N2 and N3, a small amplitude positive-component around the time of P3a was apparent following these stimuli. During REM, white noise and

environmental sounds elicited a large amplitude positivity occurring around the same latency and amplitude as the waking-P3a. The scalp distribution maps of these positivities was however different. In waking, it was maximum over centro-frontal scalp sites. During REM, the positivity was more widespread. Deviants not eliciting P3a in waking also did not elicit this positivity during REM. This suggests that processes related to the possible intrusion into consciousness, which are critical for survival, remain active during REM. The brain regions activated by these highly relevant stimuli do however appear to be different in REM.

P5-Moderate, acute sleep restriction has differential effects on components of attention

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Background: Inadequate sleep resulting from illness, work schedules or personal choices can result in cognitive performance deficits. One aspect of cognition that is well known to be affected by sleep loss is attention. Attention is a complex function that is regulated by several separate, but interacting neural systems that control different aspects of performance. These include: vigilance (readiness to respond); orienting (search for, and selection of, stimuli for further processing); and executive control (attention resource allocation). It is not clear to what extent each of these underlying component processes of attention is affected by sleep loss. The purpose of this study was to evaluate the effects of moderate sleep restriction on these attention components using the Dalhousie Computerized Attention Battery (DalCAB), which consists of eight computerized reaction time tasks designed to measure aspects of vigilance, orienting and executive control. Method: DalCAB tasks were administered to 16 healthy participants (women aged 19-25 years) on two consecutive mornings: once after a 9 h overnight sleep opportunity (baseline control), and once after a 3 h overnight sleep opportunity (sleep restriction condition). Self-ratings of sleepiness (Stanford Sleepiness Scale) and mood states (POMS) were also obtained following each sleep condition. Results: Participants showed increases in self-reported sleepiness and fatigue after sleep restriction. After sleep restriction, most tasks assessing vigilance and executive control showed either slower reaction times and reduced accuracy or a lack of improvement that is normally seen with repeated testing. In contrast, measures of orienting (visual search) and multi-tasking showed performance improvement after sleep restriction. Conclusions: These results indicate that acute, moderate sleep restriction has differential effects on multiple components of attention. In contrast to most tasks assessing vigilance and executive control, those assessing orienting were largely unaffected by the degree of sleep loss imposed.

P6-Nasoendoscopic diagnosis for prediction of oral appliance treatment outcome in moderate and severe obstructive sleep apnea

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Introduction: The aim of this study was to assess the morphological changes of the upper airway under mandibular protrusion using nasoendoscopy in the prediction of oral appliance treatment outcome in moderate and severe obstructive sleep apnea. Methods: A total of 61 patients with moderate to severe PSG-diagnosed OSA were prospectively and consecutively recruited for this study. The velopharynx and oropharynx was assessed via nasoendoscopy for each patient while awake and in the supine position. The airway expansion ratio, defined as the cross-sectional area of the airway during maximum mandibular protrusion divided by the area in centric occlusion, was then calculated at the level of both the velopharynx and oropharynx. A Mann-Whitney U-test was used to

compare the expansion ratio between responders and non-responders. A Multivariable logistic regression analysis was performed, with OA treatment outcome as the dependent variable and the independent variables included age, body mass index (BMI), baseline AHI, and the airway expansion ratio in the velopharynx and oropharynx. Results: The expansion ratio of the velopharynx was significantly greater in responders than in non-responders (2.9 vs 1.7, $p<0.001$). Similarly, the expansion ratio of the oropharynx was also significantly greater in responders than in non-responders (3.4 vs 2.4, $p<0.05$). Baseline AHI and the expansion ratio of the velopharynx were found to be independent predictors of OA treatment outcome with the multivariate logistic regression analysis. The estimated area under the curve (AUC) was 75.7 and the cut-off value of the expansion ratio was 2.00. The best combination of sensitivity/specificity and PPV/NPV was 85.7/80.8 and 85.7/80.8. Conclusions: The airway expansion ratio of the velopharynx was significantly greater in responders than in non-responders, and a cut-off value of 2.0 provided a prediction with a high accuracy. Nasoendoscopy may have significant clinical utility in predicting success of OA treatment.

P7-Utility of acoustic pharyngometry in the diagnosis of obstructive sleep apnea

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Introduction: Obstructive sleep apnea (OSA) is due to intermittent collapse of the upper airway at the level of the pharynx. Due to resource limitations the testing of patients for OSA via polysomnography is often delayed. Acoustic pharyngometry is a non-invasive cheap and simple technique used to assess the upper airway cross-sectional area (UA-XSA). It is known that in those with OSA the UA-XSA is reduced. Therefore, the objectives of our study were to determine the discriminative ability and predictive value of the UA-XSA measures for OSA. Methods: This was a cross-sectional study in a clinical consecutive cohort of subjects with suspected OSA who had both full-night polysomnography and acoustic pharyngometry performed between 2009 and 2014 at Toronto General Hospital (Toronto, Canada). OSA was defined by apnea-hypopnea index ≥ 5. Multivariable logistic regression analyses and Receiver Operating Characteristic (ROC) curves were used to address our research objectives. Results: Among 576 subjects included, 500 (87%) had OSA. Participants were predominantly male (64%) with a median body mass index (BMI) of 30.3 kg/m2 and age of 57 years. In patients with OSA a median UA-XSA at functional residual capacity (FRC) when sitting was 3.3 cm2 (95% confidence interval (CI): 2.7-3.8) as compared to 3.7 cm2 (95% CI: 2.9-4.2) in subjects without OSA. A cut-off value of 3.75 cm2 provided fair discrimination for OSA (sensitivity= 73%, specificity = 46%, area under the curve = 0.60). Logistic regression analysis demonstrated that the odds of OSA increased for every 1cm2 decrease in the mean UA-XSA FRC when sitting (OR=1.60, 95%CI: 1.22-2.11) controlling for age, sex, BMI and comorbidities. Conclusions: Although the mean UA-XSA at FRC when sitting was a significant predictor of OSA controlling for important confounders, it had fair discriminant validity for identifying those with OSA.

P8-Effect of BMI on Severity of OSA in Chinese, South Asian and non-Asian populations

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Introduction: Obstructive sleep apnea (OSA) is a common sleep disorder affecting all ethnicities. Large scale studies with in-depth consideration of body mass index (BMI) affecting OSA in specific ethnic groups such as Chinese and South Asian population are limited. The objective of this study was to establish the prevalence and the effects of BMI on OSA severity in the Chinese and South Asian patients as compared to Non-Asian. Methods: A large scale (N=1788), retrospective study analyzing AHI, and its relationship with BMI amongst Chinese, South Asian and non-Asian ethnic groups was performed. All subjects underwent level 1 polysomnography scored according to AASM guideline. Subgroup analyses after matching for: OSA severity, BMI, age and gender was analyzed between the three groups using SPSS software. Results: There is a significant higher prevalence of OSA among

Chinese and South Asian patients compared to non-Asian. There is also positive correlation between BMI and severity of OSA; with increasing BMI, it significantly increases the severity of OSA in all three groups. The effect of BMI on increased in AHI is much more profound in the Chinese group, especially in female, followed by South Asian group, with the least impact observed in the Non-Asian group. Conclusion: The data from this study confirms that Chinese and South Asian have higher prevalence of OSA compare to non-Asian. Obesity has a much more profound additive effect on OSA severity in these ethnic groups. Additionally, this study also highlights the possibility of other risk factors in addition to overweight; such as narrow upper airway anatomy, that could play a more dominant etiologic role in the pathogenesis of OSA in the Asian populations. Modification of risk assessment criteria for OSA, such as the effect of BMI and inclusion of upper airway assessment would be particularly important in Asian ethnic groups.

P9-The Effect of Upper Airway Surgery on Sleep Quality and OSA

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Introduction: Obstructive sleep apnea (OSA) is a common sleep disorder due primarily to upper airway obstruction. Chinese are more susceptible to severe degree of OSA due in part to inherent narrow upper airway anatomy such as thickening and narrow palatal arch; webbing of the posterior tonsillar pillars and retrognathia. Patients who cannot tolerate or comply with the Continuous Positive Airway Pressure (CPAP), may benefit from alternative surgical treatment such as UVPP. In this study, we investigated the role and treatment outcome of upper airway surgeries on OSA in Chinese patients who have clinical identifiable upper airway anatomical obstruction. Methods: A retrospective study (N= 50)to analyze the effect of UVPP (partial uvelectomy and lateralization of palatal pillars) and standard tonsillectomy, on Chinese patients diagnosed with moderate to severe OSA. Inclusion criteria include failure to comply/tolerate CPAP treatment and failed conservative treatment; narrow soft palatal arch with narrowing of the nasopharynx airway or presence of palatal pillar webs; with or without tonsillar hypertrophy. Outcome measures were obtained from pre- and post-operative polysomnographs (PSG) where sleep parameters, AHI, and oxygen saturation were analyzed. Results: Chinese patients who underwent UVPP and tonsillectomy in combination with TR and SP had significant improvement in all categories of AHI (supine, non-supine, REM and non-REM), with nearly 50% reduction or more in severity of OSA observed. The degree of respiratory arousals was also reduced in this group. Subjective reports on sleep quality and breathing function improved in both groups of patients post-surgery. SP and TR alone did not alter AHI and objective sleep quality. Conclusion: This study suggest that judicious selection of patients with OSA who have clearly defined upper airway obstruction (i.e. narrow palatal arch, webbing of tonsillar pillars with narrowing of nasopharynx airway with or without tonsillar hypertrophy) may benefit from tonsillectomy and UVPP.

P10-Upper Airway Parameter as Predictor of OSA Severity

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Introduction: Level 1 polysomnography is the gold standard in assessing OSA. However, Chinese patients are known to have significant smaller upper airway in the nasopharynx and oropharynx contributing to OSA severity to a different degree as compared to the non-Chinese patients. In the current study, various measurements of the upper airway and neck configuration were analyzed from a cohort of Chinese patients and correlated with AHI. A combination of these parameters were used to establish a clinical index that can potentially serve as a screening tool as well as estimation of OSA severity. Methods: The following parameters were recorded in 400 participants: thickness and degree of palatal droop - PD (score 0-3); tonsil size (1-4); palatal width - PW (at the oropharynx and nasopharynx junction in mm); presence and degree of posterior palatal webbing -PWe (subjective measurement of posterior palatal folds and webs (0-3)); Mallampati scores (1-4); neck length (from the angle of jaw to clavicle in cm); submental fat content (using skinfold calipers); mandibular distance

(from angle of jaw to mental protuberance) and Body Mass Index (BMI). All subjects underwent level 1 polysomnography scored according to AASM guideline. All results were analyzed using multiple regression method with SPSS software. Results: Significant correlations were observed between average AHI and PD; PWe; and BMI scores (P<0.025). Mallampati score, PD, submental fat and BMI were found to be significantly correlated with supine AHI (p<0.0216). By using a combination of these measured parameters, a formula can be established that can accurately estimate AHI levels. Conclusion: Measurement of the various upper airway parameters using pre-defined methods can be performed clinically. In this study, a screening index based on a combination of simple clinical upper airway measurements and neck configurations can be established and used for estimation of severity of OSA in this patient population.

P11-Cerebral venous thrombosis (CVT) in a female patient with severe Obstructive Sleep Apnea (OSA)

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Introduction: Obstructive Sleep Apnea (OSA) is reported to be a risk factor for arterial ischemic stroke, however, relationship between OSA and cerebral venous thrombosis (CVT) remains unclear. Methods (case presentation): we present a case of a 38 year old obese woman, who developed headache, seizures and hemiparesis. Patient was taking combined oral contraceptive pills (OCPs) for 2 weeks prior to this event. Her coagulation profile (including anti DNA, antithrombin III, protein C and S, and factor V leiden) was unremarkable. Magnetic resonance imaging (MRI) brain and magnetic resonance venography (MRV) were done and showed CVT. patient underwent an overnight poly sonogram (PSG) which revealed severe OSA. COnclusion: inspite of being a risk factor for venous thrombosis, short term consumption of OCPs can not be considered as the only risk factor for the development of CVT in this obese patient, especially in the absence of hereditary thrombophilic state. In this patient, severe OSA may be considered as another relevant contributory factor, which together with the short term OCPs consumption, predisposes the patient to a state of hypercoagulability. Thus, OSA should be considered as one of the multiple factors causing CVT.

P12-Resolution of Sleep Disordered Breathing in Three Children with Chronic Kidney Disease Post Renal Transplant

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Introduction: There is an increased prevalence of sleep disordered breathing (SDB) in chronic kidney disease (CKD). Factors responsible for SDB in CKD include an increased apneic threshold secondary to uremia, uremic neuropathy causing decreased upper airway muscle tone, as well as metabolic alkalosis secondary to bicarbonate based dialysate fluids leading to hypoventilation and hypercapnia. The literature assessing SDB in pediatric CKD using polysomnogram (PSG), the gold standard to diagnose SDB is limited. Our aim was to describe the PSG features of children with paediatric CKD pre and post renal transplant. Methods: We reviewed the results of three paediatric CKD patients. The baseline PSGs were performed as part of a larger research protocol approved by the Research Ethics Board (REB) at the Hospital for Sick Children (REB #1000031590). Results: Patient 1 was a 5 year old girl with membranoproliferative glomerulonephritis who underwent bilateral nephrectomies for severe hypertension. Nocturnal intermittent peritoneal dialysis using Physioneal™ was started. Baseline PSG demonstrated hypoventilation with an end tidal carbon dioxide level being greater than 50 mmHg for 98.5% of the total sleep time. Patient 2 was a 7 year old boy with posterior urethral valves, renal dysplasia and stage 4 CKD. Baseline PSG was significant for a CAHI of 8.2/hr. Patient 3 had a diagnosis of Joubert's syndrome, hypertension and stage 4 CKD. The baseline PSG was significant for a CAHI of 6.3/hr. All three patients underwent repeat PSGs three months post transplant. There was complete resolution of SDB in all patients. Conclusions: Children with CKD are at risk for SDB and there should be a low threshold for screening with PSG. The resolution of SDB suggests that this

was secondary to the underlying kidney disease. Further research is needed to identify the clinical characteristics that predict the development of SDB in children with CKD.

P13-Clinical and Polysomnographic (PSG) Considerations in Non-Compliance with CPAP in Patients with Obstructive Sleep Apnea (OSA): A Multimodal Treatment Approach in Patients with Combined OSA and Sleep Instability

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INTRODUCTION: Cycling alternating pattern (CAP) and alpha electroencephalography pattern (alpha-EEG) are markers of sleep instability and are associated with autonomic instability, nonrestorative sleep, daytime fatigue, musculoskeletal pain symptoms, poor memory and concentration, and low or irritable mood. Patients with CAP and alpha-EEG often have a history of significant stressors (psychological and/or physical) and marked anxiety. It can be postulated that if increased anxiety persists this may precipitate the development of sleep instability. Patients with combined OSA and sleep instability report sleepiness and fatigue. With CPAP treatment, AHI, oxygen saturation, and daytime sleepiness will improve, however sleep remains non-restorative. Patients may erroneously deduce that CPAP has not been of benefit and abandon treatment. METHODS: In a pilot study, we identified 6 patients with OSA with CAP and/or alpha-EEG, who were non-compliant with CPAP and who had abnormally high scores on an Adrenal Fatigue Questionnaire and have clinical evidence of low saliva cortisol throughout the day. In addition, on the Symptom Checklist-90 (SCL-90), which is a self-report instrument used in evaluating a broad range of psychological symptoms, patients reported moderate to excessive psychological distress with anxiety and depressive symptoms. In these same patients, the Wahler Physical Symptoms Inventory revealed self-reported evidence of marked physical fatigue and discomfort and elevated scores on the Epworth Sleepiness Scale. RESULTS: One patient was lost to follow-up. The remaining 5 patients showed improved compliance with CPAP when managed with a multimodal treatment approach. They reported subjective improvement in their sleep, feeling more refreshed upon awakening and improvement in their daytime sleepiness and fatigue. In 2 patients there was PSG evidence of a decreased alpha-EEG. CONCLUSIONS: Education about differentiating the treatment effects CPAP and the untreated clinical symptoms of sleep instability is needed. Treatment of underlying adrenal fatigue, mood and anxiety disorders, and life stressors must be considered.

P14-An in-home auto-adjusting mandibular positioner selects patients for oral appliance therapy: results in severe OSA

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Purpose: To assess the accuracy of an in-home auto-adjusting mandibular positioner for selecting patients with severe OSA for oral appliance therapy (OAT). Methods: Patients (n=136) with a broad severity range of OAS (mean AHI=25.4±13.2 hr-1) were studied for two nights at home using a temporary dental appliance attached to a computer-controlled actuator. Apneas and hypopneas were identified in real-time, and each study predicted therapeutic outcome with OAT using prospectively-established rules. Studies predicting success were assigned an effective target protrusive position (ETPP) derived from the study, and those predicting failure received a sham value of 70% maximal protrusion. Each participant received a custom appliance (G2, Somnomed), which was set to ETPP or the sham value. Baseline and outcome AHI values were the mean of two nights of home sleep testing with a portable monitor (Sagatech). Results: The overall therapeutic success rate with OAT was 74%, and the value varied with OSA severity (mild:78%; moderate:84%; severe:58%). For the entire population, the test's sensitivity and specificity were 82% and 83%, respectively with an overall incorrect prediction rate of 19% (PPV 93%; NPV 63%), and the ETPP was correctly identified in 91%.

A noteworthy finding is that of the participants with severe OSA (n=43; mean AHI:42.4+/-8.2 hr-1) the test yielded a good prediction of therapeutic outcome (sensitivity:75%; specificity:89%; overall error rate:19%) having positive and negative prediction values of 90% and 73% and ETPP of 83%. Conclusions: An in-home test for selecting patients for OAT was found to have strong predictive accuracy. This was true even in severe OSA where, despite a somewhat lower therapeutic success rate, the test correctly identified 91% of responders. Clinical Implications: The use of OAT can be extended to include patients with severe disease if an auto-adjusting mandibular positioner is used in-home to prospectively predict therapeutic outcome.

P15-Investigating the effects of rostral fluid shift during sleep on inspiratory flow limitation in men

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Introduction: Recently we showed that nocturnal fluid redistribution from legs to neck increases neck circumference (NC), narrows the upper airway, and exacerbates sleep apnea severity. However, in these studies, the changes in the pathophysiology of the upper airway during sleep have not been investigated. The gold standard assessment of the upper airway narrowing requires invasive measurement of pharyngeal pressure, which cannot be performed routinely. In this study we sought to detect the effects of rostral fluid shift on the upper airway narrowing during sleep based on non-invasive analysis of the contour of nasal airflow. Methods: Subjects attended the sleep laboratory for a daytime polysomnography, by which sleep stages and sleep apnea severity (apnea/hypopnea index, AHI) were determined. Before and after sleep, NC was measured using a measuring tape. The temporal pattern of nasal airflow recording from polysomnography was investigated by two experts. Based on previously validated methods, the inspiratory breaths with a plateau or a level-off in the nasal airflow were marked as flow-limited inspirations. The correlations between baseline and change in NC, and percentage of flow-limited inspirations during non-REM stage 2 were investigated.Results: Nineteen non-obese men, age 39.2±12.3 years, BMI of 26.5±3.3, and AHI of 21.7±25.2, completed the protocol. After sleep, there was a significant increase in NC (ΔNC:0.36±0.27cm, $p<0.001$). 1150±452 inspiratory airflow episodes from non-REM stage 2 were analyzed for every individual. There was a significant and positive correlation between ΔNC and flow-limited inspirations ($r = 0.47$, $p = 0.043$). Conclusions: Our results demonstrate that men with more increase in NC due to rostral fluid shift had more percentage of flow-limited inspirations during sleep. These results could be used to develop novel algorithms to assess the effects of rostral fluid shift on the upper airway physiology and sleep apnea severity.

P16-Consciousness and sleep-wake cycle consolidation improve simultaneously in acute traumatic brain injury

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Introduction: Recent evidence suggests that the presence of a circadian sleep-wake rhythm could help discriminate between vegetative and minimally conscious states in chronic traumatic brain injury (TBI). This study aimed to verify whether the sleep-wake cycle could also be used to detect signs of improving consciousness in acute TBI recovering from coma. We hypothesized that sleep-wake cycle consolidation would improve with increasing consciousness. Methods: Twenty-eight medically stable moderate-severe TBI adults (29.0±13.9 years; admission Glasgow coma score: 7.7±3.6) were recruited from a level-1 trauma center in Montreal, Canada. Patients wore a wrist actigraph for 11.4±4.1 days, starting 19.7±12.8 post-injury, when continuous sedation had ceased for >24h. Sleep-

wake cycle consolidation was estimated with the daytime activity ratio (DAR): [daytime (7:00-21:59) activity/24-h activity]*100. A DAR ≥80% designated a consolidated sleep-wake cycle. During actigraphy recording, the Rancho Los Amigos (RLA) scale of cognitive functioning was assessed daily by occupational therapists to evaluate key features of consciousness, such as response to stimuli, ability to follow command, and appropriateness of verbalisation and motor actions. The DAR and RLA were integrated into a linear mixed model analysis using both autoregressive and compound symmetry covariance structures. Results: Overall, there were 216 days of actigraphy and RLA assessment. Mean DAR was 77.9±12.3% and 119 days (55.1%) were consolidated. Akaike's Information Criterion was smallest for the autoregressive mixed model, suggesting a stronger fit. A significant effect of RLA on DAR ($p<0.01$) was found, showing a strong linear relationship ($p<0.001$) between increasing DAR and improvement in cognitive and behavioural response. Conclusions: This study shows that sleep-wake cycle consolidation goes hand in hand with recovery of consciousness in acute TBI. Though further studies are needed, these results could have implications for the development of interventions targeting the circadian clock and aimed at optimizing functional recovery in acute and chronic disorders of consciousness.

P17-Beyond circadian adjustment: the role of chronotype in the quality of sleep and waking hours in shift work

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Circadian adaptation to night work usually does not occur, which has deleterious effects on sleep and vigilance. Since chronotype has been hypothesized as a mediator of shift work adaptability, we aimed to compare circadian phase, sleep, vigilance, sleepiness, and light patterns between chronotypes, as part of a naturalistic longitudinal study on shift workers.
Thirty-three patrol police officers (10 women) aged 22-35 years on rotating shift schedules completed the Morningness-Eveningness Questionnaire. Sleep and light were monitored using actigraphy during 4 consecutive night shifts. To assess circadian phase, salivary melatonin was collected hourly between 19:00-01:00h and 20:00-04:00h the night before and the night after the 4 shifts, respectively. A 10-min Psychomotor Vigilance-Task (PVT) was administered at the beginning (23:00h) and at the end (07:00h) of each shift. Subjects completed the Karolinska Sleepiness Scale (KSS) 5 times during each night shift (23:00h, 01:00h, 03:00h, 05:00h, 07:00h). Mixed models were used for statistical analysis. No subject was categorized as Morning-type. Phase shifts ranged from 00:30h to 06:36h, with Evening-types (E-types, n=9) having greater phase shifts than Intermediate-types (I-types, n=24) (03:38±01:41h vs. 02:17±01:14h; p?0.05). E-types exhibited lower daytime sleep efficiency (81.8% vs 86.1%, $p<0.01$) and higher levels of sleepiness at night ($p<0.01$) than I-types. No group difference was found as regard PVT parameters and light exposure patterns. After 4 days of night work, circadian phase was delayed more significantly in E-types than in I-types. Intriguingly, even with this larger circadian phase shift, E-types experienced lower sleep quality and reported higher levels of sleepiness. These results altogether suggest that improving sleep and waking hours in shift work necessitates more than the sole adjustment of the circadian phase to the night shift. Additional studies are needed to elucidate the mechanisms underlying shift work adaptability and the specific role of chronotype in this phenomenon.

P18-The Role of Self Regulation and Shift Schedules to Counter the Slow Violence of Shift Work

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The term "Slow Violence" was coined by Rob Nixon to describe the catastrophic effects of environmental deterioration and its invisible trauma on human beings. As shift-workers we commit the

slow violence against ourselves. Shift work is associated with circadian rhythm and mood disorders, metabolic disorders, diabetes, obesity, heart disease, and cancer. In Canada 28% of the working population are shift-workers, therefore, practical results that help make shift work more sustainable are needed. This longitudinal field self-case study looked at real life interventions based on shift schedules, exercise, and diet as aids to cope with shift work. A sleep technologist working 12-hour nights kept a log of shift schedule, sick days, exercise and food intake during nightshifts and days off work over three years. Shifts varied from 4 nights/week to 3 and then 2 nights/week with an 8-hour dayshift every two weeks. Timing and type of exercise was modified over the three years to include cardio, strength training and yoga done in minimal space in under 40 minutes. A regular schedule including four or more recovery days after 2 consecutive night-shifts, and a flexible dayshift in conjunction with timed exercise and meals reduced sick time from 8 days a year to zero and increased productivity. High intensity exercise on night shifts optimally timed around 02h00, regular intensity exercise on days off between 15h00- 18h00 with food intake 45-60 minutes pre and post-exercise and a 12 hour fast timed to include the sleep period. Regular consecutive night shifts followed by at least 4 days off and a flexible day shift on a two week cycle reinforced with self-regulation in terms of daily timed exercise and meals, and a 12 hour fast led to better mental and physical health, reduced sick days, and increased productivity.

P19-Chronotype in shift work disorder

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Shift work disorder (SWD) is characterized by the presence of insomnia and/or sleepiness occurring in association with a work schedule. It is suggested in the literature that a morning chronotype contributes to SWD. However, that relationship has not yet been demonstrated in a shift worker population clearly diagnosed for SWD. The present study investigated chronotype in night shift workers with and without SWD. 120 participants working in Québec City hospitals were recruited (mean age = 38.1, women = 78.4%). 80 were night shift workers, of whom 43 met SWD criteria. Participants without diagnosis and satisfied with their sleep were considered as good sleepers (GS). Four groups were created: (1) night shift workers with SWD; (2) GS night shift workers; (3) day workers with insomnia; and (4) GS day workers. Night shift workers were also divided according to their night work schedule (continuous vs fragmented). The Morningness-Eveningness questionnaire was completed by participants after a screening evaluation. There is a significant chronotype difference between GS but not between workers with a diagnosis. GS day workers present a morning chronotype while GS night shift workers present an evening chronotype ($p = 0.0125$). There was no significant difference on chronotype between GS night shift workers and those with SWD. Similarly, there was no significant difference between GS day workers and those with insomnia. Moreover, chronotype did not differ according to the work night schedule (continuous or fragmented). These results confirm that night shift workers with good sleep tend to be more alert in the evening while day workers with good sleep present the opposite. However, the results do not confirm that a morning chronotype contributes to SWD: other variables must interact with chronotype to lead to SWD. Further studies are warranted to clarify this issue in a shift worker population with a diagnosis of SWD.

20-Psychosocial factors in shift work disorder: preliminary

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Insomnia is known to have a negative impact on the health of shift workers, but little is known about the particular insomnia symptoms seen in the context of shift work. The present study aims at characterising insomnia in a shift worker population. 120 participants (mean age = 38.1, women = 78.4%) working in hospitals were recruited: 80 night shift workers and 40 day workers. Participants underwent a diagnostic interview for sleep disorders and completed daily sleep diaries for two weeks.

43 night shift workers met SWD criteria while 20 day workers met insomnia criteria. Participants without diagnosis and satisfied with their sleep were good sleepers (GS). Four groups were created: (1) night shift workers with SWD; (2)GS night shift workers; (3)day workers with insomnia; and (4)GS day workers. Sleep variables such as total sleep time (TST), total wake time (TWT), and Sleep Onset Latency (SOL) were computed for the main sleep episode and for the 24-hour sleep period which included all sleep episodes occurring in that period. For main sleep, night shift workers with SWD have more TWT (mainTWT) and a lower sleep efficiency (mainSE) than GS night shift workers (ps< .00002; .001). These two groups are similar for mainSOL and mainTST. Compared to day workers with insomnia, night shift workers with SWD are less severe on mainSOL, mainTWT, and mainSE except for mainTST. On 24 hours, GS night shift workers are similar to GS day workers except for 24hrSOL where night shift workers take more time to fall asleep (p< .02). Night shift workers with SWD have a higher 24hrSE and more 24hrTWT than day workers with insomnia (ps< .04; .002). GS night shift workers sleep approximately the same amount of time as GS day workers over a 24 hours period. Night shift workers with SWD have less severe insomnia than day workers with insomnia. The treatment of insomnia in SWD deserves greater attention in future studies.

P21-DLMO in Children and Adolescents with Fetal Alcohol Spectrum Disorders (FASD)

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Fetal Alcohol Spectrum Disorders (FASD) is the most common form of toxic prenatal brain damage and is caused by intrauterine alcohol exposure. FASD is associated with a wide range of somatic, cognitive and behavioural problems that pose extreme treatment challenges. According to parent/foster parent reports sleep problems affect approximately 85% of children with FASD; however objective data of sleep disturbances in this population is almost completely lacking. Circadian problems and melatonin secretion abnormalities are common in neurodevelopmental disorders in general. Although objective data concerning melatonin secretion in FASD is not available, rodent models have shown that prenatal alcohol exposure damages the suprachiasmatic nucleus and induces a chronic disruption of circadian rhythms. The aim of this exploratory study was to detect the features of melatonin secretion in children and adolescents with FASD in order to obtain preliminary, objective data of the biological underpinning of sleep disturbances in this population. Twenty four children and adolescents with FASD (age M = 10.0, SD = 3.2, range 6-18; 55.6% females) participated in Dim Light Melatonin Onset Tests (DLMO). Hourly saliva samples were collected (for a total of 8 samples) according to a standard protocol. Partial melatonin phase response curves were recorded. Seventy nine percent of the sample had abnormal melatonin secretion curves. The abnormal melatonin secretion profiles were classified into three main categories: delayed sleep phase syndrome (17%), advanced sleep phase syndrome (8%), or other melatonin abnormality (54%). Abnormal melatonin profiles were common in this sample. Melatonin has been efficacious in managing sleep problems in other neurodevelopmental disorders and could be a promising treatment option for children and adolescents with FASD. The effective treatment of both sleep and circadian problems could optimize the development and everyday functioning of these children and ease the burden of their caregivers.

P22-Characteristics of Sleep in the Healthy New Mother

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The postpartum period is characterized by disrupted sleep and other stressors related to caring for a new-born baby. In two studies (n = 45 first time healthy new mothers) we examined daytime and nighttime factors involved in the appraisal of sleep quality. We also evaluated nighttime sleep and daytime sleepiness and fatigue at 2 and 6 months post-partum through interview and questionnaires. Study 1 examined sleep quality 2 months postpartum. Correlations revealed that poor sleep quality

was significantly related to the following nocturnal variables: complaint of insomnia, difficulty falling asleep and getting back to sleep, and total nocturnal sleep time (TST). Poor sleep quality was also related to the following daytime variables: non-refreshing sleep, daytime sleepiness, and lack of vitality. Depression, anxiety and insomnia severity were also significantly correlated with poor sleep quality. However, the means were all within the normal range and fewer than 23% of the mothers scored in the moderate range on these variables. Study 2 examined sleep, sleepiness and fatigue 2 and 6 months postpartum in a subsample of Study 1 participants (n=37).t-tests indicate that nocturnal TST, number of sleep episodes, sleepiness, and anxiety were significantly improved at 6 months, but fatigue and depression did not. 49% of mothers experienced difficulty initiating and maintaining sleep 2 months post-partum; sleep and daytime sleepiness improved by 6 months. The results suggest that in this healthy sample, most mothers are quite resilient to the temporary sleep disruption of a needy baby. Poor sleep quality in this group was defined by sleep disruption, feeling unrefreshed in the morning, daytime sleepiness and lack of vitality. These are the same sleep quality components endorsed by other groups, both with and without sleep disruption, reinforcing the notion that varying life circumstances make little difference in the appraisal of sleep quality. Acknowledgements: This research was funded by the Canadian Institutes of Health Research (CIHR).

P23-REM dream activity of insomnia sufferers: A systematic comparison with good sleepers

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Dream imagery activity has been seldom studied in insomnia, especially in laboratory settings. Therefore, the main objective was to determine if dream recall frequency (DRF), and dream content could be reflecting the hyperarousal observed in insomnia. This was achieved using in-lab dream collection to compare DRF and dream content of insomnia sufferers (INS) with those of good sleepers (GS). Twelve INS (Mean age=37.5, SD=4.3) and 12 GS (Mean age=37.3, SD=4.7) underwent 5 consecutive PSG nights where nights 1, 3 and 5 occurred in the lab and nights 2 and 4 at home. REM sleep awakenings were triggered during nights 3 and 5 (in lab) for dream collections. Dreams were analysed for positive and negative components using the HVDC scales, and dreamer self-evaluations. Groups were similar on DRF (p=.23). As expected, GS' dreams tended to include more positive emotions (p=.06) and INS' dreams were characterized by a greater ratio of negative elements than positive ones (p=.001). Subjectively, GS characterized their dreams as being more pleasant and containing more joy, happiness and vividness (p=.03) than INS. Finally, elevated negative dream contents were positively correlated to low objective sleep efficiencies in INS (p=.004). These data suggest that less positive emotions and greater negative elements in INS' dreams may be the result of their hyperarousal exacerbating their pre-sleep negative thoughts and contributing to their poorer sleep quality. INS' oneiric activity could be related to their sleep maintenance difficulties as the observed positive correlation between negative dream elements and low sleep efficiency suggests. The lack of difference in DRF is most likely due to the forced awakening for the dream collection procedure. The study of oneiric activity seems a promising avenue to better understand the 24-hour experience of insomnia and explore the potential benefits of dream management techniques.

P24-Sleep oscillations at baseline predict responses to cognitive behavioral therapy for chronic insomnia

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Approximately 15% of the population complains of chronic insomnia associated with impairments in daytime functioning. Cognitive-behavioral therapy for insomnia (CBT-I) clinically reduces insomnia severity; however less than half of them achieve clinical remission. Polysomnographic (PSG) sleep spindles and slow-wave activity (SWA) have been shown to modulate sleep stability and sleep quality.

Our objective was to evaluate whether sleep oscillations contribute to pathophysiology and predict treatment response to CBT-I in chronic insomnia. Nineteen chronic insomniacs (14F, M=39y ±13SD) had 6 weeks of group CBT-I following overnight PSGs (baseline, pretreatment). Sleep spindles and EEG power density in the sigma and delta (SWA) frequency range (adapted bands) were analyzed from a central-occipital (C4-O2) derivation for each Non-REM sleep cycle and across the night (Non-REMN2-N3 stages) in a 'pre-/post-CBT-I' measure (sleep diary, Pittsburgh Sleep Quality index-PSQI, PSG) x 'EEG' (spindles, SWA) repeated ANOVA (controlling for age, gender and education). There was a significant interaction between sigma power during Non-REM sleep cycle 1 and latency to N3 as measured by PSG following CBT-I ($p<0.001$), such that higher sigma power at baseline was associated with larger decrease in latency to N3 after CBT-I. Wake after sleep onset (WASO) and sleep efficiency, as measured by sleep diaries pre-/post-CBT-I, were seen to interact with several measures of spindles (e.g. density, amplitude and sigma power) in N2-N3stages ($p's<0.05$), such that higher spindle activity at baseline was associated with larger decreases in WASO and increases in sleep efficiency following CBT-I. Larger improvement in sleep quality after CBT-I as measured by PSQI was associated with higher sigma power and spindle density at baseline ($p's<0.01$). However, no significant interactions were observed between SWA at baseline and changes in sleep measures following CBT-I. These data suggest that individual differences in spindle activity modulate neurophysiological vulnerability to insomnia and a differential response to CBT-I.

P25-The link between hyperarousal and dream activity during REM sleep in adult population
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Insomnia disorder is linked to hyperarousal during REM sleep (Riemann & al., 2012). Also, insomnia sufferers have a higher number of negative items in their dream content than good sleepers (GS) (Ermann, 1995). The objective was to study REM sleep macrostructure to investigate the link between hyperarousal and dream activity (especially the number of negative items in dream content) by comparing dreams of GS and those of INS. All participants were aged between 30 and 45 (INS:?X = 38,75, sd = 4,65; BD : ?X = 35,75, sd = 4,23) and met inclusion criteria for either insomnia or good sleepers. Participants were eight INS and eight GS. Participants slept for five consecutive nights (N1 to N5) in which three were in the laboratory while the other two were at home. This study only considered nights at home (N2 & N4). PSG was recorded and a daily dream diary was completed. Participants all completed home questionnaires, clinical interviews and PSG recordings. PSA (14Hz to 30Hz) was completed during N2 and N4. The MIXED procedure with 3 factors (group, electrodes (C3 & C4) and nights (N2 & N4)) and 2 repeated factors (electrodes and nights) showed no between group differences on hyperarousal in REM sleep macrostructure (beta) ($p = 0.71$). The Poisson regression model showed no between group differences on negative items from dream content ($p = 0.22$). In addition, the Spearman correlation showed no link between hyperarousal and the number of negative items in dream content ($p = 0.81$). Hyperarousal seems an independent phenomenon from dream content. Hyperarousal does not seem to be linked to the number of negative items in dream content. Results might have been different if daily concerns were investigated in liaison with dream content (continuity theory of dreams) and with a larger group of individuals.

P26-Salivary Melatonin Levels in Pregnant Women with Insomnia: A Prospective Cohort with Two Comparison Groups; Preliminary Results
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Insomnia in pregnancy is associated with depression, hypertension or preeclampsia, gestational diabetes, and increased risk for preterm labor. Studies have shown a pattern of increased maternal plasma melatonin levels as pregnancy proceeds, reaching its peak near term. However, the role of melatonin in insomnia during pregnancy has not yet been investigated. The aim of this study is to

measure nocturnal saliva melatonin levels in pregnant women with and without insomnia. Prospective cohort study with three groups: 1- Exposed group; pregnant women with insomnia taking sleep medications. Comparison groups: 2- disease-matched; pregnant women with insomnia not taking any sleep medications, and 3- healthy pregnant women. All groups are matched for gestational age and maternal age. Women collect three Saliva samples one hour before bed in 30 minutes intervals at 12-14 weeks, 24-26 weeks, and 34-36 weeks. ELISA method is used to measure levels. One-way ANOVA showed significantly lower melatonin levels in the disease-match group ($p<0.04$). Repeated measure analysis showed increased melatonin in the exposed group since after the first trimester ($p<0.01$). Analysis also showed an increased hormone level in the Healthy group in the third trimester ($p<0.002$). Results of this study so far confirm that pregnant women with insomnia have lower levels of nocturnal melatonin. Increased melatonin levels in the exposed group may be due to improved symptoms of insomnia with pharmacotherapy. Treatment of insomnia with melatonin has been documented with a high safety profile and efficacy in non-pregnant individuals. However, safety of melatonin in pregnancy has not been investigated. In light of the current findings, future studies are needed to evaluate the safety and efficacy of melatonin in pregnancy for the treatment of insomnia. The current study is still in progress for a thorough investigation of the hormone levels in pregnancies with insomnia.

P27-Clinical insomnia in workers with delayed recovery from mild traumatic brain injury: A cross-sectional study

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Insomnia in persons with mild traumatic brain injury (mTBI) has not received much research attention despite its potential influence on recovery. This study aimed to evaluate the prevalence of insomnia in Ontario workers with delayed recovery from mTBI and its relationship with socio-demographic, TBI- and claim-related, behavioural, and clinical factors.
A cross-sectional study carried out over a period of 24 months in a large rehabilitation hospital in Ontario. To assess the prevalence of insomnia, we used the Insomnia Severity Index (ISI). Data were collected from standardized questionnaires, insurer records, and clinical assessment at the time of recruitment. Bivariate associations were calculated using the Spearman's correlation coefficient or ANOVA. We present stepwise multivariable linear regression models of factors associated with insomnia. To ensure the appropriateness of utilizing the ISI, additional analyses included an assessment of the internal consistency of the instrument. Of the 94 participants diagnosed with mTBI, clinical insomnia was reported by 69.2%. The mean age was 45.2 ± 9.9 years; 61.2% were men. No gender differences were observed in the prevalence or severity of insomnia. Insomnia was significantly associated with certain socio-demographic, claim-related, behavioural, and clinical variables. In the multivariable regression analysis, several determinants explained 53% of the insomnia variance, including depression ($ß = 0.486$, $p < 0.0001$), previous head trauma ($ß = 3.841$, $p = 0.0006$), age ($ß = 0.0004$, $p = 0.018$), use of tricyclic antidepressants ($ß = 3.067$, $p = 0.009$), and wake-up time instability ($ß = 0.343$, $p = 0.029$). The internal consistency of the ISI, as measured by Cronbach's alpha, was 0.86. Insomnia is common in persons with delayed recovery from mTBI, and is significantly associated with potentially modifiable clinical and non-clinical variables. Care of persons with brain injury requires greater attention with regard to the diagnosis and management of insomnia and associated disorders.

P28-Sleep microarchitecture in chronic primary insomnia.

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Chronic insomnia affects 15% of the population with adverse effects on their quality of life. Two major brain oscillations during non-rapid-eye-movement (NREM) sleep, spindles and slow-waves, are

involved in sleep protection from external interference and sleep homeostasis, respectively. Given the importance of these oscillations in sleep regulation, disruptions in spindles and slow-waves might contribute to sleep difficulties in individuals with chronic insomnia. 20 chronic primary insomniacs (15 F, mean age 39 years) and 15 good sleepers (11 F, mean age 34 years) underwent polysomnography. Spindle (10.5–16.75 Hz) and slow-wave activity (0.7-4Hz) were computed from C4-O2 electroencephalography derivation during stages N2-N3, across the whole night and for each NREM sleep period separately. Differences in sleep microarchitecture variables were analysed using independent t-tests. Furthermore, in order to evaluate their association with daytime function impairment, correlational analyses were performed between these variables and Epworth Sleepiness Scale (ESS), Beck Depression Inventory (BDI), and Beck Anxiety Inventory (BAI) within chronic insomniacs using Pearson's correlation ($p<0.05$). Spindle variables (i.e., spindle density, duration, amplitude, power) did not exhibit significant differences between chronic insomniacs and good sleepers. Slow-wave activity, however, was significantly lower in insomniacs during the first and the second NREM periods, compared to good sleepers ($p=0.031$, $p=0.018$, respectively). In addition, sigma spectral power during the first NREM sleep period negatively correlated with ESS ($r=-0.531$, $p=0.016$). These data suggest that chronic insomniacs as a group do not demonstrate deficits in sleep-protective mechanisms, however, at the individual level, insomniacs with lower sigma activity tend to display higher degrees of daytime sleepiness. On the other hand, compared to good sleepers, chronic insomniacs do show alteration in sleep homeostatic processes, as reflected by decreased slow-wave activity at the beginning of the night. Future studies should further investigate the functional significance of these alterations.

P29-Implicit attitudes toward food predict differences in energy intake after partial sleep deprivation.

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Research shows that chronic sleep restriction tends to increase food consumption in some individuals, which can result in weight gain. Physiological and psychological mechanisms related to this are still unknown. The objective of this study is to verify which factors among eating habits, risk taking and implicit attitudes toward food could be related to food intake after imposed partial sleep deprivation (PSD). Nine subjects (18-30y) completed an Implicit Association Test (IAT) evaluating implicit attitudes toward healthy and unhealthy food, the 3-Factor Eating Questionnaire (TFEQ) and the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ). The Iowa Gambling Task (IGT) and ad libitum energy intake (EI) measurements for the day were measured after a “normal” night of sleep and a PSD (50% sleep restriction), both spent in a sleep laboratory with polysomnography. The difference in both sleep conditions in EI (EId) was calculated for each subject. Correlations and regressions between EId and IAT score, TFEQ scores, SPSRQ scores and IGT scores were computed. No relationship was found between EId and the TFEQ (eating restraint $r=.13$, $p=.74$, disinhibition $r=.19$, $p=.62$, hunger $r=.25$, $p=.51$), the SPSRQ ($r=.12$, $p=.76$), the IGT after sleep ($r=-.05$, $p=.90$) and the IGT after PSD ($r=.04$, $p=.92$). A significant positive relationship between the IAT score and EId ($r=.73$, $p<0.05$) was found. The slope of the regression line suggests that a one-unit increase in attitude toward unhealthy food predicted an increase of 970.61kcal in EI following PSD ($b=970.61$, $t(8)=2.79$, $p<0.05$, with an adjusted $R2$ of 0.458). Despite a small sample, these results suggest that attitudes toward food are a key factor in explaining variations in EI after PSD. Since these implicit attitudes are strongly related to educational and personal beliefs and values, our results suggest that modifying eating behaviors would be much more difficult than simple dietary interventions.

P30-Toy or Tool: Preliminary Evaluation of the MindWave Mobile (A Consumer Brain-Computer Interface)

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We conducted a preliminary test of reliability and validity of an inexpensive, battery operated, portable EEG headset (NeuroSky MindWave Mobile) as an objective measure of sleepiness and alertness while driving. The device provides algorithms for “Attention,” “Meditation,” and “Eye-Blink Frequency” and outputs scores every second. Fourteen adults with a valid driver’s license (mean age = 50) engaged in a monotonous driving task for 75 minutes in a driving simulator where they wore the MindWave headset and answered questions before and after driving. Immediately prior to starting to drive participants were asked: “How sleepy do you feel presently?” “Generally, how difficult is it for you to pay attention to your driving?” Immediately after driving they were again asked about sleepiness as well as: “How difficult was it for you to pay attention to what you were doing in the last 15 minutes?” Only 10 participants provided usable data for repeated measures tests. Difficulties involved dropped Bluetooth connections, low signal strength, movement of the headset on people’s foreheads, and frequent adjustments of the headset due to slipping and discomfort. Only within-subject comparisons could be made because the MindWave instructions specify that scores are not absolute and comparisons between subjects cannot be made. Comparisons on self-reported sleepiness and attention were both significant, with participants being sleepier and less attentive than normal after driving in the simulator. There were no significant differences on MindWave “Attention” or “Meditation” (insufficient sample size for “Eye-Blink Frequency”). The non-significant MindWave findings did not mirror the significant pre to post-driving self-reports on either sleepiness or attention. Although MyndPlay Ltd. was very helpful, problems related to connectivity, discomfort, and lack of consistency with self-report suggest that the MindWave headset, in its current version, is not yet ready for prime time.

P31-Suggested Clinical Immobilization Test with a Smartphone-Based Electromyography System for Screening Willis Ekbom Disease

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Willis Ekbom disease (WED) might often be missed/misdiagnosed due to diagnostic criteria, which are based on the patients’ ability to vocalize the experienced sensorimotor discomfort. Our goal has been to develop a smartphone-based electromyography (sb-EMG) system that can provide objective information during the Suggested Clinical Immobilization Test (SCIT).
A student-team of the Capstone Design Project, an interdisciplinary program offered by the UBC Department of Electrical and Computer Engineering [http://www.ece.ubc.ca/courses/capstones], was assigned to develop the sb-EMG. The goal was that the completed sb-EMG system should be small, non-invasive, user-friendly, fast, accurate, low-cost (under $500), and applicable in clinical practice. The combination of Android-based software and a Bitalino-based hardware was chosen as the most suitable solution: (a) Android [https://source.android.com/] was chosen to be the software platform of choice due to the wide range of open-source resources. (b) Bitalino [http://www.bitalino.com/] is a hardware platform designed for acquiring physiological signals and was selected based on an evaluation of overall system design, application development support, feasibility, sustainability, and value for its cost with respect to other hardware options. A functional prototype was implemented, which can acquire EMG data, transfer it via wireless Bluetooth interface to a smartphone, and graph the EMG signal on the mobile phone’s screen. The prototype consists of a 25g (without battery), 4x2x1.5cm, single-channel hardware component and a software application usable on any mobile phone running Android 4.0 or higher. With the addition of more sensors, the system is scalable to acquire data from up to five different channels. The system also features a 3.7V, 700mAh rechargeable battery that can be interchanged with higher capacity alternatives. The sb-EMG prototype showed excellent potential to enable the acquisition and analysis of objective EMG signals during SCIT. Currently, we are validating the prototype with a standard EMG-system.

P32-The Impact of Adenotonsillectomy on Sleep Disordered Breathing in Children with Sickle Cell Disease

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Obstructive sleep apnea (OSA) is a common disorder in children estimated at 2-3% in the general pediatric population. The prevalence in patients with sickle cell disease (SCD) has been estimated to be higher at 30-70%. Intermittent nocturnal hypoxia, characteristic of OSA is thought to predispose to vaso-occlusive events in children with SCD. OSA In this population is believed to be related to adenotonsillar hypertrophy secondary to compensatory lymphoid hyperplasia. Adenotonsillectomy (AT) has been recognized as the first line treatment for moderate to severe OSA in children. The aim of this retrospective study was to review the polysomnogram (PSG) results of SCD patients with moderate to severe OSA pre and post AT.
We retrospectively reviewed PSG data in patients with SCD pre and post AT from 2003 to 2014. Moderate OSA was defined as an obstructive apnea-hypopnea index (OAHI) of >5-10/hr and severe if OAHI of >10/hr. Resolution of OSA was defined as an OAHI < 1.5 events per hour.
The study included 17 patients with SCD and OSA with a median age of 6.8 years and a median BMI of 15 kg/m2 at the time of the first PSG. The median OAHI was 11.6/hr pre-AT. 13/17 (76%) patients had severe OSA and 4/17 (24%) had moderate OSA. Post-AT, 12/17 (70.5%) of patients had PSG resolution of OSA, p <0.001. However, 5/17 (29%) had persistent OSA with 2/5 were in the mild range, 2/5 were in the moderate range and the remaining patient had severe OSA. In this retrospective study we report the significant improvement of the OAHI post-AT in the majority of SCD children with moderate to severe OSA. However, 30% of children with SCD have persistent OSA despite AT and further work should evaluate the risk factors for persistent OSA in children with SCD.

P33-The Effect of the Motivating Teens to Sleep More Program on Adolescents' Motivation to Go to Bed Earlier, Bedtime and Sleep Duration

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Adolescent sleep deprivation due to late bedtimes is prevalent and associated with negative health consequences. Sleep promotion programs are successful in improving sleep knowledge but not in advancing bedtime due to a sole focus on sleep education. The Motivating Teens to Sleep More (MTSM) program incorporates a motivational interviewing style, stage-based techniques, and personalized activities in addition to sleep education. A pilot randomized controlled trial compared the effectiveness of the MTSM program with a sleep education control program in increasing motivation to advance bedtime and improving weekday bedtime and sleep duration. Twenty-two high school students (11 males, mean age = 14.27) were recruited and randomly assigned to the MTSM or sleep education condition, which each consisted of four 1-hour, one-on-one, sessions. Bedtime and sleep duration were measured at pre-, mid-, and post- program using sleep logs, and at 6-months follow-up with online questionnaires. Actigraphy data were collected for a week pre- and post-intervention. Motivational variables (sleep-related attitudes, self-efficacy, and motivational readiness) were assessed with online questionnaires. Following the intervention, the experimental group demonstrated greater improvements in self-reported bedtime, sleep duration, and self-efficacy compared to the control group, which were not maintained at follow-up. Both groups improved in readiness to change but more MTSM participants reached the action stage of change indicating that they were actively trying to advance bedtime. Positive attitudes towards sleep did not increase in either group. The data suggest that, in the short-term, the MTSM program is more effective than sleep education alone in advancing bedtime, prolonging sleep duration, and increasing sleep-related self-efficacy. The one-on-one dynamic between the participant and the interventionist may account for the increase in the motivational readiness in both conditions. Future programs should address how to sustain earlier bedtimes and investigate motivational mediators of intervention efficacy.

P34-The use of the Suggested Immobilisation Test in children with ADHD: Relationships with periodic leg movements during sleep and nocturnal awakenings.

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The Suggested Immobilisation Test (SIT) is used to detect the restless legs syndrome (RLS) in adults. In this study, we administered the SIT in children with ADHD and explored its relationship with periodic leg movements during sleep (PLMS) and during wake (PLMW). 54 children (6-17 years, 41 boys) were recruited in a sleep disorder clinic for children and referred to the laboratory for one night of diagnostic polysomnography on the basis of various types of sleep complaints. Before lights out, they were asked to sit in bed with legs outstretched, trying not to move them while surface EMG was recorded from bilateral anterior tibialis muscles during 30-60 minutes. The sleep of 41 additional children (5-17 years, 28 boys) was also recorded without having the SIT. Every child was diagnosed with ADHD and no one had epilepsy or intellectual deficiency. Periodic leg movements during the SIT, PLMS and PLMW were scored according to standard . Groups were compared with ANOVAs and the association between the SIT, PLMS and PLMW was analyzed with Pearson correlations. 65% of the children tested with the SIT had an index above the clinical cut-off core of 40 (mean index: 137.6). The number of periodic leg movements during SIT in all children combined was positively correlated with both PLMS (r=0.271,p=0.048) and PLMW (r=0.372,p=0.006). The PLMS index was greater in the total sample of SIT-tested children than those not tested (p?0.001) but the PLMW index was not different. The SIT-positive children showed these same differences but SIT-negative children did not. This study confirms that the SIT can be used in ADHD children and supports that RLS prevalence is high in this population. It also suggests that the SIT could be used to predict the severity of PLMS and PLMW in children with ADHD.

P35-Overmedication and Poly-pharmacy in Children and Youth with Fetal Alcohol Spectrum Disorders (FASDs) and/or Prenatal Substance Exposure (PSE)

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In children and youth with FASDs and/or PSE who face multiple challenges, sleep problems often remain unrecognized. Given the complex course of their lives and mental health co-morbidities, current clinical explanatory models are often daytime focused and may not acknowledge sleep problems. Therefore, we prospectively investigated challenging/disruptive sleep/wake behaviours in children and youth with FASDs/PSE. After analysing previous assessments, diagnoses and therapeutic suggestions, we conducted functional 'Sleep/Wake-Behaviour Assessments' of the patient and if applicable, birth parents/siblings. This is a clinical practice strategy based on narrative schema and therapeutic employment, utilizing qualitative interviews and incorporating caregivers' contributions and if possible, conducted videosomnography at home, the natural setting where sleep occurs. Familial Wills Ekbom disease (WED) and sleep disordered breathing (SDB) were the most frequent causes for sleep problems (WED: n=37/37; SDB: n=14/37). The majority of patients had been previously medicated for daytime problems. Consequently, sleep problems were also targeted with (up to 18) medications without investigating the underlying cause. Use of psychostimulants started <6yrs (youngest patient: 2.5yrs), frequently leading to neurologic/behavioural, and antipsychotics to metabolic Adverse Drug Reactions. Medication indices vary from 2 (<6yrs) to 5.2 (>10yrs). Treating the underlying sleep problem helped to reduce and/or wean off antipsychotics/psychostimulants in all cases. Deficits in the diagnostic recognition of chronic sleep problems among children with FASDs/PSE result in psychotropic substances as the mainstay of therapeutic interventions, and thus fragment care. We propose a clinical practice strategy acknowledging exploration of challenging sleep/wake behaviours and a database for exploring the dimension of the problem.

P36-Sleep, depression and daytime function in family caregivers of children who depend on medical technology

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Society relies on family caregivers of children who depend on medical technology (CMT) (e.g., home ventilation) to provide highly skilled and vigilant care up to 24 hours per day. Few studies exist that have measured sleep in family caregivers, and those that do have relied entirely on subjective measures. These data suggest that sleep disruption places family caregivers at risk for poor health and related outcomes that may impair their daytime function and long-term capacity for caregiving. In a prospective cohort study 42 family caregivers CMT and 43 controls were recruited. Actigraphy data was collected for 6 days and 7 nights, and the Pittsburgh Sleep Quality Index (PSQI) was applied to collect sleep data. At home visits sleep diaries were reviewed and measures of depression (CES-D), daytime sleepiness (ESS), fatigue (MAF), and quality of life (SF-12TM) were administered. Family caregivers CMT achieved less sleep per night (6.56h [1.4h] vs. 7.21h [0.6h], $p = .02$), of poorer quality (PSQI; 7.75 [2.9] vs 5.45 [2.8], $p < .01$), than controls. Three times as many family caregivers CMT scored in the range for clinically meaningful depression (12 [33%] vs 4[10%], $p = .01$), and experienced excessive daytime sleepiness (16 [38]%) vs 5 [11.6%], $p < .01$). Fatigue was also more problematic among family caregivers CMT (22.12 [9.1] vs. 17.44 [9.0], $p = .02$). Notably, no modifiable caregiver, child or environmental risk factors were found to predict sleep disturbance in this vulnerable group. This study provides objective evidence that suggests family caregivers CMT technology are at risk of the negative consequences of acute and chronic sleep deprivation (i.e. health & safety concerns). Recommendations from the study include those for clinical practice (screening/education), health policy (home care programming), and future research (targeted sleep interventions).

P37-Follow up of polysomnographic data of Prader-Willi infants diagnosed with central sleep apnea

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Prader-Willi syndrome (PWS) is a rare genetic disorder arising from the loss of expression of paternal genes within chromosome 15q11-q13, and is characterized by mental retardation, behavioral problems, hyperphagia, and obesity. Children with PWS commonly have sleep-disordered breathing; including hypersomnolence and obstructive sleep apnea, as well as central sleep breathing abnormalities that are present from infancy. Central sleep apnea (CSA) is more prevalent in infants compared to older children with PWS. The aim of this study was to evaluate the course of CSA in PWS infants within 2 years of baseline assessment. A retrospective chart review of PWS infants with CSA who had a baseline polysomnogram (PSG) and follow up PSG in the first 2 years of life. Demographic characteristics and PSG data including central apnea index (CAI) were collected. Comparisons were made between baseline and follow up PSG data. We identified 37 (21 male) PWS infants who had baseline PSG at mean age of 1.01 (±0.52) years. The overall median CAI at baseline was 3 events per hour (range 0.1-68.3). Of these, 14/37 (38%) PWS infants were diagnosed with clinically significant CSA (CAI>5 events/hour). Of the 14 patients, to date 9/14 infants had follow up PSG data at a mean age of 2.4 years (±0.70) and the median CAI has improved from 13.7 to 4.4 events per hours ($p= 0.03$). Only three PWS infant had persistent CSA beyond infancy. However, 2/9 subjects with previous CSA had evidence of mild obstructive sleep apnea (OSA) at follow-up. Central sleep apnea is prevalent in infants with PWS but it is reassuring to note that CSA improves with age. However, these patients will continue to require monitoring as they are at risk of developing OSA.

P38-Characterisation of sleep and sleep habits in children experiencing child neglect

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The consequences of poor sleep quality may affect various aspects of a child's development. Thus establishing an optimal sleep routine is important in order to minimize possible negative impacts. However, this can prove more difficult for some parents, especially those having irregular work schedules or financial difficulties. Child neglect is often associated to these characteristics and although it represents one of the most prominent forms of maltreatment, there are few studies aimed towards children developing in this context. The objective of the present study is to determine if sleep of children experiencing neglect is different than sleep of children living in a "normal" context. Sixty-three mothers (20-43y) participating in a negligence intervention program completed measures on their child's sleep (12-59m). Sleep characteristics of these children were qualitatively compared to two normative samples of children. The sleep habits of our sample differ from those of children evolving in a non-neglect context. First, from 12 to 59 months, our children show more difficulties falling asleep, a higher number of nocturnal sleep hours during weekdays and a trend for an earlier bedtime. Also, our sample shows a diminished nocturnal sleep during weekends in older children (pre-school and school age). However, waking hours, naps frequency and parasomnias in our sample are similar to the normative samples. This study highlights the unique characteristics of sleep in children experiencing neglect. It also brings up the importance to address sleep of these children in a different way than that of children brought up in what is considered a « normal » family context. These represent the first step towards the understanding of the relation that exists between child neglect and sleep problems.

P39-Evaluating recognition memory in children referred for suspected obstructive sleep apnea

Mograss, Melodee, Mok, Elise & Constantin, Evelyn
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Our objective was to assess the extent of memory deficits in children referred for suspected obstructive sleep apnea (OSA). Children with suspected OSA were recruited prior to a night of polysomnography. Children performed a brief facial recognition memory task: 1) Prior to bedtime in the sleep laboratory, the child was instructed to study faces; 2) In the morning, the child was presented with previously studied faces and foils not seen before. The child was asked to identify which faces they remembered. We assessed memory variables accuracy (%correct) and reaction time (RT, milliseconds) and sleep/respiratory metrics. Twenty-two children (13.1years+/-2.9) were included. Those with OSA (mixed/obstructive apnea-hypopnea index, MOAHI>1) vs. without OSA (MOAHI<1) had more respiratory-related arousals ($p=0.02$) but no difference in the oxygen desaturation indices. Regardless of OSA status, children showed greater accuracy in recognizing the faces studied compared to the foils ($p<0.001$). Pearson correlations revealed no associations between memory performance and respiratory variables (MOAHI, respiratory arousals, desaturations). There were no associations between RT and sleep variables (sleep staging and total sleep time). There was an association between increased sleep and better accuracy in memory performance. ($r=0.45$, $p=0.04$). Our data suggest that OSA in children may not be associated with deficits in memory performance, when using a brief recognition memory task. We found a modest association between increased sleep duration and higher accuracy in memory performance. Future studies should determine whether sleep quantity in OSA is relevant in preventing a child's susceptibility to impairments in recognition and other types of memory.

P40-A 15 months old boy with Cornelia De Lange Syndrome and central sleep apnea: a case report

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1. Hospital for Sick Children; 2. Janeway Children's Health and Rehabilitation Centre

Background: Cornelia de Lange Syndrome (CdLS) is a rare genetic disorder with an incidence of 1:10000 to 1:50000. Sleep disturbances in CdLS have been reported in previous studies with a prevalence of 12 to 80% based on sleep questionnaires. However, PSG findings to confirm suspected SDB have not been previously reported in CdLS. Case Report: We present a 15 month old boy with

CdLS who was referred to our institution for a second opinion due to recurrent episodes of acute respiratory failure requiring intermittent invasive mechanical ventilation over the preceding 6 months. His past medical history was significant for a cleft palate, previous supraglottoplasty for laryngomalacia, gastroesophageal reflux disease requiring fundoplication and an atrial septal defect (ASD). He had been on continuous supplemental oxygen by nasal prongs since the age of 8 months. A diagnostic workup was performed showing a normal barium swallow, Chest CT showing no parenchymal disease and an echocardiographically confirmed ASD. A brain MRI demonstrated cerebral parenchymal atrophy and hypoplasia in the bilateral frontal parietal regions and brainstem. There was no adenotonsillar hypertrophy on upper airway endoscopy. An overnight oximetry study on room air showed a desaturation index of 54.4/hr. On the polysomnogram (PSG), CSA (central apnea-hypopnea index of 19/hour) and nocturnal hypoventilation (transcutaneous CO2 >50mmHg for 53% of the night) were found in the absence of obstructive events. In consideration of the PSG findings non-invasive positive pressure ventilation was initiated and resulted in a significant improvement in the child's clinical status. Children with CdLS and recurrent respiratory exacerbations and/or unexplained nocturnal oxygen desaturations should be screened for sleep disordered breathing. In the case of central sleep apnea, long-term ventilation should be discussed with the family because of the opportunity for early intervention to decrease morbidity and improve the quality of life of these children.

P41-Adenotonsillectomy Outcomes of Children with Primary Medical Diagnoses as Compared to Healthy Children: A Retrospective Review of a Canadian Tertiary Pediatric Sleep Center

Sayal, Aarti, Al-Saleh, Suhail, Narang, Indra, Huang, Jasmine, Lam, Laurie & Amin, Reshma
Hospital for Sick Children

Children with an underlying medical diagnosis have traditionally been excluded from studies reporting on the persistence of obstructive sleep apnea (OSA) post adenotonsillectomy (AT). Our aim was to determine the prevalence of persistent OSA in a cohort of children with an underlying primary medical diagnosis as compared to a cohort of healthy children. We conducted a retrospective review of children that underwent PSGs pre and post AT in the sleep laboratory at SickKids, Toronto, Canada, between 2009 and 2013. Children with an underlying medical diagnosis were defined as those with =1 International Classification of Disease tenth revision diagnostic code (ICD-10). Data were collected on baseline demographics, medical diagnoses, and PSG pre and post AT. A total of 280 children underwent pre and post AT PSGs or post AT PSG during the study period. The mean (SD) age was 5.9 (6.0) years. Fifty-nine (n=165) percent were male. 245 (88%) children had = 1 ICD-10 diagnosis. Pre AT, there were no differences in age, gender, obstructive apnea-hypopnea index, oxygen saturation nadir or maximum end-tidal carbon dioxide level between children with and without an ICD-10 diagnosis. Post AT, the oxygen saturation nadir mean (SD) was significantly lower for the children with an ICD-10 diagnosis, 82.9 (11.4) vs 88.7 (8.0), p=0.03. Post AT, moderate-severe OSA persisted in 41.0% of children with an ICD-10 diagnosis as compared to 31.6% of children without a diagnosis (p=0.026). The prevalence of persistent OSA post AT is higher in children with an underlying ICD-10 diagnosis as compared to healthy children. Clinical factors which predict the persistence of OSA in these children including the presence of Complex Chronic Conditions as per Feudtner will be available by the time of the meeting.

P42-Factors Associated with Changes in Respiratory Technology Settings During Pediatric Polysomnograms

Sayal, Priya, Al-Saleh, Suhail, Florence, Joshua, Sayal, Aman, Narang, Indra & Amin, Reshma
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There are long wait times for pediatric PSG in Canada. Our aim was to examine factors associated with changes in respiratory technology (Continuous Positive Airway Pressure (CPAP), Bi-level positive airway pressure ventilation (Bi-level) and invasive ventilation (IPPV)) settings during titration studies. We conducted a retrospective review of children with = 2 PSGs using CPAP, Bi-level and IPPV at the

sleep laboratory at SickKids, Toronto, Canada, between 2009 to 2013. Major change in settings was defined as a change in pressure or rate. Repeated measures regression for major change was performed with age, gender, BMI, technology type, reason for ventilation (Central Nervous System (CNS), Musculoskeletal (MSK), respiratory), obstructive and central apnea-hypopnea indices, time from last PSG, and PSG within recommended limit. Initiation studies were excluded. A total of 224 patients, 108 (48%) male, underwent 521 PSGs during the study period. The technology subgroups were: Bi-level, 333 (64%), CPAP 87 (17%) and IPPV, 101 (19%). The mean (SD) age was 10.02 (5.09). The mean (SD) time between PSGs was 1.16 (0.98) years. 352 (67%) studies had a major change. Technology type and reason for ventilation were significant variables in the regression analysis. The odds of a major change was greatest for Bi-level as compared to both CPAP (OR 2.74, p=0.0004) and IPPV (OR 1.72, p=0.0495). The odds of a major change was greatest for a CNS diagnosis for ventilation as compared to both a MSK diagnosis (OR 2.23, p=0.0049) and a respiratory diagnosis (OR 2.10, p=0.0042). Bi-level ventilation and a CNS diagnosis requiring ventilation were associated with the greatest chance of a major change in settings during technology titration. Further exploration of the specific CNS diagnoses associated with changes in the settings will be available at the time of the meeting.

P43-Parent and health care professional perspectives of barriers and facilitators to treating sleep problems in children with ASD

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Sleep problems such as insomnia are common in typically developing children, but especially prevalent (50-85%) in children with autism spectrum disorder (ASD). Insomnia negatively impacts the daytime functioning of children with ASD. Research on access, uptake, and effectiveness of insomnia treatment for children with ASD is extremely limited. Given the impact of insomnia on the child and family, it is critical to obtain parent and health care professional perspectives on treatment access, uptake, and provision, in order to identify facilitators and barriers. Data collection will involve completion of online questionnaires and participation in online real-time audio/video focus groups by 25 parents of 4- to 12-year-olds with ASD and insomnia, and 25 HCPs who work with this population. Ten focus groups will be conducted in 5 regions across Canada. We will follow a standardized Discussion Guide to lead focus group participants in discussing their knowledge of sleep in children with ASD, experiences in seeking treatment for insomnia for children with ASD, extent of involvement with sleep treatment (HCPs), treatment access and provision, treatment uptake, and the acceptability of an online behavioural intervention for insomnia. Participants will also provide feedback on the web-conferencing focus group format, as this is a new method. Focus groups and other data collection will take place in May - June 2015. Focus group data will be transcribed and qualitatively analyzed, via content analysis, for key themes that will be grouped into barriers and facilitators. Descriptive statistics (based on questionnaire data) will be used to characterize the sample. We anticipate that the will contribute to a better understanding of insomnia treatment needs for children with ASD, and inform the development and sustainability of a web-based intervention for insomnia in children with neurodevelopmental disabilities.

P44-Ventilatory responses during Stage I exercise tests do not correlate to PHOX2B genotype in children with congenital central hypoventilation syndrome (CCHS)

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Hospital for Sick Children

Background: Congenital central hypoventilation syndrome (CCHS) is a genetic disorder affecting the PHOX2B gene characterized by alveolar hypoventilation. Our aim was to determine if there is a genotype-phenotype correlation between mutation type and ventilatory responses to exercise. Patients less than 18 years of age diagnosed with CCHS (PHOX2B positive) that had undergone a Stage 1 exercise test according to the Godfrey protocol, in the Cardiopulmonary Exercise Laboratory

at the Hospital for Sick Children, in Toronto, Canada between September 2013 and March 2014 were included. The tests were performed on a Corival (Lode, BV, Netherlands) cycle ergometer with a VMAX V229 (VIASYS, CareFusion, San Diego, CA) oxygen consumption cart. A priori criteria for stopping the test included an end tidal CO2 of 55-60 mmHg, oxygen saturation of 85%, cardiac arrhythmia, chest pain, or inability to maintain cycling cadence. Eight children were included (4 female). Five (63%) had a non polyalanine repeat mutation (NPARM). All three PARM mutations were 20/25. The median (IQR) age at the time of exercise testing was 10.1 (8.3-12.9) years. Four children (50%) presented within the first year of life. All participants are managed with nocturnal noninvasive positive pressure ventilation (NiPPV). Stage 1 exercise tests were abnormal in 2 (25%) identical twin boys with 20/25 mutations whom presented in the first year of life. Their peak exercise end tidal CO2 values were 59 mmHg and 53 mmHg. This represented a 48% and 25% respectively, increase at peak exercise as compared to baseline. Ventilatory responses during Stage 1 exercise tests did not correlate with PHOX2B genotype or age of presentation in our cohort, suggesting the need for surveillance exercise testing in all children with CCHS. Further research is needed to determine if there is any change in ventilatory responses to exercise over time.

P45-Examining Changes in Grief Through Dreams in Bereavement

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1. Brock University; 2. University of Ottawa; 3. University of Ontario Institute of Technology

Dreams in which the deceased is present has been shown to be common during bereavement (Wright, Kerr, Doroszczuk, Kuszczak, Hang, & Luczkiewicz, 2013). Despite this, the topic of dreams in bereavement has been mainly overlooked in the psychological literature. This study investigated a woman's two and a half year dream journal that included imagery of her deceased father (Black, Murkar, & Black, 2014). There were a total of 16 dreams written down immediately upon awakening and dated. Nine of the dreams had the deceased physically present in the imagery. The dreams that had the deceased present in the imagery were scored using Garfield's (1996) themes. Characters, as well as positive and negative dream elements (of all the dreams) were analyzed using Hall and Van de Castle (1966) scoring guidelines. Seasonal changes in dream frequency for all of the dreams were examined by obtaining the date that each dream was recorded. Dream themes changed consistent with Garfield's (1996) theory of healthy changes in grief. Additionally, dream content showed time-dependent changes as dreamer happiness and appearance of family/relatives (alive and deceased in waking life) increased over time, while animals decreased over time. Furthermore, the dreams examined occurred during specific times that related to the memory of the deceased in a meaningful way, and were not sporadic throughout the year. Time-dependent changes were observed in both dream themes and dream content, which can show the waking day progression through the healing processes in bereavement. Although this case study is from a bereaved individual, the generalizability of these findings is limited. There is still further need for research in this field to assist those who support the bereaved.

P46-Association between Sedentary and Screen Time and Adolescent Sleep

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Sleep quantity and quality are increasingly recognized as linked to academic performance, mental health, physical activity and obesity in adolescents. However, many adolescents do not meet current sleep recommendations, and the evidence is increasing that screen time has deleterious effects on sleep. Electronic media are more accessible to adolescents than ever, and the average screen time of Canadian youth is approximately 8h/day, despite the recommended limit of 2h/day. The objective of this study was to determine if there is an association between different types of sedentary behaviour including screen time, and the quantity and quality of sleep among adolescents. Data were drawn from AdoQuest, a prospective investigation of 1843 grade 5 students aged 10-12 years at inception. The sample was drawn from a stratified random sample of French schools in the greater Montreal area.

We undertook a cross-sectional analysis using the 5th datawave of the AdoQuest study. Specifically, data were collected from 1233 of the 1843 participants (67%) in 2008-9 (when participants were age 14-16 years) on socio-demographic characteristics, sedentary behaviours (frequent >2h/day) and sleep quantity and quality. Frequent computer and telephone use were each independently associated with poorer sleep quality (mean PDSS scores of 11.9 vs 9.7, and 13.9 vs 10.3 respectively). Computer and videogame use were each associated with fewer minutes of sleep per night (17 and 11, respectively). Frequent computer (OR=2.3 [95%CI 1.4, 3.6]) and telephone (OR=2.3 [95%CI 1.3, 5.2]) use increased the likelihood of being a short sleeper (<8h/night). Two or more hours of computer and telephone use per day are associated with sleep quantity and quality in adolescents. Adolescents and their parents should be made aware of the impact that electronic media may have on sleep, and discuss ways to reduce screen time.

P47-Frequent nightmare sufferers have atypical emotional word associations

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Objectives: To investigate whether nightmare sufferers exhibit broader than normal emotional semantic associations, particularly following REM sleep, which is known to increase access to emotional semantic networks as measured by a previously developed associational breadth (AB) task. Nightmare sufferers (NM) were compared to healthy controls (CTL) on an AB task containing negative and positive cue-words administered both prior to (baseline) and after a daytime nap. The post nap AB task contained cue-words which were first memorized prior to sleep (primed), and cue-words which were not memorized (non-primed). A 2 group (CTL, NM) x 2 cue-type (negative, positive) ANOVA for baseline scores did not reveal the expected interaction effect ($F(1, 26)=0.44$, $p=.515$). However, there was a significant effect for group ($F(1,26)=8.56$, $p=0.007$) showing that the NM group had higher baseline AB scores; comparisons revealed the NM group had higher scores on both negative ($t=-2.51$, $p=0.02$) and positive cue-types ($t=-2.13$, $p=0.04$). However, there was no significant effect for cue-type ($F(1,26)=1.41$, $p=0.25$). The priming effect was calculated as Primed-NonPrimed AB score. A 2 group (CTL, NM) x 2 cue-type (negative, positive) ANOVA did not reveal the expected interaction effect ($F(1,22)=0.63$, $p=0.44$). However, there was a significant effect of cue-type ($F(1,22)=15.35$, $p=0.0007$) showing that the positive priming effect was significantly higher than the negative priming effect within both the CTL ($t=-3.08$, $p=0.005$) and NM ($t=-2.42$, $p=0.02$) groups. However, there was no significant group effect ($F(1,22)=0.11$, $p=0.74$). NM sufferers may possess a broader than normal emotional semantic network. However, they do not differ from CTL subjects in showing enhancement of positive semantic access and restriction of negative semantic access following awakenings from REM sleep. This suggests that REM sleep differentially integrates positive and negative cue-words during sleep, an effect that is not disrupted by the presence of frequent nightmares.

P48-Gender Dimensions in the Dreams of Young Adult Canadians

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University of Ottawa

Gender dimensions in the young adult population have been investigated and compared internationally including samples from the United States, Europe, India, Iran, and Japan. These gender studies have revealed a predominance of aggression in male dreams as well as the ubiquitous gender difference of a higher ratio of male characters in male dreams and a more even ratio in female dreams. The purpose of this study is to examine whether previously described gender differences in American and other cultures also apply to Canadians. A detailed dream diary methodology was used and participants recorded the day's events and dreams for ten days or until two dreams were reported. Two dreams each were collected from 150 males and 150 females for a total of 600 dreams from young adults ranging from 18 to 24 years old. Dreams reports were scored by two independent judges, with high inter-rater reliability, using the Hall and Van de Castle (1966) method of content

analysis. Males had a higher percentage of Male characters (h = +.23, p <.001), Aggression/Friendliness (h = +.22, p = .004), Befriender (h = +.29, p = .019), and Physical aggression (h = +.35, p <.001). Females had a higher percentage of Family characters (h = -.12, p = .009), Indoor settings (h = -.15, p = .040), Negative emotions (h = -.25, p = .002), and dreams with at least one Friendliness (h = -.28, p =.001). Previously observed gender differences seem to be robust and also apply to Canadians. More refined analyses may reveal distinctive characteristics in Canadian dreams.

P49-Actigraphic assessment of chronic sleep-wake disturbances following moderate and severe traumatic brain injury

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Poor sleep and fatigue are among the most frequent, persistent, and disabling symptoms following traumatic brain injury (TBI). It has been suggested that TBI individuals have a greater need for sleep. However, behavioral evidence for this phenomenon has to be established. Using actigraphy, we examined diurnal and nocturnal sleep patterns in chronic TBI. Twenty-six moderate to severe TBI patients (32.6±14.3 years old; 8 females; 26±11.1 months post-injury) and 22 controls (29.4±13.3 years old; 8 females) were evaluated using questionnaires and 7 days of actigraphy. Wake after sleep onset (WASO), sleep efficiency and total sleep time (TST) for daytime, nighttime, and 24-h period were analyzed. Groups were compared using t-tests and chi-square tests. Statistical significance was set at $p<0.05$. A bivariate correlation analysis was done between questionnaire scores (fatigue/sleep complaints) and sleep measures (actigraphy). TBI patients reported lower sleep quality and greater daytime sleepiness and fatigue than controls ($p<0.05$). Actigraphy indicated that both groups were comparable on the number and duration of naps. Higher fatigue level was associated with increased number of naps for TBI patients ($p<0.05$), but not for controls. TBI patients demonstrated lower sleep efficiency than controls during naps ($p<0.05$). Evening bedtimes were earlier ($p<0.05$) and nocturnal TST tended to be increased in TBI subjects compared to controls ($p=0.09$). Nocturnal WASO and 24-h TST were comparable between groups. Although participants reported poor sleep and fatigue in the chronic phase of moderate to severe TBI, actigraphy measures only showed subtle changes characterized by lower sleep efficiency during naps, earlier bedtime, and a trend for increased nocturnal total sleep time compared to controls. These do not point to an increased sleep need after TBI. To better understand fatigue among this clinical population, neuroimaging allowing a detailed characterization of brain structure and function should be investigated.

P50-Estradiol Modulates Sleep, Thermoregulation, and Cognition in Ovariectomized Female Marmosets

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Menopause in women is often associated with hot flashes, sleep disturbance and memory deficits. Reduced circulating levels of 17ß-estradiol (E2) during this period may contribute to these symptoms. Studies using animal models support this idea. In the female rat, E2 replacement modulates normal sleep-wake patterns, nighttime core body temperature (Tc), and working-memory performance. However, it is not known whether E2 has similar effects in a more translational primate model. The common marmoset (Callithrix jacchus) is a small diurnal primate well suited for such studies, due to a short lifespan (~ 10 years), high cognitive abilities, and monophasic sleep patterns comparable to those of humans. E2 replacement influences working memory in the marmoset but no study to date has examined whether E2 influences sleep patterns and thermoregulation in this species. The main goal of the present study was to conduct a preliminary examination of the effects of E2 manipulations on sleep patterns, working memory, and Tc in middle-aged ovariectomized female marmosets. Two 6-yr old ovariectomized females were implanted with a telemeter (DSI TL11M2-F20-EET) that records EEG, EMG, and Tc. Sleep patterns (including total duration of REM, NREM, and wake, duration and number bouts), Tc, and performance on the Delayed Response (DR) task were recorded under

baseline and E2 replacement (12 µg/kg/day, p.o.) conditions. Compared to baseline, E2 replacement modulated performance on the DR task in a delay-dependent manner. E2 replacement was also associated with lower Tc during the night. The number of nighttime arousals and delta power were both higher in the E2 replacement condition relative to baseline, which is consistent with the idea that E2 improves sleep quality. These preliminary results support the marmoset as a model for studying the relationships between E2, sleep disturbances, working memory deficits and Tc changes that may serve as indicators of hot flashes.

P51-Diagnosis by behavioral observation" Home-Videosomnography – A Novel Exploratory Approach to Intractable Insomnia of Children and the Elderly

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Exploring causes of intractable insomnia is a major challenge in sleep medicine. Aside from an in-depth history, gaining an understanding of sleep/wake behaviours as well as environmental influences is essential. In this context, the value of formal sleep studies, which mainly gather neurophysiological data, is limited. Explorative screening tools are needed, e.g. modern video technologies. We investigated different combinations of hardware/software for home-videosomnography (HVS) and established a process for qualitative and quantitative analysis of HVS-recordings. A case vignette (HVS analysis for a 5.5-year-old girl with major insomnia and several co-morbidities) demonstrates how methodological considerations were addressed and how HVS added value to clinical assessment. We suggest an 'ideal set of hardware/software' that is reliable, affordable (~$500) and portable (= 2.8kg) to conduct non-invasive HVS, which allows time-lapse analyses. The equipment consists of a net-book, a camera with infrared optics, and a video capture device. (1) We present an HVS-analysis protocol consisting of 3 steps of analysis at varying replay speeds: (a) basic overview and classification at 16x normal speed; (b) second viewing and detailed descriptions at 4-8x normal speed, and (c) viewing, listening, and in-depth descriptions at real-time speed. (2) We also present a custom software program that facilitates video analysis and note-taking (Annotator©), and Optical Flow software that automatically quantifies movement for internal quality control of the HVS-recording. The case vignette demonstrates how the HVS-recordings revealed the dimension of intractable insomnia caused by restless legs syndrome at a very young age, and illustrated the cascade of symptoms and challenging behaviours, which resulted in inappropriate diagnoses and medications. The strategy of using HVS, although requiring validation and reliability testing, opens the floor for new 'observational sleep medicine', which has been useful in describing discomfort-related behavioural movement patterns in patients, e.g. with communication difficulties presenting with intractable insomnia and challenging/disruptive sleep/wake behaviours.Exploring causes of intractable insomnia is a major challenge in sleep medicine. Aside from an in-depth history, gaining an understanding of sleep/wake behaviours as well as environmental influences is essential. In this context, the value of formal sleep studies, which mainly gather neurophysiological data, is limited. Explorative screening tools are needed, e.g. modern video technologies.

P52-Screening for Sleep Disturbances in Medical Patients: Translational Value of three Canadian Sleep Screening Tools

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Toronto Rehabilitation Institute

Medical Rehabilitation settings provide treatments targeted at reducing specific risk factors to improve long term outcomes of medical patients. To reduce a risk factor effective screening strategies are required, and rehab settings have not traditionally evaluated sleep disorders (SDs) as targets for intervention. Accumulating evidence indicates that SDs are pivotal to better outcomes for medical patients and routine screening for SDs could improve outcomes. The present study examined three validated sleep screening instruments for their value in identifying primary sleep disorders among a

range of chronic medical conditions (CMC). 154 consecutive patients enrolling in Stress Reduction at the Cardiovascular Rehabilitation Program at UHN-TRI (October 2012- June 2013) took part in the study. 116 of these were diagnosed with cardiac conditions, diabetes, cancer or TIA/stroke. All participants completed the Insomnia Severity Index(ISI), the STOP-BANG(SB) and the Sleep Assessment Questionnaire(SAQ). The numbers of clinical cases identified by each screening instrument were tabulated. Results from parallel instruments were compared. The 116 participants identified with a CMC (38% female) included: 39 with angina, 37 MI, 35 diabetes, 26 cancer, 14 arrhythmia, 10 TIA/stroke, and 7 heart failure. Percentage of CMC patients screening positive: 1) On SB, OSA cases were between 39% (SB = 5) and 81% (SB = 3); 2) Insomnia (ISI=14) was 45% . On the SAQGlobal measure 79% of CMC screened positive for SD, most (66%) with NRS, 45% with OSA, 38% Insomnia, and 29% Circadian Scheduling problems. Overall medical burden was correlated with SB scores (r=0.23, p<0.01**), but not ISI or SAQGlobal. All three sleep screens identified half (or more) of medical patients from all diagnostic groups having clinically significant SDs. These data confirm that these screening tools can be effective in screening for common SDs in medical populations. Strengths and weaknesses of each measure are reviewed.

P53-Temporal References of Oneiric Threat Simulations in the Absence of Waking-Life Threatening Events

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The purpose of this study was to test the hypothesis of the Threat Simulation Theory (Valli and al., 2008), which stipulates that when one does not experience severe threatening events in everyday life, the simulated threats in one's dreams should reflect components of past threatening experiences, as encoded within long-term autobiographical memory. The experiment comprised two groups of participants (age 18-24), who did not report having experienced severe threatening events in the year preceding their studied dream. The first group (n = 60) reported a dream with at least one threatening event. The second group (n = 59) reported a dream without any threats. In their dream questionnaires, the participants indicated whether the various dream elements referred to past experiences and, if so, at what point in time. This was defined in accordance with a temporal references scale, with answers ranging from 'Last night' to '20 to 29 years ago'. A subsection of the Dream Threat Scale was used by two independent judges in order to identify dream threats. As predicted, , dream with threats contained significantly more temporal references for the time categories "One year ago" (F(1,117)= 9.01, ? =.001), "From 2 to 4 years ago" (F(1,117)= 11.57, ? =.001), and "From 5 to 9 years ago" (F(1,117)= 10.86, ? =.001) than dream without threats. These results support the prediction of the threat simulation theory and the observation that dreams can express early traces of autobiographical memory of threatening events. Future research should explore this phenomenon with different age groups, particularly the elderly and explore the effects of such dream incorporations of threats on subsequent waking adaptation.

P54-Sleep restriction lowers cortisol and testosterone in men but does not affect reactive aggression

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Brock University

Although anecdotal evidence suggests that poor sleep is associated with greater aggressive behaviour, few studies have systematically investigated this relationship [1]. A previous experiment by our group [2] showed that reactive aggression was lower in men sleep deprived for one night compared to a rested control group using a well-validated task of aggression, the Point Subtraction Aggression Paradigm (PSAP). Consistent with this, sleep-deprived men showed a 27% drop in testosterone from baseline. The current study further tested this relationship using a more subtle sleep restriction manipulation. A Sleep Restriction (SR) group (11 men; M age 21), sleeping from 0300–0700, was compared to a rested control (C) group (12 men; M age 22) on endocrine function and

reactive aggression in the PSAP. Reactive aggression was indexed by the points stolen from one's opponent following provocation. Salivary cortisol and testosterone were sampled at 2200 at baseline, at 0700 and 0730 following the experimental night, and at 1600 and 1630 prior to and following the PSAP. Although equivalent at baseline, both cortisol (C = 4.88 ng/mL; SR = 3.60; GxT: p = .034) and testosterone (C = 82.93 pg/mL; SR = 65.84; GxT: p = .006) were lower in the sleep-deprived group at 0700, consistent with previous reports of reduced testosterone following total sleep deprivation [2] and a week of sleep restriction [3]. Groups did not differ in aggressive responding in the PSAP task. Thus, there was no experimental support for the hypothesis that sleep loss increases aggression. Notably, testosterone sampled immediately before the PSAP task was a significant predictor of reactive aggression in the control group only (C: r = .63, p = .029; SR: r = .30, p = .365). Thus, the established link between testosterone and aggressive responding was absent in those restricted of sleep. References: [1] Kamphuis et al. Sleep Med 2012;13:327-34. [2] Cote et al. Biol Psyc 2013;92:249-56. [3] Leproult & Van Cauter JAMA 2011;305:2173-4.

P55-Comparison of Visual and Auditory Feedback on Driving Performance While Sleepy

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Following Raidy and Scharff (2005) Blanchard and MacLean (2013) hypothesised that auditory feedback would be more effective than visual in improving simulated driving performance during prolonged wakefulness. Contrary to hypothesis, one was not superior to the other. Retrospective analysis indicated that participants were less sleepy (Epworth Sleepiness Scale [ESS] mean = 4.8) than is typical of studies of this type (ESS mean = 7.3-7.8). The study was, therefore, replicated with sleepier participants (ESS mean = 8.4). Participants (11F; 15M; Mean age 20.1y) completed four simulated, 45-minute driving sessions in the York Driving Simulator at 2400, 0200, 0400 and 0600 during a night of prolonged wakefulness. Feedback was provided if participants exceeded a safe-zone defined as being within 1m of the centre of the right-hand lane and within ±10km of the speed limit. Each participant experienced: no feedback, visual feedback and auditory feedback in random order for 15 minutes during each session. Stanford Sleepiness Scale ratings were obtained before each session and after each feedback condition. Compared to the control condition (79.6%) both visual (92.3%) and auditory (96.8%) feedback conditions led to more time being spent inside the safe-zone ($F(1,24) = 17.18$, $p<0.001$) and significantly less time was spent in the safe zone in the visual feedback condition than in the auditory condition ($F(1,24)=6.25$, $p=0.020$). A similar pattern of was seen for road position and speed variability and for crashes. Consistent with hypothesis, both visual and auditory feedback improved driving performance, and auditory feedback was significantly superior to visual feedback. It is possible that ceiling effects had a role to play in the lack of differentiation between the two types of feedback in Blanchard and MacLean (2013).

P56-A novel sleep spindle detection method to account for intra- and inter-individual differences in spindle characteristics

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Recently, a variety of automated sleep spindle detection methods have been introduced to overcome the difficult task of visually identifying spindles. However, the task of accurately detecting spindles has proven to be a significant methodological challenge. A novel detection method was developed to overcome methodological hurdles, including: 1) extracting the signal with high signal to noise ratio, 2) accounting for variations of spindle characteristics across the night, scalp and individuals, and 3) minimizing the number of user-defined parameters. Spindles were automatically detected in 15 subjects. Complex demodulation was used to extract instantaneous power in the spindle band with high signal to noise ratio. To account for intra- and inter-individual differences, the signal was z-score transformed using a 60sec sliding window. Spindle events were detected with a z-threshold=99.9th

percentile. Amplitude, duration and oscillatory frequency were derived for each spindle. Each spindle was categorized as slow or fast by its peak frequency. An expert manually identified spindles from 20min of NREM2 sleep from each recording and then compared to the automated detection. Spindles were also identified by a group of non-experts (mean N=18.4) and compared to the expert gold standard. True positive, true negative, false positive and false negatives were used to calculate: recall, precision, specificity, negative predictive value and false positive rate, which were 72%, 72%, 90%, 88% and 10%, respectively. There was high overall agreement between the expert and automated scoring (F1 score=0.70,F=0.60) as well as, between the non-expert and expert scoring (F1 score=0.80,F=0.72). This novel method of spindle detection effectively addresses many of the methodological challenges that currently plague the reliability and validity of automated spindle detection and meets or exceeds inter-rater reliability normally observed between expert scorers. We also present a method to efficiently obtain a benchmark from a large group of non-experts using internet-based crowd-sourcing techniques.

P57-How to become an expert: The role of sleep in the mastery of procedural skills

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What is required to master a new skill? With enough practice -and sleep- we adopt strategies that become automatic and subsequently refine to become an “expert”. It is not known whether sleep is involved in the mastery of new skills nor whether this may be dependent on rapid eye movement (REM) or non-REM (NREM) sleep. Here we sought to identify the post-learning changes in sleep as individuals progress from Novice to Experts on a cognitive procedural task (Tower of Hanoi task; ToH) that can be mastered over several nights, and requires the use of implicitly acquired recursive logic to arrive at the optimal solution. Fifteen healthy young adults underwent several nights of post-training polysomnographic recording where subjects performed the ToH task to arrive at an optimal solution (2N–1=31; where N=5 disks). Implicit acquisition of recursive logic in an identical and optimal pattern of movements, learned through trial-and-error. On the control night, subjects performed a modified ToH using only two disks where legal moves were randomly prompted. When the task was novel, post-training spindle density ($t(11)=3.52, p=0.005$) for fast spindles ($t(11)=4.24, p<0.001$) increased significantly. On the night where subjects become Experts and had a significant increase in accuracy on the task ($t(11)=2.60, p=0.025$), they show increased REM sleep vs. Control ($t(11=3.40, p=0.006)$), where spindles in NREM2 also became larger in terms of amplitude ($t(11)=2.32, p=0.041$) and duration ($t(11)=3.18, p=0.009$) which was significantly correlated with overnight improvement in accuracy ($r(10)=0.63, p=0.039$). Re-exposure to the task one-week after the task had already been mastered, resulted in increased NREM sleep vs. Control ($t(11)=2.21, p=0.049$). This study identifies, for the first time that increased REM sleep and spindles are involved in the acquisition of expertise of a new skill, but NREM sleep is involved in the refinement of an already mastered skill.

P58-Implications of PTSD and Sleep Disturbances for Treatment Protocols of Medical Patients in Stress Reduction Programs

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The purpose of this study was to assess the prevalence of comorbid PTSD and Sleep Disturbances (SD) among medical patients enrolling in a Stress Reduction Program (SRP). While PTSD and SD are increasingly recognized as independent risk factors for poor prognosis in medical conditions, neither is routinely targeted in SRP protocols. The present study assessed the prevalence of PTSD and SD in an outpatient medical population enrolling for stress management(including cardiac, diabetic, cancer and stroke patients), and considered the implications of these findings for designing SRP treatment protocols for multiple medical populations. 293 consecutive patients enrolling in the Stress Reduction Program (SRP) at the Cardiovascular Rehabilitation Program at UHN-TRI (October 2011-June 2013) entered the study. Of these, 223 patients had diagnoses of: cardiac disease (156), diabetes (57),

cancer (48) or stroke/TIA (26), with 61 having 'risk factors' only. All patients were engaged in reducing health risks through exercise and lifestyle change and were beginning stress reduction. All participants completed the Primary Care-PTSD screen, and the Insomnia Severity Index (ISI) and STOP-BANG (SB) sleep measures. Stress program participants had high levels of both PTSD symptoms (20% full criteria, 31% some, 49% none), Insomnia (45% clinical, 29% moderate, 26% none) and apnea risk (35% high, 45% moderate, 20% low). Full criteria PTSD and SD occurred in all medical conditions in significant numbers. Those screening positively for PTSD reported significantly more disturbed sleep but not apnea risk. Over half of medical patients enrolling for SRP had clinically meaningful levels of both SD and PTSD. Stress management protocols for medical patients can be improved by including CBTi to target sleep. PTSD (higher autonomic instability) in this population also argues for enhancing SRP protocols to target the underlying autonomic dysregulation. The value of Polyvagal Theory for improving SRP treatment is discussed.

P59-Do Individuals with OSA have Distinct Driving Records Profiles? (Part 1)

Rizzo, Dorrie[1], Lavigne, Gilles[1], Creti, Laura[2], Baltzan, Marc[2], Champagne, Katéri[3], Bailes, Sally[2], Fichten, Catherine[4] & Libman, Eva[2]
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Studies often suggest that OSA is associated with risky driving. This study explores whether more actual driving violations were committed by individuals with OSA than age- and gender-matched controls. 58 participants, (30 females, 28 males; age mean=50.78; SD=11.13; 29 OSA, 29 controls). Participants with OSA were recruited from sleep clinics immediately after receiving their polysomnography results from their doctor and before beginning treatment. Controls were a convenience sample, screened for absence of OSA. We obtained each participant's driving record from the Société Automobile du Québec—SAAQ (the provincial body regulating driver's licenses). All participants completed the Empirical Sleepiness/Fatigue Scale: derived from commonly used self-report instruments, measuring distinct sleepiness and fatigue scales. Data were compared using a variety of statistical T-test comparisons on the means of the number of infractions, simple correlations and a discriminant analysis and odds ratio analysis plus ROC curve for specificity and sensitivity of a given infraction threshold. The number of driving violations was low for both groups. Analyses did not reveal that participants with OSA committed more driving violations than Control participants. The odds of committing at least one driving violation are virtually identical for participants with OSA and for Control participants. Furthermore, an ROC curve analysis shows that the number of driving violations is a poor measure of participants' group membership (OSA or Control). The various statistical comparisons consistently show, unlike some previous research findings, that individuals, selected in this case-control study, with OSA do NOT commit more driving violations than control participants.

P60-The Role of Sleepiness and Fatigue in Traffic Violations. (Part 2)

Rizzo, Dorrie[1], Lavigne, Gilles[1], Creti, Laura[2], Baltzan, Marc[2,3], Tran, Dieu-Ly[4], Bailes, Sally[2,4], Fichten, Catherine[2,4,5] & Libman, Eva[2,4]
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5. Dawson College

Studies often demonstrate that OSA is associated with risky driving; the common belief is that excessive sleepiness is the cause. This study seeks to verify further the common conclusions in the existing literature by exploring whether actual driving violations are related to fatigue and sleepiness. Population: 58 participants (30 females, 28 males; age mean=50.78; SD=11.13; 29 OSA, 29 no diagnosis). Official driving records for a period of 5 years prior to participation and prior to diagnosis and treatment of OSA were obtained for all participants. All participants completed the Empirical Sleepiness/Fatigue Scale (ESFS): derived from commonly used self-report instruments, measuring distinct sleepiness and fatigue scales. In order to reduce the number of variables into more coherent dimensions, a Maximum Likelihood factor analysis with Direct Oblimin rotation was performed for individual items from the ESFS and the total number of driving violations committed by each

participant. The analyses included 10 items from the two measures. The optimal rotated solution yielded 3 factors. The number of driving violations item loaded with all 3 items of the ESFS that were specific to fatigue. The 7 sleepiness items of the ESFS loaded as factors distinctly dividing "social" and "solitary" items. We previously have shown that individuals with OSA did not differ from Control participants on actual driving violations and that sleepiness was not related to risky driving. This present study demonstrated that it is fatigue that was related to risky driving for all participants (both Controls and those with untreated OSA); sleepiness was not. Our results strongly suggest that the common belief in OSA and sleepiness as the culprits for risky driving needs to be re-evaluated.

P61-Effect of sleep deprivation on waking EEG coherent activity in young and middle-aged adults

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Compared to young adults, older individuals show smaller or similar effects of acute sleep loss on vigilance. After a total sleep deprivation, waking EEG studies have shown enhanced intrahemispheric but decreased interhemispheric coherence in young adults. To our knowledge, no study has yet evaluated changes in cerebral connectivity after sleep loss in aging. Therefore, the present study compared intrahemispheric (INTRA) and interhemispheric (INTER) waking EEG coherence before and after sleep deprivation in young and middle-aged participants. Fourteen young (6W; mean=29.9 ±5.0) and 15 middle-aged (11W; mean=51.3±5.0) healthy subjects participated in constant routine protocol. Two waking EEGs were recorded: one after one hour of habitual wake time (BSL) and one after 24-hours of wakefulness (PRIV). Magnitude squared coherence was computed for INTRA (F3-C3,F3-P3,F3-O1, C3-P3,C3-O1,P3-O1) and INTER (F3-F4,C3-C4,P3-P4,O1-O2) pairs of electrodes for delta, theta, alpha, and beta frequency bands. Compared to BSL, young subjects showed higher INTRA alpha coherence for F3-O1 and C3-P3 in PRIV whereas no condition effect was found for the older participants. Furthermore, both age groups showed higher INTRA coherence in alpha for C3-O1 and in delta for F3-O1 in PRIV compared to BSL. In PRIV, both age groups showed higher INTER coherence in alpha for F3-F4 but lower INTER coherence in beta for C3-C4 and in delta/theta for P3-P4 and O1-O2. Compared to young adults, middle-aged participants showed less prominent effects of the sleep deprivation on INTRA coherence supporting the hypothesis of lower effects of homeostatic sleep pressure on waking EEG connectivity in older participants. However, no age-related effect was found in INTER coherence. Future studies should evaluate how cerebral waking EEG connectivity during sleep loss is linked with vigilance and performance deterioration during aging.

P62-TASK Channels on Basal Forebrain Cholinergic Neurons Modulate Electrocortical Signatures of Arousal by Histamine

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Basal forebrain cholinergic neurons are the main source of cortical acetylcholine, and their activation by histamine elicits cortical arousal. TWIK-like acid sensitive K+ (TASK) channels modulate neuronal excitability and are expressed on basal forebrain cholinergic neurons, but the role of TASK channels in the histamine-basal forebrain cholinergic arousal circuit is unknown. We expressed TASK channel subunits and Histamine Type-1 receptors in HEK cells in vitro, measuring the acid-sensitive K+ current upon application of histamine (20μM). We then studied the role of TASK channels in modulating electrocortical activity in vivo using freely-behaving wild-type (n=12) and ChAT-Cre:TASKf/f mice (n=12), the latter lacking TASK-1/3 channels on cholinergic neurons. We then identified the effect of TASK channel deletion on electrocortical activity during microperfusion of histamine (1mM) into the basal forebrain.Histamine application onto HEK cells inhibited the acid-sensitive K+ current, indicating a functionally coupled histamine-TASK signaling mechanism. TASK channel deletion on cholinergic neurons significantly altered endogenous EEG oscillations in multiple frequency bands. Microperfusion

of histamine into the basal forebrain elicited cortical arousal as evidenced by increased 30-50Hz EEG activity. TASK channel deletion significantly modulated histamine-induced cortical arousal. In NREM sleep, TASK channel deletion on cholinergic neurons significantly attenuated the histamine-induced increase in 30-50Hz activity, consistent with TASK channels contributing to histamine action on basal forebrain cholinergic neurons. In contrast, during active wakefulness, histamine significantly increased 30-50Hz activity in ChAT-Cre:TASKf/f mice but not wild-type mice, showing that the histamine response depended upon the prevailing cortical arousal state. In summary, we identify TASK channel modulation in response to histamine receptor activation in vitro, as well as a role of TASK channels on cholinergic neurons in modulating endogenous oscillations in the electroencephalogram and the electrocortical response to histamine at the basal forebrain in vivo.

P63-Will Women With Sleep Apnea Please Stand Up!

Bailes, Sally[1], Rizzo, Dorrie[2], Baltzan, Marc[1], Grad, Roland[1], Pavilanis, Alan[1], Fichten, Catherine[1], Creti, Laura[1] & Libman, Eva[1]
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Obstructive sleep apnea (OSA) in older, primary care patients, has a high estimated prevalence. However, it is difficult to detect based on patient-reported symptoms alone, and is, therefore, under-recognized and under-treated. It is believed that OSA is less frequent and less severe in women than in men. We conducted a screening study in a family medicine setting to further examine prevalence and sex differences in patients with unsuspected OSA. 155 volunteers (61.5% women, mean age = 57.5) recruited from two hospital-based family medicine clinics completed an overnight sleep study as well as the Sleep Questionnaire (SQ) and the Sleep Symptom Checklist (SSC), which gathered information about nocturnal and daytime functioning related to sleep. A very high percentage of participants received a diagnosis of OSA: 75% of the women and 85% of the men. The mean apnea-hypopnea indices (AHI) were 29 and 34 for women and men, respectively, and were not significantly different. Compared to men, women reported worse sleep disruption, including greater difficulty initiating and maintaining sleep (SQ, SSC) and worse Daytime and Sleep Disorder symptoms (SSC). They did not differ on severity of Psychological symptoms (SSC). In this family medicine sample of middle-aged and older adults we found a high prevalence of OSA, consistent with our previous research using this recruitment procedure. Very striking is the substantial finding of OSA in women, characterized by an average AHI near the "severe" range. Participation in the study may have been more "symptom driven" for the women, as they reported more disrupted sleep. Without universal screening, it is impossible to know the true prevalence and severity of OSA in family medicine clinics. It is, however, possible to find women with significant OSA if we offer them a chance to be evaluated.

P64-Observable Movement Patterns and Sensorimotor Sensations of Paediatric Patients/Parents with Familial Willis Ekbom Disease (WED) during the Suggested Clinical Immobilization Test (SCIT)

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Diagnosis of WED is challenging in children with neurodevelopmental conditions (NDCs). To overcome current diagnostic challenges, we investigated an office-based clinical test, the SCIT, to gain a better understanding of described sensorimotor sensations and observable movement patterns of patients and attending family members with a history of WED. Patients: 31 paediatric patients with chronic early-onset insomnia and NDCs were seen together with their mothers, who presented with history of WED, iron deficiency and/or anaemia. WED was diagnosed clinically by sleep and family history, and observable movement patterns during the SCIT. SCIT: Clients get up, shake out, sit bare-foot on an appropriately sized chair, and try to remain relaxed and motionless. Observable movement patterns accompany descriptions of sensorimotor sensations. SCIT of mothers: 26/31 (84%) could participate actively: 100% described an urge to move and 53% had sensorimotor symptoms in their

legs/toes/feet, the remaining 47% could not specify; 69% had observable movement patterns (twitching; raising heels; rubbing/clenching; repetitive stereotypical limb movements), the remaining 31% suppressed observable movement patterns by increasing tension. SCIT of the children: 17/31 (55%) could participate actively: 82% described an urge to move and 47% had sensorimotor sensations in their legs/toes/feet, the remaining could not specify; 76% had observable movement patterns (see above). Out of this group, only 10/17 (59%) described sensorimotor sensations going along with the urge to move and had, in addition, observable movement patterns; the remaining could either describe sensorimotor sensations (4/17) or had observable movement patterns (3/17). Aside from descriptions of sensorimotor sensations, the SCIT captures observable movement patterns as a new structured diagnostic criterion. This test initiated collaborative discussions about sensorimotor sensations that result in an urge to move, and observable/non-observable movement patterns for being able to sit still, but need electrophysiological validation.

P65-Efficacy and Safety of Oral JZP-110 for the Treatment of Excessive Sleepiness in Adults With Narcolepsy: of a Phase 2b, Randomized, Double-Blind, Placebo-Controlled Trial

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JZP-110, a wake-promoting agent with dopaminergic and noradrenergic activity, is being evaluated for the treatment of excessive sleepiness in adults with narcolepsy. Phase 2b, double-blind, placebo-controlled, parallel-group, multicenter study evaluated safety and efficacy of JZP-110 over 12 weeks in 18- to 70-year-old patients with ICSD-2 diagnosis of narcolepsy. Patients were randomized to once-daily placebo (n=49) or JZP-110 (n=44) 150mg/day (weeks 1-4) increased to 300mg/day (weeks 5-12). Efficacy endpoints included change from baseline in average sleep latency on 40-minute Maintenance of Wakefulness Test (MWT); Clinical Global Impression-Change (CGI-C); Patient Global Impression-Change (PGI-C); and change from baseline at weeks 4 and 12 on the Epworth Sleepiness Scale (ESS). Week 4 changes from baseline were significantly greater with JZP-110 150mg/day relative to placebo: increased MWT sleep latency (9.5 vs 1.4 minutes; P<0.0001); more patients with improvement on CGI-C (80% vs 51%; P=0.0066) and PGI-C (82.5% vs 44.4%; P=0.003); and decreased ESS scores (5.6 vs 2.4 points; P=0.0038). At week 12, following 8 weeks of 300mg/day, JZP-110 resulted in significantly greater improvement from baseline than placebo: increased mean MWT sleep latency (12.8 vs 2.1 minutes; P<0.0001); more patients with improvement on CGI-C (86.0% vs 38.3%; P<0.0001) and PGI-C (93.0% vs 38.3%; P<0.0001); and decreased ESS scores (8.5 vs 2.5 points; P<0.0001). Three patients (6.8%) in the JZP-110 group discontinued due to adverse events (AEs). Most common AEs with JZP-110 300mg/day vs placebo were headache (13% vs 10%), nausea (15% vs 6%), diarrhea (13% vs 6%), insomnia (15% vs 8%), decreased appetite (13% vs 0%), and anxiety (11% vs 0%). Two serious AEs (conversion disorder, acute cholecystitis) in the JZP-110 group were considered probably unrelated to JZP-110. In adults with narcolepsy, JZP-110 at doses of 150mg/day and 300mg/day was well-tolerated, and objective and subjective symptoms of excessive sleepiness were significantly improved.

P66-Give a Hand to Sleep:Self-Shiatsu Hand Massage to Promote Sleep Efficiency in Persons with Chronic Pain

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Difficulty falling asleep is a common problem for persons living with pain. Research demonstrates that disrupted sleep will, in turn, exacerbate the chronic pain problem. The evidence-base for a range of pragmatic, non-pharmacological sleep interventions that can potentially be incorporated into pain management programs is growing. However, strategies that are controlled by the patient and are congruent with the self-management model favored by most pain services are not yet well researched.

This study looks at the outcome of teaching adults with enduring musculoskeletal pain a standardized, pre-bedtime, self-administered Shiatsu hand massage (SHM) intervention to promote sleep onset. A range of standardized sleep-related self-report tools and objective sleep actigraphy (recorded for 5-7 nights) were used to collect baseline data. Participants were then taught pre-bedtime self-administered SHM in one-to-one sessions. They also received two follow-up phone calls to offer support and clarification if needed. The assessment battery and 5-7 nights of actigraphy data were collected again at 2 weeks and 8 weeks post-SHM training. Twelve persons with diverse musculoskeletal pain experiences participated. Data collected at baseline, 2 week and 8 week follow-up periods revealed no apparent changes in actigraphy scores. Treatment fidelity dropped off at 8 week follow-up. A trend toward improved self-reported sleep latency (time to fall asleep) and sleep duration (time spent asleep) emerged. A number of participants reported they were more concerned with increasing their period of unbroken sleep as opposed to their total sleep time. None of the participants reported adverse effects of the intervention. Preliminary findings of a low-cost, pragmatic, patient-controlled intervention are promising. Further study of self-administered SHM to determine the potential mechanism(s) at play, with greater control of treatment fidelity, and to investigate its use during nighttime awakenings in addition to pre-bedtime, are particularly indicated.

P67- Prevalence and correlates of sleep-disordered breathing in congenital heart disease

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The prevalence of sleep-disordered breathing (SDB) is approximately 10% in the general population and is increased in those with comorbidities such as ischemic heart disease and stroke. The increased survival of patients with congenital heart disease (CHD) into adulthood elevates the risk of both ischemic heart disease and non-cardiovascular diseases. The aim of our study was to assess the prevalence and correlates of SDB in the CHD population at the Toronto Congenital Cardiac Centre for Adults (TCCCA). This was a retrospective cross-sectional study of active CHD patients assessed for SDB via polysomnography between 1998 and 2014 from the TCCCA. Subjects were stratified into those with (apnea-hypopnea index (AHI) = 5/hr) and without SDB (AHI < 5/hr. SDB was classified as per standard criteria. Of the 7167 active patients in TCCCA database, there were 156 with confirmed CHD who had assessment for SDB within the study period. Of these subjects, 63% were males and 37% females with a mean age of 37.9 ± 14.5 years. SDB was present in 131 (83.9%) subjects. Of those in whom full polysomnography data was available (n = 69), 7.7% had no SDB, 8.2% mild, 9.8% moderate, and 12.6% severe SDB. Those with SDB were significantly older (41 vs 33 years, p = 0.029), and had a higher BMI (31.4 vs. 25.4kg/m2, p = 0.01) than those without SDB. A history of congestive heart failure was significantly associated (p=0.021) with SDB. Two percent of patients with CHD had screening performed for SDB. In those screened for SDB there was a very high prevalence. This suggests that many patients remain undiagnosed and that screening is imperative in this population. In keeping with studies in the general population, increased age and BMI were associated with SDB.

P68-Patients' View of CPAP Treatment: A Preliminary Study of Patient-Reported Outcomes

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Symptom presentation in OSA is variable and may include complaints of poor sleep, poor daytime functioning, and psychological distress. CPAP treatment is the gold standard, but many patients are non-adherent. Here we investigate views of adherent and non-adherent OSA patients 2 years after diagnosis. Participants were 12 individuals (6 males, 6 females) 45 years of age and over (median=59; range=45-74) who underwent overnight polysomnography and were diagnosed with OSA. All completed a phone interview two years after diagnosis and a treatment recommendation of CPAP. The interview included questions about daytime functioning, sleep quality and emotional well-being (rating scales, 0-3). Participants were also asked to openly discuss their thoughts regarding

treatment (i.e., difficulties comfort, etc.). Participants were divided into 2 groups according to self-reported treatment adherence. 7 participants were in the "adherent" group and 5 participants in the "non-adherent" group. Pre-treatment health-related quality of life (SF-36) scores were similar for both groups. At 2 year follow-up, the adherent group was characterized by significantly ($p < .05$, Mann-Whitney U) better daytime functioning, sleep quality and emotional well-being. Non-adherent participants reported strong negative views related to diagnosis and CPAP adjustment (e.g., "I do not want to sleep with a machine!"), whereas adherent participants reported more positive experiences (ex.: "I can't live without my CPAP machine!"). These preliminary data indicate that although the two groups started out at the same level, adherent participants experienced better daytime functioning, sleep quality and emotional wellbeing than non-adherent individuals. Understanding adherent users' experiences may help practitioners tailor treatment recommendations with the aim of improving adherence.

P69-Impact of Long-Term Opioid Use on Central Sleep Apnea: A systematic review and meta-analysis

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Study Objective: Opioids are associated with higher risk for sleep apnea. We conducted a systematic literature review and meta-analysis to assess opioid influence on the apnea-hypopnea and central apnea indexes (AHI and CAI, respectively). A systematic review protocol (Cochrane Handbook guidelines) was developed for the search and analysis. We searched Embase, Medline, ACP Journal Club, and Cochrane Database from November 2014 for three topics: 1) narcotics, 2) sleep apnea, and 3) apnea-hypopnea index. The outcome of interest was the variation in AHI and CAI in opioid users versus non-users. Two reviewers performed the data search and extraction, and disagreements were resolved by discussion. were combined by standardized mean difference using a random effect model, and heterogeneity was tested by chi-square and presented as I2 statistics. Seven studies with a total of 803 patients with AHI (320 for opioid and 483 for opioid-free groups) and 790 patients with CAI (315 for opioid and 475 for opioid-free groups) met the inclusion criteria. The absolute effect size for opioid use was increased apnea measured by AHI (0.25, CI95%: 0.02–0.49) and CAI (0.45, CI95% 0.27–0.63). The consistency of effects across studies was calculated, showing moderate heterogeneity with I2=59% and 29% for AHI and CAI, respectively. The meta-analysis results suggests that long-term opioid use increases the risk of central sleep apnea.

P70-Sleep apnea and ethnic and cultural factors

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There is evidence that the detection of sleep problems (including OSA), by primary care physicians is further reduced among primary care practices serving ethnic minorities. However, some ethnic minority patients may have a greater prevalence of systemic hypertension, diabetes mellitus, asthma, and congestive heart failure all of which are associated with and rendered more difficult to treat with undiagnosed OSA. The study comprised 57 Caucasian, 37 Chinese and 37 Iranian patients. Information was gathered regarding the gender, age, and BMI of participants. The sleep reports and questionnaires of FSS, SSS, ZOGIM-A, THAT, TAS-20, IIRS, AIS, Stop-Bang and CES-D were reviewed. Analysis of frequencies of sleep study data from 128 selected participants showed that 27.8% of Caucasian, 35.1% of Chinese, and 59.2% of Iranian had an AHI of =5 /h and would be diagnosed with OSA. 54.5% of Caucasian, 50% of Chinese and 78.3% of Iranian scored 3 or more on STOPBANG, representing high risk for OSA. Chinese participants had lower BMI (M/SD = 24.83/3.84) compared to both Caucasian (M/SD = 29.29/5.89) and Iranian (M/SD = 29/ 4.18). FSS questionnaire score analysis was significant ($p = 0.016$) in that Iranian participants had lower scores on FSS scale

(M/SD = 2.61/1.9) compared to Caucasian (M/SD = 4.14/1.46), but not to Chinese (M/SD = 3.14/1.86). IIRS and AIS questionnaires scores analysis were significant (p = 0.001). Iranian participants had lower scores on IIRS and AIS scales (M/SD = 17.4/23.7)/ (M/SD = 6.34/4.71) compared to both Caucasian (M/SD = 43.5/18.5)/ (M/SD = 10.68/4.96) and Chinese (M/SD = 42.54/17.55)/ (M/SD = 12.13/6.2). Compared to Caucasians born in Canada, ethnic minorities appear to have a greater frequency of undiagnosed OSA. It appears that Iranians have few symptoms but when screened for sleep apnea show clear evidence of being positive which is born out in objective studies.

P71-The Interaction Of Obesity and Nocturnal Hypoxemia on Cardio-Vascular Consequences in Adults with Obstructive Sleep Apnea: A Historical Observational Study

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Animal studies suggest that obesity may exacerbate the cardiovascular (CV) consequences of intermittent hypoxemia. In this historical observational study, we investigated whether obesity augments the effect of hypoxemia on CV events development in patients with obstructive sleep apnea (OSA). All adults with suspected OSA who underwent diagnostic polysomnography at St Michael's Hospital (Toronto, Canada) between 1994 and 2010 were linked to provincial health administrative data to determine the occurrence of a composite CV outcome (hospitalization due to heart failure, myocardial infarction, stroke or revascularization procedures). Using the Fine and Gray competing-risk model, hazards were compared between four groups: (group i) obese (BMI>30 kg/m2) and > 9 minutes of sleep time spent with SaO2<90% (TST90); (group ii) obese and TST90=9 min; (group iii) non-obese and TST90>9 min; and (group iv) non-obese and TST90=9 min. Our statistical model controls for traditional CV risk factors (age, sex, comorbidities and smoking status at baseline) and apnea-hypopnea index. Additive interaction was measured using the relative excess risk due to interaction (RERI). 10,149 participants were followed: 17, 25, 8, and 50% were in groups i, ii, iii and iv, respectively. Over a median follow-up of 7.8 years, 896 (8.8%) first CV events occurred. Controlling for confounders, group i was associated with the highest hazard of developing CV events as compared to other groups using group iv as a reference (HR [group i], 95% CI = 1.79 (1.42-2.25); HR [group ii], 95% CI =1.60 (1.30-1.97); HR [group iii], 95% CI =1.41 (1.08-1.86)). The RERI was -0.22 indicating no interaction. Independent of obesity, in adult patients with OSA, nocturnal hypoxemia is associated with increased risk of developing CV events, controlling for confounders. Although a positive additive interaction was not confirmed, the highest risk of CV disease was found in obese patients with significant oxygen desaturation.

P72-Examining the link between cortical hyperarousal and sleep misperception.

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Many studies have reported that insomnia sufferers (INS) are cortically hyperaroused, this arousal being likely linked to sleep misperception, especially amongst paradoxical insomnia sufferers (PARA-I). Using spectral analysis (PSA), 1 Hz increments were chosen over large frequency bands (beta, gamma, etc). Our hypothesis was that increased cortical activity would be linked to greater sleep misperception. 77 individuals [(32 GS; Mage: 36,28, SD = 9,67); (45 INS subdivided in 28 PSY-I; Mage: 42,25, SD = 9,07 and 17 PARA-I; Mage: 41,06, SD = 9,38)] participated in this study. Subjective and objective sleep measures were obtained for sleep latency (SL) and total sleep time (TST). The sleep misperception index was derived from these data. PSA was conducted on EEG segments between 14 and 30Hz since these frequencies are known to reflect cortical hyperarousal in insomnia. Separated Pearson's correlations were conducted on the two time measures (SL, TST). Significant correlations ranged between 21 and 26 Hz (r between -0,29 and -0,25) for the SL in relation to sleep overestimation. As such, increased cortical activity seems to be linked with longer SL perception. Significant correlations were obtained between 16 and 28 Hz (r between 0,35 and 0,54) for the TST in relation to sleep underestimation, that is, increased cortical activity would mean a shorter

TST perception. These results suggest that cortical hyperarousal and sleep misperception are not independent phenomena. Specific mechanisms could be linked to specific frequency bands, such as attention, information processing or mesograde amnesia in the case of overestimation, and cognitive functions such as long-term memory for underestimation. Moreover, heightened cortical arousal may blur the distinction between sleep and wake, thus altering sleep perception. Finally, using 1 Hz increments instead of large frequency bands allows a more precise understanding of cortical activation, especially when assessing sleep misperception.

P73- Evaluating Sleep Quality: What are the Criteria?

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We carried out two sequential studies to investigate the daytime and night-time characteristics of good and poor sleep. In Study 1, 23 individuals seeking cognitive behavior therapy for insomnia (CBT-I) (mean age = 51) and 29 controls (mean age = 50) completed the Sleep Questionnaire and answered “How do you tell if you have had a good night's sleep?” and “How do you tell if you have had a poor night's sleep? “Responses were coded into 21 good and 21 corresponding poor sleep quality categories. Results showed no significant differences between groups on any sleep quality categories. Significantly more poor than good sleep quality-related responses were reported and more daytime than nocturnal responses were mentioned. More participants referred to poor rather than good aspects of nocturnal sleep quality; 83% of popular good sleep quality categories related to the daytime. In Study 2, 88 patients recently diagnosed with OSA, 57 CBT-I patients, and 14 controls without insomnia or OSA completed a number of self-report questionnaires. For all groups, ratings of poor sleep quality were highly correlated with non-refreshing sleep, sleep continuity problems, and sleep satisfaction. For those with no difficulties initiating or maintaining sleep (DIMS), poor sleep quality was most closely related to daytime variables. For individuals with DIMS, correlations were highest for total sleep time and bodily pain. None of the apnea-related symptoms correlated significantly with poor sleep quality for any of the OSA groups. Across diverse samples, whether suffering from OSA with insomnia or not, the pattern was similar: feeling refreshed in the morning characterized good sleep quality; nocturnal awakenings characterized poor sleep quality. Our findings provide a rationale for monitoring feeling refreshed in the morning and sleep continuity at night as clinical and research outcome criteria. Acknowledgements: This research was funded by the Canadian Institutes of Health Research (CIHR).

P74-Nocturnal Sleep-Onset Rapid Eye Movement (SOREM) Latency =15 Minutes for the Identification of Patients With Narcolepsy Type 1: Support From Two Clinical Trials of Sodium Oxybate

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Rapid eye movement sleep at sleep onset (SOREM) is abnormal but occurs commonly in narcolepsy. Used for narcolepsy diagnostic purposes, SOREM is limited to the first 15 minutes following sleep onset during daytime naps or at night, based on scant data. To assess whether the 15-minute limit is optimal, this analysis of sodium oxybate (SXB) clinical trial data evaluated the timing and distribution of SOREMs during nocturnal polysomnography (nPSG) of patients with narcolepsy. This post-hoc analysis evaluated baseline nPSG data from 2 randomized clinical trials of SXB in patients with narcolepsy. Trial SXB-15 (N=228) included only narcolepsy with cataplexy (NC) patients, and SXB-22 (N=222) included both NC (n=95) and narcolepsy without cataplexy (NWOC) (n=127) patients. The analysis incorporates descriptive statistics to characterize SOREM latency, and histograms of the frequency distribution of patients by SOREM latency times to determine the optimal cut-off time. Baseline nPSG data in patients untreated with anticataplectic agents or REM suppressants were available from 176 NC patients in SXB-15, and 71 NC and 91 NWOC patients in SXB-22; 41.5% and

26.5% of NC patients in SXB-15 and SXB-22, respectively, had SOREM episodes. None of the NWOC patients in SXB-22 had SOREM episodes on nPSG. Clear separation of SOREM events from non-SOREM first REM sleep episodes was observed, with 15 minutes identified as the optimal cut-off time for separation of SOREM from first REM episode. These results corroborate those from prior smaller datasets and confirm that a 15-minute cut-off for SOREMs is optimal to distinguish SOREM episodes from first REM sleep episodes on nPSG in patients with narcolepsy with cataplexy. Additionally, the findings of this post-hoc analysis corroborate those recently published highlighting the diagnostic specificity of SOREM on nPSG for narcolepsy associated with cataplexy and/or low CSF hypocretin (Andlauer et al. JAMA Neurol. 2013;70:891-902).

P75-Attempted replication of a quantitative electroencephalogram (qEEG) study of idiopathic nightmare sufferers

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Idiopathic NM sufferers (NM) have been shown to have both altered sleep architecture and REM sleep pressure, but only one study has used qEEG with a NM sample. This study found increased relative fast delta power (3-4Hz) and fast alpha (10-14.5Hz) in REM sleep, suggesting more wake-like activity but requires replication. Sleep was recorded using standard polysomnographic recordings and scored using standard criteria for 14 NM subjects and 13 control subjects (NM: 28.8±4.7 y.o.(11 W), CTL: 27.1±6.0 y.o.(7 W); t25=.028, p=0.98). FFTs were calculated on each artifact free 5-sec epoch. Relative activity was obtained for electrode F3 for delta (0.6-4Hz), fast delta (3-4Hz), theta (4-8Hz), alpha (8-12Hz) and high alpha (10-14.6Hz) frequency bands by averaging 5-sec epochs then dividing by the average total spectral power (0.6-32Hz), values were log transformed (value+1) for statistical analyses. We used a repeated measure ANCOVA for each frequency band with the 4 first sleep Cycles as a within-subject factor, Group as a between-subject factor, and BDI-II and STAI-T scores as covariates. Counter to expectations, there was a marginal CyclexGroup effect for REM high alpha power ($F(3,48)=3.51$, $p=.07$), with NM subjects showing less activity than controls in the first cycle (contrast: $F(1,16)=4.61$, $p=.05$). However, for REM fast delta, there was a significant CyclexGroup interaction ($F(3,48)=10.14$, $p<.001$), such that NM subjects showed decreased activity only in the first sleep cycle. For delta, the interaction effect was a trend ($F(3,48)=2.29$, $p=.09$). No differences were observed for REM theta, or any frequency band in NREM sleep. We failed to replicate Simor et al.'s (2013) main findings in nightmare-disordered subjects. In fact, we found an unexpected decrease in delta activity and a parallel decrease in fast alpha activity as well. Reasons for this may include methodological differences or differences in NM severity between our subject samples.

P76-A neurodegenerative model of REM sleep behaviour disorder

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The primary symptom of REM sleep behaviour disorder (RBD) is loss of REM sleep paralysis. RBD predicts neurodegenerative diseases associated with aggregates of a-synuclein, most frequently Parkinson's disease. RBD is hypothesized to result from degeneration of glutamatergic neurons in the pontine subcoeruleus (SubC) that generate REM sleep paralysis. Here, we aimed to determine if genetically-targeted silencing of glutamatergic SubC neurons could prevent REM sleep paralysis, and if overexpression of a-synuclein within the SubC would induce RBD motor symptoms in mice. To produce neurodegeneration in the SubC, we drove a-synuclein expression in the SubC of wild type (C57BL/6) mice using an adeno-associated viral vector (AAV) containing fluorescently tagged a-synuclein (AAV2-a-synuclein-GFP). To silence the activity of glutamate SubC cells we used a cre-dependent AAV carrying tetanus toxin light chain (AAV8-FLEX-TeLC-GFP) in VGLUT2-cre mice. To monitor sleep/wake state and muscle activity we used EEG, EMG and video recordings. First, we showed that selectively silencing glutamate SubC neurons increased motor activity during REM sleep (n=3 mice). We found that this intervention not only elevated EMG levels of jaw and neck muscle

activity, but it could also lead to overt REM movements that resembled human RBD. Next, we showed that we could selectively target and cause pathological accumulation of a-synuclein within SubC neurons (n=7 mice). However, it remains to be determined if this intervention causes RBD motor symptoms or neurodegeneration of SubC cells. Our results are important because they identify that glutamate cells in the SubC are required for producing normal REM sleep paralysis, suggesting degeneration of these cells could underlie motor symptoms of RBD. We also show that it is possible to induce region-specific accumulation of a-synuclein within the SubC, which will allow us to eventually test the hypothesis that neurodegeneration within the REM sleep circuit underlies RBD.

P77-Association between location of upper airway collapse and the severity of obstructive sleep apnea

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Objective: To determine the relationship between the location of upper airway (UA) collapse and the severity of obstructive sleep apnea (OSA). Endoscopic Mueller maneuvers examining the UA were performed on 604 patients with OSA. There were 3 areas of UA collapse that were evaluated: velopharynx (VP), base of tongue (BOT), and lateral pharyngeal wall (LPW). A sleep study was done after the examination to assess the severity of OSA based on the apnea-hypopnea index (AHI). At the VP, 21 patients had minimal collapse and the mean AHI was 15; 51 patients had moderate VP collapse and the mean AHI was 18; 482 patients had significant VP collapse and the mean AHI was 23. At the BOT, 134 patients had minimal collapse and the mean AHI was 13; 268 patients had moderate BOT collapse and the mean AHI was 20, 202 patients had severe BOT collapse and the mean AHI was 31 At the LPW, 169 patients had minimal collapse and the mean AHI was 14; 168 patients had moderate LPW collapse and the mean AHI was 20; 134 patients had significant LPW collapse and the mean AHI was 28. Significant correlations (r) were found between VP collapse, BOT collapse, and LPW collapse, and OSA severity ($r = 0.083$, $r = 0.33$ and $r = 0.32$, respectively, $p = 0.05$). In this study, the degree of collapse of the UA at all levels, especially at the BOT and LPW levels, correlate significantly with the severity of OSA.

P78-Utility of a Brain MRI in the Diagnosis and Management of Sleep Disordered Breathing in Children

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Polysomonography is the gold standard test for the diagnosis of both obstructive (OSA) and central sleep apnea (CSA) in children. In children, neuro-anatomical causes may contribute to both CSA as well as persistent OSA post adenotonsillectomy. A brain MRI is often necessary to exclude additional etiologies of sleep disordered breathing. The objective of the study was to evaluate the utility of a brain MRI in the diagnosis and management of sleep-disordered breathing in children. This was a retrospective analysis of the medical records, PSG and brain MRI scan of children at the Hospital for Sick Children in Toronto, Canada. These subjects were diagnosed with either 1) persistent OSA despite an adenotonsillectomy, 2) CSA of unclear etiology 3) OSA with co-existing CSA of unclear etiology and 4) unexplained nocturnal hypoventilation. The brain MRI scan occurred after the abnormal PSG. The central and obstructive apnea-hypopnea index (CAI and OAHI respectively) were recorded for each subject. There were a total of 14 subjects selected between 2013-2014. The median (range) age was 10.7 years (1 to 15) and the body mass index was 20.4kg/m2 (13.7 to 38.6). Of these subjects, 4/14 (28.5%) had CSA (mean CAI = 6.9/hour), 4/14 (28.5%) had OSA (mean OAHI =19.5/hour) and 4/14 (28.5%) had both OSA and CSA (mean OAHI and CAI were 3.9 and 4.7/hour respectively) and 2/14 subjects (14%) had nocturnal hypoventilation (mean peak CO2 was 58mmHg). Of these 14 subjects, MRI abnormalities were observed in 6/14 (43%) subjects and these abnormalities included Arnold Chiari malformation, malformed corpus callosum and changes in the cranio-cervical junction. Interventions and therapies following a brain MRI included neurosurgery, non-

invasive positive airway pressure and oxygen. A brain MRI was a useful diagnostic tool in 43% of subjects with sleep disordered breathing of unexplained etiology following a PSG.

P79-Sleep need is not higher in mild traumatic brain injury (mild TBI) patients after one year regardless post-trauma pain: An actigraphy study.

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It is widely believed that sleep is altered in mild TBI patients. Using analysis of fast electroencephalographic activity, we recently confirmed that pain decreases perception of sleep quality and sleep efficiency (89% vs. 94% in controls) (Khoury, J Neurotrauma 2013). Moreover, mild to severe TBI patients were shown to present pleiosomnia, or the need for about one additional hour of sleep (Imbach, Brain, 2015). Here, we examine whether: 1) mild TBI patients need more sleep over a one-month to one-year period; and 2) their need for more sleep is associated with post-trauma pain. Participants were 56 mTBI (17 mild TBI patients without pain complaint, 39 mild TBI patients with pain complaint), and 14 controls. Actigraphy data were collected for seven consecutive wake and sleep cycles. The outcomes of interest (differences in sleep time, % sleep, time wake during sleep) were compared between groups using Mann–Whitney U test. At one month, the 56 mild TBI patients slept on average 7 hours, had a percent sleep of 84% and had 66 minutes of wake; these sleep parameters were not significantly different from controls (7.2 of total sleep time, 86% of % sleep and 70 min of wake time). Mild TBI patients with pain did not show any significant difference in sleep parameters compared to mild TBI without pain at one month and at one year. On average, mild TBI patients slept 22 minutes more at one year follow-up compared to one month, but this was not significant. Based on the present actigraphy study, mild TBI patients do not present higher needs in sleep at one month and one year, and this regardless of pain.

P80-Effects of Electrical Stimulation of the Calf Muscle to Reduce Seated Leg Fluid Accumulation and Rostral Fluid Shift While Supine, and Alleviate Sleep Apnea

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A sedentary lifestyle could increase fluid accumulation in the legs during the day. Upon lying supine to sleep, fluid shifts rostrally from the legs and accumulates in the neck, which can narrow the upper airway and worsen sleep apnea. Therefore, reducing leg fluid accumulation during the day could reduce neck edema when lying supine and improve sleep apnea. The objective of this study is to test the efficacy of electrical stimulation (ES) of the calf muscle on reducing daytime leg fluid accumulation and rostral fluid shift upon lying supine; and alleviating sleep apnea. The study is a randomized, single-blind double cross-over protocol in which participants sit for two and a half hours and received either active or sham ES (control), followed by lying supine for one hour. After one week, participants crossed-over to the other study arm. Sleep apnea was measured at home on the night of each data collection with a portable sleep monitoring device (BresoDx) to asses apnea/hypopnea index (AHI). Fluid was estimated by bioelectrical impedance in the leg and neck simultaneously and continuously. Percent changes in leg and neck fluid volumes from baseline and AHI were compared between the arms. Nine men (age: 48.3±6.2 years, BMI: 26.2±3.1) have completed the protocol. Compared control, leg fluid accumulation while seated was smaller with active ES (7.1±3.4% vs. 3.4±2.2%, p=0.05). Upon lying supine, significantly less fluid shifted into the neck with active ES compared to control (6.5±1.3% vs. 4.0±1.4%, p=0.005). AHI reduced non-significantly from 14.4±7.4 in the control arm to 11.2±6.9 after active ES. Preliminary results demonstrate ES as an effective means of reducing leg fluid accumulation while seated and subsequent rostral fluid shift into the neck when lying supine. Active ES shows promise for alleviating sleep apnea severity; however more data needs to be collected.

P81-EEG connectivity during REM sleep and daytime functioning in neurotypical and autistic children

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Autism is a neurodeveloppemental disorder characterized by atypical connectivity between brain regions. The purpose of this study was to analyze the EEG of REM sleep, an activated brain state with minimal external influences, in children with an Autism Spectrum Disorder (ASD) and typically developing (TD) children. We also assessed relationships between these measures and clinical scales. 11 ASD (10.5±1.2 years) and 13 TD (10.2±2.0 years) children were recorded for 2 consecutive nights using a 22-electrode montage. All participants had a normal IQ and none were taking medication. Spectral power was calculated for Delta, Theta, Alpha, Sigma and Beta activity and coherence values were calculated for inter- and intrahemispheric pairs of electrodes on artifact-free samples of REM sleep taken from the second night. Group differences on EEG coherence were assessed with repeated-measured ANOVA on each electrode pair for all frequency bands and correlations were calculated with Pearson's r. We found no group differences in spectral power for any frequency band and any recording sites. EEG coherence analyses showed that, compared to TD children, the ASD group displayed significantly greater coherence values in frontal interhemispheric pairs of electrodes (FP1-FP2; F3-F4), between short distance frontal electrode pairs (FP1-F7; FP1-F3; F3-F7; FP2-F8; FP2-F4; F4-F8) and between frontal-related distant pairs (F7-C3; F3-T7; F4-C4; F8-C4; F4-T8). Enhanced coherence values in frontal electrodes pairs was positively correlated with scores of internalizing behaviors in the ASD group. ASD children displayed typical amounts of EEG voltage but atypical connectivity patterns between brain areas, namely enhanced connectivity among local frontal areas. The absence of atypical connectivity involving the occipital area diverges from adult data during REM sleep. These results point toward a developmental pattern of atypical brain organization in autism and suggest that this pattern shares a common substrate with clinical status.

P82-Sleep architecture and symptoms severity in treatment resistant depression during adolescence

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Sleep disturbances contribute to the severity and chronicity of major depressive disorder. Increasing evidence suggests that sleep improvements along the course of illness relate to more favorable clinical outcomes, but little is known about how sleep relates to the symptomatology of individuals who remain unresponsive to treatment. This study investigated associations between symptom severity on the Beck Depression Inventory (BDI-II) and sleep in 15 outpatient adolescents (15-17 years old) with treatment resistant depression who completed a polysomnography study at the Royal Ottawa Sleep Disorders Clinic. Depression severity correlated with lower percentage of N2 sleep ($r = -.76$, $p = .001$) and higher percentage of slow wave sleep (SWS; $r = .81$, $p = .001$). Lower energy and concentration reported on the BDI-II correlated with higher SWS ($r = .61$, $p = .017$ and $r = .64$, $p = .011$ respectively). Lower energy correlated with a wider discrepancy between subjective and objective sleep onset latency ($r = .56$, $p = .031$). Increased SWS is linked to worse symptom severity in adolescents with treatment resistant depression, in contrast to previous findings in adults with major depression. Daytime fatigue in these adolescents may relate to aspects of sleep state misperception.

P83-Sleep disturbances and elevated evening cortisol predict mood changes along the course of adjunctive phototherapy

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Mood disorders are often accompanied by increased evening cortisol and circadian phase delay, two factors likely to contribute to sleep initiation difficulties. Such sleep and circadian disturbances are suspected to play a role in the pathogenesis of depression. Since the antidepressant effects of phototherapy may operate in part via the restoration of biological rhythms, individuals with worse sleep and circadian profiles may better respond to this type of treatment. This preliminary study aimed to assess whether sleep and evening cortisol can predict changes in depression along the course of adjunctive phototherapy. Seventeen young participants with depression (19.5 ± 3.3 years old; 76% females) and stable medications were recruited from specialised early-intervention services. They received phototherapy as an adjunct to standard clinical care. Green-blue light-emitting glasses (506 Lux lm/m2) were used for 60 minutes each morning during two weeks. Before phototherapy (i.e. baseline), all participants filled out the Leeds Sleep Evaluation Questionnaire (LSEQ) and a subgroup (n=6) attended a semi-constant routine protocol during which salivary cortisol was measured within the 4 hours preceding sleep onset. At baseline and after phototherapy (i.e. follow-up), participants filled out the Beck Depression Inventory-II (BDI-II). Sleep initiation difficulties (R=-.79, p□.001) and poor sleep quality (R=-.71, p=.001) on the LSEQ were found to correlate with greater depressive symptoms reductions from baseline to follow-up. No significant correlations were found for the other LSEQ subscales. Higher cortisol levels prior to sleep onset correlated with greater depressive symptom reduction (R=0.87, p=.023). Although they need to be replicated in larger placebo-controlled trials, these preliminary findings suggest that sleep difficulties and elevated cortisol levels around bedtime may predict mood changes along the course of phototherapy. These biomarkers may enable the identification of individuals most likely to respond to phototherapy, a key issue for optimising light interventions for non-seasonal depression.

P-84 Sleep Fragmentation in Community-Dwelling Older Adults is Associated with Risk of Mortality

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Introduction: Sleep fragmentation, the extent to which sleep is interrupted by repeated awakenings, is associated with adverse health outcomes, but there is a paucity of data about its association with mortality. Using an objective metric of sleep fragmentation, we tested the hypothesis that sleep fragmentation in older community-based persons is associated with the risk of death.
Methods: We studied 1,094 adults (76% female; mean age at baseline: 81.6 years) participating in the Rush Memory and Aging Project, a longitudinal cohort study of the chronic conditions of aging. Sleep fragmentation was objectively quantified at baseline using 7 consecutive days of actigraphy using the metric kRA. Results: Over a follow-up period of up to 10 years (mean 4.7 years), 380 of 1,094 (34.7%) persons died. In a Cox proportional hazards model adjusted for age, sex and education, a higher baseline level of sleep fragmentation was associated with an increased risk of mortality (HR = 1.15, 95% CI 1.06–1.26, P = 0.001 per 1 standard deviation increase in sleep fragmentation). An individual with high sleep fragmentation (90th percentile) had a 34% greater hazard of death compared with someone with low sleep fragmentation (10th percentile). The association between sleep fragmentation and mortality was not attenuated in models adjusting for total daily rest time, circadian rhythm parameters, chronic health conditions, and the use of medications that can affect sleep.Conclusion: Sleep fragmentation in older adults is associated with risk of mortality. Further studies are needed to determine if interventions that decrease sleep fragmentation increase survival.

P85-Sleep quality during hospitalization: What are the common barriers to restful sleep?

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Introduction- Reduced sleep quality during hospitalisation has several deleterious effects on health and can slow the recovery process after surgery or illness. For example, sleep difficulties have been associated with slower tissue regeneration, lower pain thresholds, increased use of medications and longer hospital stays. Sleep is disrupted in several ways during hospitalisation and sleep difficulties sometimes persist beyond this period. Although the underlying causes are multifactorial, factors specific to the hospital environment are highlighted in both scientific studies and patient experience surveys. Methods- The present data were derived from a study aimed at assessing patients' perspective on the quality of the care experience at Quebec city's university hospital center. A total of 980 patients (64% women), hospitalized for a minimum of two days (44% response rate), completed a post hospitalization survey at home. One question specifically assessed quietness of the bedroom and ward at night. Respondents were also invited to suggest ways that the care experience could be improved; 579 respondents wrote 1072 different comments, which were analysed and classified into main themes using a qualitative analysis approach.Results- According to 36% of respondents, the room and its surroundings were always quiet at night, quiet most of the time according to 44%, sometimes quiet according to 12%, seldom, according to 7% and never, according to 1%. Seventy-three comments (12.6%) specifically regarded poor quality of the sleep environment. Factors identified as disturbing sleep were noise from staff conversation and equipment, care provided to patient or roommate at all hours of night, and inadequate lighting.Conclusion- These data suggest that common patient reported barriers to sleep are related to the hospital environment. Although all noise cannot be eliminated from the hospital environment, some can be significantly reduced. Research is needed to find sustainable solutions to improve sleep environment on hospital wards.

P86-Activation of a Medullary Motor Circuit by Remote Control

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Introduction: Reductions in tongue muscle tone can precipitate obstructive sleep apnea (OSA). The hypoglossal motor nucleus (HMN) is the source of motor output to the tongue, and pharmacological activation of the HMN may increase tongue activity and reduce OSA. However, there is no pharmacological agent currently able to selectively manipulate a channel that is restricted in its expression to the cranial motor pools (e.g., Kir2.4, Grace et al., Sleep, 2014). To identify the feasibility of pursuing such a "druggable" target at the HMN, we instead introduced "designer" receptors into the HMN and selectively modulated them with a "designer" drug that exclusively affects this target.Methods: Using Cre-dependent viral vectors, hypoglossal motoneurons of ChAT-Cre+ mice (n=4) were transduced with AAV8-hSyn-DIO-hM3Dq-mCherry activating receptors. After 2 weeks the mice were instrumented for sleep and respiratory muscle recordings. One week later, mice were studied before and after intraperitoneal injection of vehicle and clozapine-N-oxide (CNO; 1mg/kg); CNO activates hM3Dq receptors but is otherwise biologically inert. Histology confirmed effective trans-gene expression at the HMN. Results: Systemic administration of CNO, to activate the hM3Dq receptors transduced at the HMN, increased tonic tongue muscle activity across all sleep-wake states ($p=0.015$). Notably, tongue muscle activity was increased in non-REM and REM sleep by 385±91% and 273±59% respectively compared to before CNO, and approached the levels recorded during normal wakefulness (89.6±8.6% and 49.5±5.2% respectively). There were no significant effects of CNO on diaphragm or postural muscle activities, or sleep-wake architecture. Conclusions: Selective activation of a "designer" pharmacological target that is locally expressed in the HMN results in sustained reactivation of tongue muscle tone throughout sleep. This result establishes proof of principle for pursuing a selective and restricted "druggable" target at the HMN - such as Kir2.4 or other channels with similarly restricted expression - as a potential pharmacotherapy for OSA.

P87-The Predictive Probability of Moderate-to-Severe and Severe Obstructive Sleep Apnea by the Stop-Bang Questionnaire, A Systematic Review and Meta-Analysis

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Introduction: Obstructive sleep apnea (OSA) is associated with increased risk of perioperative complications. We conducted this meta-analysis to determine the predictive probability of moderate-to-severe (AHI >15) and severe (AHI >30) OSA by the STOP-Bang questionnaire .Methods: A search of the literature databases was carried out. Inclusion criteria were: 1) Studies that used STOP-Bang questionnaire as a screening tool for moderate-to-severe and severe OSA in adult subjects (>18 year); 2) The accuracy of the STOP-Bang questionnaire was validated by polysomnography; 3) Availability of data on AHI; 4) and probability of moderate-to-severe and severe OSA at the different STOP-Bang scores 5) Publications in the English language. Results: The meta-analysis was carried out in 3 studies in the sleep clinic patients, n=1835 and 2 studies in the surgical patients, n=957. In the sleep clinic population, the probability of moderate-to-severe OSA for a score of 3 is 52%. With a stepwise increase of the STOP-Bang score to 4, 5, 6 and 7/8, the probability rises proportionally to 62%, 72%, 82% and 92% respectively. Similarly, the same pattern exists for severe OSA. With a stepwise increase of the STOP-Bang score of 4, 5, 6 and 7/8, the probability of severe OSA climbs to 35%, 45%, 55% and 75% respectively. In the surgical population, the probability of moderate-to-severe OSA for a score of 3 is 40%. With a stepwise increase of the STOP-Bang score to 4, 5, 6 and 7/8, the probability soars proportionally to 48%, 60%, 68% and 80% respectively. With a stepwise increase of the STOP-Bang score of 4, 5, 6 and 7/8, the probability of severe OSA escalates to 25%, 35%, 45% and 65% respectively. Conclusion: In the sleep clinic and the surgical patients, the higher the STOP-Bang score, the greater the probability of patients suffering from moderate-to-severe and severe sleep apnea.

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