Scientific Programme

Saturday, 21 September 2019

07:00AM - 5:00PM  Speaker Ready Room  Administration, SRR - 201

08:00AM - C01  08:00AM - 5:00PM  C01 Pediatric sleep  Course, 118
<em>Additional registration required</em>

Summary
Growing recognition of the prevalence and impact of sleep disorders in children highlights the need for improved knowledge regarding diagnosis and treatment. The overall objective of this course is to provide the sleep medicine provider with comprehensive and updated knowledge and tools to understand, diagnose and treat pediatric sleep disorders. Polysomnographic issues will be discussed within each presentation as appropriate.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Appreciate the clinical presentation and epidemiology of common sleep disorders in children and adolescents
- Acquire knowledge regarding diagnosis and treatment of sleep disorders in children and adolescents
- Apply the knowledge presented in the course to discuss brief clinical cases

Target Audience
Health care providers with an intermediate level of knowledge regarding pediatric sleep disorders. Professionals can include practicing sleep medicine specialists, physicians in training, pediatricians, nurses, psychologists, and other health care providers in the care of children and adolescents.

Chairs:
Reut Gruber (Canada)
Oliviero Bruni (Italy)

08:00AM - 08:10AM  Introduction  Reut Gruber (Canada)
Oliviero Bruni (Italy)

08:10AM - 08:50AM  Insomnia in infants and children  Judith Owens (United States)

08:50AM - 09:30AM  Insomnia & DSPS in adolescence  Reut Gruber (Canada)
Daniel Lewin (United States)
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>09:30AM -</td>
<td>Coffee break</td>
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<tr>
<td>09:50AM -</td>
<td>SDB and OSA Part 1 - Clinical presentation, assessment, epidemiology,</td>
<td>Eliot Katz (United States)</td>
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<tr>
<td>10:30AM</td>
<td>evaluation</td>
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<tr>
<td>10:30AM -</td>
<td>SDB and OSA Part 2 - Treatment - surgical interventions, CPAP, oral</td>
<td>Sherri Lynn Katz (Canada)</td>
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<tr>
<td>11:10AM</td>
<td>appliances, positional therapy, weight loss</td>
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<td>11:10AM -</td>
<td>Parasomnias</td>
<td>Shelly Weiss (Canada)</td>
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<td>11:50AM</td>
<td>Pediatric Narcolepsy and other hypersomnia</td>
<td>Michel Lecendreux (France)</td>
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<td>12:30PM -</td>
<td>Lunch break</td>
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<tr>
<td>12:30PM -</td>
<td>Movement disorders - RLS PLMD Rhythmic movement disorder</td>
<td>Oliviero Bruni (Italy)</td>
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<tr>
<td>1:30PM -</td>
<td>Sleep and mood, anxiety, PTSD, ADHD and other psychiatric disorders</td>
<td>Anna Ivanenko (United States)</td>
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<tr>
<td>2:10PM -</td>
<td>Break</td>
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<tr>
<td>2:30PM -</td>
<td>Sleep and mood, anxiety, PTSD, ADHD and other psychiatric disorders</td>
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<tr>
<td>3:10PM -</td>
<td>Panel discussion, Q and A</td>
<td>Reut Gruber (Canada)</td>
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<td>4:00PM</td>
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<td>Oliviero Bruni (Italy)</td>
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<td>Judith Owens (United States)</td>
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<td>Daniel Lewin (United States)</td>
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<td>Eliot Katz (United States)</td>
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<td>Sherri Lynn Katz (Canada)</td>
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<td>Michel Lecendreux (France)</td>
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<td>Anna Ivanenko (United States)</td>
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**Scientific Programme**

**Course, 119**

08:00AM - 5:00PM  
C02  
**C02 Obstructive sleep apnea: Diagnosis and management**  
<em>Additional registration required</em>

**Summary**  
The clinical management of obstructive sleep apnea is a rapidly evolving area, with new diagnostic and therapeutic tools becoming available. This course will begin with an overview of the pathophysiology and science underlying sleep-disordered breathing, including muscles, structure, function and imaging of the upper airway. More recently, it has been recognized that obstructive sleep apnea is a heterogeneous group of diseases and we will look at genetics and phenotyping of OSA, enabling a personalized approach to treatment. The important consequences of OSA will be discussed, including cardiometabolic, cognitive, mood, road trauma and quality of life. We will look at diagnostic tools, including those used by Gen Z – the wearables, and consider alternative management pathways with the involvement of primary care physicians. In the final session, the course will cover new and older treatments for OSA, including CPAP, oral appliances, positional therapies and nerve stimulation devices.

**Course, 120**

08:00AM - 12:00PM  
C05  
**C05 Restless legs syndrome**  
<em>Additional registration required</em>

**Summary**  
This course will start with a quick summary of the current practice of RLS and then move to new concepts in diagnosis and management of RLS, with a special focus on iron therapy, opioids, α2δ agents, glutamate modulation, augmentation, long term outcomes including impulse control disorders, new guidelines, and update on pathophysiology including insights from genetics and animal models.
C06 Polysomnographic measurements during sleep, beyond the AHI

Summary
This course will focus on how we measure sleep, not on staging and scoring. We have failed to utilize technology available to us to digitalize EEG analysis and improve accurate detection and understanding of sleep depth and arousals. We will discuss how this may be done and used in the clinical sleep laboratory to improve our understanding of sleep and its disorders. The course will also look at information we can obtain from polysomnographic measures – EEG, flow, ECG, oximetry, beyond that of the analysis we do currently. New wearable devices will also be discussed.

Learning Objectives
Upon completion of this learning activity, participants should be able to:

- Gain an understanding of the additional information available on all channels of traditional polysomnography
- Recognise that current PSG analysis is superficial compared to possible computerised analysis available
- Recognise the dynamic changes in EEG, ECG, flow, oximetry, which can give additional information regarding phenotyping patient clinical presentation
- Develop an understanding that future advances in this field are possible, and how that may influence our clinical practice

Target Audience
Sleep scientists, sleep measurement physiologists, sleep clinicians with a wish for a deeper understanding of PSG signals, researchers with an interest in automatic analysis of signals.
Scientific Programme

10:50AM - 11:25AM
Future advances in sleep monitoring
Walter McNicolas (Ireland)

11:25AM - 11:45AM
Conclusion / Question and Answer
Erna Sif Arnardottir (Iceland)
Kerri Melehan (Australia)

08:00AM - 12:00PM
Course, 122
C07 Circadian clinical science
<em>Additional registration required</em>

Summary
This course will cover an update on the circadian regulation, with special emphasis on aspects clinically relevant. The intent is to move away from circadian disorders as "sleep disorders" but more as co-morbidity and drivers of disorders in other organ systems. Topics covered will include the role of circadian disruption and misalignment in insomnia, psychiatric disorders, cardiovascular disease, neurological disorders such as epilepsy and dementia, clinical circadian genetics, and finish with lessons from clinical circadian measurement in extreme circadian phenotypes. This is a key step for sleep medicine physicians taking ownership of circadian medicine.
Scientific Programme

Course, 222

Sleep Disorders Primary Care Education Course

Summary
This one day course is predominately tailored to general practitioners who see patients with sleep disorders in their clinic. The course will cover a broad range of sleep-related topics in both adult and pediatric patients, focusing on the most common disorders seen by practitioners. In general, the format will include a brief 15 minute lecture by local and international experts in the field, followed by 11 minutes of questions from the audience. The course will be limited to 200 attendees.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Recognize the most important sleep disorders in children and adults
- Identify the main treatment options for the major sleep disorders in children and adults including pharmacologic and nonpharmacologic therapies
- Understand basic sleep physiology and epidemiology
- Identify the indications for the major diagnostic tests used in sleep medicine

Target Audience
This course is mostly targeted to general practitioners who see patients with sleep disorders in their clinic. However, the course may also be of interest to other health professionals (e.g. nurses, nurse practitioners, pharmacists, respiratory therapists, sleep technologists, students, residents).

Chairs:
James Lee (Canada)
Célyne H. Bastien (Canada)
Najib Ayas (Canada)

08:00AM - 08:10AM
Introduction
1. Sleep physiology 101: Introduction to sleep
Célyne H. Bastien (Canada)

08:10AM - 08:32AM
1a. What is sleep, what are sleep stages, and why do we sleep?
Célyne H. Bastien (Canada)

08:32AM - 08:55AM
1b. Normal sleep across the lifespan
Julie Carrier (Canada)

08:55AM - 09:21AM
2. “I can’t sleep.” Insomnia in primary care
2a. What’s the Cause? Understanding when you are dealing with different causes of insomnia
Rob Comey (Canada)

09:21AM - 09:47AM
2b. Essential principles of cognitive behavioral therapies for insomnia (CBT-I) in primary care
Charles Morin (Canada)
<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Speaker Details</th>
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<tbody>
<tr>
<td>09:47AM - 10:02AM</td>
<td>Coffee break</td>
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<tr>
<td>10:02AM - 10:28AM</td>
<td>2c. What drugs should I use for sleep? Pharmaceutical management of insomnia including cannabis and melatonin</td>
<td>Ram Randawa (Canada)</td>
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<tr>
<td>10:28AM - 10:54AM</td>
<td>2d. How to treat insomnia with comorbidities: A primary care approach (insomnia in medical and affective disorders)</td>
<td>Dieter Riemann (Germany)</td>
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<tr>
<td>10:54AM - 11:20AM</td>
<td>2e. Pediatric insomnia including delayed sleep-wake phase in adolescents</td>
<td>Shelly Weiss (Canada)</td>
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<tr>
<td>11:20AM - 12:00PM</td>
<td>Lunch break</td>
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<td>12:00PM - 12:26PM</td>
<td>3. Breathing deeply or not: Sleep-Disordered Breathing in primary care</td>
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<tr>
<td>12:26PM - 12:52PM</td>
<td>3a. Adult Obstructive Sleep Apnea- Diagnosis and Treatment from a local perspective</td>
<td>John Fleetham (Canada)</td>
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<tr>
<td>12:52PM - 1:18PM</td>
<td>3b. Adult OSA- a ticking time bomb for cardiometabolic disease?</td>
<td>Sanjay R. Patel (United States)</td>
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<tr>
<td>1:18PM - 1:44PM</td>
<td>3c. “I can’t stand CPAP.” How to improve CPAP adherence and alternatives to CPAP</td>
<td>Frank Ryan (Canada)</td>
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<tr>
<td>1:44PM - 2:00PM</td>
<td>3d. Children can get sleep apnea too. Pediatric sleep-disordered breathing in primary care</td>
<td>Rakesh Bhattacharjee (United States)</td>
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<td>2:00PM - 2:26PM</td>
<td>4. Other Things that go Bump in the Night</td>
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<td>2:26PM - 2:52PM</td>
<td>4a. Restless Legs Syndrome</td>
<td>Diego García-Borreguero (Spain)</td>
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<tr>
<td>2:52PM - 3:18PM</td>
<td>4b. The role of sleep in Chronic Fatigue Syndrome and Fibromyalgia</td>
<td>Richard Arseneau (Canada)</td>
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<tr>
<td>3:18PM - 3:44PM</td>
<td>4c. When the clock is out of whack. Shiftworking and Jetlag-</td>
<td>Diane Boivin (Canada)</td>
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<tr>
<td>3:44PM - 4:10PM</td>
<td>4d. Effects of substance abuse on sleep</td>
<td>Launette Rieb (Canada)</td>
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<td>4:10PM - 4:36PM</td>
<td>4e. Let sleeping infants lie: addressing the concerns of caregivers</td>
<td>Keyvan Hadad (Canada)</td>
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<td>4f. Pediatric potpourri: hypersomnia, parasomnia and others</td>
<td>James Lee (Canada)</td>
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</tbody>
</table>
Scientific Programme

4:36PM - 4:50PM  Conclusion

08:00AM -  Wake Up Narcolepsy
4:00PM   Registration and Coffee
08:45AM   Welcome & Introduction
09:00AM   Claire Crisp (Canada)
09:00AM -  Thriving as a young adult
09:45AM   Thomas Scammell (United States)
09:45AM -  Coffee break
10:05AM   Current Research
10:05AM -  Yves Dauvilliers (France)
10:05AM -  Transitional Care—the journey from childhood to adulthood
10:50AM   Brian Murray (Canada)
10:50AM -  Lunch break
12:35PM   Living with Narcolepsy
12:35PM   Kelsey Biddle (Canada)
12:50PM   Depression and Management with Narcolepsy
1:05PM    Indra Narang (Canada)
1:35PM - 2:05PM  The psychological impact of narcolepsy on the young
2:05PM    Shelly Weiss (Canada)
2:05PM - 2:35PM  Break
2:35PM - 3:20PM  Panel discussion
2:35PM - 3:20PM  Claire Crisp (Canada)
2:35PM - 3:20PM  Thomas Scammell (United States)
2:35PM - 3:20PM  Yves Dauvilliers (France)
2:35PM - 3:20PM  Brian Murray (Canada)
2:35PM - 3:20PM  Kelsey Biddle (Canada)
2:35PM - 3:20PM  Indra Narang (Canada)
2:35PM - 3:20PM  Shelly Weiss (Canada)
Scientific Programme

Course, 224
08:30AM - 5:00PM

Dental Sleep Medicine

Summary
Obstructive sleep apnea is a major health problem affecting over 10% of the adult population. The two most common and effective therapies used to treat sleep apnea are: (1) Continuous or Automatic Positive Airway Pressure (PAP), and (2) Oral Appliances. Dental Sleep Medicine is one of the fastest growing fields in dentistry, with large numbers of individuals with sleep apnea being treated with oral appliances. This one and a half day course will be focused on oral appliance therapy for the treatment of sleep apnea as well as touching on other areas in dental sleep medicine, like pediatric sleep apnea and bruxism. The course has been design to bring up-to-date and exciting information for new and experienced, clinicians and researchers in the field.

This is a clinically-focused and evidence-based continuing education program combining worldwide experts to bring to attendees the newest knowledge and its application to clinical practice.

The course will be divided in lectures on the first day and lectures with discussion panels for the second day.

Learning objectives
Upon completion of this CME activity, participants should be able to:

- Understand the the range of severity of sleep apnea and their relevance in the treatment choice and implications to cardiovascular disease.
- Discuss the role of oral appliance in specific populations such as pediatric, edentulous, and pregnant woman.
- Present current patient management approaches, focused on treatment efficacy and effectiveness
- Recognize scope of existing and emerging combination therapy approaches to OSA treatment, with a greater emphasis on combinations with oral appliance therapy.
- Have an up-to-date understanding of the latest controversies in dental sleep medicine, such as association with bruxism, small oral appliance titration, side effects and long term effectiveness

Target audience
Dentists, dental Assistants, and Physicians, Researchers, Sleep & Respiratory technologists and other health care professionals interested in dental sleep medicine

Chairs:
Fernanda Almeida (Canada)

08:30AM - 08:40AM
Welcome
Fernanda Almeida (Canada)

08:40AM - 09:10AM
Treatment of mild OSA, should I bother treating it?
Raphael Heinzer (Switzerland)
Scientific Programme

09:10AM - 09:40AM  
CV consequences of OSA, can we rely on PSG data, biomarkers or symptoms?  
Sanjay R. Patel (United States)

09:40AM - 10:10AM  
Impact of oral appliance on CV and diabetes  
Tea Galic (Croatia)

10:10AM - 10:30AM  
Coffee break

10:30AM - 11:00AM  
Oral appliance in edentulous and almost edentulous patients  
Marc Braem (Belgium)

11:00AM - 11:30AM  
Pregnancy and impact of OSA, can we use oral appliances?  
Sushmita Pamidi (Canada)

11:30AM - 12:00PM  
Pediatric OSA and craniofacial characteristics - findings of the PDSA trial  
Benjamin Pliska (Canada)

12:00PM - 12:30PM  
History of Oral Appliance Therapy  
Gail Demko (United States)

12:30PM - 1:30PM  
Lunch break

1:30PM - 2:00PM  
Mean Disease alleviation and compliance  
Kate Sutherland (Australia)

2:00PM - 2:30PM  
Predictors of oral appliance therapy, are the answers all on the upper airway  
Peter Cistulli (Australia)

2:30PM - 3:00PM  
Patient management before and after OA insertion  
John Tucker (United States)

3:00PM - 3:30PM  
Break

3:30PM - 4:00PM  
Periodontal disease as a comorbidity or side effects on oral appliance therapy  
Fernanda Almeida (Canada)

4:00PM - 4:30PM  
Evaluating and applying the evidence around oral appliance therapy  
Leslie Dort (Canada)

4:30PM - 5:00PM  
The past and the future of DSM, get your questions answered by Alan Lowe  
Alan Lowe (Canada)

09:00AM - 5:00PM  
Affiliated Meeting, 110

09:00AM - 5:00PM  
Hypersomnia
Scientific Programme

Affiliated Meeting, 111

09:00AM - 5:00PM
Sleep Apnea

Affiliated Meeting, 117

09:00AM - 5:00PM
Vigilance & Wake-A-Thon’s

Course, 114

1:00PM - 5:00PM
C08 Staging and scoring

<em>Additional registration required</em>

Summary
This course by Natus is still being developed.

Course, 120

1:00PM - 5:00PM
C15 Parasomnia

<em>Additional registration required</em>

Summary
Clinical, videographic, and mechanistic aspects of the parasomnias will be presented, including REM-behaviors, sleep-related epilepsies, and recently described antineuronal antibody syndromes. Management challenges will be identified.

Course, 121

1:00PM - 5:00PM
C09 Portable devices for clinical practice and sleep research

<em>Additional registration required</em>

Summary
Although the reference standard procedure in sleep medicine remains in-laboratory polysomnography, there is increasing interest in portable, in-bedroom, and wearable technologies. These technologies can also assess sleep in real-world environments. The most common target application of both traditional and portable technology is diagnosis, treatment, and follow up for sleep disordered breathing. This course will review technological developments and wearable devices used to monitor sleep-wake activity and sleep-related breathing. Presentations will review issues regarding advantages and disadvantages of portable or wearable devices to measure sleep in clinical and research contexts. Validity, reliability, and usability of these devices will be discussed, including potential ways to integrate such technologies into sleep medicine and research.
Scientific Programme

Course, 122

1:00PM - C10
5:00PM

C10 Circadian basic science: Human circadian rhythms from OMICS to behavior

<em>Additional registration required</em>

Summary
This course will focus on an update on basic science aspects of circadian medicine, including mechanisms of photoentrainment, non-photic entrainment, circadian metabolic control, circadian mechanisms in oncogenesis, and advanced circadian measurements (metabolome, transcriptome).

Affiliated Meeting, 107

5:00PM - 7:00PM

Sleep Technologist Certification: Education, eligibility and examinations
Scientific Programme

Sunday, 22 September 2019

07:00AM - 5:00PM
Administration, SRR - 201

Speaker Ready Room

08:00AM - 5:00PM
Course, 118

C03 Sleep health in women

<em>Additional registration required</em>

Summary
Women have a different experience of sleep and sleep disorders compared to men. This may be related to hormonal influences, anatomical and physiological reasons but also to social and environmental factors. These factors may influence disease presentation, natural course, and even response to, and compliance with, therapy. This course will discuss sleep patterns in women, social and biological differences that contribute to sleep disorders, and the impact of various life stages on sleep across a woman's lifespan.

The course will cover the vast body of literature that has emerged in the last 10 years linking sleep to maternal and fetal outcomes in pregnancy, including the impact of sleep disordered breathing to gestational hypertension and diabetes and preterm birth, and the importance of maternal sleep to mental health postpartum. The course will also provide knowledge updates on areas such as the circadian influence and shift work on sleep in women, prescribing for sleep disorders across the lifespan, cardiovascular consequences of sleep disorders, and restless legs syndrome.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Understand contributions of sex to different patterns of sleep and sleep disorders
- Appreciate the role of sleep and sleep disorders in pregnancy in impacting the health of woman and baby and the use of pharmacotherapy in this population
- Recognize sex differences in circadian rhythms and shift work
- Gain knowledge on different clinical presentations of women and how diagnosis and management may need need to be tailored to women
- Understand the changes in sleep associated with various stages of a woman's life

Target Audience
Clinicians, Scientists, Trainees, Polysomnography technicians, Allied professionals
Scientific Programme

08:00AM - 08:10AM Introduction
Ghada Bourjeily (United States)

08:10AM - 08:40AM Social contributions to sleep in women
Yu Sun Bin (Australia)

08:40AM - 09:10AM Insomnia in women
Hrayr Attarian (United States)

09:10AM - 09:40AM Women, circadian rhythms and shift work
Diane Boivin (Canada)

09:40AM - 10:10AM Normal sleep and insomnia in pregnancy
Lianne Tomfohr-Maden (Canada)

10:10AM - 10:40AM Coffee break

10:40AM - 11:10AM Sleep disordered breathing and perinatal outcomes
Danielle Wilson (Australia)

11:10AM - 11:40AM Making sense of associations between sleep disturbances and perinatal outcomes
Margaret Bublitz (United States)

11:40AM - 12:10PM Treating pregnant women with sleep disorders
Ghada Bourjeily (United States)

12:10PM - 1:10PM Lunch break

1:10PM - 1:40PM Restless legs syndrome/ Willis Ekbom Disease in women
Mauro Manconi (Switzerland)

1:40PM - 2:10PM Sleep and cardiovascular consequences in women
Reena Mehra (United States)

2:10PM - 2:40PM Sleep and menopause
Helena Hachul (Brazil)

2:40PM - 3:00PM Break

3:00PM - 3:30PM Sleep and mental health in women
Laura Palagini (Italy)

3:30PM - 4:00PM Sleep, circadian rhythms and fatigue in cancer
Sonia Ancoli-Israel (United States)
Scientific Programme

Course, 119
08:00AM - 5:00PM
C04 State of the field / Year in review
<em>Additional registration required</em>

Summary
Integrating research and clinical practice (all day). This course will bring together basic science and clinical advances, putting together the best of a "year in review" and a "basic science/methods" update for the sleep physician”. The span of topics should include technology, controversial areas, recent (2-3 years) literature.

Course, 120
08:00AM - 12:00PM
C11 Chronic insomnia: Assessment, diagnosis and management (part 1)
<em>Additional registration required</em>

Summary
Chronic Insomnia will be covered during 2 half days which could be taken together or attended separately. The first half day will focus on 1) recent advances in understanding the pathophysiology of insomnia and; 2) best practices in the assessment and diagnosis of chronic insomnia. The presentations will explore primary insomnias as well as insomnia with co-morbid medical or mental issues. The second half day will focus on best practices using evidence-based approaches. The potential advantages and risks of treatment with medication and Cognitive Behavioral Therapies (CBT) will be discussed, including incorporation of practical, "real world" constraints associated with clinical practice. The course aims to provide a comprehensive and in-depth understanding of chronic insomnia along with practical tools and approaches suitable for use in the specialized sleep medicine setting but also in more general settings such as primary care and general psychiatry and psychology practices.
Scientific Programme

08:00AM - 12:00PM  C12  
C12 Aging, neurodegeneration and sleep

<em>Additional registration required</em>

Summary
Aging per se is associated with many physiological alterations as sleep and circadian rhythms changes and other sleep disorders suggestive of hypothalamic dysfunction. It is increasingly recognized that sleep disorders are often present and a significant part of the neurodegenerative diseases (NDDs), which are more common among the elderly. Moreover, detecting and treating sleep disorders in these populations have a considerable interest as a potential way to impact the development and the course of NDDs. The course will give an overview from the sleep changes associated with the process of aging to the sleep abnormalities associated with different NDDs (i.e. Alzheimer disease, Parkinson disease, Lewy body dementia), starting from the concept that sleep abnormalities when noted to increase in severity beyond the expected for age could be a marker, similar to cognitive changes, reflecting specific pathophysiological mechanisms of interest in NDDs.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- To describe the major sleep modifications and their mechanisms with aging
- To correlate sleep alterations and characteristics in the NDDs with their pathophysiology mechanisms and the eventual role of sleep disorders in the starting and evolution of the different NDDs
- To disentangle the question of whether sleep initiate or drive (or both) disease progression or are only downstream events due to the sleep disruption by the increasing buildup of neuropathology
- To show the actual state of the art of the importance to recognize and diagnose sleep disorders in different NDDs and the possible effect of their treatment on the evolution and progression of the diseases

Target Audience
Clinicians and different sleep medicine experts interested in evaluating and treating sleep disorders in the elderly; researchers interested in the field of sleep and aging, and in the pathophysiology of the modifications possibly related to the neurodegenerative processes.

Chairs:
Marco Zucconi (Italy)
Birgit Högl (Austria)

08:00AM - 08:10AM  
Introduction
Marco Zucconi (Italy)
Birgit Högl (Austria)

08:10AM - 08:45AM  
Sleep and the aging brain
Sonia Ancoli-Israel (United States)
Scientific Programme

08:45AM - 09:20AM
Is macro and microstructure alteration of sleep a risk for neurodegeneration?
Liborio Parrino (Italy)

09:20AM - 09:40AM
Coffee break

09:40AM - 10:15AM
PLMS and sleep apnea: Are they a sign of neurodegeneration in the aging brain?
Marco Zucconi (Italy)

10:15AM - 10:50AM
Sleep and risk factor for AD and taupathies
Madeleine Grigg-Damberger (United States)

10:50AM - 11:25AM
Sleep and alpha synucleinopathies
Birgit Högl (Austria)

11:25AM - 11:45AM
Conclusion & Discussion
Scientific Programme

08:00AM -   C13   12:00PM

C13 Cardiovascular and renal consequences of sleep apnea

<em>Additional registration required</em>

Summary
The hallmarks of obstructive sleep apnea (OSA) are (i) intrathoracic pressure swings (ii) repeated episodes of hypoxia/re-oxygenation and (iii) sleep fragmentation, with consequent sympathetic activation, inflammation and endothelial dysfunction. This course will discuss the pathophysiological mechanisms underlying the relationship between OSA and cardio-renal disease. The areas to be covered include hypertension, coronary artery disease, cardiac arrhythmias, kidney and cerebrovascular disease. The session will conclude with a critical review of the recent randomised trials and lessons for future trials in the research area.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

• To understand the pathophysiological mechanisms in OSA that drive cardio-renal disease
• To understand the epidemiology of hypertension, coronary artery disease and atrial fibrillation in the OSA population and the evidence base for treating OSA
• To understand the aetiology of cerebrovascular disease and stroke in OSA populations
• To appreciate the lessons that have been learnt from large OSA treatment trials and what new trials may be on the horizon

Target Audience
MD, PhDs and multidisciplinary teams from all covered areas

Chairs:
Luciano Drager (Brazil)
Craig Phillips (Australia)

08:00AM -   Introduction   08:10AM
Luciano Drager (Brazil)
Craig Phillips (Australia)

08:10AM -   Pathophysiology of CVD in OSA   08:40AM
Virend Somers (United States)

08:40AM -   Hypertension and Resistant Hypertension in OSA (Epidemiology and RCT results)   09:10AM
Manuel Sánchez-de-la-Torre (Spain)

09:10AM -   Coronary and Carotid Artery Disease (Epidemiology and Intervention results)   09:40AM
Yuksel Peker (Turkey)

09:40AM -   Coffee break   10:00AM
### Scientific Programme

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>10:00AM - 10:30AM</td>
<td><strong>Arrhythmias (Epidemiology and OSA Intervention results)</strong> Reena Mehra (United States)</td>
</tr>
<tr>
<td>10:30AM - 11:00AM</td>
<td><strong>Kidney Disease (Mechanisms and Intervention studies)</strong> Patrick Hanly (Canada)</td>
</tr>
<tr>
<td>11:00AM - 11:30AM</td>
<td><strong>Cerebrovascular Disease and Stroke</strong> Najib Ayas (Canada)</td>
</tr>
<tr>
<td>11:30AM - 12:00PM</td>
<td><strong>Lessons from the Large Trials</strong> Susan Redline (United States)</td>
</tr>
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#### Technologist Program, 221

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>08:00AM - 4:00PM</td>
<td><strong>Technologist workshop: content to be determined</strong></td>
</tr>
</tbody>
</table>

#### Course, 220

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
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<tbody>
<tr>
<td>08:00AM - 9:00PM</td>
<td><strong>International Restless Legs Syndrome Study Group Annual Meeting &amp; Course</strong></td>
</tr>
</tbody>
</table>

$165

Program Committee: Denise Sharon (USA), Federica Provini (Italy), Garima Shukla (Canada), Rochelle Zak (USA), Cornelius Bachman (Germany)

**Summary**
The International Restless Legs Syndrome Study Group (IRLSSG) will offer a full-day course on Sunday, September 22, 2019. Attendance is open to any sleep professional who is interested in RLS. A business meeting will be held after the course, which is only open to IRLSSG members.

Registration includes the sessions, lunch and networking dinner.

**Target Audience:**
Sleep specialists and internists interested in sleep disorders and in identifying and treating RLS with a more basic understanding of the disorder; RLS experts and researchers in the field; trainees interested in learning and developing the field.

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>08:00AM - 08:30AM</td>
<td><strong>Networking and Coffee</strong> Denise Sharon (United States) Federica Provini (Italy) Garima Shukla (Canada) Rochelle Zak (United States) Cornelius Bachman (Germany)</td>
</tr>
<tr>
<td>08:30AM - 08:45AM</td>
<td><strong>Welcome to Vancouver &amp; Introductions</strong> Denise Sharon (United States) Allan O’Bryan (United States)</td>
</tr>
</tbody>
</table>

**Animal models task force**
Mauro Manconi (Switzerland) Diego García-Borreguero (Spain)
Scientific Programme

08:45AM - 09:00AM  Behavioral Animal Models: when phenotype matters and objective markers are missing
Jerome Siegel (United States)

09:00AM - 09:15AM  Critical review of outcome measures of the past models: rationale and need of consensus
Mauro Manconi (Switzerland)

09:15AM - 09:30AM  Expert Consensus Guideline for an animal model of RLS: How to reach a consensus on outcome measures in animal models: methods and preliminary results
Aaro Salminen (Germany)

09:30AM - 09:45AM  Update on RLS animal models and iron
Richard Allen (United States)

09:45AM - 10:00AM  State of the research on animal model KO for BTBD9
Yuqing Li (United States)

10:00AM - 10:15AM  Animals models task force summary and update
Mauro Manconi (Switzerland)

10:15AM - 10:30AM  Coffee break

10:30AM - 10:50AM  RLS: leg movements identify arousal
Richard Allen (United States)

10:50AM - 11:10AM  Update on blood pressure and endothelial dysfunction in RLS
Yves Dauvilliers (France)

11:10AM - 11:30AM  New MRI findings in RLS
Ambra Stefani (Austria)

11:30AM - 11:45AM  A Proteomic and System Biology Approach Reveal Novel Biomarker Signatures for RLS
Raffaele Ferri (Italy)

11:45AM - 12:00PM  The lifespan course of short-interval, periodic and isolated leg movements during sleep
Raffaele Ferri (Italy)

12:00PM - 1:00PM  Lunch break

1:00PM - 1:03PM  Introduction
Garima Shukla (Canada)

1:03PM - 1:23PM  Restless legs syndrome and Parkinson’s disease - the dopaminergic connection and treatment challenges
Luigi Ferini-Strambi (Italy)

1:23PM - 1:40PM  Restless legs syndrome in acute neurological conditions - lessons from stroke and acute neuropathies
Garima Shukla (Canada)
Scientific Programme

1:40PM - 2:00PM
How RLS contributes to quality of life in Multiple Sclerosis
Mauro Manconi (Switzerland)

Young Investigators
Arthur Walters (United States)
Denise Sharon (United States)
Rochelle Zak (United States)
John Swieca (United States)

2:00PM - 2:15PM
Young Investigator Presentation #1

2:15PM - 2:30PM
Young Investigator Presentation #2

2:30PM - 2:45PM
Young Investigator Presentation #3

2:45PM - 3:00PM
Young Investigator Presentation #4

3:00PM - 3:15PM
Young Investigator Presentation #5

3:15PM - 3:30PM
Break

IRLSSG Projects
Denise Sharon (United States)

3:30PM - 3:45PM
Diagnostic accuracy of RLS screening tools
Stephany Fulda (Switzerland)

3:45PM - 4:00PM
Update on PLMS scoring program certification
Stephany Fulda (Switzerland)

4:00PM - 4:15PM
National RLS Opioid Registry: 1-2 Year Longitudinal Results
John Winkelman (United States)

4:15PM - 4:30PM
Establishing RSD as a new diagnosis
Lourdes DelRosso (Peru)

4:30PM - 4:45PM
Pediatric RLS and GP Task Force update
Arthur Walters (United States)

4:45PM - 4:50PM
Ideas for projects from the attendees

4:50PM - 5:00PM
Outgoing Chair Summary
Diego García-Borreguero (Spain)

5:00PM - 5:15PM
Break

5:15PM - 6:00PM
Business Meeting
Diego García-Borreguero (Spain)

6:00PM - 9:00PM
Dinner
Scientific Programme

08:00AM - 4:00PM

Affiliated Meeting, 222

Trainee Research Day

No Additional Cost

Summary
This daylong event, sponsored by Canadian Sleep Society, Institute of Circulatory and Respiratory Health (ICRH) and the Canadian Sleep and Circadian Rhythms Network, has been designed by trainees for trainees in sleep research. The program will be relevant to a wide range of trainees. Participation is encouraged from trainees at all levels, from graduate students to fellows, working in basic and clinical research fields. The format of the program will include a mixture of data presentations by trainees and senior investigators, in addition to professional development sessions where attendees will get advice from experts on improving scientific communication skills.

The trainee day will conclude with a social event and data blitz aimed at getting attendees to interact and have fun.
Scientific Programme

08:30AM - 12:50PM

Dental Sleep Medicine

Summary
Obstructive sleep apnea is a major health problem affecting over 10% of the adult population. The two most common and effective therapies used to treat sleep apnea are: (1) Continuous or Automatic Positive Airway Pressure (PAP), and (2) Oral Appliances. Dental Sleep Medicine is one of the fastest growing fields in dentistry, with large numbers of individuals with sleep apnea being treated with oral appliances. This one and a half day course will be focused on oral appliance therapy for the treatment of sleep apnea as well as touching on other areas in dental sleep medicine, like pediatric sleep apnea and bruxism. The course has been design to bring up-to-date and exciting information for new and experienced, clinicians and researchers in the field.
This is a clinically-focused and evidence-based continuing education program combining worldwide experts to bring to attendees the newest knowledge and its application to clinical practice.
The course will be divided in lectures on the first day and lectures with discussion panels for the second day.

Learning objectives
Upon completion of this CME activity, participants should be able to:

- Understand the the range of severity of sleep apnea and their relevance in the treatment choice and implications to cardiovascular disease.
- Discuss the role of oral appliance in specific populations such as pediatric, edentulous, and pregnant woman.
- Present current patient management approaches, focused on treatment efficacy and effectiveness
- Recognize scope of existing and emerging combination therapy approaches to OSA treatment, with a greater emphasis on combinations with oral appliance therapy.
- Have an up-to-date understanding of the latest controversies in dental sleep medicine, such as association with bruxism, small oral appliance titration, side effects and long term effectiveness

Target audience
Dentists, dental Assistants, and Physicians, Researchers, Sleep & Respiratory technologists and other health care professionals interested in dental sleep medicine

Chairs:
Fernanda Almeida (Canada)
Leslie Dort (Canada)

Alternative, emerging and combination therapies

08:30AM - 08:50AM
Phenotyping and its relevance to dental sleep medicine
Danny Eckert (Australia)
Scientific Programme

08:50AM - 09:10AM

Oral Appliance and oxygen therapy - different application ot complimentary?
Scott Sands (United States)

09:10AM - 09:30AM

Cannabis , bruxism and OSA, where is the smoke?
Gilles Lavigne (Canada)

09:30AM - 09:50AM

CPAP, position training and other combination therapies to OAT
Marijke Dieltjens (Belgium)

09:50AM - 10:20AM

Discussion Panel: The pros and cons of combination therapy
Fernanda Almeida (Canada)
Danny Eckert (Australia)
Scott Sands (United States)
Gilles Lavigne (Canada)
Marijke Dieltjens (Belgium)

10:20AM - 10:40AM

Coffee break

10:40AM - 11:00AM

The latest questions on oral appliance therapy

10:40AM - 11:00AM

Bruxism and OSA, association or causality? How to treat?
Ramesh Balasubramaniam (France)

11:00AM - 11:20AM

Titration - is just a little too little?
Satoru Tsuiki (Japan)

11:20AM - 11:50AM

Status of bite changes and management
Julia Cohen-Levy (France)

11:50AM - 12:10PM

Long term effectiveness of OAT

12:10PM - 12:50PM

Panel Discussion: Get your clinical question addressed by a researcher
Leslie Dort (Canada)
Ramesh Balasubramaniam (France)
Satoru Tsuiki (Japan)
Julia Cohen-Levy (France)
Scientific Programme

Affiliated Meeting, 109

09:00AM - 5:30PM

Sleep Expo 2019: Public Lecture Series

Sleep Expo 2019 will be open to the public and will include the following programming(*):

• Sleep Disorder Lecture Series: Lecture-based presentations covering treatment options, diagnostic criteria and other current information. Expert lecturers will not provide an overview on the various sleep disorders, but delve into the recent changes that have been made in the field in the past 18-months, as well as where the next 18-months may lead. Topics covered will include insomnia, sleep apnea, restless legs syndrome, hypersomnia and other sleep disorders.

(*) Program is still in development and is subject to change.

09:00AM - 09:30AM
How to know if you have a sleep disorder. Do you sleep well?
Steve Carstensen (United States)

09:30AM - 10:00AM
Women and sleep: pregnancy to menopause
Melissa C. Lipford (United States)

10:00AM - 10:30AM
Knowing your best treatment options for sleep disorders
Paul Glovinsky (United States)

10:30AM - 11:00AM
Nutrition, exercise and sleep: The co-dependent trio for healthy living
Charles Samuels (Canada)

11:00AM - 11:30AM
Let Sleeping Infants Lie: Addressing the Concerns of Caregivers
Lourdes DelRosso (Peru)

11:30AM - 12:00PM
My child can't sleep: Managing sleep disorders in infants to adolescents
Phyllis Zee (United States)

12:00PM - 12:30PM
The aging brain and sleep
Stuart Fogel (Canada)

12:30PM - 1:00PM
Sleep, Memory, Dreams, and Nightmares: Myths vs Facts
Charles Morin (Canada)

1:00PM - 1:30PM
Why can't I fall asleep?
Michael Thorpy (United States)

1:30PM - 2:00PM
I keep falling asleep! Narcolepsy management from children to adults
David Rye (United States)

2:00PM - 2:30PM
The future of Hypersomnia: Research and treatments
Richard Allen (United States)

2:30PM - 3:00PM
Use of Dental Devices (MAS) in the treatment of sleep disorders
Fernanda Almeida (Canada)
Scientific Programme

3:30PM - 4:00PM
What 2020 will offer sleep apnea patients: Future treatment options
Cameron Harris (United States)

4:00PM - 4:30PM
Sleep duration and health outcomes
Virend Somers (United States)

4:30PM - 5:00PM
Drowsy Driving
Mark Howard (Australia)

5:00PM - 5:30PM
Effect of sleep on sports performance and sports injury
Charles Samuels (Canada)

Affiliated Meeting, 110

09:45AM - 5:15PM
Sleep Expo 2019: Discussion Groups and Author Tables
Sleep Expo 2019 will be open to the public and will include the following programming(*):

• Facilitator-led Discussion: A panel of facilitators will lead a discussion on health topics that impact multiple sleep disorders and their treatment. The discussion style will feature a problem/solution approach. Topics covered will include nutrition, exercise, coping mechanisms, depression & anxiety and other related topics.

• Sleep-related Author Tables: Authors of sleep-related books will provide an overview of their research, findings and content, as well as have a chance to answer reader questions in person. Books will be available for purchase at the tables

(*) Program is still in development and is subject to change

09:45AM - 10:45AM
Discussion Group 1: Sleep Health

10:45AM -
Author Table 1

11:15AM -
Discussion Group 2: Pediatric Sleep

12:15PM -
Author Table 2

12:45PM -
Discussion Group 3: Caregiving & Coping

1:15PM - 2:15PM
Author Table 3

2:15PM - 3:15PM
Discussion Group 4: Communicating Sleep Problems

3:15PM - 3:45PM
Author Table 4
Scientific Programme

3:45PM - 4:45PM  
Discussion Group 5: Alternative Sleep Aids

4:45PM - 5:15PM  
Author Table 5

1:00PM - 5:00PM  
C14  
C14 Chronic insomnia: Assessment, diagnosis and management (part 2)

<em>Additional registration required</em>

Summary
Chronic Insomnia will be covered during 2 half days which could be taken together or attended separately. The first half day will focus on 1) recent advances in understanding the pathophysiology of insomnia and; 2) best practices in the assessment and diagnosis of chronic insomnia. The presentations will explore primary insomnias as well as insomnia with co-morbid medical or mental issues. The second half day will focus on best practices using evidence-based approaches. The potential advantages and risks of treatment with medication and Cognitive Behavioral Therapies (CBT) will be discussed, including incorporation of practical, “real world” constraints associated with clinical practice. The course aims to provide a comprehensive and in-depth understanding of chronic insomnia along with practical tools and approaches suitable for use in the specialized sleep medicine setting but also in more general settings such as primary care and general psychiatry and psychology practices.
Scientific Programme

1:00PM - 5:00PM  C16  C16 Narcolepsy and other hypersomnias: Diagnostic approach and management

<em>Additional registration required</em>

Summary
The objectives of this half day course are to present current concepts regarding the assessment and diagnosis of narcolepsy and other hypersomnias of central origin, and to discuss the contemporary landscape of pharmacological and non-pharmacological treatment options. This course is directed towards practicing sleep medicine specialists and will focus on narcolepsy, idiopathic hypersomnia, periodic hypersomnia, and hypersomnia due to medical conditions in adults and children.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Recognize typical and atypical presentations of central hypersomnias in children and adults
- Identify the possible pitfalls and limitations in the diagnosis of hypersomnia
- Summarize the current and emerging treatment options of narcolepsy and other hypersomnias in children and adults
- Summarize the psychosocial burdens and quality of life issues associated with narcolepsy and other hypersomnias.

Target Audience
Practicing sleep medicine specialists and physicians-in-training; Nurse practitioners, psychologists, social workers, and other healthcare providers involved in the care of patients with hypersomnias.

Chairs:
Merrill S. Wise (United States)
Tomi Sarkanen (Finland)

1:00PM - 1:10PM  Introduction
Merrill S. Wise (United States)
Tomi Sarkanen (Finland)

1:10PM - 1:50PM  Narcolepsy: presentation, assessment and diagnosis
Tomi Sarkanen (Finland)

1:50PM - 2:30PM  Idiopathic Hypersomnia and other Hypersomnias: presentation, assessment and diagnosis
Lynn Marie Trotti (United States)

2:30PM - 2:50PM  Coffee break

2:50PM - 3:25PM  Narcolepsy in Children
Merrill S. Wise (United States)
Scientific Programme

3:25PM - 4:10PM  Treatment of Narcolepsy and Other Hypersomnias
                  Yves Dauvilliers (France)

4:10PM - 4:40PM  Psychosocial, Academic and Vocational Aspects of Hypersomnia
                  Stine Knudsen (Norway)

4:40PM - 5:00PM  Conclusion / Question and Answer
                  Merrill S. Wise (United States)
                  Tomi Sarkanen (Finland)
A critical review of orofacial myofunctional therapy & sleep disordered breathing: phenotyping, clinical markers, and early intervention

Summary
Obstructive sleep apnea is increasingly common sleep disorder with heterogeneity in clinical presentation and pathophysiology. In recent years, four contributing causes or phenotypes have been identified and included airway collapsibility, impaired pharyngeal dilator muscle function, lowered arousal threshold and loop gain.

Increased understanding of the pathophysiology and phenotyping of SDB traits can improve the success rate of targeted treatment such as myofunctional therapy, alone or in combination with other treatments in mild and moderate OSA, highlighting the need for further research and the need to develop simple phenotyping tools for SDB related muscle function.

Orofacial myofunctional therapy (OMT) represents a novel, non-invasive strategy to treat sleep disordered breathing including OSA (Guilleminault 2013, Camacho 2015, Camacho 2018). Recent evidence has supported its usage in children with residual OSA following adenotonsillectomy (Villa 2015, Guilleminault 2017, Felicio 2018). Further, OMT may represent a novel paradigm of therapy that may prevent pediatric OSA (Sullivan 2017). Standardized treatment modalities, models for detection of orofacial myofunctional disorders, and clear understanding of the related phenotypes, however, are yet to be established.

This symposium will critically evaluate the recent evidence on OMT, while exploring what is known clinically that may be of immediate interest to those working in sleep medicine who wish to apply a precision medicine approach including ENT, orthodontic, pulmonary, and OMT intervention.

This program is a joint meeting of the Academy of Applied Myofunctional Sciences (AAMS, www.aamsinfo.org) and the World Sleep Society.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Describe how the maldevelopment of specific structural components of the craniofacial respiratory complex in early childhood can be associated with sleep and airway morbidity
- Appraise the relationship between mouth breathing patterns, tongue restriction, posture, and sleep disordered breathing
- Employ a clinical decision making model to help providers determine when to implement OMT in children suspected with OSA
- Appraise the potential of myofunctional therapy alone or in combination therapy targeted to muscle phenotype in a precision medicine model and evaluate the success.

Target Audience
Sleep Specialists, sleep researchers, dentists, sleep technologists, sleep medicine instructors, otolaryngologists, allied health professionals, myofunctional therapists, public health specialists

Chairs:
Marc Richard Moeller (United States)  
Sharon Keenan (United States)
Scientific Programme

1:00PM - 1:17PM  Introduction: the emerging area of myofunctional therapy; why sleep disordered breathing?
Marc Richard Moeller (United States)

1:17PM - 1:44PM  Need for Orthodontic Treatment Under the Age of Seven: A Predictor of Increased Risk for Sleep Related Breathing Disorders (SRDB)
Kevin Boyd (United States)

1:44PM - 2:11PM  Stick your tongue out: OMT and its place in pediatric OSA
Rakesh Bhattacharjee (United States)

2:11PM - 2:38PM  Orofacial Myofunctional Therapy (OMT) for Obstructive Sleep Apnoea
Brigitte Fung (Hong Kong)

2:38PM - 3:05PM  Impaired pharyngeal dilator muscle function in OSA; a phenotype for new modalities of treatment
Venkata Koka (France)

3:05PM - 3:30PM  Break

3:30PM - 3:57PM  Should the kids breathe through nose or mouth? Implications of early treatment of respiratory dysfunction
Takashi Ono (Japan)

3:57PM - 4:24PM  Oral Dysfunction and Sleep Meet Education: A Collaborative Four-Part School-Based Model for Screenings
Nicole Archambault (United States)

4:24PM - 4:51PM  A Call for Changes to Sleep Education and Sleep Screening
Sharon Keenan (United States)

4:51PM - 5:18PM  Oroonasal abnormalities and dysfunctions in persistent sleep disordered breathing
Julia Cohen-Levy (France)

5:18PM - 5:45PM  Orofacial Myofunctional Therapy in the Mouth Breathing Patient: An Interdisciplinary Approach and Its Place in Sleep Medicine
Silke Weber (Brazil)

Poster Abstract, Exhibition

Poster session 1

6:00PM - 8:00PM  Social Event, BR A - Ballroom A
Opening Ceremony
Scientific Programme

Monday, 23 September 2019

07:00AM - 5:00PM
Administration, SRR - 201

08:00AM - 08:45AM
Speaker Ready Room

Keynote, BR A - Ballroom A

08:00AM - 08:02AM
Introduction

08:02AM - 08:45AM
K01: Insomnia: Public health burden and new trends in treatment development and dissemination

Summary
Insomnia is a prevalent public health problem associated with significant burden for the individual (e.g., increased risks of depression and hypertension) and for society (e.g., increased disability and absenteeism from work). There is solid evidence that cognitive behavioral therapy for insomnia (CBT-I) is effective, safe, and well accepted by patients. CBT-I is also recognized as first-line therapy for chronic insomnia in most clinical practice guidelines. Despite this strong research-based evidence and endorsement by the scientific and professional community, CBT-I is still not widely available as first-line therapy and remains underutilized by health care practitioners. Several innovative and cost-effective treatment delivery models (e.g., Internet-based therapy, telemedicine) have yielded promising results, but it has not yet solved the imbalance between supply and demands. This lecture will review the public health significance of insomnia, summarize the current state of evidence on insomnia therapies, highlight some paradoxes between research evidence and clinical practices, and outlines future trends for improving treatment access and optimizing outcome.

08:00AM - 08:02AM
K01: Insomnia

Charles Morin (Canada)
Scientific Programme

Symposium, BR A - Ballroom A

09:00AM - S01
10:30AM

S01: Opioids and sleep disordered breathing: From biomedical research to clinical practice

Summary
Over the last two decades, there has been a dramatic rise in opioid use, misuse, morbidity, and mortality worldwide. This alarming tendency can be explained by a combination of factors, of which the recognition of chronic (non-cancer) pain by the medical community, the encouragement of patients to seek treatment and more importantly, the promotion of opioids as a key treatment modality are prime considerations. Opioid use is associated with alterations in sleep architecture, respiratory depression and sleep-disordered breathing. Despite these risks, current evidence on the relationship between opioid use, respiration during sleep, and associated adverse long-term consequences is limited and controversial. This symposium gathering experts in biomedical research, clinical science, and epidemiology will cover the health impacts of opioid medications on sleep-disordered breathing (SDB), sleep quality, and the associated risks. Specifically, Dr. Gaspard Montandon (University of Toronto, Canada) will present the current knowledge related to the neural mechanisms regulating opioid-induced sedation and respiratory depression. We will then explore the impacts of opioid use and misuse in adults. Specifically, Dr. Atul Malhotra (University of California San Diego, USA) using a case-based format will outline the opioid effects on clinical parameters and on polysomnography (PSG). The recognition and diagnosis of those patients taking chronic opioids who are most at risk of SDB is often challenging being limited by both health care resources and patient willingness to undergo further investigation. Dr. Clodagh Ryan (University of Toronto, Canada) will present the results from a study evaluating clinical predictors of SDB in patients on chronic opioids attending a multidisciplinary patient clinic. The current prescription pattern of opioids in individuals at risk for SDB and the impact of the interaction between SDB and opioid use at a population level will be explored by Dr. Tetyana Kendzerska (University of Ottawa, Canada). We will finalize our symposium with the overview of current treatment modalities for SDB in opioid users by Dr. Sutapa Mukherjee (Flinders University, Australia). Considering the current opioid epidemic, a clear understanding of the impacts of opioid drugs on respiratory health is critical. This symposium will provide the audience with an up-to-date overview of the pathophysiology of opioid-induced sleep and respiratory alterations and associated risks, and the clinical and epidemiological impacts of opioids on sleep and SDB as well as current treatment approaches.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- To understand the mechanisms of opioid-induced changes on sleep and breathing
- To recognize the effects of acute and chronic opioid use on sleep architecture and respiration during sleep
- To learn about the efficacy of clinical prediction tools (STOPBANG) and portable monitoring systems for the diagnosis of sleep apnea in opioid users
- To be aware about prescriptions patterns of opioids in individuals with suspected SDB and the relationship with positive airway pressure treatment prescription and long-term adverse health consequences
- To understand recommended treatment modalities for SDB in opioid users

Target Audience
Researchers, clinicians, sleep technologists, allied health professionals, students and patients

Chairs:
Tetyana Kendzerska (Canada)
Clodagh Ryan (Canada)
### Scientific Programme

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<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker</th>
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<tbody>
<tr>
<td>09:00AM</td>
<td>Introduction</td>
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<tr>
<td>09:02AM</td>
<td>Pathophysiology of opioid-induced sedation and respiratory depression</td>
<td>Gaspard Montandon (Canada)</td>
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<td>09:18AM</td>
<td>The effects of acute and chronic opioid use on sleep architecture and</td>
<td>Atul Malhotra (United States)</td>
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<td>09:34AM</td>
<td>respiration during sleep: clinical and polysomnographic effects</td>
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<tr>
<td>09:34AM</td>
<td>How do we predict sleep apnea in patients on opioids?</td>
<td>Clodagh Ryan (Canada)</td>
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<tr>
<td>09:50AM</td>
<td>The relationship between opioid use in adults with suspected sleep-</td>
<td>Tetyana Kendzerska (Canada)</td>
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<tr>
<td>10:06AM</td>
<td>disordered breathing, positive airway pressure treatment prescription</td>
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<td>10:06AM</td>
<td>and associated long-term consequences</td>
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<tr>
<td>10:22AM</td>
<td>The treatment of sleep-disordered breathing in individuals on opioids</td>
<td>Sutapa Mukherjee (Australia)</td>
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<tr>
<td>10:22AM</td>
<td>Conclusion</td>
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<td>10:30AM</td>
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Scientific Programme

09:00AM - 09:10AM  S02: Sleep, sleep disorders and perioperative care

Summary
Hospitalized patients predisposed to upper airway obstruction and/or hypoventilation are at increased risk of adverse events due to the synergistic effects of medications used for anxiety, sleep, sedation, pain, and their underlying airway collapsibility. Unfortunately, sleep-disordered breathing and non-respiratory disorders remain mostly undiagnosed in the population and approximately 40% of patients with severe sleep-disordered breathing are not compliant with the use of PAP therapy. Understanding the important common ground between sleep and anesthesia and the insights behavior in one state may provide for behavior in the other state. The panel will provide the evidence for the need of screening and evidence of PAP therapy in patients with obstructive sleep apnea and obesity hypoventilation syndrome. The management of patients with non-respiratory sleep disorders when they are hospitalized for acute medical conditions or surgery will be discussed. The impacts of hospitalization on sleep and the importance of sleep in recovery from surgery and illness will be evaluated. This session has put together experts in this field and will present scenarios for best practice in an interactive with audience manner. This session will contribute to improving safety and outcomes in the hospitalized patient in sleep, sleep disorders and perioperative care.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- The attendees will appreciate the important common ground between sleep and anesthesia and the insights behavior in one state may provide for behavior in the other
- The attendees will appraise the evidence for need of screening and evidence of PAP therapy in patients with obstructive sleep apnea and obesity hypoventilation syndrome
- The attendees will evaluate the management of patients with non-respiratory sleep disorders when they are hospitalized for acute medical conditions or surgery
- The attendees will learn the impacts of hospitalization on sleep and the importance of sleep in recovery from surgery and illness

Target Audience
Sleep physicians, respirologists, neurologists, psychiatrists, ENT surgeons, anesthesiologists, dentists, trainees, sleep technologists, nurses, and allied health professionals

Chairs:
John Fleetham (Canada)

09:00AM - 09:22AM  Introduction
Sleep and Anesthesia: the Physiological Common Ground
Clifford B. Saper (United States)
## Scientific Programme

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>09:22AM - 09:42AM</td>
<td>Obstructive sleep apnea, and obesity hypoventilation syndrome: Who should be assessed, and how should we optimize? Frances Chung (Canada)</td>
</tr>
<tr>
<td>09:42AM - 10:02AM</td>
<td>Narcolepsy, Restless Leg Syndrome, and Parasomnias: Non-Respiratory Sleep Disorders in the Perioperative Environment Dennis Auckley (United States)</td>
</tr>
<tr>
<td>10:02AM - 10:22AM</td>
<td>Sleep in the Hospitalized Patient: An Under-Appreciated Influence on Recovery? David Hillman (Australia)</td>
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<tr>
<td>10:22AM - 10:30AM</td>
<td>Conclusion</td>
</tr>
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</table>
S03: Combination therapy approaches for OSA: Can we improve effectiveness?

Summary
Obstructive Sleep Apnea (OSA) is a highly prevalent condition associated with daytime symptoms and cardiovascular and metabolic risk. As a chronic disorder, effective treatment needs to be applied long-term in order to circumvent poor health outcomes. However, available therapy options for OSA come with various therapeutic limitations. Standard care remains CPAP, a highly efficacious therapy but with the well-recognized limitation that a large proportion of OSA patient use it at suboptimal levels to achieve health effects, or abandon it altogether soon after implementation. Alternative therapies often fair better on patient adherence and preference. However, most alternative therapies do not eliminate all apneic events, leaving some level of residual OSA in most patients. Given that no single treatment is ‘perfect’, there is scope for combination therapy approaches to OSA treatment to improve treatment effectiveness. Combination therapy approaches can involve adjuncts to standard CPAP to improve effectiveness and meet patient needs. Additionally, alternative therapies, which are not completely efficacious on their own, can be combined to better eliminate the disease. Novel opportunities for combination therapies targeting non-anatomical pathophysiology are also emerging. This symposium will highlight advances in combination therapy approaches to OSA therapy.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Recognize the limitations of traditional single therapy approaches to OSA
- Understand the scope of existing and emerging combination therapy approaches to OSA treatment
- Understand the potential for enhancing oral appliance therapy outcomes with other therapies
- Have an up-to-date understanding of therapies which target various non-anatomical pathophysiology in OSA

Target Audience
Dentists and physicians, researchers, sleep & respiratory technologists

Chairs:
Kate Sutherland (Australia)

09:00AM - 09:02AM
Introduction

09:02AM - 09:18AM
Combining the two main device therapies: CPAP and Oral appliances
Fernanda Almeida (Canada)

09:18AM - 09:34AM
Targeting both jaw and body position in supine OSA: oral appliances and positional therapy
Marijke Dieltjens (Belgium)
### Scientific Programme

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
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<tbody>
<tr>
<td>09:34AM - 09:50AM</td>
<td>Lifestyle intervention combined with OSA device treatment: CPAP and weight loss</td>
<td>Craig Phillips (Australia)</td>
</tr>
<tr>
<td>09:50AM - 10:06AM</td>
<td>Targeting pathophysiological mechanisms for combination therapy options</td>
<td>Scott Sands (United States)</td>
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<tr>
<td>10:06AM - 10:22AM</td>
<td>Combination drug therapy for the upper airway muscles</td>
<td>Luigi Taranto Montemurro (United States)</td>
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<tr>
<td>10:22AM - 10:30AM</td>
<td>Conclusion</td>
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</table>
Scientific Programme

Symposium, 121-122 - 121
09:00AM - 10:30AM  S04  S04: The subjective experience of sleep: Emerging objective correlates

Summary
Perceived (or subjective) sleep quality is an important contributor to well-being and poor sleep quality is one of the major reasons to consult a sleep specialist. Despite this obvious importance, there is currently a lack of knowledge and consensus on the objective determinants of the subjective sleep experience. In addition, sleep quantity is frequently underestimated by patients suffering from insomnia, but it is unknown what underlies this subjective-objective mismatch. Research performed in the last decade may offer new approaches to a better understanding of what accounts for subjective sleep quality and quantity. On the one hand, sleep is not considered a global phenomenon anymore, affecting the brain uniformly and simultaneously. Instead, sleep occurs and is regulated locally 1-3. In many physiological and pathological conditions, sleep- and wake-like patterns may co-exist in different brain areas 4, with major consequences on cognitive function and mental activity 5-7. Recent studies using refined signal analysis techniques have convincingly shown that it is possible to relate such patterns of regional brain activity to sleep-related subjective experiences, such as dreaming 6,8. With the present symposium, we aim to present an overview of recent work relating the subjective perception of sleep quantity and quality to objective physiological measures. The studies will cover various neuroimaging methods (positron emission tomography, high-density EEG recordings), study groups (large populational cohorts, patients with insomnia), and analysis techniques (machine learning algorithms). Prof. Zeitzer will present a large study in which polysomnographic (PSG) parameters were found to explain only 11-17% of the variance in predicting subjective quality 9,10. Among these, sleep efficiency, total sleep time and sleep stage transitions appeared as the most important objective correlates. Next, Prof. Dijk will present results 11 showing that sleep continuity and the duration of REM sleep are positively correlated with subjective sleep quality and performance accuracy during the day across the adult lifespan. Prof. Riemann will demonstrate how using a serial awakening paradigm, his group was able to show that patients with insomnia more frequently misperceive their sleep state in REM sleep compared to healthy individuals, suggesting that the subjective experience of insomnia may be specifically coupled to REM sleep 12. Dr. Siclari will then present a high-density EEG study revealing local wake-like patterns in central and posterior brain regions when healthy individuals felt awake during sleep 13. Finally, Prof. Kay will show how the perception of sleep onset latency relates to activity in the cingulate gyrus and the insula measured by PET-FDG 14. Taken together, these lines of research suggest that sleep quality depends on sleep continuity and may be specifically linked to REM sleep. In line with these findings, patients with insomnia appear to misperceive the REM sleep state. Finally, these studies advance potential anatomical substrates involved in sleep state misperception, including the insula and posterior brain regions (posterior cingulum).

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- List the major polysomnographic parameters associated with good sleep quality
- Acknowledge that REM sleep plays a major role in state perception in patients with insomnia
- Understand how local sleep- and wake-like pattern may influence the perception of sleep quality and sleep state

Target Audience
Researchers (human research), sleep clinicians, psychiatrists

Francesca Siclari (Switzerland)
<table>
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<tr>
<th>Time</th>
<th>Session Title</th>
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<tbody>
<tr>
<td>09:00AM -</td>
<td><strong>Introduction</strong></td>
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<tr>
<td>09:02AM -</td>
<td><strong>When a gold standard isn’t so golden: predicting subjective sleep quality</strong></td>
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<td>09:18AM</td>
<td>from sleep polysomnography</td>
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<td></td>
<td>Jamie Zeitzer (United States)</td>
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<td>09:18AM -</td>
<td><strong>Rapid Eye Movement Sleep, Sleep Continuity and Slow Wave Sleep as</strong></td>
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<td>09:34AM</td>
<td><strong>Predictors of Cognition, Mood, and Subjective Sleep Quality in Healthy</strong></td>
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<td><strong>Men and Women</strong></td>
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<td>Derk-Jan Dijk (United Kingdom)</td>
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<td>09:34AM -</td>
<td><strong>Results from a NREM/REM sleep awakening study in good sleepers and</strong></td>
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<tr>
<td>09:50AM</td>
<td><strong>patients with insomnia</strong></td>
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<td></td>
<td>Dieter Riemann (Germany)</td>
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<td>09:50AM -</td>
<td><strong>Feeling awake while asleep: a high-density EEG assessment of sleep</strong></td>
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<tr>
<td>10:06AM</td>
<td><strong>perception</strong></td>
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<td></td>
<td>Francesca Siclari (Switzerland)</td>
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<tr>
<td>10:06AM -</td>
<td><strong>Subjective-Objective Sleep Discrepancy Is Associated With Alterations in</strong></td>
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<td>10:22AM</td>
<td><strong>Regional Glucose Metabolism in Patients With Insomnia and Good</strong></td>
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<td><strong>Sleeper Controls</strong></td>
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<td>Daniel Kay (United States)</td>
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<td>10:22AM -</td>
<td><strong>Conclusion</strong></td>
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S05: Sleep and bidirectional changes in synaptic plasticity: The untold story

Summary
Converging lines of evidence support an important role for sleep in synaptic plasticity. From flies to worms to humans, sleep and sleep loss have been shown to profoundly alter behavior dependent upon synaptic plasticity, synaptic processes necessary for plasticity and in some cases, plasticity itself. Nevertheless, there is no single, unifying theory that adequately explains the diverse effects of sleep on synapse number, strength or morphology. In this symposium, scientists that measure plasticity on multiple levels spanning behavior, synaptic proteins, morphology and neuronal activity discuss the complex effects of sleep on brain plasticity. Our speakers will show that the effects of sleep are not easily explained by uniform changes in synaptic strength or processes that spare some synapses while globally downscaling others. Sleep can instead lead to synaptic strengthening or weakening based on the circuit under examination, prior waking experience, and ontogenetic status. These findings show that sleep more generally leads to bidirectional changes in synapses that are determined by different types of waking experience. They suggest that current theories of sleep function as they relate to plasticity must be revised or discarded.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Understand that sleep has diverse effects on synapse number and efficacy
- Understand some of the factors that determine these diverse effects
- Understand that there are different theories that explain how sleep influences synaptic plasticity, but no one theory is universally accepted

Target Audience
Students, post-doctoral fellow, clinicians and basic scientists

Chairs:
Marcos G. Frank (United States)
Scientific Programme

10:06AM - 10:22AM  The tired hippocampus; elucidating the molecular underpinnings of sleep loss-induced memory impairments
                     Robbert Havekes (The Netherlands)

10:22AM - 10:30AM  Conclusion
Symposium, 212-214 - 212
09:00AM - 10:30AM
S06: Effects of sleep and sleep loss on synaptic function

Summary
Sleep promotes the acquisition and consolidation of memory traces, the integration of new information within the prior body of knowledge, and the forgetting of irrelevant information. The underlying mechanisms remain poorly characterized and a matter of intense debate. Does sleep promote learning and memory mainly by strengthening or weakening synapses, or both? Are these mechanisms conserved throughout brain development, and are they shared across brain regions? Are plastic changes mainly due to behavioral state, or do they strongly depend on the circadian clock? Do they critically depend on specific oscillations such as Up and Down states? This symposium will address each of these questions using animal models and multiple in vivo and in vitro approaches, with an emphasis on new, currently unpublished results. The five speakers have complementary expertise and different scientific background. Drs. Diering, Gisabella and Olsen are recent "newcomers" to our field.

Chiara Cirelli will introduce the topic of sleep and synaptic plasticity and the outstanding questions that will be addressed. She will also present unpublished data obtained with serial block-face electron microscopy in the CA1 region of the hippocampus of adolescent mice, and in the immature, pre-adolescent cerebral cortex. Both results support a role for sleep in broad synaptic down-selection.

Steven Brown will take a bimodal approach, first examining the cell physiological consequences of changing sleep pressure using -omics technologies in cortex, and then exploring their function via rational perturbation of relevant pathways. The overall picture that will emerge, based significantly on unpublished data, is one in which a circadian clock attempts to anticipate sleep need, and this control is then fine-tuned or even overridden by sleep-wake-dependent cortical activity.

Ole Paulsen will discuss experiments aiming at identifying the precise mechanisms by which slow wave sleep promotes synaptic refinement during development and memory consolidation in the adult. He will discuss the circuit mechanisms of Up-Down state transitions and the implications for synaptic plasticity based on experiments in brain slices as well as in vivo. He will argue that synaptic plasticity is network state dependent, and that this may help explain the distinct effects of neural activity on synaptic weights in sleep and wake state.

Barbara Gisabella will discuss unpublished data obtained in vglut2-Cre mice injected with mCherry CRE-DIO AAV reporter, combined with confocal 3D analysis, to test how sleep loss affects dendritic spines in the hippocampus. She will show that short sleep deprivation leads to branch and segment specific increases in volume and density of CA1 spines, consistent with the hypothesis of broad synaptic decreases during sleep.

Graham Diering will describe how his lab uses sub-cellular fractionation combined with biochemistry and mass spectrometry to examine how synapses in the cortex are modified by sleep or sleep disruption in mice at different ages as the animals mature towards adulthood. He will also discuss the use of mouse models of human autism spectrum disorder to understand how chronic early life sleep disruption contributes to lasting changes in cognitive and social behaviors.

Learning Objectives
Upon Completion of this CME activity, participants should be able to...

- understand the current status of the debate about the cellular mechanisms underlying the beneficial effects of sleep on learning and memory
- understand the basic principles of some of the most recent methodologies used to study synaptic function in relation to sleep/sleep loss
- understand similarities and differences between the effects of sleep/sleep loss in the immature and mature brain
- understand how circadian and sleep homeostatic factors affect synaptic function

Target Audience
This symposium should be of broad interest to sleep scientists interested in understanding why sleep is beneficial for learning and memory, and how its effects can vary across development and brain areas. Although the primary target audience will be basic sleep researchers, it is likely that the topic will also be of great interest to sleep clinicians who want to have a deeper understanding, at the mechanistic level, of why sleep benefits cognition.
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<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>09:00AM -</td>
<td>Introduction</td>
</tr>
<tr>
<td>09:02AM -</td>
<td>Sleep-dependent synaptic weakening across brain regions and during development</td>
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<tr>
<td>09:18AM</td>
<td>Chiara Cirelli (United States)</td>
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<tr>
<td>09:18AM -</td>
<td>A cortical neuron’s view of sleep and wake</td>
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<tr>
<td>09:34AM</td>
<td>Steven Brown (Switzerland)</td>
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<tr>
<td>09:34AM -</td>
<td>Cortical synaptic plasticity during slow wave sleep-related activity</td>
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<tr>
<td>09:50AM</td>
<td>Ole Paulsen (United Kingdom)</td>
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<tr>
<td>09:50AM -</td>
<td>Regulation of hippocampal dendritic spines following sleep deprivation</td>
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<tr>
<td>10:06AM</td>
<td>Barbara Gisabella (United States)</td>
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<tr>
<td>10:06AM -</td>
<td>Conclusion</td>
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Symposium, 217-219 - 219

09:00AM - S07
10:30AM

S07: Innovative multi-cultural approaches to sleep health education for children and families

Summary
This symposium will bring together a diverse international group of sleep researchers and educators to present a variety of innovative strategies for addressing sleep health knowledge gaps in children across age, socio-economic and cultural backgrounds in the interest of improving child health. In particular, implementing sleep health education interventions using technological advances and social media, in novel settings and in vulnerable populations will be explored.

Sleep Education for Adolescents in Asia:
Dr. Wing’s talk will summarize the effectiveness of sleep education programs among children and adolescents in Asia, including school-based and group-based sleep education. In particular, the issue of late bedtime culture among Asian adolescents will be addressed, as well as future directions to improve adolescent sleep health.

Novel Delivery Methods for Sleep Education:
Dr. Quante will describe applications of experiential learning to sleep education and how smartphone-based applications can be integrated in sleep education, as well as highlight qualitative outcomes of a first pilot trial.

Sleep Education in the School Setting: Pros and Cons:
As much of the research in youth sleep intervention has been delivered within a school setting, Dr. Rigney will provide a brief overview of the school-based sleep education programs that have been conducted worldwide to date. The advantages of this form of delivery (e.g., access to a large number of children and adolescents), as well as challenges (e.g., over-crowded curriculum and difficulties in achieving systemic changes) will be discussed. Future directions for school-based sleep education, including the advances in eHealth and mHealth programs, will also be explored.

Multi-level Sleep Health Education in Low-Income Child Care Settings:
Dr. Bonuck will present her work implementing classroom, parent, organizational, and multi-media interventions across 22 New York State (US) child care program sites, enrolling n=514 dyads, many of whom were from racial/ethnic minorities, into the stepped wedge cluster randomized controlled trial during the 2018-2019 school year. This talk will present process (implementation), fidelity (adherence to education protocols) sleep (duration, behavior/problems, parent knowledge), and classroom (emotional climate) data and report on knowledge translation (policy) outcomes.

Developing and Testing A Culturally and Contextually-Tailored Sleep Hygiene Intervention for High-Risk Youth:
Dr. Koinis-Mitchell will summarize steps involved in the development and testing of a tailored intervention to improve sleep hygiene behaviors and sleep outcomes for urban middle school Latino children in Providence, RI and San Juan, Puerto Rico (USA). The intervention is school-based and includes caregiver and child involvement in the home, as well as four group sessions in the school setting. Data that informed the development of this program will also be reviewed.

Learning Objectives
Upon Completion of this CME activity, participants should be able to...

- Describe the efficacy of sleep education interventions among children and adolescent in Asian populations and discuss future directions to maximize the effect of sleep education.
- List how experiential learning and mobile health technologies can be used to improve sleep behavior in children.
- Describe the current status of school-based sleep education programs and discuss both the advantages and challenges of implementing sleep education within the school setting.
- Explain how multi-level multi-component sleep health intervention can be implemented in school-based programs.
- Discuss procedures for developing and testing culturally and contextually appropriate community-based interventions to improve sleep behaviors and sleep health outcomes.
Scientific Programme

09:00AM - 09:02AM
Introduction

09:02AM - 09:18AM
Sleep education for adolescents in Asia
Yun Kwok Wing (Hong Kong)

09:18AM - 09:34AM
Novel delivery methods for sleep education
Mirja Quante (Germany)

09:34AM - 09:50AM
Sleep education in the school setting: pros and cons
Gabrielle Rigney (Australia)

09:50AM - 10:06AM
Multi-level sleep health education in low-income child care settings
Karen Bonuck (United States)

10:06AM - 10:22AM
Developing and testing a culturally and contextually-tailored sleep hygiene intervention for high-risk youth
Daphne Koinis-Mitchell (United States)

10:22AM - 10:30AM
Conclusion
S12: Sleep-disordered breathing and maternal and fetal outcomes of pregnancy

Summary

Adverse outcomes of pregnancy (gestational hypertension-preeclampsia, gestational diabetes, low infant birth weight, premature birth) may have devastating short- and long-term health effects for both mother and infant. Prevention and treatment strategies for these prevalent complications are limited, and new therapeutic approaches are urgently needed. Available evidence indicates that sleep-disordered breathing (SDB) may affect up to 20-25% of women by the third trimester of pregnancy. Furthermore, there is growing evidence linking maternal SDB to adverse maternal and fetal pregnancy outcomes, which suggests that SDB may represent a novel therapeutic target for improving pregnancy outcomes. This symposium will critically review current evidence regarding diagnostic criteria, testing strategies, and the prevalence of SDB over the course of pregnancy. Current data linking maternal SDB to hypertensive disorders of pregnancy, gestational diabetes and other maternal outcomes, and the mechanisms by which this is believed to occur, will be presented. Available knowledge from animal and human studies evaluating the impact of maternal SDB on fetal growth, premature birth and infant and child development and health will be discussed. Current data on CPAP, oral appliance and other treatment strategies as well as the available evidence on SDB treatment outcomes will be presented.

Learning Objectives

Upon Completion of this CME activity, participants should be able to...

- describe current knowledge concerning the diagnosis and prevalence of sleep-disordered breathing during pregnancy
- describe the evidence linking sleep-disordered breathing during pregnancy to adverse maternal pregnancy outcomes including hypertensive disorders of pregnancy and gestational diabetes;
- describe current evidence linking maternal sleep-disordered breathing to fetal growth and effects on child development and health
- describe available evidence on treatment of maternal sleep-disordered breathing during pregnancy using positive airway pressure and oral appliances
- identify the implications of current knowledge for patient care, summarize knowledge gaps and describe specific research priorities in this area

Target Audience

Clinicians involved in the diagnosis and management of sleep-disordered breathing; epidemiologists, clinician-scientists and basic scientists interested in sleep-disordered breathing and cardiometabolic outcomes in adults and children

Chairs:

R John Kimoff (Canada)
Scientific Programme

09:02AM - 09:25AM  
Sleep-disordered breathing in pregnancy: definitions, diagnosis and prevalence  
Susan Redline (United States)

09:25AM - 09:48AM  
Sleep-disordered breathing and maternal outcomes of pregnancy  
Ghada Bourjeily (United States)

09:48AM - 10:06AM  
Impact of maternal sleep-disordered breathing on fetal/infant outcomes  
Najib Ayas (Canada)

10:06AM - 10:24AM  
Treatment of sleep-disordered breathing during pregnancy: PAP, oral appliances and beyond  
Sushmita Pamidi (Canada)

10:24AM - 10:30AM  
Conclusion

09:00AM - 10:30AM  
Oral abstract: content to be determined

09:00AM - 10:30AM  
Technologist workshop: content to be determined

10:00AM - 4:00PM  
Exhibition
D01: Defining and identifying "restless sleep disorder" among sleep disorders of childhood

Summary
Pediatric sleep disorders have a significant impact in the life of children and their families. Lack of sleep can adversely affect a child’s development, health and performance. In spite of clear diagnostic criteria for sleep disorders, the diagnosis of these conditions in children can be challenging as symptoms can overlap, and other conditions can present with sleep disruption and daytime symptoms. A group of children with “restless sleep” have been identified. These children do not fit criteria of any other current diagnostic category. The parents have concerns that night time restlessness is associated with excessive sleepiness, school cognitive problems or behavioral problems (irritability or hyperactivity). Dr. DelRosso will describe the clinical, polysomnographic and video characteristics of “restless sleep disorder” (RSD). Dr. Picchietti will present an update on diagnostic criteria in children with restless legs syndrome (RLS), periodic leg movement disorder (PLMD) and RSD. Dr. Bruni will describe the presentation and symptoms of children with various phenotypes of insomnia based on clinical data. A classification algorithm and distinctive features of insomnia in children might help optimize the assessment and treatment of this condition. Dr. Peirano will discuss the effects of iron deficiency during early brain development and the possible role in restless sleep disorder.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Identify “restless sleep disorder” following agreed criteria
- Differentiate "restless sleep disorder” from other common sleep disorders of childhood
- Discuss the possible mechanisms of “restless sleep” and its possible association with iron deficiency

Target Audience
Sleep clinicians, Neurologists, Pediatricians.

Chairs:
Lourdes DelRosso (Peru)

10:45AM - Introduction
10:47AM - Clinical and video polysomnographic findings in children with restless sleep
Lourdes DelRosso (Peru)

11:07AM - Diagnostic criteria for pediatric RLS, PLMD and proposed criteria for RSD
Daniel Picchietti (United States)

11:27AM - Hypermotor insomnia and other insomnia types in childhood
Oliviero Bruni (Italy)
Scientific Programme

11:47AM - 12:07PM  
**Effects of iron deficiency on brain development**  
Patricio Peirano (Chile)

12:07PM - 12:15PM  
**Conclusion**

Dental Symposium, 119-120 - 119

10:45AM - 12:15PM  
**S09: Treatment modalities for sleep apnea patients with complex comorbidities**

**Summary**  
This symposium is focused on the clinical aspects of evaluation and treatment of patients with sleep apnea and other concomitant complex health issues. While traditional approaches to the treatment of sleep apnea are well described in the literature, when it comes to complex patients, the personalized approach is often a case by case decision. The session will describe the literature supporting the evaluation and treatment approach and other specific personalized approaches. CPAP use in psychiatric population and patients heart failure will be assessed and discussed. In the diabetic population, a team treatment approach will be examine, focused on treatment and ideal biomarker to assess outcomes. Oral appliance treatment role in the treatment of the above described diseases and more in depth in diabetes and periodontal disease will discussed.

**Learning Objectives**  
Upon Completion of this CME activity, participants should be able to:

- Understand how to assess patients with psychiatric disorders and suspicion of OSA
- Understand the peculiarities of treatment of OSA patients with heart failure
- Discuss with multidisciplinary teams on treatment approaches for patients with OSA and diabetes.

**Target Audience**  
Physicians, dentists, researchers

**Chairs:**  
Hiroko Tsuda (Japan)

10:45AM - 10:47AM  
**Introduction**

10:47AM - 11:03AM  
**Incidence and treatment of OSA in the psychiatric population**  
Nathaniel Marshall (Australia)

11:03AM - 11:19AM  
**CPAP treatment for patients with heart failure**  
John Fleetham (Canada)

11:19AM - 11:35AM  
**Does CPAP improve diabetes outcomes in OSA patients**  
Sushmita Pamidi (Canada)
<table>
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<tr>
<th>Time</th>
<th>Session Title</th>
<th>Speaker</th>
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<tr>
<td>11:35AM -</td>
<td><strong>Oral appliances outcomes in diabetes and other complex cases</strong></td>
<td>Tea Galic (Croatia)</td>
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<td>11:51AM</td>
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<tr>
<td>11:51AM -</td>
<td><strong>Incidence of periodontal disease and treatment implications: Mask and oral appliance fitting</strong></td>
<td>Maria Clotilde Carra (France)</td>
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<td>12:07PM -</td>
<td><strong>Conclusion</strong></td>
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S10: Bridging basic research to clinical aspects in REM sleep behavior disorder: from bench to bed

Summary
REM sleep behaviour disorder (RBD) is a neurological condition characterized by abnormal sleep behaviours during REM sleep, often associated with dream content. RBD is accompanied by pathological loss of REM sleep atonia, which in healthy people prevents movement during REM sleep. More than 80% of individuals diagnosed with the isolated form of RBD (iRBD) eventually develop an overt neurodegenerative disease, particularly an alpha-synucleinopathy (Parkinson’s disease, multisystem atrophy or dementia with Lewy bodies). This suggests that RBD itself could result from a neurodegenerative process. This symposium will address this idea by presenting new data unraveling potential RBD mechanisms in both animal models and humans.

The first speaker (Dr. Peever) will present new data showing that synucleinopathic degeneration of the REM sleep circuits that control muscle atonia lead to an RBD phenotype in mice. This talk will present data showing that the same pathogenic mechanisms that cause synucleinopathic disorders such as Parkinson’s disease also cause neurodegeneration of the REM sleep circuits and lead to RBD in mice.

The second speaker (Dr. Gan-Or) will build on this concept by providing further insights into RBD pathogenetic mechanisms from recent genetic studies in humans. Generally, these studies demonstrate that RBD has a distinct genetic background, which only partially overlaps with that of PD or DLB. Genes such as GBA and SNCA are important in RBD, while other genes such as MAPT and APOE seem to not play an important role in risk for RBD. These and other genes will be discussed in the session. Currently, large scale genomic studies are being performed to delineate the genetic background of RBD, and compare it to that of PD, DLB and MSA. Furthermore, the role of genetics in the rate of phenoconversion is also being studied, and recent, unpublished data will be presented.

The third speaker (Dr. Stefani) will move to a clinical focus, correlating symptoms of RBD (e.g., dream enactment, emotion-charged vivid dream content) with alteration in mechanisms regulating REM sleep. Moreover, evidence from clinical studies that iRBD is not a mere risk factor for alpha-synucleinopathies but, rather, it represents an early phase of these disorders will be reviewed. These data will be presented in light of hypothesized physiopathological mechanisms of alpha-synucleinopathy related neurodegeneration. Furthermore, the relevance of isolated loss of REM sleep atonia will be discussed.

The fourth speaker (Dr. Heidbreder) will present RBD in the context of autoimmune disorders of the central nervous system (e.g., narcolepsy, multiple sclerosis, anti-IgLON5 disease). Characteristic features of RBD in these patients will be explained and correlated with the underlying pathogenetic mechanisms. This talk will have a special focus on the novel anti-IgLON5 disease, linking known neuropathological aspects to clinical manifestations of the disease. Overall this session aims to give a complete view of RBD based on anatomopathological, genetic and clinical studies, and to stress its relevance in neurological diseases.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Understand mechanisms underlying REM sleep control whose dysfunction causes REM sleep behavior disorder
- Have an overview of genetic factors underlying the risk of RBD, and how the function of encoded proteins fit into RBD pathogenetic mechanisms and neurodegeneration
- Correlate clinical manifestation of RBD, in particular, motor activity and dream content, with alteration in mechanisms regulating REM sleep
- Get a complete view of RBD as early phase alpha-synucleinopathy, based on anatomopathological, genetic and clinical studies
- Understand how autoimmune disorders can cause RBD and why RBD manifestation can be different in different neurological diseases

Target Audience
Basic researchers interested in REM sleep, parasomnias and genetic; sleep physicians and neurologists interested in RBD, neurodegeneration and autoimmune disorders
Scientific Programme

10:45AM - 10:47AM  
Introduction

10:47AM - 11:07AM  
Synucleinopathic degeneration of REM sleep circuits triggers RBD in mice  
John Peever (Canada)

11:07AM - 11:27AM  
Genetic studies provide further insights into pathogenetic mechanisms of RBD  
Ziv Gan-Or (Canada)

11:27AM - 11:47AM  
How basic science explains dream content, motor behaviors, and neurodegeneration in RBD  
Ambra Stefani (Austria)

11:47AM - 12:07PM  
RBD associated with autoimmune disorder: pathogenetic mechanisms explain clinical manifestations  
Anna Heidbreder (Germany)

12:07PM - 12:15PM  
Conclusion
S11: Large-scale genomic studies advancing understanding of sleep and circadian biology and disorders in humans

Summary
Despite marked advances in sleep and circadian sciences, there remain fundamental questions regarding the molecular bases for sleep and sleep and circadian disorders. Large-scale genomic studies in humans have provided novel insights. Recent international initiatives have produced large data resources of genomic data combined with a broad variety of phenotypes, including self-reported sleep phenotypes, polysomnography, and actigraphy. These remarkable data resources have catalyzed a large number of international collaborations, leading to the discovery of multiple variants for a wide range of sleep traits, identifying novel pathways and clarifying inter-relationships and causal associations with neuro-psychiatric and cardiometabolic diseases. In particular, the UK Biobank has performed whole genome genotyping on 500,000 individuals who have undergone a variety of phenotyping and links to electronic health data, providing scale and power. The NHLBI Trans-Omics in Precision Medicine (TOPMed) generates whole genome sequencing and multi-omic data in deeply phenotyped individuals from multiple multi-ethnic cohorts, providing base-level molecular resolution. The Cohorts for Heart and Aging Research In Genomic Epidemiology (CHARGE) is an infrastructure for promoting meta-analyses, including studies of gene by environmental interactions, across multiple international cohorts, providing context with comorbidities and generalization to diverse studies. This proposal will highlight the unique and complementary features of the UK Biobank, TOPMed, and CHARGE, identifying newly emergent opportunities for sleep and circadian researchers to access and analyze large genomic data sets; to understand approaches for maximizing information from collected sleep and circadian phenotypes within public repositories; to identify statistical tools for optimizing statistical power and identify the influence of rare or functional variants on sleep and circadian traits; and to understand methods for dissecting mediating, causal and common genetic mechanisms that link sleep and neuropsychiatric and cardiometabolic diseases and their associated genes and molecular phenotypes. Common pitfalls and challenges of genomic research will be discussed, including population-specific variants, false discovery, and imprecision of phenotypes, along with approaches for addressing these challenges. Seminal findings from UK Biobank, TOPMed, and CHARGE will be highlighted, including discoveries of novel variants influencing sleep duration, chronotype, sleepiness, sleep apnea, nocturnal hypoxemia, and insomnia; variation of epigenetic markers and gene expression across sleep phenotypes; and gene variants that operate to increase risk for hypertension or dyslipidemia differently in the background of short and long sleep. An over-riding aim of the symposium also will be to foster discussion across the sleep and circadian community on strong collaborative models to enhance multi-disciplinary team science, cross-cohort and international collaboration, and attracting and supporting new investigators working in this rapidly evolving area.

Learning Objectives
Upon Completion of this CME activity, participants should be able to...

- Understand how to access large publicly available genomic data sets and create international collaborations.
- Appreciate cutting-edge methods for analyzing genome-wide data, including maximizing information from rare and functional variants, incorporating gene expression and epigenetic data into genome-wide studies; address ancestry-specific information; and minimize false discovery.
- Identify ways to maximize information from existing sleep and circadian phenotypes, and opportunities to further apply machine learning and quantitative signal analysis to improve phenotypes.
- Appreciate molecular pathways identified through large genome-wide studies that elucidate mechanisms underlying sleep, circadian biology, and sleep/circadian disorders.
### Scientific Programme

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<th>Time</th>
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<th>Presenter</th>
<th>Institution</th>
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<tr>
<td>10:45AM -</td>
<td>Introduction</td>
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<tr>
<td>10:47AM -</td>
<td>Emerging challenges and opportunities in human genomic studies of</td>
<td>Susan Redline</td>
<td>United States</td>
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<td>11:03AM</td>
<td>sleep and circadian biology</td>
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<td>11:03AM -</td>
<td>Accelerating gene discovery using diverse international resources:</td>
<td>Richard Saxena</td>
<td>United States</td>
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<td>11:19AM</td>
<td>UK Biobank, TOPMed, and CHARGE</td>
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<td>11:19AM -</td>
<td>Genetic variants influencing sleep and chronotype: clinical and</td>
<td>Martin Rutter</td>
<td>United Kingdom</td>
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<td>11:35AM</td>
<td>biological insights from the UK biobank</td>
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<td>11:35AM -</td>
<td>Genetic variants and genomic profiles for sleep disordered breathing</td>
<td>Brian Cade</td>
<td>United States</td>
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<td>11:51AM</td>
<td>related traits in the NHLBI TOPMed consortium</td>
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<td>11:51AM -</td>
<td>Investigating the biology of sleep-associated cardiometabolic traits</td>
<td>Raymond Noordam</td>
<td>The Netherlands</td>
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<td>12:07PM</td>
<td>using gene-sleep interactions: CHARGE</td>
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<td>12:07PM -</td>
<td>Conclusion</td>
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S08: Using sleep to maximize the mental and cognitive health of young people around the world

Summary
A growing body of research supports the benefits of sleep to optimize the mental and cognitive health of children and adolescents. Despite this evidence, few educators and policymakers worldwide have sought to use sleep optimization to improve youth academic and emotional functioning or to use sleep behavior as a basis for identifying young people at risk of poor mental health while it is still preventable. A better understanding of the ways in which sleep optimization can be used to improve cognitive and emotional health or to reduce the risk of poor mental health will provide policymakers and educators with knowledge that they can use to promote youth health and well-being.

This symposium will first provide a contemporary context for using sleep health promotion as a means to improve youth well-being along with an overview of the mechanisms that underlie the impact of optimized sleep on cognition and mental health. Such mechanisms include improvement of executive functions, memory consolidation, sustained attention, emotional regulation and impulse control – all of which are essential for youth mental and cognitive health.

The symposium will then focus on different strategies that can be used to optimize sleep for improving the mental and cognitive health of young people, and how sleep can be used to identify youth at risk of poor mental health. We will examine and integrate data from empirical studies of school-based sleep education interventions used to optimize adolescents’ sleep; examine the rationale for impact of delaying school start time in the attempt to achieve such outcomes, assess practical considerations, such as the ability of use of high- and low-intensity school interventions to achieve successful outcomes; and demonstrate how sleep-related questions can be used to screen for adolescents at risk of self-harm.

Finally, we will extract research, educational, and practical implications that can guide researchers, educators and policy makers in planning how to integrate knowledge of sleep optimization into effective action in educational settings. The outcome is expected to pave the way to enable the use of sleep improvement as a means of maximizing the mental and cognitive health of young people around the world.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Understand the mechanisms that underlie the impact of optimized sleep on cognition and mental health
- Outline innovative strategies that use sleep to optimize youth mental health or performance or to identify and minimize risk
- Appreciate research, practical, and policy implications

Target Audience
Researchers, clinicians, educators and policymakers

Chairs:
Reut Gruber (Canada)
Scientific Programme

10:47AM - 11:03AM  Sleep education in UK High Schools
Christopher Harvey (United Kingdom)

11:03AM - 11:19AM  Low vs High-Intensity School Sleep Interventions for Teenagers
Kate Bartel (Australia)

11:19AM - 11:35AM  Findings and Next Steps for Delaying School Start Times for Adolescents’ Sleep and Health
Amy Wolfson (United States)

11:35AM - 11:51AM  Sleep behavior phenotypes in adolescents at risk for self-harm
Joshua J. Gooley (Singapore)

11:51AM - 12:07PM  Discussion: Lessons Learned and Gaps Remaining
Mary Carskadon (United States)

12:07PM - 12:15PM  Conclusion
S13: Sleepy Heads and Anesthesia: Anesthetic implications of disorders of daytime hypersomnolence

Summary
As more and more people undergo surgeries and require anesthesia, health care professionals are now caring for patients with a multitude of sleep disorders. Apart from obstructive sleep apnea, there is little familiarity amongst the health care providers and patients with anesthetic considerations for other sleep disorders that have potentially significant relationship with anesthetic management. One such example are disorders of daytime hypersomnolence, such as narcolepsy and idiopathic hypersomnia (IH). These patients present with unique symptom profile and pharmacological treatment warrants special anesthetic considerations. Theoretical complications include perioperative cataplexy or sleep paralysis episodes, status cataplecticus, drug interactions with anesthetic agents, prolonged emergence after general anesthesia and postoperative hypersomnia. Currently, little information exists regarding the perioperative anesthetic management and outcomes of narcolepsy or IH patients undergoing surgery. This symposium is presented on behalf of the Society of Anesthesia and Sleep Medicine (SASM) educational initiative to raise awareness and provide a platform to discuss the relationship between neurophysiological, neuropsychological and neuropharmacological function between sleep and anesthesia states. The first speaker, Dr. Dennis Auckley (Case Western Reserve University, USA) will discuss the shared mechanisms determining unconsciousness, sleep and anesthesia and how derangements in these mechanisms can lead to disorders of daytime hypersomnolence. The second speaker, Dr. Lynn Marie Trotti (Emory University, USA) will discuss the differences between narcolepsy and idiopathic hypersomnia (IH) and share their institutional experience with novel therapies such as Flumazenil. Diagnostic work-up and classification of these disorders, with specific focus on pathophysiology and symptoms will be discussed. Dr. Mandeep Singh (University of Toronto, Toronto, Canada) will then discuss the treatment options with a focus on various pharmacological agents used for these conditions and the potential for interaction with anesthesia management. In the end, Dr. David Hillman (University of Western Australia, Australia) will discuss specific issues with the anesthesia management of these patients, and the importance of proper work-up, counseling, and creation of anesthesia management plan for these patients.

Learning Objectives
Upon Completion of this CME activity, participants should be able to:

- Understand the pathophysiology and classification of disorders of daytime hypersomnolence
- Understand the important differences between specific phenotypes such as narcolepsy and idiopathic hypersomnia
- Understand the anesthetic considerations for such patients considering surgery
- Evaluate and apply current evidence in the optimal management and patient counseling in the perioperative period.

Target Audience
Practicing Sleep Physicians and Anesthesiologists; Practicing health care personnel taking care of patients who are scheduled to undergo surgeries or surgical procedures; Patients and caregivers with IH or Narcolepsy undergoing or planning to undergo surgical procedures under anesthesia

Chairs:
Mandeep Singh (Canada)
### Scientific Programme

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<tr>
<td>10:45AM - 10:47AM</td>
<td><strong>Introduction</strong></td>
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<tr>
<td>10:47AM - 11:07AM</td>
<td><strong>Unconsciousness, sleep and anesthesia: Shared mechanisms</strong></td>
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<tr>
<td></td>
<td>Dennis Auckley (United States)</td>
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<td>11:07AM - 11:27AM</td>
<td><strong>Narcolepsy or idiopathic hypersomnia: What’s the difference?</strong></td>
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<td>Lynn Marie Trotti (United States)</td>
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<td>11:27AM - 11:47AM</td>
<td><strong>Pharmacological Treatment Options and Possible Drug Interactions with Anesthesia Management</strong></td>
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<td>Mandeep Singh (Canada)</td>
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<tr>
<td>11:47AM - 12:07PM</td>
<td><strong>Anesthetic considerations for patients with narcolepsy and idiopathic hypersomnia</strong></td>
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<td>David Hillman (Australia)</td>
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<td>12:07PM - 12:15PM</td>
<td><strong>Conclusion</strong></td>
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S14: Multidimensional sleep health: A new paradigm for understanding sleep-health relationships

Summary
Mental health. Cardiac health. Metabolic health. We are used to thinking about different domains of health, but until recently, we have struggled to define sleep health. What, exactly, is “good sleep?” This question is important on scientific, clinical, and population health grounds. Good sleep health is not simply the absence of sleep disorders, but the presence of features that promote optimal health and wellbeing. For instance, sleep duration of 7-9 hours is associated with the best cardiac, metabolic, mental, and mortality outcomes. But sleep health goes beyond sleep duration: satisfaction, efficiency, timing, regularity, and sleepiness are also important. Moreover, each characteristic is simultaneously present in every individual, and each exists on a continuum. Thus, sleep health is a multidimensional construct.

Important issues remain: Can we define multidimensional sleep health conceptually and psychometrically? Does sleep health relate more strongly to health outcomes than single measures of sleep? Do optimal measures of sleep health vary across age, and among different health outcomes? Can the sleep health perspective be applied to behavioral interventions? Our symposium addresses these questions.

Dr. Buysse (Chair) will present a brief introduction and overview of the multidimensional sleep health construct, setting the stage for subsequent presentations.

Dr. Wallace will discuss statistical approaches to describing multidimensional sleep health and relating it to health outcomes, ranging from the simple (composite scores of “good” or “bad” sleep dimensions) to more complex (cluster analyses) to cutting-edge techniques for sleep (variable importance indices from random forests). Dr. Wallace will illustrate these techniques using data from sleep cohort studies.

Dr. Knutson will discuss the development and validation of the National Sleep Foundation’s Sleep Health Index (SHI), developed to assess population-level sleep health. She will present the methodology and expertise behind its development, and describe how SHI scores vary by age, gender, and race/ethnicity. The SHI can inform our understanding of sleep health as a public health issue.

Dr. de Batlle will present data using a 5-item sleep health scale (SATED) in the nationally-representative Catalan Health Survey. He will present data on the utility of SATED vs. sleep duration alone in relation to physical health. He will discuss data showing that SATED is more strongly related to perceived health status than physical activity or poor diet.

Dr. Buxton will present data relating sleep health to biomarker-derived cardiometabolic risk of CVD event in 10 years. Different sleep health facets, defined by self-report and actigraphy, are associated with cardiometabolic risk among 2 cohorts of midlife/older adults. Results may optimize future biopsychosocial, behavioral, and workplace interventions.

Dr. Stone will present data on individual and multiple dimensions of self-reported sleep health in relation to functional limitations, physical performance, and risk of falls in two large cohorts of older women and men. Among older men, those with a greater number of poor sleep health indicators had increased odds of developing limitations over 3 years.

Dr. Buysse will conclude the symposium with a discussion between panel members and the audience.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Define salient dimensions of multivariable sleep health
- Understand the strengths and limitations of different statistical approaches to defining sleep health
- Appreciate the utility of multivariable sleep health in relation to health outcomes and interventions

Target Audience
Clinical and epidemiological sleep researchers; sleep medicine clinicians and trainees
# Scientific Programme

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<th>Time</th>
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<td>10:45AM</td>
<td>Introduction</td>
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<tr>
<td>10:47AM</td>
<td>Multidimensional Sleep Health: Can we define it? Does it Matter?</td>
<td>Daniel J. Buysse (United States)</td>
<td>Multidimensional Sleep Health: Can we define it? Does it Matter?</td>
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<td>11:03AM</td>
<td>The National Sleep Foundation’s Sleep Health Index: An assessment of national sleep health</td>
<td>Kristen Knutson (United States)</td>
<td>The National Sleep Foundation’s Sleep Health Index: An assessment of national sleep health</td>
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<td>11:19AM</td>
<td>Statistical Approaches for Analyzing Multidimensional Sleep Health Data</td>
<td>Meredith J. Wallace (United States)</td>
<td>Statistical Approaches for Analyzing Multidimensional Sleep Health Data</td>
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<td>11:35AM</td>
<td>Multidimensional Sleep Health is More Strongly Associated with Self-Rated Health Than Traditional Predictors: The Catalan Health Survey</td>
<td>Jordi de Batlle (Spain)</td>
<td>Multidimensional Sleep Health is More Strongly Associated with Self-Rated Health Than Traditional Predictors: The Catalan Health Survey</td>
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<td>11:51AM</td>
<td>Multidimensional Sleep Health and Age-Related Functional Outcomes</td>
<td>Katie L. Stone (United States)</td>
<td>Multidimensional Sleep Health and Age-Related Functional Outcomes</td>
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**Oral Abstract, 216**

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**Technologist Program, 223-224 - 223**

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<td>10:45AM</td>
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Satellite Symposium, BR A - Ballroom A
12:30PM - 2:00PM

Waking up to narcolepsy: Strategies to improving outcomes

Summary
Narcolepsy is a life-long disorder with the core symptoms of excessive daytime sleepiness (EDS), cataplexy, hypnagogic or hypnopompic hallucinations, sleep paralysis, and sleep disruption. Narcolepsy pathophysiology is linked to loss of signaling by hypocretin-producing neurons: an autoimmune etiology possibly triggered by an environmental agent may precipitate hypocretin neuronal loss. Narcolepsy is typically associated with a delay in diagnosis of approximately 8 to 15 years. The delay is related to numerous causes, such as mildness of symptoms, gradual onset, lack of recognition of the condition by the patient or clinician, and mistaken diagnosis because of alternative disorders of sleepiness such as sleep deprivation or obstructive sleep apnea. The high comorbidity burden in patients with narcolepsy with disorders that have symptom overlap with narcolepsy also contributes to the lack of recognition. The delayed diagnosis leads to delayed treatment, which increases the burden of the disease with detrimental effects on health care resource use, employment, and quality of life.

In order to improve time to diagnosis, questions about the characteristic features of the sleepiness, sleepiness while sedentary, dreaming during naps, and the age of onset of sleepiness will help in identifying the patient with narcolepsy. Screening tools such as the Swiss Narcolepsy Scale (SNS) and Epworth Sleepiness Scale (ESS) can help identify problematic sleepiness and symptoms of narcolepsy. In order to effectively diagnose narcolepsy, a series of two in-lab diagnostic tests are performed: an overnight polysomnogram (PSG), followed by a Multiple Sleep Latency Test (MSLT). Because the diagnosis of narcolepsy relies heavily on the MSLT, it is essential that the test be performed under the correct conditions.

No cure for narcolepsy exists; therefore, treatment is targeted at symptom management. Non-pharmacologic management should be initiated in all patients. Good sleep habits with avoidance of sleep deprivation and/or irregular sleep patterns should be emphasized. Unfortunately, lifestyle changes are rarely sufficient to adequately control the symptoms of narcolepsy, and most patients require life-long medication to cope with the debilitating effects of the disorder. Pharmacologic interventions include alerting medications for EDS, sodium oxybate (which treats both EDS and cataplexy), and antidepressants for cataplexy. Emerging therapies include solriamfetol, a selective dopamine and norepinephrine reuptake inhibitor (DNRI) for EDS, and pitolisant, a selective histamine 3 receptor antagonist/inverse agonist, for EDS and cataplexy.

Narcolepsy in the pediatric population is associated with impaired academic performance and reduction in social and participatory activities. Narcolepsy is frequently not diagnosed and misdiagnosed, often due to the difficulty in diagnosing narcolepsy in children because atypical presentations of cataplexy and associated medical, sleep, and behavioral comorbidities can lead to misdiagnoses. Narcolepsy management in children involves behavioral and lifestyle changes along with pharmacologic therapy. Many of the medications used for treating narcolepsy in adults are used off-label in children; sodium oxybate has recently been approved by the FDA for the treatment of cataplexy or EDS in pediatric patients with narcolepsy.

In this symposium, sleep clinicians will be provided with best practices in the diagnosis and treatment of narcolepsy in adults and children.

Learning Objectives

• Describe best practices to achieve earlier and accurate diagnosis of narcolepsy
• Assess effective treatments for narcolepsy including traditional and emerging therapies
• Recognize clinical pearls for making a diagnosis of narcolepsy in children and summarize management strategies to improve outcomes

Target Audience
This educational activity is intended for physicians and other healthcare professionals involved in the management of sleep disorders.
Scientific Programme

12:30PM - 12:35PM
Introduction
Michael Thorpy (United States)

12:35PM - 1:00PM
Strategies for Early and Accurate Diagnosis of Narcolepsy
Thomas Scammell (United States)

1:00PM - 1:25PM
Treatments for Narcolepsy: Evaluating the Landscape
Michael Thorpy (United States)

1:25PM - 1:50PM
Optimizing Outcomes in Pediatric Patients
Kiran Maski (United States)

1:50PM - 2:00PM
Take-Home Tips for Clinical Practice

Satellite Symposium, 211
12:30PM - 2:00PM
Industry Symposium: Insomnia

Satellite Symposium, 217-219 - 219
12:30PM - 2:00PM
Industry Symposium: OSA

Satellite Symposium, 223-224 - 223
12:30PM - 2:00PM
Arbor Pharmaceuticals Industry Symposium

Satellite Symposium, 216
1:00PM - 1:45PM
Nox Medical Industry Workshop

Symposium, 121-122 - 121
1:45PM - 2:45PM
Meet the Professor
Chairs:
Michael Thorpy (United States)

1:45PM - 2:30PM
Panel Discussion
Thomas Scammell (United States)
Michael Thorpy (United States)
Kiran Maski (United States)
Scientific Programme

Keynote, BR A - Ballroom A

2:00PM - 2:45PM Carskadon

K03: Adolescent sleep: Timing is everything...or is it?

Summary
A major focus of Dr. Carskadon’s scientific activities is research examining interrelations between the circadian timing system and sleep/wake patterns of children, adolescents, and young adults. Her findings have raised public health issues regarding the consequences of insufficient sleep for adolescents as well as concerns about early starting times of schools. Her work has affected education policy, prompting the AAP, CDC, and others to promote later school timing for adolescents and many school districts to delay school start times for high school students.

Carskadon’s current research includes an evaluation of how sleep and circadian timing influence smell, taste, food choices, and food consumption in overweight and assessing effects of serial nights of alcohol on sleep and next-day function in adults. Proposed new projects seek to (1) assess the chronic and direct effects of caffeine on circadian and homeostatic sleep systems in early adolescents; (2) evaluate sleep health disparities in inner-city children with chronic asthma; (3) measure gene methylation and genotype with observational phenotyping and experimental sleep interventions in young adults.

2:00PM - 2:02PM Introduction
2:02PM - 2:45PM Adolescent sleep: Timing is everything...or is it?
Mary Carskadon (United States)

2:00PM - 2:45PM Cistulli

K02: Oral appliance therapy for obstructive sleep apnea: Ready for prime time (a state of the art review of the field)

Summary
Oral appliances (OA) have emerged as the leading alternative to positive airway pressure (PAP) for Obstructive Sleep Apnoea (OSA) treatment. There is a strong evidence base demonstrating OA therapy improves OSA in the majority of patients, including some with more severe disease. They are generally well tolerated, and patients often prefer OA over PAP treatment. Despite the superior efficacy of PAP over OA, randomized controlled trials comparing the two indicate similar improvement in health outcomes such, as sleepiness, quality of life, driving performance, blood pressure, and other cardiovascular measures. The evidence base strongly supports the use of OA therapy in the management of OSA.

2:00PM - 2:02PM Introduction
2:02PM - 2:45PM Oral appliance therapy for obstructive sleep apnea: Ready for prime time (a state of the art review of the field)
Peter Cistulli (Australia)
Scientific Programme

Symposium, BR A - Ballroom A

3:00PM - 4:30PM S15

S15: Management of sleep disordered breathing in specific populations: new insights from recent publications

Summary

The purpose of this symposium is to address issues related to the management of sleep disordered breathing (SDB) in specific populations. We have focused on patient groups that are commonly encountered in clinical practice, and in which there is considerable controversy in the field/recent published data with particular relevance to the population in question. The speakers/chairs are international experts with representation from Canada, Brazil, Australia, and Japan. At the conclusion of each talk, the speaker will provide a brief one slide summary of what their practice is with respect to these patients (i.e., "This is what I do"). Each talk will be 20 mins in length, leaving 2 minutes for Introductions, and 8 mins for questions/final comments at the end.

The first talk (Dr. Drager, a keynote speaker and co-author of the SAVE study) will focus on minimally symptomatic patients with sleep apnea. This is a highly controversial area given that the SAVE study (published 2016) called into question the effectiveness of CPAP in cardiovascular (CV) disease prevention. However, this talk will not only address issues related to CPAP, but also discuss other potential non-PAP therapies (e.g. pharmaceutical and non-pharmaceutical interventions such as exercise) that might be considered to reduce future CV risk in this population.

The second talk (Dr. Naughton) will focus on patients with heart failure with reduced ejection fraction. This will not only include discussion of positive airway pressure, but also other interventions including oxygen and phrenic nerve stimulation.

The third talk (Dr. Berlowitz) will focus on patients with spinal cord injury (SCI). These patients have a markedly high prevalence of sleep apnea but management can be very challenging. Recent randomized trials (COSAQ study) will be highlighted.

The fourth talk (Dr. Hanly) will focus on the bidirectional relationship between sleep apnea and renal disease. Dr. Hanly will discuss how renal failure management can affect sleep apnea severity (e.g. frequency of dialysis, ultrafiltration, edema management), and how sleep apnea therapy may impact progression to renal disease highlighting recent RCT in the field.


Drager L. Treatment of OSA as primary or secondary prevention of CVD. Curr Opin Pulm Med 2018.

Berlowitz DJ et al. Positive Airway Pressure for SDB in acute quadriplegia; a RCT. Thorax (in press)

Ayas N et al. Could adjunctive pharmacology mitigate CV consequences of OSA? AJRCCM (in review)

Naughton M et al. Sleep apnoea in heart failure. To treat or not to treat. Respirology 2017.

Learning Objectives

Upon Completion of this CME activity, participants should be able to...

- Understand the controversies and management alternatives to reduce cardiovascular risk in patients with minimally symptomatic sleep apnea
- Understand the treatment alternatives, as well as their indications and contraindications, to treat sleep apnea in patients with heart failure
- Understand the effectiveness and indications for therapy of sleep apnea in patients with spinal cord injury
- Understand the relationship between sleep apnea and kidney disease and the implications for management

Target Audience

The target audience is broad and includes physicians who care for patients with sleep apnea, sleep technologists, CPAP providers, health administrators and researchers.
Scientific Programme

3:00PM - 3:02PM  Introduction

3:02PM - 3:22PM  Management of sleep apnea in minimally symptomatic patients
Luciano Drager (Brazil)

3:22PM - 3:42PM  Management of sleep apnea in patients with heart failure
Matt Naughton (Australia)

3:42PM - 4:02PM  Management of sleep apnea in patients with spinal cord injury
David Berlowitz (Australia)

4:02PM - 4:22PM  Sleep apnea and kidney disease: a bidirectional relationship
Patrick Hanly (Canada)

4:22PM - 4:30PM  Conclusion
D02: Alternative diagnostic approaches to childhood obstructive sleep apnea

Summary
Childhood obstructive sleep apnea (OSA) is a common condition and prevalence rate is often quoted as 3 - 5%. This condition has important clinical implications as if it is left untreated, a variety of complications can result, namely cardiovascular, neurocognitive and metabolic disturbances. Therefore it is important to recognize the condition early and offer prompt treatment. The current gold standard in diagnosing childhood OSA is overnight polysomnography (PSG). Unfortunately, PSG is rather labor and cost intensive. In addition, it is not available in all pediatric units and therefore waiting time for patients to undergo PSG is often very long. This has resulted in unnecessary delay as patients have to wait for months and even years before a diagnosis is confirmed and management instituted. Recent research has focused on alternative diagnostic methods in order to prioritize patients suspected with OSA for early intervention and in some studies, methods to replace PSG are also being investigated.

In this symposium, the various speakers will discuss on the following topics that aim to provide an up-to-date review of alternative tools being investigated/used for the diagnosis of childhood OSA.
- Pitfalls of polysomnography for childhood OSA, why is it failing us?
- Can parent-reported sleep symptom questionnaire and or overnight oximetry replace PSG?
- Combining imaging findings and symptoms in diagnosing OSA.
- Drug-induced sleep endoscopy is the way forward, where is the evidence?

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Have a better grasp of problems associated with the use of overnight PSG in the diagnosis of childhood OSA
- Have a greater understanding of recent literature on the use of sleep symptom questionnaire, overnight oximetry and radiological imaging techniques in replacing/substituting PSG in managing children suspected to have OSA
- Acquire knowledge in the use of drug-induced sleep endoscopy as a diagnostic strategy for childhood OSA

Target Audience
Pediatricians, psychologists, psychiatrists, nursing colleagues and allied health care workers interested in childhood sleep apnea

Chairs:
Albert Martin Li (Hong Kong)

3:00PM - 3:02PM
Introduction

3:02PM - 3:22PM
Pitfalls of polysomnography for childhood OSA, why is it failing us?
Rosemary Horne (Australia)
Scientific Programme

3:22PM - 3:42PM  Can parent-reported sleep symptom questionnaire and or overnight oximetry replace PSG?
Daniel Goh (Singapore)

3:42PM - 4:02PM  Combining imaging findings and symptoms in diagnosing OSA
Kate Chan (Hong Kong)

4:02PM - 4:22PM  Drug-induced sleep endoscopy is the way forward, where is the evidence?
An Boudewyns (Belgium)

4:22PM - 4:30PM  Conclusion

3:00PM - 4:30PM  S16: Imaging and sleep apnea: Can we predict the presence of disease and treatment outcomes?

Summary
During this symposium advanced imaging techniques used for screening and prediction of treatment outcomes will be described. Simple smart phone photography accuracy in the screening of OSA will be described and the supporting literature will be discussed. Many forms of imaging have been used over the years in the search of phenotyping children and adults with OSA. Discussions of the identification of bony restriction or excess of soft tissue around the upper airway is highly important for the better understanding of future target treatment approaches and prevention of the disease. Imaging today is also used to identify function and non-static assessment of the upper airway musculature shows important insights of the disease, treatment options and outcomes.

Learning Objectives
Upon Completion of this CME activity, participants should be able to:

- Understand simple photography role in screening OSA
- Evaluate the role of intraoral assessments of children with OSA
- Get knowledge on new non-static imaging technique, the tag-MRI
- Discuss the role of imaging in research, screening and treatment of OSA.

Target Audience
Clinicians, researchers, dentists and related health professionals

Chairs:
Fernanda Almeida (Canada)

3:00PM - 3:02PM  Introduction
Scientific Programme

3:02PM - 3:22PM
Photography for the evaluation of facial profiles in obstructive sleep apnea
Kate Sutherland (Australia)

3:22PM - 3:42PM
Facial characteristics of children with OSA: Results of the PDSA cohort study
Fernanda Almeida (Canada)

3:42PM - 4:02PM
TAG-MRI phenotyping and predicting treatment outcomes
Peter Cistulli (Australia)

4:02PM - 4:22PM
The role of CBCT in the diagnosis and oral appliance treatment outcome
Bingshuang Zou (Canada)

4:22PM - 4:30PM
Conclusion
Scientific Programme

Symposium, 121-122 - 121
3:00PM - 4:30PM
S17

S17: Frontiers of dissemination of CBT for sleep and circadian problems in mental and physical health

Summary
Despite impressive evidence documenting its efficacy and strong endorsement as first line therapy in clinical practice guidelines, CBT for sleep and circadian problems remain infrequently used in clinical practice. Several barriers contribute to this underutilization, including cost, limited access to CBT and concerns about the fit with certain populations and contexts. This symposium seeks to present five lines of research that aim to make progress on these problems. Dr. Morin will present a pragmatic trial on the feasibility and efficacy of a two-stage CBT program for insomnia in primary care practice. Preliminary data show that Internet-based CBT-I is an acceptable and efficient initial treatment option and, for those who do not respond adequately to this initial intervention, face-to-face CBT-I can augment treatment outcomes. Dr. Sivertsen will present an evaluation of the short- and long-term efficacy of an unguided Internet-based cognitive-behavioral treatment program for insomnia (CBTi), called SHUTi (Sleep Healthy Using the Internet). Unguided Internet-based CBTi produced significant short-term improvements in sleep in patients with chronic insomnia. Dr. Espie will present a summary of 8 RCTs of the digital CBT program Sleepio that addresses if targeting sleep per se maybe a sufficient treatment for at least some people with depression, and as an important adjunct in routine depression care. Dr. Buysse will present promising findings from the Hypertension with Unsatisfactory Sleep Health (HUSH) study which is a low-cost, pragmatic, patient-centered clinical trial that examines the effectiveness of two forms of CBT-I vs. Enhanced Usual Care on patient-reported sleep outcomes and home blood pressure in primary care patients with insomnia. Finally, Dr. Harvey will present data showing that the Transdiagnostic Intervention for Sleep and Circadian Dysfunction (TranS-C) improves functional impairment, disorder-focused symptoms and sleep and circadian functioning in severe mental illness. This study was conducted in community mental health, which are publicly funded, under resourced and provide treatment to poor and underserved community members. Taken together, these five talks make seminal contributions to the growing science of dissemination and implementation.

Learning Objectives
Upon Completion of this CME activity, participants should be able to...

- Identify challenges to the dissemination and implementation of CBT for sleep and circadian problems
- Describe the elements of treating sleep and circadian problems using CBT-I and the associated approaches
- Describe innovative approaches to ensuring CBT reaches the people who need it.

Target Audience
Sleep medicine physicians, psychologists and nurses who are interested in public health and public policy and in ensuring evidence-based treatments become more widely available.

Chairs:
Allison G. Harvey (United States)
Scientific Programme

3:00PM - 3:02PM  Introduction

3:02PM - 3:18PM  Sequencing Internet-Based and Face-to-Face CBT-I in a Stepped-Care Model of Insomnia Management in Primary Care
                 Charles Morin (Canada)

3:18PM - 3:34PM  The Short- and Long-Term Efficacy of an Unguided Internet-Based Cognitive-Behavioral Therapy for Insomnia: A Large Randomized Controlled Trial
                 Borge Sivertsen (Norway)

3:34PM - 3:50PM  Sleep as a novel therapeutic target for depression: A meta analysis of randomized controlled trials of digital CBT for insomnia
                 Colin Espie (United Kingdom)

3:50PM - 4:06PM  The Hypertension with Unsatisfactory Sleep Health (HUSH) study: A low-cost, pragmatic, patient-centered clinical trial
                 Daniel J. Buysse (United States)

4:06PM - 4:22PM  A transdiagnostic sleep and circadian treatment to improve severe mental illness outcomes in a community setting: The results of a randomized controlled trial
                 Allison G. Harvey (United States)

4:22PM - 4:30PM  Conclusion
Scientific Programme

Basic Science Symposium, 211

3:00PM - 4:30PM

S18: The molecular and physiological mechanisms of sleep

Summary
Sleep, including behavior sleep, is a widely conserved and an indispensable physiological phenomenon in almost all living organisms. The success of electroencephalogram (EEG) and electromyogram (EMG) recording in 1929 by Hans Berger enables us to define physiological sleep stages quantitatively: slow-wave sleep (SWS), rapid eye movement (REM) sleep, and wakefulness. The knowledge about functions and underlying mechanisms of each state has been accumulated for several decades; however, we are still not able to answer many fundamental questions: What drives sleep oscillation? How are they shaped? Which genes are essential for maintaining/switching the states? To address these questions, in this symposium, we will focus on the molecular and cellular mechanisms of sleep with unpublished simulation studies, tens of transgenic mice lines, and unique animal models. All the speakers have expertise in the area of the molecular or circuit mechanism of sleep.

Shoi Shi will present a new hypothesis raised by his group. They recently identified several sleep genes, and raise a hypothesis that the Ca2+-dependent or -independent hyperpolarization owed by the potassium channels could shape the SWS and play a role in SWS duration regulation in mammals.

Yasutaka Niwa will talk about REM sleep. To identify the essential genes of REM sleep, he knocked out each gene of the acetylcholine receptor family. He identified Chrm1 and Chrm3 as the essential genes in REM sleep and succeeded to create “NO REM” mice.

Hirofumi Toda will present his genetical screening of somnogen in fruit flies. He carried out an unbiased and genome-wide genetic screen over 12,000 lines and discovered a novel gene, “nemuri” regulating sleep in Drosophila.

Hiroaki Norimoto will present unpublished data obtained in Australia dragon pogona vitticeps. Using ex vivo whole brain preparation, he succeeded to replicate the SWS state which can be observed in vivo dragon and clarified a novel circuit mechanism that regulates the state. Combined with his recent work (Norimoto et al., Science, 2018), he will also discuss the function of SWS for synaptic plasticity.

Daisuke Miyamoto will present his recent data about cortical circuitry and molecular mechanisms of memory consolidation during sleep. With in vivo repeated imaging in dendritic spines and shafts, he visualized AMPA receptors’ sequential dynamics by motor learning and sleep.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Catch up the up-to-date studies on sleep homeostasis
- Understand the molecular mechanisms of NREM and REM sleep regulation
- Get the inspiration of new molecular targets of sleep medicine.
- Know a diversity of model systems is essential if we wish to identify the brain’s fundamental principles

Target Audience
People in basic sleep, neuroscience, clinical, and pharmaceutical research fields

Chairs:
Shoi Shi (Japan)
Hiroaki Norimoto (Germany)
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<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker</th>
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<tr>
<td>3:00PM - 3:02PM</td>
<td>Introduction</td>
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<tr>
<td>3:02PM - 3:18PM</td>
<td>Genetic identification of cholinergic mechanisms controlling sleep and wakefulness</td>
<td>Yasutaka Niwa (Japan)</td>
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<td>3:18PM - 3:34PM</td>
<td>Spatio-temporal structure of sleep oscillations in reptilian brain</td>
<td>Hiroaki Norimoto (Germany)</td>
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<td>3:34PM - 3:50PM</td>
<td>Synaptic AMPA receptor plasticity by learning and sleep</td>
<td>Daisuke Miyamoto (United States)</td>
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<td>3:50PM - 4:06PM</td>
<td>Newly-identified sleep genes: the role of calcium dependent hyperpolarization pathway in sleep regulation</td>
<td>Shoi Shi (Japan)</td>
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<td>4:06PM - 4:22PM</td>
<td>Genetic dissection of sleep in fruit flies</td>
<td>Hirofumi Toda (United States)</td>
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<td>4:22PM - 4:30PM</td>
<td>Conclusion</td>
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S19: Novel strategies to personalize OSA treatment and care from adolescents to adults

Summary
Obstructive sleep apnea (OSA) is highly prevalent in obese adolescents and in the adult population. The pathogenesis of OSA is multi-factorial and not just related to anatomical factors. However, the mainstay of treatment, continuous positive airway pressure (CPAP), although highly efficacious is poorly tolerated. Indeed, recent data suggests that CPAP adherence rates are approximately 50% in adults and may be even lower in adolescence and that there has been no increase in CPAP adherence rates over the last 10 years. Since OSA is associated with adverse metabolic, cerebrovascular and cardiovascular consequences, effective, tolerated therapies for OSA are a clinical priority. In particular, since 75% of obese adolescents will become obese adults, many with co-existing OSA, effective therapies are urgently needed prior to adulthood. Current and emerging data has identified at least 4 distinct phenotypes of OSA. This session will commence with a presentation by Dr Jayne Carberry (Flinders University, Adelaide Australia) on the knowledge related to the distinct OSA phenotypes. This will be followed by a presentation by Professor Danny Eckert (Neuroscience Research Australia, Sydney) on the exciting advances in novel targeted therapeutic strategies that address the distinct OSA phenotypes. Dr Indra Narang (Hospital for Sick Children, Toronto) will discuss how a personalized approach in adolescents with OSA is paramount to limiting OSA related morbidity downstream in adulthood. Finally, Dr Clodagh Ryan (Toronto General Hospital, Toronto) will discuss how a personalized approach to OSA aligns with patient centered initiatives and outcomes.

Given the emerging evidence for novel strategies for OSA, this session will be of major interest to many attendees at 2019 World Sleep Meeting.

Learning Objectives
Upon Completion of this CME activity, participants should be able to...

- Understand the pathogenesis of OSA lending to different phenotypic variability of OSA
- Describe the novel targeted therapies for the management of OSA in adults.
- Understand the differences in approach to the management of OSA in adolescence versus adults
- Discuss how a personalized approach to OSA aligns with patient centered outcomes

Target audience
Sleep specialists, fellows, technologists, researchers and trainees

Chairs:
Susan Redline (United States)

3:00PM - 3:02PM
Introduction
Scientific Programme

3:02PM - 3:22PM  Pathophysiological phenotypes of OSA
                 Jayne Carberry (Australia)

3:22PM - 3:42PM  Novel targeted therapies for OSA in adults
                 Danny Eckert (Australia)

3:42PM - 4:02PM  Personalized approach for OSA in adolescence- is it time to throw away the CPAP?
                 Indra Narang (Canada)

4:02PM - 4:22PM  Aligning a personalized approach to OSA with patient centered outcomes
                 Clodagh Ryan (Canada)

4:22PM - 4:30PM  Conclusion
Scientific Programme

S20: Pathophysiological insights from animal models of restless legs syndrome

Summary

Restless legs syndrome (RLS), is a common neurological disorder that has motor, sensory, and circadian components. RLS affects up to 10% of the general population. The symptoms of RLS often lead to sleep disturbances and can severely affect the patient’s daytime function and quality of life. This therefore suggests importance of studying the pathophysiology of RLS.

Iron deficiency, which produces changes in dopaminergic neurons and receptors in the substantia nigra and putamen, has been reported to correlate with RLS. Iron deficient rats have insomnia and severe PLM in wake and in Slow Wave Sleep. The sleep pattern and symptoms of putamen-lesioned rats and ID rats resemble human RLS patients. Using neurotoxic lesion, in vivo microdialysis HPLC analysis, microinfusion of GABAA receptor agonists and antagonists, systemic injection of histamine receptor agonist and antagonist, Western blotting, and EEG spectral analysis techniques, a comprehensive understanding of RLS pathophysiology has emerged (speaker 1).

Recently, genome-wide association studies were performed, and 19 genetic loci were found to impart varying increased risk of developing RLS. Among these loci, genetic regions containing the genes MEIS1 and BTBD9 represent the top two hits and have been replicated in multiple independent genetic studies. The identification of these RLS candidate genes paved the way for making genetic animal model of RLS that could potentially be more relevant in elucidating the pathophysiology of RLS and developing therapeutic treatments.

The BTBD9 gene encodes a protein, which modulates cytoskeleton arrangement, transcription repression, and protein ubiquitination. An alteration in hippocampal synaptic plasticity and neurotransmission has been found in Btbd9 knockout mice. Furthermore, loss of the BTBD9 homolog in fly and mice, results in increased motor activity, altered dopaminergic systems, and fragmented sleep patterns. The latest studies using BTBD9 homolog knockout in worms and conditional knockout and brain imaging in mice will be discussed (speaker 2).

MEIS1 is a homeobox protein that has been linked with maintenance of hematopoietic stem cells and in forebrain development. Mutant Meis1 knock-out mice show behavioral alterations, including a circadian hyperactivity pattern, that are analogous to the symptoms of RLS in humans. Functional studies using zebrafish and mouse models suggest RLS is a neurodevelopmental disorder linked to the development of the basal ganglia (speaker 3).

Finally, speaker 4 will discuss ways to use animal models of RLS to gain pathophysiological insight of RLS. What defines a valid RLS animal model for pathophysiological studies? The advantages and limitations of genotypic and phenotypic animal models of RLS will be summarized. The 4 speakers as a group are uniquely positioned to achieve the goal of the proposed symposium. All of them are established scientists in the RLS pathophysiology and published extensively in this and related topics. They come from 3 countries and one speaker is a successful women scientist.

Learning Objectives

Upon Completion of this CME activity, participants should be able to:

□ Understand the latest update on the pathophysiology of the RLS from the studies of iron deficient rats

□ Know the biological function of BTBD9 and MEIS1 and how mutations of these genes can cause RLS

□ Understand how animal models can be constructed and used to gain pathophysiological insights of RLS

□ Understand how these new pathophysiological insights can inspire new targeted therapy of RLS

Target Audience

Clinicians, basic research scientists, technologists who are interested in RLS
## Scientific Programme

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<th>Time</th>
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<tr>
<td>3:00PM - 3:02PM</td>
<td><strong>Introduction</strong></td>
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<tr>
<td>3:02PM - 3:22PM</td>
<td><strong>Pathophysiological insights from the iron deficient rats</strong></td>
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<td>Yuan-Yang Lai (United States)</td>
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<td>3:22PM - 3:42PM</td>
<td><strong>Pathophysiological studies of RLS using BTBD9 mutant animal models</strong></td>
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<td>Yuqing Li (United States)</td>
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<td>3:42PM - 4:02PM</td>
<td><strong>MEIS1-based animal models and the pathophysiology of RLS</strong></td>
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<td>Aaro Salminen (Germany)</td>
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<td>4:02PM - 4:22PM</td>
<td><strong>Use of animal models for the pathophysiological study of RLS</strong></td>
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<td>Mauro Manconi (Switzerland)</td>
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<td>4:22PM - 4:30PM</td>
<td><strong>Conclusion</strong></td>
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3:00PM - 4:30PM **Oral abstract: content to be determined**

3:00PM - 4:30PM **Technologist workshop: content to be determined**
S21: The nature of arousals: An update for the 21st century

Summary

Arousals in sleep have been defined in 1992 and this definition has remained basically unchanged since then, as has our incorporation into clinical practice, which simply quantifies the number of arousals during sleep but little else. Since then, however, a wealth of evidence has accumulated arguing for a more differentiated approach to arousals in sleep, and the aim of this symposium is to provide a timely update of recent developments in the field.

The first presentation will be focused on respiratory-induced cortical arousals, including the factors that influence these arousals, and the role that cortical arousal plays in obstructive sleep apnea pathogenesis.

The second presentation will discuss the relationship between movements during sleep and cortical and autonomic arousals, including the contribution of state-of-the-art machine learning approaches in defining movement characteristics that identify different central nervous system processes producing arousals.

The third presentation will spotlight the different forms of arousals during slow wave sleep including those that so far have not been considered as arousals according to the scoring rules but critically contribute to the characterization of physiological and pathological NREM arousal patterns.

Finally, the fourth presentation will focus on the nonrandom time structure of cortical and autonomic arousals, highlighting the periodic components of both spontaneous arousals as well as arousal associated respiratory or movement events that are intimately involved in the dynamic regulation of sleep.

Learning Objectives
Upon Completion of this CME activity, participants should be able to...

- recognize different types of arousals and understand their involvement in healthy and disordered sleep
- appreciate that easy arousability is a major determinant of severity of obstructive sleep apnea
- use the sleep-related movement, particularly leg movement, characteristics to identify occurrence of different types of arousals
- identify the different patterns of arousal during SWS, the limits of the actual criteria for their scoring and their relations with pathological phenomena in SWS
- recognize the periodic nature of cortical arousals

Target Audience
sleep clinicians, human sleep researchers, sleep technicians

Chairs:
Régis Lopez (France)

4:30PM - 4:32PM  Introduction
4:32PM - 4:52PM  Cortical arousals: determinants and role in obstructive sleep apnea.
Magdy Younes (Canada)
Scientific Programme

4:52PM - 5:12PM  The relation of movements to cortical and autonomic arousals in sleep: artificial intelligence - machine learning analyses  
Richard Allen (United States)

5:12PM - 5:32PM  The problematic definition of arousals during SWS. Implications for the characterization of the NREM parasomnias  
Régis Lopez (France)

5:32PM - 5:52PM  On the periodicity of arousals  
Stephany Fulda (Switzerland)

5:52PM - 6:00PM  Conclusion
D03: Sleep medicine and research training opportunities throughout the world

Summary
The pipeline for trainees entering into sleep medicine and research has been a concern for many established clinicians and investigators. An underlying issue is that young clinicians and investigators might not be aware of the educational and training opportunities for sleep medicine and research within their own countries as well as on an international level. For example, the World Sleep Society has recently initiated an International Sleep Research Training Program (ISRTP), the goal of which is to select trainees who are interested in sleep research and have them be matched to mentors and training programs at academic sleep centers throughout the world. This program is being initiated at five international sites: Harvard University, Stanford University, University of Oxford, University of Pennsylvania, and University of Sydney. The goal of this program is to provide mentorship for these trainees in sleep research and exposure to clinical sleep medicine within a one-year training period.

The aim of the proposed symposium is to highlight the current state of international sleep medicine education and training in five continents: Asia, Australia, Europe, North America, and South America. We will also discuss the opportunities for the future, in terms of expansion of their educational and training programs, both in scope, size, and spread to other geographic regions. Challenges (e.g., institutional barriers, selection of candidates, attracting potential candidates, etc.) to growth of these programs will be covered, as well as strategies for overcoming these challenges.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Describe the current state of existing sleep medicine/research educational and training opportunities in five continents
- Discuss what is being done on an international level for mentoring trainees in sleep research
- Learn opportunities for the future, in terms of expansion of existing sleep medicine/research educational and training programs

Target Audience
Sleep researchers and clinicians

Chairs:
Clete Kushida (United States)
Scientific Programme

5:04PM - 5:20PM  Sleep Medicine and Research Training Opportunities in Europe
Zoran Dogas (Croatia)

5:20PM - 5:36PM  Sleep Medicine and Research Training Opportunities in Australia
Brendon Yee (Australia)

5:36PM - 5:52PM  Sleep Medicine and Research Training Opportunities in South America
Dalva Poyares (Brazil)

5:52PM - 6:00PM  Conclusion

4:30PM - 6:00PM  S22: Advances in precision application of dental appliances: indications, design, and prognostic risk

Summary
The clinical application of oral appliances has entered a more precise and refined stage. It plays an effective role in the treatment of various sleep-related breathing disorders, not only the obstructive sleep apnea syndrome. When considering indications, we should fully weigh the side effects and risks. Together, these constitute suitable objects for oral appliances. For adapting to the witness group, we should find ways to enhance the effectiveness and comfort of the two aspects. As a therapeutic method based on morphological changes, a large number of morphological analysis will appear in this section.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Balance and compare the indications and side effects of OA
- Choose OA for more possibilities
- Promote the development of dental appliances in terms of effectiveness and patient compliance

Target Audience
Dentists

Chairs:
Fernanda Almeida (Canada)

4:30PM - 4:32PM  Introduction

4:32PM - 4:48PM  Oral appliance for Downs Syndrome
Fernanda Almeida (Canada)

4:48PM - 5:04PM  Application of oral appliance in Catathrenia(Groaning) / Long-term follow-up of oral therapy on OSA
Xuemei Gao (China)
### Scientific Programme

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<th>Time</th>
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<tr>
<td>5:04PM - 5:20PM</td>
<td>Mechanism and efficacy of magnetic levitation mandibular elevator in treatment of obstructive sleep apnea syndrome</td>
<td>Xilong Zhang (China)</td>
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<tr>
<td>5:20PM - 5:36PM</td>
<td>Prediction in obstructive sleep apnoea: diagnosis, comorbidity risk, and treatment outcomes</td>
<td>Kate Sutherland (Australia)</td>
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<tr>
<td>5:36PM - 5:52PM</td>
<td>3D imaging application in OSA</td>
<td>Bingshuang Zou (Canada)</td>
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<td>5:52PM - 6:00PM</td>
<td>Conclusion</td>
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S23: Using eHealth to bridge the gap between research and practice for insomnia: Examples from across the lifespan

Summary
Insomnia is highly prevalent, with approximately one-third of individuals across the lifespan displaying at least symptoms of this disorder. Insomnia, and symptoms of insomnia, are associated with poorer quality of life, including more physical and mental health problems, and lower academic/occupational functioning. Importantly, behavioral treatments are highly effective at resolving insomnia symptoms, but without treatment, insomnia can become a chronic and impairing disorder. While there exists effective behavioral interventions, these are not often used; rather, medication is the most common treatment, despite its lack of known effectiveness with some ages (e.g., children) and its poor long-term resolution of symptoms. This knowledge-to-practice gap is significant; it is estimated that < 20% of individuals with insomnia receive appropriate evidence-based interventions. eHealth (i.e., delivering interventions over the internet) shows promise in reducing this knowledge-to-practice gap by addressing key barriers related to inadequate human resources and limited access to evidence-based interventions. During this symposium we will share information about five eHealth programs that were designed to deliver evidence-based interventions to treat insomnia in infants (Mindell), children (Corkum), adolescents (Stremler), young adults (Rigney), and adults (Thorndike).

Each of these eHealth programs are at a different stage of the research-to-practice continuum, with two in everyday practice (infants, adults), two in the testing stage (adolescents, young adults), and one just entering the sustainability stage (children). Mindell will present on an infant program that has been found to be efficacious in randomized control trials (RCT) and is now incorporated into a publicly-available app and educationally-based websites. She will present on real world data collected regarding parental concerns and effectiveness. Corkum will present on the development and evaluation of an eHealth intervention that was recently evaluated via a large pan-Canadian RCT. Satisfaction, adherence, and efficacy data will be presented, along with plans for sustainability. Stremler developed and tested a mobile app intervention using high-fidelity user testing with sleep-restricted adolescents to gain feedback on the experience, content, and feedback features including goal-setting and gamification strategies. She will also share the results of a pilot RCT (n=60), aimed at determining compliance, feasibility, and preliminary data on health outcomes. Rigney will present on the user-centered approach taken to develop an eHealth program for young adults, which supported the importance of using a micro-content delivery framework. The results of the focus groups, program evaluations, and sleep behavior data from the usability study will be presented. While eHealth programs for insomnia have been found to be efficacious with adults, the true potential of digital health interventions in the real world is unknown. Toward that aim, Thorndike will share data from over 7,000 adults who consecutively registered (paid for) a digital CBT-I program. That cohort’s usage, completion, and insomnia severity index scores will be reported, comparing those metrics to published RCT data using the same web intervention. The symposium will end with the chair (Weiss) providing a reflection on the key themes that arose during the symposium and then facilitating a question and answer period.

Learning Objectives
Upon Completion of this CME activity, participants should be able to:

• Understand the research-to-practice gap for the treatment of insomnia across the lifespan and explain how eHealth holds promise to bridge this gap

• Describe five different eHealth programs focused on treating insomnia at different developmental stages, from infancy to adulthood

• Discuss the research-to-practice continuum in regard to eHealth interventions

Target Audience
Sleep researchers and clinicians; clinical and research trainees
Scientific Programme

4:30PM - 4:32PM  Introduction

4:32PM - 4:48PM  eHealth applications for infants and toddler sleep disturbances: Real world data and moving from efficacy to effectiveness
Jodi Mindell (United States)

4:48PM - 5:04PM  Development, evaluation and dissemination of Better Nights, Better Days for preschool and elementary school-aged children
Penny Corkum (Canada)

5:04PM - 5:20PM  Design and pilot RCT of a mHealth intervention for sleep promotion in adolescents
Robyn Stremler (Canada)

5:20PM - 5:36PM  Development of Better Nights, Better Days-Youth: The importance of a user-centered design when working with young adults
Gabrielle Rigney (Australia)

5:36PM - 5:52PM  Real world evidence: Impact of digital therapeutic for insomnia in adults
Frances Thorndike (United States)

5:52PM - 6:00PM  Conclusion
S24: Prognostic value of the different available methods for upfront prediction of treatment outcome with non-CPAP therapy towards a more personalized treatment of obstructive sleep apnea

Summary
Obstructive sleep apnea (OSA) is increasingly recognized as a complex and heterogeneous disorder in terms of its causes, clinical expression and susceptibility to comorbidities. This poses challenges for a one-size-fits-all management approach to treat this disease, hence it represents an opportunity to tailor treatment to the individual patient.

The standard treatment for patients with moderate to severe OSA is continuous positive airway pressure (CPAP), applying pressurized air throughout the respiratory cycle to keep the upper airway patent. Although CPAP is highly efficacious in reducing the severity of OSA, the clinical effectiveness is often compromised by a low patient acceptance and suboptimal adherence. As a result, there is an imminent need for non-CPAP alternatives such as oral appliance therapy using mandibular advancement device (MAD) and sleep surgery including upper airway stimulation (UAS) relying on hypoglossal nerve stimulation during sleep.

The outcome with different non-CPAP options will be variable in unselected OSA patients and therefore the aim should be to prospectively select the right non-CPAP treatment for the individual patient. In order to implement such personalized treatment a better in-depth understanding of the multi-etiologic of OSA is mandatory.

The pathophysiological traits of OSA comprise three phenotypical traits, one anatomical trait and one element fitting both the phenotypical and anatomical traits being the narrow, collapsible upper airway. The different lectures within this symposium will focus on the assessment of these anatomical and phenotypical traits with various techniques, including different imaging techniques, endoscopy, multimodal techniques, remotely controlled mandibular protrusion technology, and, various types of phenotyping, based on data obtained during awake state, drug-induced sedation or natural sleep. The emerging evidence on the application of these different available methods in terms of predictive power for upfront prediction of non-CPAP treatment outcome will be reviewed, including recent results on innovative techniques including dynamic magnetic resonance imaging, feedback-controlled mandibular positioner, and non-invasive assessment of pathophysiological OSA traits derived from polysomnographic signals.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Have an up-to-date understanding of different emerging methods for potential ‘upfront’ prediction of treatment outcome with non-CPAP treatment options in OSA patients
- Have a notion about the role of imaging techniques in the prediction of treatment outcome with non-CPAP options such as upper airway stimulation and mandibular advancement device (MAD) treatment
- Understand the differences in the predictive value of various techniques used during awake state, drug-induced sedation versus during natural sleep
- Be aware of the newest developments regarding automated titration of MAD treatment using home-based remotely controlled mandibular protrusion techniques
- Have an impression on the innovative methodology of deriving OSA pathophysiological traits from polysomnographic signals in order to phenotype OSA patients in a non-invasive way

Target Audience
Sleep physicians, sleep surgeons, dental sleep professionals, dental assistants, sleep laboratory technicians, biomedical scientists, life science engineers
Scientific Programme

4:30PM - 4:32PM Introduction

4:32PM - 4:48PM What have we learned from the past about prediction of treatment outcome with non-CPAP treatment for sleep-related breathing disorders
Marc Braem (Belgium)

4:48PM - 5:04PM The application of imaging to extract anatomical predictors of non-CPAP treatment success
Richard Schwab (United States)

5:04PM - 5:20PM Multimodal prediction : awake versus sleep-related assessments
Peter Cistulli (Australia)

5:20PM - 5:36PM Feedback-Controlled Mandibular Positioner (F-RCMP) to predict oral appliance therapy outcome
Shouresh Charkhandeh (Canada)

5:36PM - 5:52PM The role of pathophysiological phenotyping in predicting therapeutic outcome with upper airway stimulation and mandibular advancement device treatment
Olivier Vanderveken (Belgium)

5:52PM - 6:00PM Conclusion
Scientific Programme

4:30PM - 6:00PM  S25  

S25: Sleep-wake disturbance and the aging brain: Insights into the impact of poor sleep and sleep-disordered breathing on neurodegeneration

Summary
Prof. Benca will provide an overview of the associations between sleep-wake disturbance in aging and the risk of AD. She will summarize the epidemiological work showing increased risk of MCI and AD in the presence of sleep and circadian rhythm disorders. There will be a discussion of the potential mechanisms that are thought to underpin these associations, including the glymphatic system and the functional role of slow wave sleep, and OSA in the pathogenesis of Alzheimer’s disease. Dr. Spira will discuss the use of wrist actigraphy to quantify circadian rest activity rhythms (RARs) in large-scale epidemiological studies, and summarize the literature documenting links between RARs and brain health. He will then present his group’s recent results linking data-driven actigraphic RAR indices with brain volumes from MRI in cognitively normal older people, and discuss the implications of these findings.

Dr. D’Rozario will summarize the objectively measured changes to sleep macro- and microarchitecture that occur in older adults at-risk of dementia and sleep-disordered breathing populations, highlighting how some sleep and wake EEG abnormalities are common to both groups. She will provide insights about how alterations to sleep neurophysiology relate to cognitive functioning. She will also present the latest data from high-density EEG sleep studies and routine polysomnography investigating the recovery of sleep EEG deficits and cognitive dysfunction following CPAP treatment.

Dr. Mander will present findings linking local deficits in NREM and REM sleep EEG with amyloid and tau pathological burden. He will also discuss the clinical biomarker potential of these signature changes in sleep EEG, and how they relate to local sleep deficits observed in MCI and AD. He will finally touch on the cognitive functional significance of these sleep deficits as they relate to hippocampus-dependent memory impairment.

Prof. Naismith will conclude the session by discussing the neuroimaging evidence of sleep-wake disturbance and sleep disordered breathing on worsened cognitive trajectories in aging. She will present data on the role of hypoxemia and oxidative stress as mechanisms for neurodegeneration, and will also describe interventional approaches to optimize sleep in patients with mild cognitive impairment, with and without OSA.

Learning Objectives
Upon Completion of this CME activity, participants should be able to ...

• Appreciate the associations between sleep-wake disturbance in aging and the risk of Alzheimer’s disease from epidemiological studies.

• Understand the links between actigraphic sleep and brain atrophy in aging populations.

• Describe the evidence base linking objective measures of sleep architecture with cognitive impairment and brain changes in aging, mild cognitive impairment and sleep disordered breathing clinical populations.

• Gain insights into the OSA-related brain changes that may underlie worse cognitive trajectories in older adults at risk of dementia.

• Understand the bidirectional relationship between altered sleep architecture, amyloid pathology and dementia risk.

Target Audience
Researchers and clinicians with an interest in the impact of sleep disturbance on neurobehavioral and neurocognitive function and risk of dementia

Chairs:
Ruth M. Benca (United States)
Scientific Programme

4:30PM - 4:32PM Introduction

4:32PM - 4:48PM Introduction and Overview
Ruth M. Benca (United States)

4:48PM - 5:04PM Altered circadian rest/activity rhythms and brain atrophy in cognitively normal older adults
Adam Spira (United States)

5:04PM - 5:20PM Abnormal sleep neurophysiology in mild cognitive impairment and sleep-disordered breathing populations
Angela D’Rozario (Australia)

5:20PM - 5:36PM Sleep disruption and Alzheimer’s disease pathology: a mechanism for increased AD risk?
Bryce Mander (United States)

5:36PM - 5:52PM What is the link between sleep-disordered breathing and neurodegeneration?
Sharon Naismith (Australia)

5:52PM - 6:00PM Conclusion
S26: New insights on sleep at high altitude

Summary
The health effects of sleep at high altitude affect more and more people because high altitude trekking in the Himalayans and larger hiking and climbing tours in all continents is practiced meanwhile by millions. Recent research shows that although sleep at high altitude despite hypoxia induced periodic breathing appears to be sufficient in regard to amount of total sleep time and sleep stage distribution, nightly hypoxemia might still have significant effects on different organic functions. Especially the brain could suffer from the nightly hypoxemia. There are hints from latest research that there is an increased cranial pressure at night at altitude with effect on neuronal function, and cognitive function declines on the following day to a certain degree. This might affect not only difficult tasks during climbing but also difficult tasks of professionals doing commercial and non commercial labour at altitude. Furthermore, depending on individual circumstances more people than previously thought might develop hypoxia induced breathing already at lower altitudes than 2000m above sea level and could be affected by nightly hypoxemia occurring with central apneas. These new insights will not only be discussed at this symposium but the attendees will learn how to prevent health problems by diagnostic procedures before high altitude exposure and giving the correct advice to high altitude sojourners.

Learning Objectives
Upon Completion of this CME activity, participants should be able to...

- Learn and understand new possible health problems occurring after sleep at high altitude
- Take now into account individual problems of persons at high altitude after a previously more generalized pathophysiology
- Get to know new diagnostic approaches for clients who want to travel to high altitude
- Give better and more individualized medical advice to high altitude travellers and workers

Target Audience
Family practitioners, nurse practitioners and nurses, pulmonologists, sleep specialists, medical, physiology and sport science students

Chairs:
Nikolaus C. Netzer (Germany)

4:30PM - 4:32PM  Introduction
4:32PM - 4:48PM  The brain at altitude
                  Nikolaus C. Netzer (Germany)
4:48PM - 5:04PM  Cognitive decline after sleep at high altitude
                  Stephan Pramsohler (Germany)
Scientific Programme

5:04PM - 5:20PM  MRI studies on the brain after exposure to hypobaric hypoxia
Michael Decker (United States)

5:20PM - 5:36PM  Individual influences on hypoxia and hypobaria induced periodic breathing
Rachel Turner (United Kingdom)

5:36PM - 5:52PM  The heart during sleep at high altitude
Marco Maggiorini (Switzerland)

5:52PM - 6:00PM  Conclusion

Oral Abstract, 220

4:30PM - 6:00PM  Oral abstract: content to be determined

Oral Abstract, 216

4:30PM - 6:00PM  Oral abstract: content to be determined

Oral Abstract, 223-224 - 223

4:30PM - 6:00PM  Young investigator: content to be determined

Poster Abstract, Exhibition

Poster session 2

Social Event, Banquet 301

6:00PM - 9:00PM  Gala Dinner

Social Event, Foyer

6:00PM - 9:00PM  Technologist Social Evening

Social Event, Banquet 305

9:00PM - 11:00PM  Jazz Night
Scientific Programme

Tuesday, 24 September 2019

07:00AM - 5:00PM
Administration, SRR - 201
Speaker Ready Room

Keynote, BR A - Ballroom A

08:00AM - 08:45AM
Riemann
K05: Sleep, insomnia and mental health: A chance for prevention?

Summary
Almost all mental disorders are accompanied by sleep disturbances, especially depressive disorders. In this patient group, not only rather specific changes of REM sleep (shortening of REM sleep latency) and a decrease of Slow Wave Sleep) occur, but from a clinical point of view insomnia complaints (prolonged sleep latency, sleep maintenance problems, early morning awakening) may dominate the picture. Insomnia disorder, on the other hand, without co-morbidity has been shown to be a risk factor for depression and other mental disorders. It is postulated that the relationships between insomnia and mental disorders are bi-directional and that the treatment of insomnia may serve a preventive strategy for mental illness.

08:00AM - 08:02AM
Introduction
08:02AM - 08:45AM
Sleep, insomnia and mental health: A chance for prevention?
Dieter Riemann (Germany)

Keynote, 211

08:00AM - 08:45AM
Van Cauter
K04: Interactions between sleep, circadian rhythms and body weight regulation

This lecture will review and discuss the epidemiologic evidence that has linked insufficient sleep duration, poor sleep quality and/or circadian misalignment to the risk of obesity, noting that sleep deficiency and circadian disruption strongly interact. Putative causal mechanisms identified in laboratory interventions involving several nights of experimental sleep restriction, fragmentation or extension with and without circadian disruption will be presented, with an emphasis on the role of endocrine mediators in the dysregulation of energy balance. The potential benefits of optimizing sleep and circadian alignment to reduce the risk of obesity, and promote weight maintenance or weight loss will be discussed.

08:00AM - 08:02AM
Introduction
08:02AM - 08:45AM
Interactions between sleep, circadian rhythms and body weight regulation
Eve Van Cauter (United States)
Scientific Programme

09:00AM - 10:30AM  S27

S27: Placing patient needs first: Designing personalized care in sleep medicine

Summary
As personalized sleep medicine has emerged as an area of research and practice, much of the focus has remained on the impact of genetic influences and circadian systems on sleep. In addition to patients being phenotypically diverse, they also have individual needs, preferences, and values that impact treatment decisions in the care of sleep disorders. Designing care models and treatment pathways that are personalized for an individual patient’s values, preferences, and biology has the potential to improve patient outcomes, satisfaction scores, influence access, and transform the patient care experience.

This symposium will explore personalized care approaches in sleep medicine which could include: identification of patient values, preferences, and other factors impacting treatment decisions; determining patient-specific needs to guide treatment decisions; possible methods to promote patient engagement and reduce patient burden, tools for assessing patient-centered outcomes, and genetically directed care. While exploring these approaches, attendees will be exposed to several different research approaches, including patient-centered design, traditional case-control trials, usability testing and various genetic analytic methods that will continue to inform sleep medicine as a field.

Topics will include:

- **Speaker 1:** Dr. Timothy I. Morgenthaler, MD. (Mayo Clinic, Rochester, MN) A framework with which to deliver patient-centered care in sleep medicine. This will serve as a general introduction to concepts of personalized healthcare models for sleep medicine, methods to understand gaps in patient needs and experiences, and exploration of tools for personalized patient care within sleep medicine. (5 min)

- **Speaker 2:** Lauren Seymour (Designer, Mayo Clinic Center of Innovation) Using a combination of human-centered design, market research, and literature research, this speaker will share insights about perceived patient needs and modalities to serve those needs as it applies to insomnia and sleep health. This session will highlight a design approach to learning how to learn and respond to “what matters to the patient?” rather than the Baconian hypothesis driven-approach dealing with “what’s the matter with the patient?”. (25 minutes)

- **Speaker 3:** Najib Ayas, MD. (University of British Columbia, Vancouver, BC, Canada) Improving the shared decision-making process is essential to placing patients’ choices first. This speaker will discuss the development and testing of technological tools to present information about competing treatment options for OSA, while also helping the patient deliberate and clarify their values and communicate these to their healthcare professional. (25 min)

- **Speaker 4:** Simon Archer, BSc, PhD, FRSB (University of Surrey, UK) New tools are clarifying the genetic basis for diverging phenotypes in circadian rhythm preference and disorders, sleep disruption, and even acute and chronic sleep loss. This speaker will explore how these new findings will begin to influence sleep medicine diagnostic and therapeutic planning in a much more personalized way, delivering better value to the patient. (25 minutes)

- **Panel discussion for questions** (10 minutes)

Upon Completion of this CME activity, participants should be able to...

- Identify and understand gaps in the perceptions, needs, behaviors, and expectations of patients with sleep disorders and their relationship to offerings in health care.

- Gain awareness of methods you can apply in your sleep practice to better understand and meet patient needs and ultimately improve your own and your patient’s outcomes.

- Explore tools and services for personalized patient care, and the future of patient-centered care in sleep medicine.
### Scientific Programme

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<tr>
<th>Time</th>
<th>Session Title</th>
<th>Speaker(s)</th>
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<td>09:00AM -</td>
<td>Introduction</td>
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<tr>
<td>09:02AM -</td>
<td>Sleep medicine and the healthcare and patient revolution</td>
<td>Timothy I. Morgenthaler (United States)</td>
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<td>09:22AM</td>
<td>Learning “what matters to patients”: a human-centered design approach</td>
<td>Lauren Seymour (United States)</td>
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<td>to insomnia and sleep health</td>
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<td>09:42AM -</td>
<td>Improving shared decision making in sleep apnea management:</td>
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<td>technological tools and user preferences</td>
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<td>10:02AM -</td>
<td>My genes, my sleep medicine; genomics and the personalization of sleep</td>
<td>Simon Archer (United Kingdom)</td>
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<td>10:22AM -</td>
<td>Conclusion</td>
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Scientific Programme

09:00AM - 10:30AM  S28

S28: New insights into light’s non-visual impact on sleep and circadian physiology

Summary
Light exerts profound effects on circadian physiology and sleep-wake behavior. This symposium will shed new insights into: 1.) how classical and non-classical retinal photoreceptors mediate non-visual responses to light, 2.) how light is implicated in direct non-circadian effects and sleep homeostasis, 3.) how daylight affects the human circadian timing system, 4.) how new LED solutions replicating daylight affect mood, circadian rhythms and sleep and 5.) how the daytime lighting situation affects nighttime sleep quality in a clinical setting.

Dr. Stuart Peirson, Oxford, UK: will discuss the interaction of the classical rod/cone- and the melanopsin photoreceptor system and their role in mediating the effects of light on circadian rhythms, sleep and performance in mice.

Dr. Patrice Bourgin, Strasbourg, F: will present novel data on light’s influence on the kinetics of the sleep homeostatic process in mice and humans.

Dr. Kenneth Wright, Boulder, USA: will discuss insights into the influence of daylight on the human circadian clock including effects of latitude and season.

Dr. Oliver Stefani, Basel, Switzerland: will present various approaches on how to simulate daylight and their impact on human visual and non-visual responses including mood, circadian physiology and sleep.

Dr. Tomoko Wakamura, Kyoto, Japan: will discuss insights into the association between various light exposures during the day and sleep quality in humans.

Since this symposium gives an integrative view on light’s non-visual repercussions on sleep and circadian physiology ranging from mechanisms and concepts in animal research to human basic and clinical studies, it is attractive for a broad audience working in the sleep field. Furthermore, the current development in LED technology along with the increasing amount of daily “screen time” makes light an important environmental factor to consider in sleep medicine and in our society in general. Thus, we think that our symposium would provide an exciting and up-to-date contribution to the World sleep meeting 2019 in Vancouver.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Know the impact of light on human and animal sleep
- Know how respective photoreceptive systems interact to elicit non-visual responses of light
- Know the impact of natural light exposures on the human circadian timing system
- Know how to design human-centric light solutions at the workplace and in residential areas

Target Audience
Basic animal and human sleep researchers, Clinicians interested in non-pharmacological treatments of sleep-wake disorders, Clinicians interested in the effects of light on clocks and sleep, Chronobiologists

Chairs:
Christian Cajochen (Switzerland)
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<th>Time</th>
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<th>Presenter</th>
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<tr>
<td>09:00AM</td>
<td>Introduction</td>
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<tr>
<td>09:02AM</td>
<td>More than just blue light? The effects of light on circadian rhythms, sleep</td>
<td>Stuart Peirson</td>
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<td></td>
<td>and performance in mice</td>
<td>(United Kingdom)</td>
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<td>09:18AM</td>
<td>Light and sleep homeostasis: A proof of concept study from mice to humans</td>
<td>Patrice Bourgin</td>
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<td>(France)</td>
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<td>09:34AM</td>
<td>Daylight replications with LEDs: Effects on sleep, circadian physiology</td>
<td>Oliver Stefani</td>
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<td>and mood</td>
<td>(Switzerland)</td>
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<td>09:50AM</td>
<td>Natural light, sleep and the circadian clocks in humans</td>
<td>John Axelsson</td>
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<td>10:06AM</td>
<td>The effect of daytime lighting on the quality of sleep in human - from</td>
<td>Tomoko Wakamura</td>
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<td>healthy people to caregivers</td>
<td>(Japan)</td>
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<td>10:22AM</td>
<td>Conclusion</td>
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S29: Memory processing as a biological drive for sleep?
The impact of waking cognition on subsequent sleep: evidence from basic and clinical research

Summary
While the influence of sleep on wake has been extensively investigated in the last century, the opposite issue (i.e., how wake affects sleep) has received much less attention, but can reveal valuable insight into the processes which unfold specifically during sleep that support cognitive and mnemonic function. For many years, wake duration has been mostly considered as the main factor (i.e., “Process S”) affecting sleep’s timing and features (e.g., slow wave sleep intensity). However, recent research provides compelling evidence that waking experiences have a remarkable impact on sleep architecture. Learning during wake may also lead to electrophysiological and biochemical brain modifications during subsequent sleep, thus constituting a competing biological drive reflected in the reorganization of sleep macro- and micro-architecture.

Here, we propose a symposium to elucidate the influence of waking cognitive processes on sleep. We feel this will contribute both to the refinement of existing sleep regulation models and to improved clinical interventions for sleep quality. We aim to provide the latest evidence of the dramatic impact of learning on subsequent sleep, highlighting the dynamic and active role of sleep in memory reorganization processes and the changes at the systems and synaptic level sustaining them. We will also provide integration between animal and human literature and between basic and clinical aspects.

The symposium will be opened by Sara Aton, from the University of Michigan, presenting animal data on how novel sensory (visual) experiences during wake lead to changes in the electrophysiological behavior of thalamocortical circuits during subsequent sleep. She will also discuss the role of electrophysiological features of sleep in renormalizing firing rates and tuning visual response properties in the cortex. This contribution will set the basis for the understanding of a core part of the symposium, dedicated to research on brain mechanisms reflecting the reactivation and reorganization of memories during sleep. Stuart Fogel, from the University of Ottawa, will present results from simultaneous and combined electrophysiological (EEG) and functional neuroimaging (fMRI) studies on post-learning sleep spindle-related memory trace reactivation, with a focus on procedural memory. These data will be nicely integrated by those on processes of abstraction and creative problem solving enhanced by sleep presented by Penelope Lewis, from the University of Cardiff, obtained through the targeted memory reactivation (TMR) technique.

These topics will provide the background to explain the underlying mechanisms leading to the relevant sleep macrostructural changes observed after pre-sleep tasks both in healthy and clinical populations. Francesca Conte, from the University of Campania (Italy), will discuss how administering specific cognitive tasks before sleep consistently increases sleep quality indexes (e.g., stability and continuity), while Iris Haimov, from the Yezreel Valley College (Israel), will extend these observations to the clinical setting, showing how long-term cognitive training improves sleep quality in elderly insomniacs.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Understand the reciprocal influence of waking cognition and sleep
- Describe the mechanisms through which learning during wake affects sleep, i.e. the reactivation and reorganization of memories at the systems level, with their electrophysiological correlates, as well as synaptic plasticity processes at the cellular level
- Be familiar with the recent cutting-edge techniques used to probe the relationship between sleep, memory and cognition
Scientific Programme

09:00AM - 09:02AM
Introduction

09:02AM - 09:18AM
Effects of experience and subsequent sleep on visual system function
Sara Aton (United States)

09:18AM - 09:34AM
The need for sleep: memory optimization and enhancement. Insights from recent EEG-fMRI studies
Stuart Fogel (Canada)

09:34AM - 09:50AM
Sleep's impact on semantic memory and creative problem solving
Penelope Lewis (United Kingdom)

09:50AM - 10:06AM
Sleep quality improvements after pre-sleep training
Francesca Conte (Italy)

10:06AM - 10:22AM
Effects of cognitive training on sleep quality among older adults with insomnia
Iris Haimov (Israel)

10:22AM - 10:30AM
Conclusion
Scientific Programme

Symposium, 121-122 - 121

09:00AM - 10:30AM

S30: REM Sleep and insomnia: So emotional!

Summary

Recent epidemiological data indicate between 30-48% of adults complain of insomnia symptoms while close to 10% suffer of an insomnia syndrome (severe and chronic insomnia complaints) or insomnia disorder. Reports of negative daily consequences, associated with insomnia, are part of the clinical picture. Insomnia is a 24-hour problem. Surprisingly though, little research or clinical efforts have been devoted so far to understanding emotional distress and the impact of cognitive activity during REM sleep in this population. REM sleep fragmentation is a neurophysiological marker of insomnia and the negative impact it has on emotion regulation should be advanced if we want to develop adequate treatments, especially in an era of neurobiological discoveries, and specifically about the dysregulation of certain brain structures (limbic system and Default Mode Network) in insomnia. Challenging the link between maladaptive cognitions and emotions and the arousal produced by sleep-onset difficulties or nightly awakenings is an essential first step in adequately developing a novel target for treatment of insomnia. This symposium is aimed at assessing the neurophysiological components of nocturnal insomnia through the study of cognitive activity during REM sleep. It is our aim to present both basic and clinical data as a translational way to better understand the challenges faced by individuals suffering from insomnia on a 24hr basis. From dream questionnaires to treatments targeting REM sleep, this symposium will illustrate: 1) diurnal impact of negative valence of cognitive nocturnal activity (Crawford); 2) the role of REM sleep and arousals on cognition during the night (links to neurophysiological measures of the EEG) (Riemann), 3) how emotional distress lacks dissipation (Wassing); and 4) the use of lucid dreaming as an adjunct treatment (Ellis and Bastien). It is our aim to present the most recent data from neurophysiological measurement techniques and clinical settings as a means to advance our understanding of the 24hr cycle of insomnia.

Learning Objectives

Upon completion of this CME activity, participants should be able to:

- Understand different aspects of emotions in insomnia
- Understand different aspects of REM sleep in relation with emotions
- Introduce new markers of insomnia
- Discuss the hyperarousal concept of insomnia on an integrative level.
- Highlight the importance of novel research and treatment approaches and theories for further progress in the field.

Target Audience

Students, Clinicians, Psychologists, Psychiatrists, Physicians

Chairs:

Célyne H. Bastien (Canada)

09:00AM - 09:02AM

Introduction
Scientific Programme

09:02AM - 09:22AM  Dream valence and next day mood in patients with insomnia
                    Megan R. Crawford (United Kingdom)

09:22AM - 09:42AM  REM Sleep and Arousal
                    Dieter Riemann (Germany)

09:42AM - 10:02AM  Dissipation of Emotional Distress
                    Rick Wassing (The Netherlands)

10:02AM - 10:22AM  Lucid Dreaming as an Adjunct Treatment for Insomnia
                    Jason Ellis (United Kingdom)
                    Célyne H. Bastien (Canada)

10:22AM - 10:30AM  Conclusion

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Scientific Programme

09:00AM - 10:30AM

S31: New sleep circuits and their role in disorders

Summary

The recent development of tools for remote control and recording of phenotypically defined population of neurons and circuits like optogenetics, chemogenetics, virally-mediated ablation, fiber photometry and calcium imaging has revolutionized our understanding of the circuits that regulate sleep-wake behaviors. Careful characterization of these circuits will undoubtedly provide a mechanistic explanation of disorders where these circuits have been altered, and may offer novel therapeutic avenues. For this symposium, we propose to cover recent discoveries in neural circuits and behavior research, and what role these circuits play in sleep disorders and related co-morbid diseases. The speakers that composed this symposium are investigators from four different countries (Canada, Switzerland, USA and Japan) representing a wide range of international expertise and backgrounds. This symposium will cover several major disorders (i.e., Insomnia, RBD, Parkinson’s disease and schizophrenia), and will be of the highest interest to both basic research and clinical audiences.

In this symposium, we will present four recently described sleep-wake circuits relevant to sleep medicine. 1) The ventral tegmental area (VTA) circuit induces arousal, and when inhibited engages robust sleep behavior even in the context of strong arousing stimulus. 2) The ventral midbrain/pons (VMP) circuit control the daily amount of sleep and wakefulness through control of the dopaminergic system. Understanding how these circuits interact is of critical importance for patients suffering from insomnia and may provide potential therapeutic targets for this sleep disorder that affects 30% of the population. 3) The sublaterodorsal nucleus (SLD) and the ventral medulla (VM) form the brainstem circuit controlling rapid eye movement (REM) sleep. Neurodegeneration of this circuit has been hypothesized to underlie REM sleep behavior disorder (RBD), offering new avenues for treating RBD as well as neurodegenerative synucleinopathies like Parkinson’s disease. 4) The thalamic reticular nucleus (TRN) has been shown to be a strong modulator of arousal and sleep. Disruption of this circuit triggers symptoms mimicking schizophrenia; hence, understanding its regulation will provide therapeutic insights for this severe mental disorder. There are no doubts that novel molecular and genetic tools (e.g., optogenetics and chemogenetics) have helped dissect the critical neural circuits involved in sleep-wake regulation, and will not only provide insight on the pathobiology of sleep disorders but also offer potential therapeutic strategies that are more focused and with fewer side effects for a variety of diseases.

Learning Objectives

Upon completion of this CME activity, participants should be able to:

- Understand the methodologies used to dissect sleep-wake neural circuit (e.g., optogenetics, chemogenetics and calcium imaging) and how they can be useful in sleep medicine
- Understand how the VTA dopamine circuit and the VMP GABA circuit underlie arousal and potentially insomnia
- Understand the neurodegenerative process that affects the brainstem circuit underlying RBD
- Understand the role that thalamic circuit play in controlling sleep/wake behavior and schizophrenia

Target Audience

Basic science researchers and clinicians

Chairs:

Jimmy Fraigne (Canada)
Carolina Gutierrez-Herrera (Switzerland)
## Scientific Programme

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<tr>
<td>09:02AM -</td>
<td>Introduction</td>
</tr>
<tr>
<td>09:22AM</td>
<td>Pathological alterations in VTA-dopaminergic regulation of arousal</td>
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<tr>
<td>Ada Eban-Rotschild (United States)</td>
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<td>09:22AM -</td>
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<tr>
<td>09:42AM</td>
<td>Sleep-regulating midbrain GABAergic circuitry</td>
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<td>Yo Oishi (Japan)</td>
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<td>09:42AM -</td>
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<tr>
<td>10:02AM</td>
<td>REM sleep circuit underlying REM sleep behavior disorder</td>
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<tr>
<td>Jimmy Fraigne (Canada)</td>
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<tr>
<td>10:02AM -</td>
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<tr>
<td>10:22AM</td>
<td>Thalamic contribution to sleep wake and schizophrenia</td>
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<tr>
<td>Carolina Gutierrez-Herrera (Switzerland)</td>
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<td>10:22AM -</td>
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<td>10:30AM</td>
<td>Conclusion</td>
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<td>10:30AM</td>
<td>Oral abstract, 212-214 - 212</td>
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<td>09:00AM -</td>
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<td>Oral abstract: content to be determined</td>
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S32: Cross-cultural sleep: Sleep around the world and across the lifespan

Summary
Sleep issues are universal, with research indicating significant differences across cultures. Surprisingly, though, few studies have examined sleep cross-culturally. Almost all studies conducted on sleep patterns and sleep health have focused on one country or region. Almost no research has compared sleep patterns and sleep health across countries/regions, by either utilizing similar methodologies and measures or by comparing data across studies in an integrated fashion. These expected cross-cultural differences in sleep are also not specific to one age group but rather span the ages. Thus, the aim of this symposium is to present and consider the cross-cultural contexts and differences, as well as similarities, in sleep patterns, sleep problems, and sleep health across the developmental span, from infants through adolescence to adulthood. Speakers will highlight not only cultural sleep differences, but also the common features. This study of sleep cross-culturally and across the lifespan is expected to contribute to our understanding of the nature of sleep, as well as provide a better understanding of sleep health around the world, which has implications for global interventions that can be universally efficacious.

Dr. Jodi Mindell (Saint Joseph’s University and Children's Hospital of Philadelphia, United States) will present data collected from over 50,000 young children (ages 0-5) from over 25 countries, including North America (US, Canada), South America (Brazil), Europe (UK), Middle East (e.g., Saudi Arabia, Egypt, Algeria), Asia (e.g., China, Japan, India, Malaysia, South Korea), and Australasia (Australia, New Zealand). Data will be presented regarding sleep patterns, sleep ecology, and sleep problems.

Dr. Michael Gradisar (Flinders University, Australia) will present an update of his 2011 publication in Sleep Medicine, which was a meta-analysis of adolescent sleep published in the scientific literature during the 2000s. This new update adds several years of new data to the original study, including new evidence from an additional 3 continents (Africa, South America, Australia). School-night vs weekend bedtimes, wake-up times, and total sleep time, as well as daytime sleepiness and sleep-onset insomnia meta-data will be presented and compared across continents. Potential contributing cultural factors influencing the sleep patterns and problems of teens across the world will be discussed.

Dr. Bizu Gelaye (Harvard Medical School, United States) will present data on prevalence and correlates of chronotype, sleep quality, and sleep apnea from a large multi-country study of college students across four countries (Peru, Thailand, Ethiopia and Chile). Additional data on sleep problems and associated outcomes will be presented from a recent study of working adults in Chile and older adults in Thailand.

Dr. Saverio Stranges (Western University, Canada) will present epidemiological evidence on sleep problems and health in adult populations, across low-, middle- and high-income countries. Among other sleep projects, Dr Stranges led one of the first comprehensive examinations of the burden of sleep problems and associated correlates in low-income settings, among over 40,000 older adults (aged 50 years and over) from eight countries across Africa and Asia, as well as cross-cultural comparisons on the cardio-metabolic implications of sleep problems in high-income countries, such as the US and UK.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Appreciate and understand cross-cultural differences in sleep patterns from around the world in young children through adulthood
- Appreciate and understand cross-cultural similarities in sleep patterns from around the world in young children through adulthood
- Articulate a better understanding of sleep health around the world
- Apply the knowledge to the provision of sleep advice and treatment to promote health for all age individuals, within the consideration of cultural factors
- Appreciate the multifaceted nature of sleep problems and potential health implications

Target Audience
Sleep researchers, sleep medicine physicians, primary care practitioners, psychologists, sleep technicians
## Scientific Programme

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<td>Introduction</td>
</tr>
<tr>
<td>09:02AM -</td>
<td>Sleep patterns and sleep ecology in young children around the world</td>
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<tr>
<td>09:22AM</td>
<td>Jodi Mindell (United States)</td>
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<tr>
<td>09:22AM -</td>
<td>Recent worldwide sleep patterns and problems during adolescence: An updated 2019 review</td>
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<td>09:42AM</td>
<td>and meta-analysis of age, region, and cultural influences</td>
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<td>09:42AM -</td>
<td>Michael Gradisar (Australia)</td>
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<tr>
<td>10:02AM -</td>
<td>Epidemiology of sleep disturbances among African, South East Asian and South American</td>
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<td>10:02AM -</td>
<td>Bizu Gelaye (United States)</td>
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<td>10:22AM</td>
<td>Sleep problems and health in adult populations: A global perspective</td>
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<td>10:22AM -</td>
<td>Saverio Stranges (Canada)</td>
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<td>10:30AM</td>
<td>Conclusion</td>
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<td>09:00AM -</td>
<td>Affiliated Meeting, 220</td>
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<td>09:00AM -</td>
<td>SRS-CSS Frontiers: Sleeping Well and Staying in Rhythm</td>
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<tr>
<td>10:00AM</td>
<td>Summary</td>
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<td>Sleep is important for the brain as well as the body. This symposium includes an exciting</td>
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<td>in both experimental and population-based studies. Our key speakers are renowned experts</td>
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<td>in the field of sleep and health (Dr. Phyllis Zee) and in the associations between sleep</td>
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<td>Learning Objectives</td>
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<td>Upon completion of this CME activity, participants should be able to:</td>
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<td>□ Understanding the associations between sleep, circadian rhythms and metabolic health</td>
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<td>□ Understanding the public health implications of poor sleep on health and disease</td>
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<td>09:00AM -</td>
<td>Target Audience</td>
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<td>10:00AM</td>
<td>Basic and clinical researchers and clinicians</td>
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<tr>
<td>09:00AM -</td>
<td>Sleeping Well and Staying in Rhythm: Implications for Brain and</td>
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<td>10:00AM</td>
<td>Metabolic Health</td>
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<td>Phyllis Zee (United States)</td>
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09:00AM - 10:30AM

Oral Abstract, 216

Oral abstract: content to be determined

Technologist Program, 223-224 - 223

09:00AM - 10:30AM

Technologist workshop: content to be determined

10:00AM - 4:00PM

Exhibition, Exhibition

10:00AM - 10:30AM

Exhibition 2

Affiliated Meeting, 220

10:15AM - 12:00PM

SRS-CSS Frontiers: Sleep: Impact on physiology and public health

Summary
Sleep is important for the brain as well as the body. This symposium includes an exciting range of speakers that will present data linking sleep to brain function and physiology in both experimental and population-based studies. Our key speakers are renowned experts in the field of sleep and health (Dr. Phyllis Zee) and in the associations between sleep and cognitive function (Dr. Nadia Gosselin). Each featured presentation is followed by an oral symposium on a related theme with a broad range of speakers and topics.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Understanding the associations between sleep, circadian rhythms and metabolic health
- Understanding which sleep characteristics are most strongly associated with cognitive function and decline
- Understanding the public health implications of poor sleep on health and disease

Target Audience
Basic and clinical researchers and clinicians

Chairs:
John Peever (Canada)
Kristen Knutson (United States)

10:15AM - 10:40AM

Inflammatory and counter-inflammatory responses to chronic sleep disruption in humans

Monika Haack (United States)
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<td>10:40AM</td>
<td>Sleep, Recovery and Human Performance in Elite Athletes</td>
<td>Charles Samuels</td>
<td>Canada</td>
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<tr>
<td>11:05AM</td>
<td>The Epidemiology of Sleep and Population Health Implications</td>
<td>Chandra L. Jackson</td>
<td>United States</td>
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<td>11:30AM</td>
<td>Human sleep in comparative context: exploring the link between our</td>
<td>David Samson</td>
<td>Canada</td>
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<td>evolutionary history, health, and well-being</td>
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D04: Melatonin use in children: The promise and the peril

Summary
While there is a robust literature supporting the efficacy of melatonin in short-term pediatric clinical trials in special needs populations, many questions remain. For example, recent evidence suggests that over-the-counter preparations of melatonin may vary significantly in terms of actual concentration, and may contain contaminants such as serotonin. There are concerns regarding long-term safety considerations in children, including the impact on the hypothalamic-gonadal axis and the immune system. The appropriate timing and dosage of melatonin for circadian rhythm disorders in adolescents have yet to be determined. This symposium will address a number of fundamental concerns regarding melatonin use in children, including what is currently known regarding melatonin neurophysiology in the developing brain, the challenges of establishing clinical guidelines for melatonin use in the face of somewhat limited empirical evidence, indications for use of melatonin in a variety of pediatric populations, and future directions for research.

Update on the Neurophysiology of Melatonin in Children and Adolescents
This talk will review the neuroanatomy of the retinohypothalmic track, the concepts of entrainment, the ontogeny of sleep and circadian rhythms, and the influence of melatonin in childhood sleep.

Safety of Short Term and Long Term Pharmacologic Treatment with Melatonin in Children
This presentation will review the melatonin safety literature regarding adverse events in general, in special patient populations, and some theoretical safety issues based on melatonin characteristics in seasonal breeding animals.

Melatonin in Children with Autism and Neurodevelopmental Disorders- The Latest Evidence
The results of 3 large randomised-controlled trials of pharmacological and non-pharmacological interventions for children with ASD and sleep problems. Findings from the MENDS immediate release melatonin study and recent studies on a novel, pediatric prolonged-release melatonin will be presented.

Establishing Clinical Guidelines for Melatonin Use in Children
Despite a relative dearth of studies examining the safety and efficacy of melatonin in typically-developing healthy infants, school-age children and adolescents, and conflicting data regarding dosage and timing of administration in relation to the specific type of sleep disturbance, melatonin is one of the most commonly used drug by pediatricians. The aim of this presentation will be to discuss the development and recent (2014) clinical guidelines regarding when and how to use melatonin for sleep disturbances in the pediatric population.

“Vitamin M”: Melatonin and insomnia in children (Owens USA)
This presentation will focus on the evidence from healthcare data bases regarding the increasing use of melatonin in pediatric populations worldwide, healthcare providers and caregivers attitudes and knowledge regarding melatonin use in infants, children, publically available information on the relative efficacy and safety of melatonin use in pediatrics and trends in marketing of melatonin for children and adolescents to caregivers, as well as the array of available products. Future directions for research will also be discussed.

Learning Objectives
Upon Completion of this CME activity, participants should be able to:

- Describe the physiology and anatomy of melatonin and its effects on the developing sleep system
- List the primary safety considerations in the use of melatonin in children
- Outline current clinical trials findings regarding melatonin use in special needs pediatric populations
- Describe the development and specific provisions of clinical guidelines for melatonin use in infants, children and adolescents

Target Audience
Sleep researchers interested in basic developmental physiology of melatonin, clinical sleep researchers and clinical trials specialists interested in pharmacologic treatment of pediatric insomnia and circadian rhythm disorders, clinicians treating insomnia in the pediatric population, and policy makers interested in developing clinical guidelines for use of medication in children and adolescents.

Chairs:
Judith Owens (United States)
**Scientific Programme**

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<tr>
<td>10:47AM</td>
<td><strong>Update on the neurophysiology of melatonin in children and adolescents</strong></td>
<td>Jonathan Lipton (United States)</td>
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<tr>
<td>11:03AM</td>
<td><strong>Safety of short term and long term pharmacologic treatment with melatonin in children</strong></td>
<td>Inge van Geijlswijk (The Netherlands)</td>
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<tr>
<td>11:19AM</td>
<td><strong>Melatonin in children with autism and neurodevelopmental disorders: The latest evidence</strong></td>
<td>Paul Gringras (United Kingdom)</td>
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<tr>
<td>11:35AM</td>
<td><strong>Establishing clinical guidelines for melatonin use in children</strong></td>
<td>Oliviero Bruni (Italy)</td>
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<tr>
<td>11:51AM</td>
<td><strong>“Vitamin M”: Melatonin and insomnia in children</strong></td>
<td>Judith Owens (United States)</td>
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<tr>
<td>12:07PM</td>
<td><strong>Conclusion</strong></td>
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Scientific Programme

10:45AM - 12:15PM

**S34: Sensory–motor network of the restless legs syndrome (RLS): Electrophysiology and imaging**

**Summary**

In recent years, there are most progress on pathophysiology of restless legs syndrome (RLS), especially electrophysiological and neuroimaging researches in sensory-motor disorder of RLS. Novel imaging techniques such as functional MRI and diffusion tractography imaging have demonstrated activation or connectivity changes in the sensory–motor network. The cortex, basal ganglia, cerebellum, thalamus, and their connections seem to play a key part in abnormalities of sensory–motor processing in RLS. Also, RLS patients exhibit increased excitability of the sensorimotor cortex, a remarkable abnormality existing in early somatosensory gating control and an attenuated inhibitory interneuron network by electrophysiological magnetoencephalography. But in vivo excitability studies on motor and sensory axons of the median nerve provide evidence that the increased excitability of peripheral motoneurons but not sensory axons contributes to the pathophysiology of RLS. And RLS like tics in Tourette’s syndrome, the movement disorders are modulated by internal and external sensory signals and that abnormal sensorimotor integration might alter normal motor control. Reduced short-latency afferent inhibition, a marker for sensorimotor integration, has been shown with transcranial magnetic stimulation (TMS) in RLS patients. Further, low-frequency rTMS on S1-M1 connectivity alleviated the sensory–motor complaints of RLS patients by modulating cortical excitability and inducing short-term synaptic plasticity.

We want to hold a symposium to have topic on sensory–motor network of RLS, to provide the electrophysiological and imaging evidence for the abnormality of sensory–motor network and gain novel insight into physiopathologic mechanism of RLS in order to better guide the treatment.

**Learning Objectives**

Upon Completion of this CME activity, participants should be able to:

- the abnormal central sensory process of RLS
- the abnormal excitability of sensory and motor cortex of RLS
- the abnormal sensorimotor integration of RLS
- the changes on neural activity and connectivity in region related to sensory and motor process of RLS
- the neuromodulation of sensory–motor network in RLS

**Target Audience**

Those with an interest in sleep medicine and research, restless legs syndrome, movement disorder, electrophysiology, neuroimaging and neuromodulation

**Chairs:**

Richard Allen (United States)

10:45AM - 10:47AM

**Introduction**
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<th>Location</th>
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<tr>
<td>10:47AM</td>
<td>fMRI: Connectivity and sensory-motor systems in RLS</td>
<td>Yong Won Cho (Republic of Korea)</td>
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<tr>
<td>11:03AM</td>
<td>The mechanism of sensory disorder in RLS based on MEG</td>
<td>Yuping Wang (China)</td>
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<td>11:03AM</td>
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<tr>
<td>11:19AM</td>
<td>Non-invasive brain stimulation and RLS: Clinical, electrophysiological</td>
<td>Giuseppe Lanza (Italy)</td>
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<td>and neuroplastic effects</td>
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<tr>
<td>11:35AM</td>
<td>The sensory experience of RLS and its relationship to pain, itch and</td>
<td>John Winkelman (United States)</td>
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<td></td>
<td>Tourette’s</td>
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<tr>
<td>11:51AM</td>
<td>Peripheral mechanisms in Restless Legs Syndrome</td>
<td>Dirk Czesnik (Germany)</td>
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<td>12:07PM</td>
<td>Conclusion</td>
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Scientific Programme

Pediatric Symposium, 121-122 - 121

10:45AM - 12:15PM

S35: Progression of childhood sleep-disordered breathing - natural and after intervention

Summary
Childhood sleep-disordered breathing (SDB) is a spectrum spanning from individuals with regular snoring yet normal sleep study to obstructive sleep apnoea (OSA). Latter belongs to the severe end of this spectrum and can lead to a variety of complications if it is unrecognized and left untreated. Childhood and adult OSA share some similarities in terms of pathophysiology, namely anatomically narrow upper airway, and/or increase in airway collapsibility, and/or alterations of neuromuscular tone. However, they are pretty distinct disease entities because of different underlying aetiologies. During childhood, the most common cause is adenotonsillar hypertrophy, while approaching adulthood, obesity becomes the more common predisposing factor. Understanding the natural history of SDB can help us predict disease course, perform risk stratification with individual characteristics and guide us in management. More importantly, longitudinal data will help answer the question of whether childhood OSA predisposes an individual to the development of adult OSA. Furthermore, information and progress related to post OSA intervention are essential when we counsel parents and patients regarding the most suitable treatment options and prognosis.

In this symposium, the various speakers will discuss on the following topics that aim to provide an up-to-date review on natural progression of SDB and longer term outcomes following OSA intervention:
- What happens to a child with primary snoring with time, is he morbidity free?
- Longitudinal follow-up data from a Chinese cohort to examine predictors of SDB resolution
- Findings from Penn State longitudinal cohort to evaluate predictors for incident SDB
- The cohort study of Pediatric OSA following surgery treatment
- Are OSA related complications reversible following intervention

Learning Objectives
Upon completion of this CME activity, participants should be able to:

☐ Have a better grasp of the natural history of primary snoring and OSA in children, and the information gathered will help them in disease management

☐ Have a greater understanding of predictors for OSA occurrence and resolution in adulthood

☐ Acquire knowledge for patient counseling in relation to longer term outcomes following intervention for childhood OSA

Target Audience
Pediatricians, ENT surgeons, nursing colleagues and allied health care workers interested in childhood sleep-disordered breathing

Chairs:
Albert Martin Li (Hong Kong)

10:47AM

Introduction
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<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker</th>
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<tr>
<td>10:47AM -</td>
<td>What happens to a child with primary snoring with time, is he morbidity free?</td>
<td>Chun Ting Au (Hong Kong)</td>
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<tr>
<td>11:03AM -</td>
<td>Longitudinal follow-up data from a Chinese cohort to examine predictors of SDB resolution</td>
<td>Kate Chan (Hong Kong)</td>
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<tr>
<td>11:19AM -</td>
<td>Findings from Penn State longitudinal cohort to evaluate predictors for incident SDB</td>
<td>Edward Bixler (United States)</td>
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<td>11:35AM -</td>
<td>The cohort study of Pediatric OSA following surgery treatment</td>
<td>Yu-Shu Huang (Taiwan)</td>
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<tr>
<td>11:51AM -</td>
<td>Are OSA related complications reversible following intervention?</td>
<td>Rosemary Horne (Australia)</td>
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<tr>
<td>12:07PM -</td>
<td>Conclusion</td>
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Scientific Programme

Basic Science Symposium, 211

10:45AM - S36
12:15PM

S36: What else can we learn from sleep oscillations?

Summary

Brain activity during sleep is characterized by a wide spectrum of oscillatory activities. The use of high-density scalp EEG and intracranial recordings in human and rodents during sleep have revealed a complex landscape of region-specific oscillations in what was previously assumed to be a ‘uniform’ pattern of brain activity. These oscillations include slow waves, spindles and theta rhythms and reflect patterned activities of anatomically distinct neuronal circuits located in, or encompassing, the cortex, thalamus or hippocampus structures. A major challenge in sleep research and sleep medicine is to better understand the neurobiological mechanisms orchestrating sleep oscillation in time and space to shine light on the structure and the functions of sleep in animal models and humans, as well as make important advances in prevention and treatment of brain disorders. This symposium will focus on the oscillatory nature of neural circuits in the sleeping brain at different levels of organization studied using a variety of experimental models and approaches. The main goal of the symposium will be to provide the audience with recent results and novel concepts on the basic mechanisms and function of sleep oscillations. In agreement with the title of the symposium ‘What else can we learn from sleep oscillations about...” each speaker will offer their perspective on the origin and the role of brain activity during sleep. The first speaker, Prof. A Adamantidis (Bern, Switzerland) will describe the dynamics of single cell activity underlying sleep states studied using electrophysiological recordings, calcium imaging and optogenetics. Then, Prof. V. Vyazovskiy (Oxford, UK) will discuss local and global aspects of sleep homeostasis, and Dr K. Benchenane (Paris, France) will provide novel insights into the sleep-wake state related activities in non-canonical brain structures, such as the olfactory bulb. Next, Dr M. Boly (Madison, USA) will address how oscillatory brain dynamics can inform us about the presence of conscious experience in specific sleep stages and also under anesthesia and in disorders of consciousness. Finally, Prof. R. Benca (Irvine, USA) will discuss recent advances provided by the use of high-density EEG in patients with neuropsychiatric conditions, and describe how sleep changes mediate these disorders or some of their associated symptoms.

Learning Objectives

Upon completion of this CME activity, participants should be able to:

□•Learn about the state-of-the-art techniques used in sleep research (both animal and human)
□•Improve their knowledge of the global and local regulation of sleep and consciousness
□•Appreciate the importance of global and local regulation of brain circuits during sleep
□•Be exposed to novel (unpublished) results on brain mechanisms of sleep oscillations
□•Update their knowledge on the relationship between sleep and psychiatric disorders

Target Audience

Trainees, PIs, PhD or MD with background in either a molecular, cellular or system neuroscience, animal and human sleep research; translational researchers, clinicians

Chairs:

Antoine Adamantidis (Switzerland)
Vladyslav Vyazovskiy (United Kingdom)
### Scientific Programme

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<th>Time</th>
<th>Topic</th>
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<tr>
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<tr>
<td>10:47AM</td>
<td>Cellular dynamics of thalamo-cortical circuits across sleep states</td>
<td>Antoine Adamantidis (Switzerland)</td>
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<td>11:03AM</td>
<td>Local and global aspects of sleep homeostasis</td>
<td>Vladyslav Vyazovskiy (United Kingdom)</td>
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<td>11:19AM</td>
<td>Harnessing olfactory bulb oscillations to perform fully brain-based sleep-scoring</td>
<td>Karim Benchenane (France)</td>
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<td>11:35AM</td>
<td>Brain oscillations, sleep states and consciousness</td>
<td>Melanie Boly (United States)</td>
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<td>11:51AM</td>
<td>High-density EEG in sleep and mental disorders</td>
<td>Ruth M. Benca (United States)</td>
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<tr>
<td>12:07PM</td>
<td>Conclusion</td>
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</table>
**Scientific Programme**

**10:45AM - S37**

### S37: Novel biomarkers in sleep and circadian research: Requirements and real-world applications

**Summary**

The search for novel biomarkers for sleep and circadian disruption has been propelled by new technologies such as the omics revolution and novel data analysis methods such as machine learning. Amidst these new opportunities, there is a need for evaluation of the biomarkers developed against requirements that arise from sleep and circadian biology and real-world scenarios. This symposium will explore the theoretical concepts and approaches to sleep and circadian rhythm biomarker discovery and will provide an overview of novel approaches to biomarker discovery and their value for sleep and circadian rhythm research and real-world applications. The symposium will be chaired by Simon Archer (UK) who has worked on the development and validation of human blood-based transcriptome biomarkers for sleep and circadian rhythms and is a member of the ESRS-EBRS biomarker task force.

Julie Carrier (Canada) and Jeanne Duffy (USA) will each give a short overview of the requirements and criteria to be used in the development and evaluation of novel biomarkers for sleep and circadian rhythms, respectively. They will discuss the case for developing biomarkers for the sleep field and beyond. A review of critical features that a useful biomarker should capture, protocol features important in collecting data for sleep and circadian rhythm biomarkers, and test populations for validating biomarker robustness will be discussed.

Alterations in the microbiome-gut-brain-axis are associated with poor health and poor cognitive outcomes. Ken Wright (USA) will present findings from research studies designed to determine the influence of combined sleep restriction and circadian misalignment on the microbiota-gut-brain axis (MGB), characterize stability of individual differences in MGB, and determine associations with an objective measure of alertness in humans.

Joshua Gooley (Singapore) will present data from a study to investigate whether baseline measures of psychomotor vigilance test (PVT) performance and heart rate variability can be used to estimate individual differences in drowsy driving. He will present data showing that subjects with more than one PVT lapse or with higher heart rate variability had significantly shorter survival times to their first drowsy driving event. The findings indicate that baseline measures of PVT performance and heart rate variability carry information about a person’s risk of drowsiness-related driving events following exposure to total sleep deprivation. Emma Laing (UK) will present computational approaches to identify candidate blood-based mRNA biomarkers for predicting the status of an individual at multiple ‘levels’: molecular (e.g. circadian disruption), physiological (e.g. lack of sleep), and cognitive (e.g. task performance).

**Learning Objectives**

Upon completion of this CME activity, participants should be able to:

- Understand the potential of biomarker discovery for sleep research and sleep medicine
- Understand the theoretical considerations and limitations for sleep and circadian rhythm biomarker development
- Be aware of multi-level approaches that can be used in biomarker discovery
- Have an up-to-date realization of how laboratory-based biomarker discovery can be applied to real-life situations

**Target Audience**

Basic and clinical sleep scientists with an interest in the development and application of biomarkers for sleep and circadian rhythm disruption and associated phenotypes.

**Chairs:**

Simon Archer (United Kingdom)
Scientific Programme

10:45AM - 10:47AM  Introduction

10:47AM - 11:03AM  Biomarkers for circadian rhythmicity: considerations for development and validation

11:03AM - 11:19AM  Biomarkers for sleep: considerations for development and validation

11:19AM - 11:35AM  Microbiome related biomarkers of alertness during sleep and circadian disruption

11:35AM - 11:51AM  Baseline predictors of drowsy driving performance

11:51AM - 12:07PM  Blood transcriptome-based biomarkers for the multi-level assessment of sleep and circadian perturbations in humans

12:07PM - 12:15PM  Conclusion
Scientific Programme

10:45AM - 12:15PM
S38: Sleep in elite athletes: Implications for performance and recommendations for optimal recovery

Summary
The scientific literature on the role of sleep in athletes has exponentially increased in the last decade and therefore, sports medicine/science staff now understand the potential for sleep to enhance athletic performance and recovery. Sleep is considered a vital component for both physical and mental recovery from exercise and hence, coaches and athletes rate it as the best recovery strategy available. Unfortunately, acute sleep disruption in athletes is not unusual; sleep impairments have been commonly observed in individual sport athletes due to habitual early morning training and may also occur in team sport athletes due to night matches. Several other factors may also negatively influence sleep in athletes, including chronotype, high-volume and/or intensity training, pre-competition anxiety and long-haul travel. Therefore, the aims of the present symposium will be to: 1) Describe how an athlete’s chronotype and training/competition schedule may influence their sleep behavior, including the reciprocal relationship between sleep and exercise; 2) Describe the impact of long-haul travel on sleep and physical performance, and provide evidence-based strategies to counteract these effects; 3) Highlight the role of napping for athletes, specifically indicating the importance of nap duration and timing to achieve optimal benefits in a training and competition setting; 4) Present the methods commonly used to monitor athlete’s sleep and highlight the reliability and validity of these various methods; and 5) Provide evidence-based solutions to mitigate sleep disruption in athletes and present some novel, state of the art and sleep hygiene strategies to improve athletes’ sleep and recovery.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Understand the role of sleep for elite athletes’ health, performance and recovery
- Understand how to manage common factors that can disrupt athletes sleep: long-haul travel, training/competition schedules and training volume and/or intensity
- Understand the reciprocal relationship between sleep and exercise. Not only is this related to athletes, but also the health and wellness of the general population
- Understand the advantages and disadvantages of the various methods that commonly used to assess athletes sleep
- Understand the advantages and disadvantages of the various methods that commonly used to assess athletes sleep

Target Audience
Experts in sport science, chronobiology applied to sport science, and researchers with an interest in the interaction between exercise and sleep, particularly in athletic populations; experts in sleep research

Chairs:
Shona Halson (Australia)
Jacopo A. Vitale (Italy)
Scientific Programme

10:45AM - 10:47AM  Introduction
10:47AM - 11:03AM  The influence of chronotype and training schedules on athletes’ sleep
                          Jacopo A. Vitale (Italy)
11:03AM - 11:19AM  How to assess athletes' sleep? The pros and cons of common methods
                          Mathieu Nedelec (France)
11:19AM - 11:35AM  The impact of long-haul travel on sleep and evidence-based solutions
                          Peter Fowler (Australia)
11:35AM - 11:51AM  To nap or not to nap? Possible benefits and risks for athletes
                          Michele Lastella (Australia)
11:51AM - 12:07PM  State of the art on non-invasive sleep hygiene strategies to improve athletes’ sleep
                          Shona Halson (Australia)
12:07PM - 12:15PM  Conclusion
Scientific Programme

Symposium, 216

10:45AM - 12:15PM S33

S33: Update on non OSA sleep breathing abnormalities: upper airway resistance syndrome and inspiratory flow limitation

Summary

UARS (Upper Airway Resistance Syndrome) and IFL (Inspiratory Flow Limitation) are considered as non OSA breathing abnormalities during sleep. However, the importance of these mild sleep breathing disorders is still under debate. Despite their frequency and clinical relevance, few international efforts have been made towards consensus definition. The purpose of this symposium is to bring together experienced sleep researchers and clinicians to discuss the current evidence and encourage discussion for future directions.

Symposium lectures

- Defining UARS: Which parameters should be scored? RERAs, IFL or both? (JL Pepin)
- UARS data from Follow Up of Sao Paulo epidemiological study. (Luciana Palombini)
- Is there a specific UARS phenotype? (Avram Gold)
- What are the evidences currently available that UARS is a distinct syndrome? (Christian Guilleminault)
- Discussion IFL: update on evidences and perspectives for consensus on the analysis and scoring in PSG among sleep specialists. (David Rapoport)

Learning Objectives

Upon completion of this CME activity, participants should be able to:

- Update knowledge regarding currently data on UARS and IFL
- Understand the importance of IFL on sleep breathing disorders
- Contribute to future planning on studies on IFL and UARS

Target Audience

Sleep medicine professionals

Chairs:

Luciana Palombini (Brazil)
Dalva Poyares (Brazil)

10:45AM - 10:47AM Introduction

10:47AM - 11:07AM Lecture 1

Christian Guilleminault (United States)

11:07AM - 11:27AM Lecture 2

JL Pepin (France)
Scientific Programme

11:27AM - Lecture 3
11:47AM
Avram Gold (United States)

11:47AM - Lecture 4
12:07PM
Susan Redline (United States)

12:07PM - Conclusion
12:15PM

10:45AM - Technologist workshop: content to be determined
12:15PM
Technologist Program, 223-224 - 223
Satellite Symposium, BR A - Ballroom A

12:30PM - 2:00PM

**Excessive daytime sleepiness in patients with OSA: Impact, causes and treatment strategies**

**Summary**

Patients with obstructive sleep apnea (OSA) who remain excessively sleepy despite use of continuous positive airway pressure (CPAP) present a long-standing clinical dilemma. Quantifying the degree of excessive daytime sleepiness (EDS) and the impact on quality of life and function is clinically important. Identifying the cause of EDS in OSA patients is critical. Adequacy of therapy with CPAP is pivotal. Concomitant sleep disorders can coexist with OSA and should be ruled out, as should mood disorders (which can be associated with hypersomnolence), neurologic conditions, and other comorbidities. In addition, many medications have sedating side effects. Therefore, careful history-taking is essential, and clinical tools such as patient questionnaires can be useful to proactively monitor EDS in OSA.

Recent research indicates that OSA can lead to brain alterations that increase sleepiness, and one of the major consequences of OSA syndrome (the combination of OSA and EDS) is an impact on neurocognitive functioning. Because many patients have OSA for many years before seeking treatment, it may be that years of intermittent hypoxia or sleep fragmentation have caused damage to brain regions, and this cannot be completely reversed on initiation of CPAP therapy. Therefore, identifying early, targeted treatment of patients at highest risk of developing EDS is prudent.

Effective management of OSA patients with EDS includes recognition of clinical occurrence and impact, definition of etiology, and treatment intervention. Non-pharmacologic treatment of EDS in OSA patients includes emphasizing cognitive therapy with appropriate quantity and quality of sleep as well as lifestyle changes. Optimizing CPAP treatment is imperative. Modafinil and armodafinil are non-amphetamine wakefulness promoters that are used in patients with OSA and residual sleepiness despite CPAP treatment. An emerging potential therapy recently reported for EDS in patients with OSA is solriamfetol, a selective dopamine and norepinephrine reuptake inhibitor with wake-promoting effects. This symposium will provide sleep clinicians with 1) up-to-date research exploring the prevalence and impact of EDS in OSA patients; 2) causes of EDS in OSA including a relationship between neuronal injury and excessive sleepiness; 3) clinical tools to proactively monitor EDS in OSA; 4) clinical pearls to improve accuracy in determining the cause of the EDS; and 5) best practices for nonpharmacologic (behavioral) and pharmacologic management of EDS in patients with OSA.

**Learning Objectives:**

- Describe best practices in identifying OSA patients with residual daytime sleepiness and determining the causes of residual daytime sleepiness
- Discuss nonpharmacologic treatments for excessive daytime sleepiness in OSA patients
- Interpret data with pharmacologic therapies and identify appropriate settings for use

**Target Audience**

This educational activity is intended for physicians and other healthcare professionals involved in the management of sleep disorders.

**Chairs:**

Richard Bogan (United States)
Scientific Programme

12:30PM - 12:35PM
Introduction
Richard Bogan (United States)

12:35PM - 1:00PM
OSA Patients with Residual Daytime Sleepiness: Who Are the Patients? What Are the Causes?
Patrick Strollo (United States)

1:00PM - 1:25PM
Treatment of Residual Daytime Sleepiness in OSA Patients
Atul Malhotra (United States)

1:25PM - 1:50PM
Case Presentations
Richard Bogan (United States)

1:50PM - 2:00PM
Take-Home Tips for Clinical Practice

12:30PM - 2:00PM
Industry Symposium

12:30PM - 2:00PM
Harmony Biosciences

12:30PM - 2:00PM
Industry Symposium: OSA

12:30PM - 2:00PM
Merck Industry Symposium: Insomnia

2:00PM - 2:45PM
K08: Sleep-related breathing disorders
Drager

2:00PM - 2:02PM
Introduction

2:02PM - 2:45PM
Sleep-related breathing disorders
Luciano Drager (Brazil)
Scientific Programme

2:00PM - 2:45PM
Meet the Professor
Chairs:
Richard Bogan (United States)

2:00PM - 2:45PM
Panel Discussion
Patrick Strollo (United States)
Atul Malhotra (United States)
Richard Bogan (United States)

2:00PM - 2:45PM
Yanagisawa K06: Toward the mysteries of sleep
Summary
Although the executive neurocircuitry and neurochemistry for sleep/wake switching has been increasingly revealed in recent years, the fundamental mechanism for homeostatic regulation of sleep, as well as the neural substrate for “sleepiness” or sleep need, remains unknown. We have initiated a large-scale (>9,000 mice thus far) forward genetic screen of sleep/wake phenotype in ENU-mutagenized mice based on EEG/EMG measurements. By combining linkage analysis, whole-exome sequencing and genome editing, we have identified the causal mutations in several pedigrees with marked sleep abnormalities (Nature 539:378-383, 2016). We expect that the mutated genes will provide new insights into the elusive cellular/molecular pathway regulating sleep. Indeed, through a systematic cross-comparison of the hypersomnia Sleepy mutants and sleep-deprived wildtype mice, we have recently found that the cumulative phosphorylation state of a specific set of mostly synaptic proteins may be the molecular substrate of sleep need (Nature 558:435-439, 2018).

2:00PM - 2:02PM
Introduction
2:02PM - 2:45PM
Mysterious molecular basis of sleep need
Masashi Yanagisawa (Japan)
Restless legs syndrome (RLS) is a common chronic neurological disorder that manifests through sensorimotor symptoms that interfere with rest and sleep. It has a wide spectrum of symptom severity affecting not only quality of life but also possibly increasing cardiovascular risk.

Our knowledge on the causes and mechanisms of RLS is still limited: several susceptible single nucleotide polymorphisms such as BTBD9 and MEIS1, which are thought to be involved in embryonic neuronal development, have been reported to be associated with RLS. An increasing number of studies have suggested an important role of brain iron deficiency in the pathophysiology of RLS. Moreover, a number of recent preclinical and clinical studies suggest a hypoadenosinergic state leading to hypersensitive cortico-striatal input and leading to a striatal presynaptic hyperglutamatergic and hyperdopaminergic neurotransmission. Understanding the interplay between these dysfunctional striatal circuitries might be crucial to develop new therapeutic targets.
S39: New insights into the pathophysiology, clinical manifestations and treatment of sleep related eating disorder

Summary
Sleep-related eating disorder (SRED) is a female predominant condition characterized by recurrent episodes of eating at the transition from night-time NREM sleep to arousal. Level of consciousness during SRED episodes ranges from partial consciousness to dense unawareness typical of somnambulistic episodes. Patients who seek medical assistance are likely to show a chronic course with near-nightly eating episodes and suffer from a variety of consequences such as weight gain and psychological distress.

The current data indicate that the appearance of SRED is sometimes associated with several factors including genetic background, use of psychotropic medication and the existence of psychiatric disorders as well as other sleep disorders. Night eating syndrome (NES) is another important condition in the disordered night-time eating spectrum showing hyperphagia episodes in the evening prior to sleep.

While SRED and NES have been described as independent categories, some features overlap and the coexistence of these two disorders is recognized in a certain number of patients. Considering this, there has been some argument about similarities and differences between them. NES has been speculated to appear based on an abnormality in the circadian rhythm of meal timing but with a normal circadian timing of sleep onset. Given that SRED and NES share some similarities in phenotype, it is possible that circadian misalignment is partially involved in the mechanism of SRED. Taking these together, the mechanism of SRED is thought to be heterogenous, and patients require careful treatment selection corresponding to respective backgrounds/mechanism of the disorder.

In this symposium, we firstly would like to introduce recent study results regarding the background factors of SRED focusing on other sleep disorders including parasomnias, narcolepsy, restless legs syndrome and periodic limb movements during sleep. Secondly, the relationship of mood disorders and psychotic disorders to the occurrence of SRED with consideration of the influence of psychotropic drugs will be presented. Thirdly, we would like to make a comparison of the mechanism and clinical manifestation between SRED and NES with both clinical and basic research perspective. We also would like to discuss the possible contribution of circadian misalignment to the occurrence of SRED and the adverse effect of night eating on the metabolic control system. Finally, recent advances in the pharmaceutical treatment of SRED including topiramate, SSRIs and melatonergic drugs will be presented.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- The background factors that cause or trigger SRED
- Similarity and difference in the mechanism and clinical manifestation between SRED and NES
- The relationship between the circadian system and metabolic control
- The current treatment strategy for SRED based on pathophysiology and clinical characteristics

Target Audience
Sleep scientists and sleep medicine specialists

Chairs:
John Winkelman (United States)
Yuichi Inoue (Japan)
Scientific Programme

3:00PM - 3:02PM  Introduction
3:02PM - 3:18PM  The Borderlands of Sleep Related Eating Disorder  Carlos Schenck (United States)
3:18PM - 3:34PM  The associated factors of SRED in the general population  Yuichi Inoue (Japan)
3:34PM - 3:50PM  Sleep related eating disorder in psychiatric populations  Yun Kwok Wing (Hong Kong)
3:50PM - 4:06PM  Meal timing: Circadian control and metabolic consequences  Frank Scheer (United States)
4:06PM - 4:22PM  What Works for the Treatment of Sleep-related Eating Disorder  John Winkelman (United States)
4:22PM - 4:30PM  Conclusion
Panel Discussion, 118

3:00PM - 4:30PM

D05: The International Sleep Research Training Program (ISRTF) of World Sleep Society

Summary
World Sleep Society (WSS) has initiated an International Sleep Research Training Program (ISRTF) to provide training to International trainees (i.e., post-doctoral students with Ph.D., M.D., or equivalent degrees) in sleep research. The overarching goal of the program is to prepare sleep trainees from various countries throughout the world for future leadership in basic and/or clinical sleep research. Currently, there is not a formalized process to select the best international trainees; most academic sleep centers do not have a formal curriculum or rigorous selection process to choose trainees whom have the best education/backgrounds and/or whom might benefit from a 1-year comprehensive training program. The ISRTF will provide an opportunity for such trainees, especially those in underserved countries, to train at major academic institutions (Harvard University, Stanford University, University of Oxford, University of Pennsylvania, University of Sydney) so they can acquire sleep research skills from experienced investigators. In turn, the program will foster a cohort of future sleep research leaders who will keep the field of sleep medicine and research vibrant with their ideas, plans, and goals.

The purpose of this Discussion Group is for the Steering Committee of this program (directors of the 5 sites, and representatives from the WSS Education and Examination Committees) to discuss the goals, curricula, short-term and long-term learning objectives, outcomes, timeline, applicant selection process, ensuring the future success of the trainees, and challenges for the program.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Understand the goals and learning objectives of the program
- Discuss the current state of sleep trainees in different regions of the world
- Explore the opportunities and challenges of international sleep trainees

Target Audience
Potential mentors and trainees for this program

<em>This educational initiative is supported by Philips.</em>

Chairs:
Clete Kushida (United States)

3:00PM - 3:02PM
Introduction

3:02PM - 3:12PM
Sleep Research Opportunities at Stanford University
Clete Kushida (United States)

3:12PM - 3:22PM
Sleep Research Opportunities at Harvard University
Susan Redline (United States)
### Scientific Programme

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<td>Sleep Research Opportunities at the University of Oxford</td>
<td>Simon Kyle (United Kingdom)</td>
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<td>3:32PM - 3:42PM</td>
<td>Sleep Research Opportunities at the University of Pennsylvania</td>
<td>Allan Pack (United States)</td>
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<td>3:42PM - 3:52PM</td>
<td>Sleep Research Opportunities at the University of Sydney</td>
<td>Brendon Yee (Australia)</td>
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<td>3:52PM - 4:02PM</td>
<td>Sleep Research Opportunities in Brazil</td>
<td>Dalva Poyares (Brazil)</td>
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<td>4:02PM - 4:12PM</td>
<td>Sleep Research Opportunities in Germany</td>
<td>Thomas Penzel (Germany)</td>
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<td>4:12PM - 4:22PM</td>
<td>Current Trainee Experience</td>
<td>Adell Xu (China)</td>
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<td>4:22PM - 4:30PM</td>
<td>Conclusion</td>
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S41: Treatment of insomnia in co-morbid obstructive sleep apnea and insomnia

Summary
Reviews have shown a high prevalence (40-60%) of insomnia in those diagnosed with obstructive sleep apnea (OSA). Those with co-morbid insomnia/OSA (COMISA) have higher morbidity than those suffering either disorder alone. Positive airway pressure (PAP) is the indicated treatment for OSA yet suffers poor acceptance and adherence. Evidence shows that co-morbid insomnia reduces acceptance and adherence to PAP therapy. Most sleep clinics around the world specialize in the diagnosis and treatment of OSA and may often overlook the presence of insomnia in their patients thereby under-treating this COMISA group.

Cognitive behavior therapy for insomnia (CBTi) has been shown to be an effective and durable treatment for insomnia without significant side effects and is recommended over drug treatment for insomnia. The series of speakers in this symposium will present the results of large (all N>121) randomized controlled trials investigating the adjunct use of CBTi in the treatment of insomnia in patients with COMISA. All trials measured outcomes of PAP adherence and sleep quality. One trial assessed the effectiveness of pre-treating the insomnia with therapist led CBTi before introduction of PAP therapy. The second trial compared treatment of the insomnia before with insomnia treatment concurrent with the beginning of PAP therapy to assess when it is best to use CBTi to treat the insomnia component of this co-morbid condition. The third trial treated the insomnia concurrent with CPAP therapy using an on-line CBTi program and additional CBTi if needed. The fourth trial used an integrated CBTi treatment with a PAP adherence program with ongoing PAP treatment in these co-morbid patients.

In these pivotal trials, several important outcome measures are compared between the insomnia treated and untreated groups including sleep quality from polysomnography, actigraphy, sleep diaries, and quality of life questionnaires. The symposium will present the latest findings in this important area of clinical research.

This symposium in World Sleep 2019 will raise the awareness of the sleep community to the high prevalence and negative impact of co-morbid OSA/insomnia and its past treatment inadequacies and challenges. The most obvious approach would be to treat the co-morbid insomnia with CBTi. This symposium will explore the success of CBTi both before the introduction of PAP, concurrent with PAP and combined with therapies directly addressing PAP adherence. The findings could lead to a change in the operation of sleep clinics around the world by introducing diagnostic processes for the detection of co-morbid insomnia and putting in place the best modes of treating it either before or concurrently with the introduction of PAP therapy.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Appreciate the high prevalence and high morbidity of co-morbid insomnia/OSA
- Appreciate the effectiveness of cognitive/behavior therapy for the treatment of insomnia (CBTi) that is co-morbid with OSA
- Understand the different sequencing and modes with which CBTi can be effectively used to improve PAP adherence and overall sleep quality
- Understand how this area of clinical research can raise the importance of diagnosing and treating insomnia in sleep clinics world-wide that have previously focused primarily on OSA

Target Audience
Researchers and clinicians involved in clinical research and practice in the treatment of obstructive sleep apnea and insomnia

Chairs:
Leon Lack (Australia)
Scientific Programme

3:00PM - 3:02PM  Introduction

3:02PM - 3:22PM  The combination of CBTi and CPAP therapy in the treatment of co-morbid insomnia and sleep apnea
                   Alexander Sweetman (Australia)

3:22PM - 3:42PM  Treating COMISA in a multidisciplinary sleep clinic: Does sequence of treatment matter?
                   Jacon C. Ong (United States)

3:42PM - 4:02PM  Online and in-person Cognitive Behavioral Therapy for insomnia co-occurring with sleep apnea
                   Jack Edinger (United States)

4:02PM - 4:22PM  Using sleep coaches to provide integrated behavioral treatment for insomnia and PAP adherence in US veterans
                   Cathy Alessi (United States)

4:22PM - 4:30PM  Conclusion
Scientific Programme

3:00PM - 4:30PM

Basic Science Symposium, 211

S42: Genetic and Epidemiological Triggers of Sleepiness - from natural variation to severe sleep disorders

Summary
This symposium will summarize the latest findings in sleepiness, the effect of sleepiness on diseases and the severe sleep disorders with core disease component of sleepiness (narcolepsy, excessive daytime sleepiness and Kleine-Levin Syndrome). In addition, we will present the triggering factors for natural and pathological sleepiness disorders and their recent discovered underlying biological mechanisms as well as unpublished work. This symposium comprises five talks that specifically address the following topics. 1) What affects normal variation in sleepiness in population level 2) What are the genetic and environmental triggers behind hypersomnia disorders 3) How is sleepiness connected with disease predisposition. Finally, this symposium shows the known triggers and mechanisms in severe sleepiness, most notably in narcolepsy and Kleine-Levin Syndrome. Data presented comprises clinical cohorts, large scale population cohorts, electronic health records and functional biological assays where the exact disease mechanisms have been measured both in humans and in model organisms.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Understand the spectrum of sleepiness from natural variation to severe sleep disorders
- Have an overview of the environmental and genetic triggers
- Discover the novel predisposing factors that lead to the development of these disorders.

Target Audience
Clinical fellows interested in sleepiness, treating type 1 or type 2-narcolepsy, hypersomnia or extreme daytime sleepiness. Basic scientists interested in the molecular mechanisms of sleep disorders and pathways controlling normal sleep regulation

Chairs:
Hanna M. Ollila (United States)

3:00PM - 3:02PM
Introduction

3:02PM - 3:18PM
Genetic association analyses for excessive daytime sleepiness
Heming Wang (United States)

3:18PM - 3:34PM
USF1 ties metabolism to chronotype and sleepiness
Nasa Sinnott-Armstrong (United States)

3:34PM - 3:50PM
Kleine Levin Syndrome is strongly associated with variants at TRANK1 locus and genes involved in the regulation of rhythmic behaviours
Aditya Ambati (United States)
### Scientific Programme

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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</table>
| 3:50PM - 4:06PM | **Electronic health records define novel genetic and environmental triggers for sleepiness and narcolepsy**  
Hanna M. Ollila (United States) |
| 4:06PM - 4:22PM | **CD8 T-cell autoreactivity in type 1 narcolepsy**  
Birgitte Kornum (Denmark) |
| 4:22PM - 4:30PM | **Conclusion** |

### Summary

Obstructive sleep apnea (OSA) is a common condition, with numerous co-morbidities. The major pathophysiological changes in OSA are frequent arousals and intermittent hypoxia due to partial or completed upper airway including the pharyngeal collapse. The current main treatment of OSA is continuous positive airway pressure (CPAP) which could not be tolerated by many patients, although substantial efforts have been made to improve CPAP compliance. It is critical to understand pharyngeal function and mechanism of arousal and to develop alternative new treatments for OSA. This symposium covers from bench science to clinical medicine and will focus on upper airway physiology including assessment of laryngeal function using endoscopic techniques, inspiratory muscle activity and its coordination with the upper airway muscles, in particular, genioglossus, will be discussed. The new insight into the mechanism of arousal and its contribution to phenotype of OSA would be introduced. After introduction of physiological change of upper airway a novel treatment with transvenous electrical stimulation of hypoglossal nerve will be introduced for OSA treatment. Finally, the development of potential new drug targeting on upper airway dilator muscle for treatment of OSA would be introduced.

### Learning Objectives

Upon completion of this CME activity, participants should be able to:

- Understand upper airway physiology including assessment of laryngeal function, respiratory muscle function and coordination between pump muscle and genioglossus muscle
- Understand the arousal mechanism related to sleep apnea events and its roles on OSA phenotype
- Know the new incoming treatments including transvenous electrical stimulation and drug treatment targeting on upper airway muscles

### Target Audience

Physicians, scientists including physiologists and technicians.

### Chairs:
Yuanming Luo (China)
<table>
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<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>3:00PM - 3:02PM</td>
<td>Introduction</td>
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<tr>
<td>3:02PM - 3:18PM</td>
<td>Endoscopic laryngeal assessment---what is it and can it help those</td>
<td>Michael Polkey (United Kingdom)</td>
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<td></td>
<td>prescribing PAP therapy</td>
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<td>3:18PM - 3:34PM</td>
<td>Coordination between respiratory pump and upper airway muscles in</td>
<td>Yuanming Luo (China)</td>
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<td></td>
<td>OSA</td>
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<tr>
<td>3:34PM - 3:50PM</td>
<td>New insight into arousal mechanism and its role on OSA phenotype</td>
<td>Peter Catcheside (Australia)</td>
<td></td>
</tr>
<tr>
<td>3:50PM - 4:06PM</td>
<td>Treatment of sleep apnea with transvenous electrical stimulation</td>
<td>Xilong Zhang (China)</td>
<td></td>
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<tr>
<td>4:06PM - 4:22PM</td>
<td>New development of drug targeting on upper airway dilator muscles in</td>
<td>Andrew Wellman (United States)</td>
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<td></td>
<td>OSA</td>
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<tr>
<td>4:22PM - 4:30PM</td>
<td>Conclusion</td>
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S44: New perspectives in the management of pediatric narcolepsy

Summary
Narcolepsy is a chronic and disabling disorder affecting sleep and wakefulness, characterized by excessive daytime sleepiness (EDS), sudden sleep episodes and attacks of muscle atonia mostly triggered by emotions (cataplexy). Narcolepsy is a lifelong disorder, however not progressive, due to the loss of hypocretin neurons, and which occurrence during childhood is frequent. Among others, the occurrence of the disorder during childhood and adolescence should be taken into consideration. Narcolepsy in children and adolescents is still under-diagnosed and is often mistaken in its onset for other diseases or even neglected.

Young patients affected by the disorder often show dramatic and abrupt impairment in their social skills and academic performances due to excessive daytime sleepiness, fatigue and lack of energy. The goal of the symposium is to underlie the clinical characteristics of pediatric narcolepsy and to highlight the therapeutic outcome for the disorder.

All speakers are well known experts in the field of narcolepsy and pediatrics who will provide useful information from their clinical practice and/or specific research. For each topic, speakers will focus on clinical and therapeutic specificities in childhood and adolescent narcolepsy.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- To increase awareness and improve diagnosis of narcolepsy and cataplexy in children
- To help clarify the role of clinical investigation in the management of narcoleptic children
- To better understand the underlying mechanisms involved in pediatric narcolepsy
- To become more familiar with psychiatric comorbidities related to pediatric narcolepsy
- To describe current treatment and new perspectives in the management of narcoleptic children and adolescents

Target Audience
Physicians, pediatricians, sleep specialists involved with children and adolescents, child psychiatrists, psychologists, neuro-pediatricians, specialists in Narcolepsy and Hypersomnias

Chairs:
Michel Lecendreux (France)
Scientific Programme

3:02PM - 3:18PM  Clinical features in the narcoleptic child: How clinical evaluation may orientate towards therapeutic decisions
Giuseppe Plazzi (Italy)

3:18PM - 3:34PM  Pediatric narcolepsy, auto-immunity and potential therapeutic outcomes
Lucie Barateau (France)

3:34PM - 3:50PM  Pediatric narcolepsy and psychiatric features and treatment issues
Paul Gringras (United Kingdom)

3:50PM - 4:06PM  Management of the pediatric narcoleptic patient
Michel Lecendreux (France)

4:06PM - 4:22PM  Directions for the future, what can we expect regarding narcolepsy and other disorders of EDS based on current research?
Yves Dauvilliers (France)

4:22PM - 4:30PM  Conclusion

Affiliated Meeting, 220

3:00PM - 4:00PM  SRS-CSS Frontiers: Obstructive sleep apnea and the risk of cognitive decline in older adults
Nadia Gosselin (Canada)

Summary
Sleep is important for the brain as well as the body. This symposium includes an exciting range of speakers that will present data linking sleep to brain function and physiology in both experimental and population-based studies. Our key speakers are renowned experts in the field of sleep and health (Dr. Phyllis Zee) and in the associations between sleep and cognitive function (Dr. Nadia Gosselin). Each featured presentation is followed by an oral symposium on a related theme with a broad range of speakers and topics.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

□ Understanding the associations between sleep, circadian rhythms and metabolic health
□ Understanding which sleep characteristics are most strongly associated with cognitive function and decline
□ Understanding the public health implications of poor sleep on health and disease

Target Audience
Basic and clinical researchers and clinicians
Scientific Programme

3:00PM - 4:30PM
Oral Abstract, 216
Oral abstract: content to be determined

3:00PM - 4:30PM
Technologist Program, 223-224 - 223
Technologist workshop: content to be determined

4:15PM - 6:00PM
Affiliated Meeting, 220
SRS-CSS Frontiers: Sleep: Impact on neurological function

Summary
Sleep is important for the brain as well as the body. This symposium includes an exciting range of speakers that will present data linking sleep to brain function and physiology in both experimental and population-based studies. Our key speakers are renowned experts in the field of sleep and health (Dr. Phyllis Zee) and in the associations between sleep and cognitive function (Dr. Nadia Gosselin). Each featured presentation is followed by an oral symposium on a related theme with a broad range of speakers and topics.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Understanding the associations between sleep, circadian rhythms and metabolic health
- Understanding which sleep characteristics are most strongly associated with cognitive function and decline
- Understanding the public health implications of poor sleep on health and disease

Target Audience
Basic and clinical researchers and clinicians

Chairs:
Kristen Knutson (United States)
John Peever (Canada)

4:15PM - 4:40PM
Chronic sleep loss neural injury: play early, pay later
Sigrid Veasey (United States)

4:40PM - 5:05PM
Links between global and local sleep disruption and Alzheimer’s disease pathophysiology
Bryce Mander (United States)

5:05PM - 5:30PM
REM sleep behavior disorder: animal models and the neuronal network involved
Pierre-Hervé Luppi (France)
Scientific Programme

5:30PM - 5:55PM
Obstructive sleep apnea and Alzheimer Disease: Is amyloid the link between breathing and dementia?
Yo-El Ju (United States)

4:30PM - 6:00PM
S45
S45: Central sleep apnea: PAP, ASV or Phrenic Nerve Stimulation?

Summary
In this session, we will be reviewing the epidemiology of obstructive and central sleep apnea (OSA, CSA) in heart failure patients. Since the results of the SERVE-HF trial have been published, the treatment of central sleep apnea has been confusing for many providers. The speakers will present evidence to support the choice of treatment for central sleep apnea, which includes PAP, ASV and phrenic nerve stimulation.

Learning Objectives
Upon Completion of this CME activity, participants should be able to:

- Accurately distinguish between central vs obstructive hypopneas on polysomnograms in patients with heart failure
- Review evidence on the efficacy of CPAP on central sleep apnea
- Review evidence on the efficacy and safety of ASV on central sleep apnea
- Determine how to treat patients with central sleep apnea
- Apply the best evidence when deciding on the treatment plan for your patient with central sleep apnea.

Target Audience
Cardiologists; Physicians-in-training; General Medicine physicians; pulmonary physicians; registered nurses; respiratory therapists; sleep physicians; nurse practitioners

Chairs:
Neomi Shah (United States)

4:30PM - 4:32PM
Introduction

4:32PM - 4:48PM
Epidemiology of sleep apnea in heart failure
Neomi Shah (United States)

4:48PM - 5:04PM
CPAP for central sleep apnea
Douglas Bradley (Canada)

5:04PM - 5:20PM
ASV for central sleep apnea
Virend Somers (United States)
Scientific Programme

5:20PM - 5:36PM  Phrenic nerve stimulation for central sleep apnea
Shahrokh Javaheri (United States)

5:36PM - 5:52PM  Summary & discussion
Virend Somers (United States)
Neomi Shah (United States)

5:52PM - 6:00PM  Conclusion
D06: And you thought CPAP adherence was hard: Weight management for patients with obstructive sleep apnea

Summary
Obesity is the greatest risk factor for obstructive sleep apnea (OSA). Although weight loss is an important patient-centered outcome, treatment of OSA with continuous positive airway pressure (CPAP) typically results in weight gain rather than weight loss. In addition to CPAP, optimal management of overweight and obese patients with OSA should include attention to weight management, yet few Sleep Medicine providers have training in or experience in weight management. The American Thoracic Society recently published a Clinical Practice Guideline on the impact of weight loss interventions in patients with OSA*. Various methods of weight loss including diet, exercise, pharmacological and surgical were considered. A number of patient-centered outcomes were reviewed. Using a panel of international experts, the purpose of this symposium will be to disseminate the findings of the clinical practice guideline and:
1) review the evidence of the impact of weight-loss interventions on OSA severity, quality of life, and associated comorbidities.
2) provide specific recommendations for weight management in adult patients with OSA who are overweight or obese.


Learning Objectives
Upon Completion of this CME activity, participants should be able to...

• Recognize the impact of weight loss on OSA severity and other patient-centered outcomes in people with OSA.

• Compare and contrast different methods (diet, exercise, surgery, medications) for promoting weight loss in overweight and obese patients with OSA.

• Construct a weight management program for their overweight and obese patients with OSA.

Target Audience

• Sleep Clinicians

• Researchers interested in weight loss in OSA

Chairs:
Robert L. Owens (United States)
Scientific Programme

4:30PM - 4:32PM
Introduction

4:32PM - 4:48PM
Beyond the AHI: what else gets better with weight loss?
Indira Gurubhagavatula (United States)

4:48PM - 5:04PM
Impact of diet/exercise/behavior modification on weight in OSA
Susan Bartlett (Canada)

5:04PM - 5:20PM
A chance to cut is a chance to heal: Impact of surgery on weight in OSA
Sanjay R. Patel (United States)

5:20PM - 5:36PM
Red pill vs blue pill?: impact of pharmacotherapy on weight in OSA
Daniel Besseson (United States)

5:36PM - 5:52PM
Delivering weight loss in a sleep clinic
Ron Grunstein (Australia)

5:52PM - 6:00PM
Conclusion

Surgery Symposium, 119-120 - 119

4:30PM - 6:00PM
S46 S46: TBD
TBD
S47: Insomnia and performance: From school age to workplace

**Summary**

While about 25% of school-age children will experience behavioral insomnia at one point or another, according to different studies between 4 and 13% of adolescents will also experience sleep difficulties (especially falling asleep). In college and university students, the prevalence of poor sleep quality can reach up to 60% and about 8% of students report insomnia. Once education is completed and individuals find themselves in the workplace, adults complaining of severe and chronic insomnia or diagnosed with an insomnia disorder compose about 12% of the population. While insomnia has been linked to many negative consequences in adults, it is only in the last decade or so that grades at school or productivity on the job have become an important aspect of performance linked to insomnia. Although we know that insomnia per se cost billions of dollars each year in direct and indirect costs in adults, we do not know much about school performance and insomnia. Little research or clinical efforts have been devoted so far to understanding the emotional or psychological impact of insomnia on grades at school and in productivity in adults. Moreover, we do not know much about how behavioral interventions or CBT-I can help students and adults at increasing their performance or productivity. This symposium is aimed at assessing school performance in students from different age groups to productivity in adults as one receives hygiene tips or full CBT-I to counteract negative effects of insomnia. It is our aim to present data to better understand the impact of daily factors linked to insomnia on performance and productivity across the lifespan. This symposium will comprise: 1) diurnal impact of insomnia on performance in school-age children and the use of sleep restriction to counteract insomnia (Corkum); 2) the impact of insomnia on academic performance in adolescents (Gruber), 3) the impact of insomnia on performance through anxiety and depressive symptoms in college and university students (Bastien); and 4) the use of CBT-I in adults to increase productivity in the workplace (Espie).

**Learning Objectives**

Upon completion of this CME activity, participants should be able to:

- Better understand how insomnia effects performance in school
- Better understand how insomnia expresses itself differently in different age groups
- Distinguish between different treatment options for insomnia in different age groups
- Highlight the importance of treating insomnia to counteract productivity/performance deficits for further progress in the field

**Target Audience**

Students, Clinicians, Psychologists, Psychiatrists, Physicians

**Chairs:**

Célyne H. Bastien (Canada)
### Scientific Programme

<table>
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<tr>
<th>Time</th>
<th>Presentation</th>
<th>Speaker</th>
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<tbody>
<tr>
<td>4:32PM - 4:52PM</td>
<td>Sleepy Children: The impact of sleep restriction on daytime functioning</td>
<td>Penny Corkum (Canada)</td>
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<tr>
<td>4:52PM - 5:12PM</td>
<td>The associations between sleep and academic performance in adolescents with insomnia</td>
<td>Reut Gruber (Canada)</td>
</tr>
<tr>
<td>5:12PM - 5:32PM</td>
<td>Depressive and anxiety symptoms in college and university students: insomnia and performance</td>
<td>Célyne H. Bastien (Canada)</td>
</tr>
<tr>
<td>5:32PM - 5:52PM</td>
<td>The impact of CBT for insomnia on workplace productivity; meta analysis of RCT data on a digital intervention</td>
<td>Colin Espie (United Kingdom)</td>
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<tr>
<td>5:52PM - 6:00PM</td>
<td>Conclusion</td>
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S48: Advances in the analysis of clinical polysomnography data

Summary

While remarkable advances have been made in our understanding of the role of sleep in health and disease, there remain considerable knowledge gaps regarding the bases for individual differences in sleep and sleep-related susceptibility to cardiometabolic and cognitive disorders. Addressing these knowledge gaps requires the use and development of hitherto unexplored measurements that can be extracted from polysomnography (PSG) as well as analysis of large data sets of well annotated sleep data linked to a variety of risk factors, outcome, and genetic information. The first two presentations will focus on technologies that extract new information from polysomnograms. The first speaker will address heart rate variability (HRV) which is emerging as an important metric in understanding the patho-physiology of sleep disorders. Heart rate is modulated by sympathetic and parasympathetic activities during sleep. These activities regulate mean heart rate, heart rate variability, and the beat-to-beat coupling during sleep. By exploiting these modulations with methods in the time domain (mean values), in the frequency domain (very low, low and high frequency), and using non-linear analysis (detrended fluctuation analysis), it is possible to distinguish sleep stages and disorders such as sleep apnea and periodic limb movements syndrome.

The clinically useful information that is currently derived from manual scoring of PSGs is extremely limited, particularly given the complexity and expense of these long studies and the potential for rich, clinically-important information, to exist in the electroencephalogram (EEG). Research studies have already shown the potential importance of some EEG features, for example sleep spindles, in understanding clinical disorders. These, and many others, are potential hidden treasures in the EEG. The second speaker will describe a number of metrics (biomarkers) that have been recently proposed and made available in clinical PSGs. Early results of their use will be presented.

The last two presentations will deal with analyzing large datasets using new exposures to better understand disease pathophysiology. The third speaker will address the application of new PSG analytical approaches to large datasets to transform the way obstructive sleep apnea (OSA) is managed within an individual patient. He will present evidence that the acquisition, storage and analyses of large scale clinical PSG data might improve characterization of OSA patients. He will also provide data on unsupervised approaches evaluating both conventional and novel PSG metrics to understand heterogeneity in OSA, as well as to better define groups with relevant consequences of OSA such as cardiovascular outcomes.

The last presentation will summarize approaches and platforms for aggregating and analyzing large sleep datasets from well characterized cohorts, describing tools for harmonization, exploration and analysis to address emerging scientific questions. As well, the presentation will include early insights gained from using new variables (exposures) in large cohorts to determine the physiological bases for development of hypertension in obstructive sleep apnea.

Learning Objectives

Upon Completion of this CME activity, participants should be able to...

- learn of new approaches that aim to extract more clinically useful information from the PSG than is currently possible.
- learn about new EEG biomarkers, such as a continuous scale of sleep depth, spindle characteristics, alpha intrusion index, coherence of sleep depth between right and left hemispheres and others, and their clinical potential.
- learn how existing large data sets are being harvested to extract information not hitherto possible and how this new information will inform risk assessment and management in sleep apnea and obstructive sleep apnea.

Target Audience

Sleep physicians, Sleep research scientists

Chairs:

Susan Redline (United States)
Magdy Younes (Canada)
Scientific Programme

4:30PM - 4:32PM  Introduction
4:32PM - 4:52PM  Heart rate variability during polysomnography: methods of assessment and clinical relevance
                   Thomas Penzel (Germany)
4:52PM - 5:12PM  EEG analysis: more than just sleep architecture (new EEG biomarkers)
                   Magdy Younes (Canada)
5:12PM - 5:32PM  Utilizing PSG signals to characterize obstructive sleep apnea subtypes and severity
                   Diego Mazzotti (United States)
5:32PM - 5:52PM  Leveraging existing polysomnographic datasets for discovery and replication
                   Susan Redline (United States)
5:52PM - 6:00PM  Conclusion
Scientific Programme

Symposium, 212-214 - 212

4:30PM - S49
6:00PM

S49: Sleep, stroke and vascular dementia

Summary

This session will provide a comprehensive update on the current state of knowledge of the relationships between sleep disorders and cerebrovascular disease. International experts will provide literature review and clinical algorithms regarding diagnosis and treatment of sleep disorders in the acute and chronic stroke setting. Emerging data will be discussed linking sleep-disordered breathing to the radiographic signature of Binswanger vascular dementia. The combined conditions of cerebrovascular disease and sleep disorders are extremely common; yet often underdiagnosed and suboptimally treated. Sleep apnea is an independent and modifiable risk factor for stroke and is associated with increased morbidity and mortality in stroke patients. Current data suggests treating this disease may lead to functional and neurologic improvements as well as reduced long-term cardiovascular and cerebrovascular risk. Despite compelling evidence, sleep apnea treatment is still not part of the standard of care in managing ischemic stroke or in recurrent stroke prevention. This symposium will review critical evidence underscoring the importance of testing and treating sleep disorders in the prevention of cerebrovascular disease and in the post-stroke setting. Faculty in the areas of Sleep Medicine and Cerebrovascular Disease will provide evidence and expert consensus-based strategies in managing sleep-disordered breathing in stroke patients. The evolution of sleep apnea following acute ischemic stroke will be discussed, along with guidance on when to perform definitive testing in this patient population. Guidance on alternative therapies for stroke patients who cannot tolerate PAP will be provided. Data on the links between sleep-disordered breathing and the radiographic signature of Binswanger dementia will also be discussed. Finally, emerging data regarding the bi-directional relationships between restless legs syndrome/periodic limb movements of sleep and cerebrovascular disease will be discussed.

At the conclusion of this symposium, attendees will understand how to incorporate the diagnosis and management of sleep disorders into the care of patients with cerebrovascular disease. Seminal studies, as well as necessary areas for future research, will be highlighted.

Learning Objectives

Upon completion of this CME activity, participants should be able to:

- Understand how sleep apnea serves as a risk factor for stroke and evolves following acute ischemic stroke. Utilize current evidence to guide the appropriate timing for definitive testing and instituting sleep apnea treatments
- Understand benefits associated with treating sleep apnea in the acute and chronic stroke setting based on current literature
- Discuss the specific challenges of PAP therapy in the stroke population and when to use alternative therapies
- Review data regarding how untreated sleep apnea exerts its influence as a cerebrovascular risk factor and eventually contributes to the radiographic signature of Binswanger dementia
- Learn the associations between restless legs syndrome/periodic limb movements of sleep and cerebrovascular disease

Target Audience

Providers involved in the management of patients with cerebrovascular disease and sleep disorders. This includes sleep specialists, neurologists, psychiatrists, pulmonologists, physiatrists, family medicine, and internal medicine providers.

Melissa C. Lipford (United States)
Scientific Programme

4:30PM - 4:32PM  Introduction

4:32PM - 4:52PM  The Evolution of Sleep Disordered Breathing after Stroke
Devin L. Brown (United States)

4:52PM - 5:12PM  Treating Sleep Apnea in the Stroke Patient: Alternative Therapies when PAP isn’t an option
Karl Droghamji (United States)

5:12PM - 5:32PM  Sleep Apnea and Vascular Dementia of the Binswanger Type: A Brewing Storm
Antonio Culebras (United States)

5:32PM - 5:52PM  Relationships between RLS/PLMS and Cerebrovascular Disease
Mark Boulos (Canada)

5:52PM - 6:00PM  Conclusion
Scientific Programme

S50: Sleep in space

Summary
Humans have been fascinated with space exploration for thousands of years. With rapid scientific development and inquiry into interplanetary travel in the 20th century fuelled by various political motives, the “Space Race” culminated with Yuri Gagarin as the first human to enter the outer space in 1961. Since then, with over five decades worth of space exploration, much research has uncovered the effects of microgravity and spaceflight on human physiology. Along with changes to cardiovascular and bone physiology, multiple neurocognitive and neuroanatomical changes are thought to occur under zero-gravity conditions. The associated sensory deprivation and extreme conditions have been shown to significantly affect sleep and circadian rhythms with potentially devastating implications, although the exact mechanisms are as of yet unclear. In this symposium, an internationally renowned set of experts will attempt to tackle some of the big knowns and unknown of this field, and the audience will be able to see some of our unpublished data that points to some new potential mechanisms behind the effects of spaceflight on sleep and its rhythms.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

• To understand and to account for the impact of extreme environments and/or spaceflights on sleep macro-architecture, sleep and circadian rhythms, human neuroanatomy and neurophysiology

• To account for the diversity of currently used Earth models of microgravity and their differential pros and cons in assessing the sleep physiology

• To learn about the newest and most state of the art Artificial Intelligence (AI) techniques for assessing astronauts’ mental & physical well-being through remote sensing and on-board equipment

Target Audience
Sleep Physicians, Sleep Neuroscientists, Neurologists, Psychiatrists, Psychologists, Physiologists, Space Medicine Physicists, Astronauts and Extraterrestrial Living Enthusiasts

Chairs:
Ivana Rosenzweig (United Kingdom)

4:30PM - 4:32PM
Introduction

4:32PM - 4:48PM
Causes and consequences of sleep deficiency during spaceflight
Laura Barger (United States)

4:48PM - 5:04PM
Sleep in Space
Chrysoula Kourtidou Papadeli (Greece)

5:04PM - 5:20PM
Extended Simulated Microgravity Disrupts Sleep and the Temporal Organization of the Human Blood Transcriptome
Simon Archer (United Kingdom)
Scientific Programme

5:20PM - 5:36PM  Functional Neuroimaging and Physiological Network Advances in Sleep Neuroscience for Extreme Environments and its Terrestrial Applications
Christos Frantzidis (Greece)

5:36PM - 5:52PM  Changes in Sleep Rhythms and Architecture under Conditions of Microgravity
Ivana Rosenzweig (United Kingdom)

5:52PM - 6:00PM  Conclusion

4:30PM - 6:00PM  Oral abstract: content to be determined

4:30PM - 6:00PM  Young investigator: content to be determined

Poster Abstract, Exhibition
Poster session 3

7:00PM - 8:00PM  WSS Membership Meeting
Scientific Programme

Wednesday, 25 September 2019

07:00AM - 5:00PM

Administration, SRR - 201

 Speaker Ready Room

08:00AM - 08:02AM

Introduction

08:02AM - 08:45AM

Associations between subjective awareness of drowsiness and adverse driving events

Clare Anderson (Australia)

08:00AM - 08:45AM

Anderso

K10: Biomarkers and determinants of drowsy driving: Advances in reducing crash risk

Summary
Drowsiness remains a significant cause of motor vehicle crash, responsible for approximately 20% of all crashes. This talk will examine current approaches to reducing the impact of drowsy driving, including (i) understanding of the characteristics of drowsiness-related motor vehicle crashes, beyond falling asleep (e.g., gaze allocation and distractibility); (ii) an evaluation of the available technologies that map onto these different signatures of impairment; (iii) a look into the future of roadside testing, including the development of novel biomarkers of the drowsy state that yield promise for implementation into road side tests; and (iv) revisiting the associations between subjective awareness of drowsiness and adverse driving events.

08:00AM - 08:02AM

Introduction

08:02AM - 08:45AM

Perspectives of neuroimaging in sleep disorders

Seung Bong Hong (Republic of Korea)
Scientific Programme

09:00AM - 10:30AM
S51: State-of-the-art of wearable technology and big data to advance sleep and circadian science

Summary
We are facing a new era in which the boom in sensing technology is converging with the exponential growth of the internet. One of the exceptional results is the availability of big data, an unprecedented and overwhelming amount of multidimensional information with the potential of changing and improving the way we approach health and disease. Technology is changing the way we do science, and as scientists, it is our responsibility to evaluate and determine whether to adopt, regulate and use novel technology. Within the framework of the internet of things, it is now possible to collect a vast amount of sleep and sleep-relevant information outside the restriction of a laboratory setting. Data from mobile surveys, apps designed for cognitive and emotional testing, users’ biosignals (e.g. physical activity, breathing, cardiac function), geolocation, and biospecimens (e.g., saliva) can all be easily collected. Particularly, over recent years, many novel, highly sophisticated and relatively inexpensive consumer wearable devices have been introduced on the market, claiming to measure users’ behavior, including sleep. These multisensory devices are able to capture different sources of information that go beyond simple motion, are easy to use, and have the potential for offering an unprecedented window on users’ daily health and sleep over long periods of time. Alarmingly, however, there is little guidance within and outside the sleep community about the use of wearables leading to confusion and controversy about the validity and use of wearable technology in the sleep field. The proposed session aims to explain the current landscape in digital health, provide a critical overview of the state of the art of the use of consumer wearables, and review the main experimental findings of validation studies assessing the performance of novel wearables devices in healthy sleepers and patients with clinical sleep disorders. Importantly, as part of an ongoing international effort promoted by the Sleep Research Society, pros and cons in the use of these technologies in sleep research and clinical sleep medicine, overview of biomarkers that can quantify objective measures of sleep and circadian physiology in “real-world” environments, and future directions in wearable sleep technology will be extensively discussed in a critical fashion.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Understand the current state-of-the-art of consumer wearable technology in the field of sleep research and clinical sleep medicine
- Demonstrate knowledge about the validity of wearable devices in healthy sleepers and individuals with sleep disorders, and be informed about the pros and cons of using wearable technology in clinical and research settings
- Understand the unique opportunity to collect and integrate different sources of information, and the potential and the challenges of the big data approach to sleep science

Target Audience
Sleep researchers and clinicians

Chairs:
Massimiliano de Zambotti (United States)
Scientific Programme

09:00AM - 09:02AM  Introduction
09:02AM - 09:18AM  Intro to sleep in the digital health revolution
Sean Drummond (Australia)

09:18AM - 09:34AM  State-of-the art of wearable sleep technology
Massimiliano de Zambotti (United States)

09:34AM - 09:50AM  Sleep and circadian biomarkers: toward new opportunities
Julie Carrier (Canada)

09:50AM - 10:06AM  Sleep faces big data: potential and challenges
Shaun Purcell (United States)

10:06AM - 10:22AM  Future direction in wearable sleep technology: short and long-term goals and needs
Sean Drummond (Australia)

10:22AM - 10:30AM  Conclusion
Scientific Programme

Panel Discussion, 118

09:00AM - D07
10:30AM

D07: Capturing standardized outcome measures for registry based single N RCTs (nRCT=1)

Summary
With an augmented level of awareness of sleep disorders among the public, there has been a rise in requests for sleep studies, application of screening methodologies and use of various apps informing about one's individual sleep/wake-behaviours. Particularly, patients/families use app/smartphone based information to underline or explain their symptoms and get medical attention. Physicians, working in different geographic areas under different circumstances interpret such data differently. One reason for this dis-concordance is the lack of understanding in regards to sensitivity and specificity of the applied tools. Another reason is that evidence-based outcome measures, are generally derived from epidemiologically but not individually informed data. Therefore, our research consortium is suggesting a paradigm change in behavioural medicine related outcome measures from a 'one-size-fits-all' to a personalized approach, utilizing clinical single-N (n=1) trial platforms, and responding to the recent advances in medicine. The motivation for this paradigm shift is enhanced by (a) studies suggesting that inappropriate and ineffective treatments, not including individual outcome measures, may result in overmedication and poly-pharmacy, thus iatrogenic harm, and (b) modern technologies allowing data collection directly from home - a recent trend, catalyzed by modern apps and smartphones. In this context, randomized clinical single-N trials (nRCT=1) allow the consideration of: (a) classic standardized outcome measures such as sleep latency or sleep efficiency; (b) complications or biological changes; but also (c) capture systematically and rigorously patient oriented "personally meaningful outcomes" that may affect wellness, satisfaction, adherence, and the quality of life of patients/families. Therefore, understanding technical and clinical information provided by screening devices and/or information provided by an app, is crucial. It offers significant insight in to pathophysiology in relation to patient symptoms. The purpose of this symposium is to provide an overview of currently most frequently used home-based screening and diagnostic methods and suggest a toolbox, which allows combinations, thus collection of individualized information for pre-assessment and monitoring of individualized outcome measures.

Learning Objectives
Upon Completion of this CME activity, participants should be able to:

- Understand pros and cons of information provided by screening devices and/or cell-phone apps, utilizing (1) actigraphy; (2) pulsoxymetry; and (3) video methodologies
- Understand how personally meaningful outcomes can be tracked with modern technology for supporting decision making and personalizing sleep/wake-behaviour medicine

Target Audience
Physicians (paediatricians, neurologists, pulmonologists, psychiatrists), psychologists, occupational/physio-/behavioural-therapists, pharmacists & pharmacologists

Chairs:
Osman Ipsiroglu (Canada)
## Scientific Programme

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<tr>
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<td><strong>Introduction</strong></td>
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</table>
| 09:02AM - 09:18AM | The traditional use of actigraphy and modern actigraphy applications in smartphones  
                    | Mirja Quante (Germany)                                                |
| 09:18AM - 09:34AM | The variety of pulsoxymeters and their application in special patient populations  
                    | David Wensley (Canada)                                                |
| 09:34AM - 09:50AM | The use of home-based video-footage to identify contextual and personal factors affecting sleep and to differentiate discomfort and pain  
                    | Sue McCabe (Australia)                                                |
| 09:50AM - 10:06AM | How cell-phone based selfies can be used for vigilance detection   
                    | Gerhard Klöesch (Austria)                                             |
| 10:06AM - 10:22AM | The do’s and don’ts of screening and home monitoring technologies for avoiding misinterpretations  
                    | Calvin Kuo (Canada)  
                    | Mike Van der Loos (Canada)                                           |
| 10:22AM - 10:30AM | **Conclusion**                                                        |
S52: Electronic media and sleep: Where are we and where are we headed?

Summary
Over the past 15 years, there has been growing concern about the association between electronic media use and sleep. Meta-analyses show that electronic media use before bedtime is related to shorter sleep duration, longer sleep onset latency, irregular sleep schedules, and daytime fatigue. Although the magnitude of the association may appear to be small at the individual level, it is important to compare findings across populations, to unravel the complex mechanisms underlying them, and to explore sensible prevention strategies. This panel will address these topical questions with data from varying countries, collected via diverse methodological approaches, and identify future steps to take in this research field. The first speaker, Prof. Lauren Hale, will present an update on the associations between electronic media use and sleep in adolescents. The confluence of (1) environmental and biological challenges to teens’ sleep (i.e., earlier school start times and circadian delay), (2) psychological and behavioral changes (e.g., less parental control, higher academic pressure), and (3) their intense preoccupation with screen media has earlier been described as a “perfect storm”. As such, teenagers are widely recognized as a risk group when it comes to the effects electronic media on sleep.

The second speaker, Holly Scott, Msc, will discuss the challenges experienced by teenagers disengaging from social media at bedtime. Using focus group research she identified the motivations for late night social media engagement, which led to the development of (1) a validated self-report measure, and (2) a pilot classroom-based program that helps young people identify, reflect on and discuss these concerns with their peer group. Her talk will expand current knowledge on the underlying mechanisms of the effects of social media use on sleep.

The third and fourth speaker will cover current efforts to reduce technology use before bedtime as a sleep intervention. So far, the clinical relevance of the effects of screen media for sleep remain largely unclear, and, consequently, it is unclear whether cutting back on media use before bedtime is a fruitful intervention strategy. This question, and the feasibility of limiting media use in a population of avid screen users, will be addressed by Prof. Michael Gradisar and Prof. Tamar Shochat, respectively. Prof. Gradisar will present results from a smartphone intervention among adolescents in Australia, and Prof. Shochat will offer results from a study comparing the sleep and media use patterns of secular and ultra-orthodox youth in Israel. These talks will be followed by a reflection on current media use and sleep hygiene guidelines.

The final speaker, Dr. Liese Exelmans, will present data from multiple large scale community samples on whether and how electronic media use affects sleep among adults in Belgium. Compared to younger age groups, adults remain an under-researched population on this topic. Looking both at sleep quality and sleep behavior, this talk will discuss effect sizes and explore sleep deprivation as a behavioral issue (i.e., bedtime procrastination), offering alternative strategies for prevention and intervention.

Learning Objectives
Upon Completion of this CME activity, participants should be able to...

- describe the effects of electronic media on sleep quality and sleep behavior.
- discuss the ways in which electronic media undermine sleep duration and sleep quality.
- describe the current trends in intervention strategies to mitigate possible negative effects of screen media on sleep.
- summarize current problems and opportunities for researchers and clinicians on the topic of media and sleep.

Target Audience
Researchers and clinicians who are interested in technology and sleep

Chairs:
Jan Van den Bulck (United States)
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<tr>
<td>09:00AM -</td>
<td>Introduction</td>
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<tr>
<td>09:02AM -</td>
<td>The association between electronic media use and sleep in adolescents, an update</td>
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<tr>
<td>09:18AM</td>
<td>Lauren Hale (United States)</td>
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<td>09:18AM -</td>
<td>Social media and sleep: the adolescent perspective informing research and education</td>
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<td>09:34AM</td>
<td>Holly Scott (United Kingdom)</td>
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<td>09:34AM -</td>
<td>The lesser of many evils: could a harm minimisation approach to reduce electronic media use</td>
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<td>09:50AM</td>
<td>improve young people’s sleep?</td>
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<td>09:50AM -</td>
<td>Michael Gradisar (Australia)</td>
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<td>10:06AM</td>
<td>Limited media exposure is associated with poor sleep patterns in ultra-orthodox female</td>
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<td>10:06AM</td>
<td>adolescents: the forbidden fruit effect?</td>
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<td>10:06AM</td>
<td>Tamar Shochat (Israel)</td>
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<td>10:22AM</td>
<td>Electronic media use and sleep among adults: is it all the same?</td>
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<tr>
<td>10:22AM</td>
<td>Liese Exelmans (United States)</td>
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<tr>
<td>10:30AM</td>
<td>Conclusion</td>
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S53: Insomnia as a risk factor for suicide and the impact of treating insomnia in suicidal patients: The REST-IT study

Summary
A large and growing literature has established a statistical linkage between insomnia and suicidal ideation, suicidal behavior and suicide death. The evidence linking insomnia and suicide justifies including insomnia as a “sentinel event” in the surveillance for risk of suicide. Further, the association between insomnia and suicide calls for a randomized controlled trial (RCT) of hypnotic medication versus placebo in depressed patients with insomnia and suicide, realizing that the prescription of hypnotics to suicidal patients carries the risk of overdose. Therefore, we performed the first RCT comparing a hypnotic versus placebo in suicidal, depressed outpatients with insomnia, who were also taking an open-label selective serotonin reuptake inhibitor (SSRI), with the primary goals of examining whether targeted treatment of insomnia is safe in this population and would help to mitigate suicidal ideation. The development of the methodology of this RCT required close attention to strategies for ensuring patients’ safety and reducing the risk of suicide attempt, as well as consideration of the ethics of conducting research in this population.

The resulting experimental design produced “Reducing Suicidal Ideation Through Insomnia Treatment (REST-IT)”, which was conducted from 2012-2018. REST-IT included three recruiting sites plus a separate data management site. Suicidal, insomniac patients with depression were randomized to controlled-release zolpidem versus placebo for 8 weeks, while also receiving open-label fluoxetine. At the conclusion of randomized treatment, participants were followed weekly for two additional weeks in order to ensure safe transition to “care as usual”. A priori outcomes included measures of actigraphy as well as self-reported sleep, depression, suicidality, and quality of life. One hundred and three participants were randomized (64 women and 39 men; median age of 41 years), providing 80% power to detect a meaningful effect on the Scale for Suicide Ideation (SSI). Patient retention was high, with participants completing the majority of scheduled visits. Remarkably, there were no deaths and no suicide attempts, and no major decompensations during the two weeks of observation after participants exited the randomized portion of the study.

Strong treatment effects favoring zolpidem were seen on measures of insomnia, with a marginally significant advantage for zolpidem on one measure of suicidal ideation. Significant relationships were also found between suicidal ideation and actigraphically-determined timing of sleep, and between the change over time between insomnia symptom intensity and suicidal ideation. REST-IT represents the first study to demonstrate the feasibility of safely recruiting and retaining patients at risk of suicide in pharmacologic RCTs of sleep interventions. This symposium will discuss (1) the epidemiology of sleep and suicide, (2) design features to enhance safety in insomnia-suicide RCTs, (3) the results of REST-IT, as well as (4) implications for future research.

Learning Objectives
Upon Completion of this CME activity, participants should be able to...

☑ have a comprehensive understanding of the link between insomnia and suicide
☑ describe potential mechanisms explaining the link between insomnia and suicide
☑ know how to mitigate suicide risks in the design of clinical trials involving sleep patients at risk of suicide
☑ understand the impact of zolpidem on suicidal ideation in a RCT
☑ describe next steps in the scientific advancement of methods to reduce suicide in insomnia patients

Target Audience
Sleep medicine clinicians; clinical sleep researchers who study insomnia or psychiatric disorders
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<tr>
<td>09:00AM - 09:02AM</td>
<td>Introduction</td>
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<tr>
<td>09:02AM - 09:22AM</td>
<td>Epidemiology of insomnia and suicide</td>
<td>Ruth M. Benca</td>
<td>United States</td>
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<tr>
<td>09:22AM - 09:42AM</td>
<td>REST-IT methods: a RCT designed to enhance the safety of suicidal patients</td>
<td>Andrew Krystal</td>
<td>United States</td>
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<tr>
<td>09:42AM - 10:02AM</td>
<td>REST-IT results - sleep measures: actigraphy and self-report</td>
<td>Meredith Rumble</td>
<td>United States</td>
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<tr>
<td>10:02AM - 10:22AM</td>
<td>REST-IT results and implications: suicidality measures and their relationship to sleep and mood measures</td>
<td>William Vaughn McCall</td>
<td>United States</td>
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<tr>
<td>10:22AM - 10:30AM</td>
<td>Conclusion</td>
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S54: What is slow-wave activity? And, can we manipulate it to our benefit?

Summary
Slow-wave Activity (SWA) has historically been associated with the homeostatic regulation of sleep. In 1982, Borbely proposed the Two-Process Model of Sleep Regulation which postulated that two biological mechanisms regulate the sleep-wake cycle, with Process S increasing throughout the day and decreasing across the sleep period, representing the homeostatic drive to sleep. Borbely posited that SWA could be considered a putative marker of Process S, as peak SWA in the first NREM period increases with wakefulness, representative of an accumulation of sleep pressure, and subsequently decreases exponentially during sleep, representing dissipation of the sleep drive. Emerging research, however, has begun to suggest that SWA may be more than a marker of sleep homeostasis.

The Synaptic Homeostasis Hypothesis, for example, has theorized that EEG slow oscillations, characteristic of SWA, may play a role in regulating neuroplasticity via the homeostatic downscaling of synaptic strength. Additionally, ample evidence from the memory literature has demonstrated a relationship between slow-wave sleep (SWS) and the consolidation of declarative memories, with data from neuroimaging studies suggesting that it is the reactivation of memory traces during slow-wave sleep that is essential to memory consolidation. Moreover, an exciting and developing body of literature has also implicated SWA in a bidirectional relationship with amyloid-β.

Because SWA has been suggested to be associated with numerous important brain functions, it is only natural that researchers have questioned whether its manipulation can be used to both experimentally test its function or enhance its effects. In an elegant set of studies, it was shown that slow-wave sleep could be selectively disrupted using an auditory stimulation paradigm. Using this approach, they demonstrated that SWA could be significantly reduced without decreasing total sleep time. More recently, it has also been shown that SWA can be selectively enhanced using a closed-loop auditory stimulation method. This SWA enhancement has been shown to improve memory function and increase immune function. In the proposed session, we seek to discuss the most current theories about the nature and function of SWA, and examine whether SWA manipulation through various means can serve to elucidate its function or be used to yield positive outcomes. XX will discuss the relationship between SWA and the modulation of plasticity. Bjorn Rasch will present a theoretical account and data on how thoughts, imaginations and affective states before sleep could affect subsequent SWS and SWA. Guang Yang will discuss how learning experiences and subsequent slow wave sleep regulate the plasticity of synapses and neurons. Bryce Mander will present work linking SWA to the deposition and regulation of amyloid-β in preclinical stages of Alzheimer’s disease (AD), and will further demonstrate the importance of this relationship for hippocampus-dependent memory. Jennifer Goldschmied will present data on the effects of slow-wave disruption, and Eden Debellemaniere will discuss novel findings from closed-loop auditory stimulation studies. This symposium aims to integrate the most recent SWA findings cutting across multiple levels of analysis, and demonstrate the importance of SWA to ultimately propose that the study of SWA is essential to the investigation of the role of sleep, more broadly.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Discuss the latest research on the contributions of SWA to brain function, cognition, and disease
- Identify the effects of manipulating SWA via disruption and enhancement on several measurable outcomes
- Integrate findings across approaches and discuss how they relate to different theories of the function of SWA

Target Audience
Sleep researchers and clinicians interested in the nature and function of slow-wave activity, and those who are interested in learning about the methodology and effects of the modulation of SWA via slow-wave disruption and closed-loop auditory stimulation.
Scientific Programme

09:00AM - 09:02AM  
Introduction

09:02AM - 09:18AM  
Experience and sleep-dependent synaptic plasticity
Guang Yang (United States)

09:18AM - 09:34AM  
Bidirectional links between slow wave activity and β-amyloid pathology and their functional significance
Bryce Mander (United States)

09:34AM - 09:50AM  
I want to sleep deeper! How does cognition affect slow-wave sleep?
Björn Rasch (Switzerland)

09:50AM - 10:06AM  
Selective Slow-wave Disruption in Healthy and Depressed Samples
Jennifer Goldschmied (United States)

10:06AM - 10:22AM  
Slow wave activity : from basic knowledge to manipulation
Eden Debellemiere (France)

10:22AM - 10:30AM  
Conclusion
Scientific Programme

Symposium, 212-214 - 212

09:00AM - 10:30AM  S55: Obstructive sleep apnea, cognitive dysfunction & neurodegeneration: current understanding

Summary
Sleep is increasingly recognized as an important factor in brain health. Obstructive sleep apnea (OSA) causes intermittent hypoxia and sleep fragmentation, which may both affect brain structure and function. OSA affects at least 20% of individuals after the age of 65. The harmful effects of disturbed sleep on brain health are particularly important for older individuals with OSA. With an aging population and increasing prevalence of neurodegenerative disorders and dementia, it is a public health priority to identify risk factors for cognitive decline and optimize strategies to maintain brain health.
Recent cohort studies suggest that OSA is a risk factor for stroke, mild cognitive impairment, Alzheimer’s disease and Parkinson’s disease. Prevention through treatment of risk factors is currently the main intervention for reducing the incidence of dementia. Therefore, how obstructive sleep apnea affects brain health and whether its treatment can slow neurodegeneration are highly relevant questions.
In this session, we focus on the aging brain and the link between obstructive sleep apnea, brain health, cognitive decline, dementia and neurodegeneration. We present preliminary results of obstructive sleep apnea treatment, which can slow, stop or reverse neurodegenerative processes accentuated by obstructive sleep apnea, even in individuals already affected by a neurodegenerative disease. The first speaker will describe epidemiologic studies linking OSA to cognitive decline and dementia, and describe potential pathophysiological mechanisms that could explain the link between OSA and cognitive decline. The second speaker will review the neuropsychological effects of OSA and compare similarities and differences with other disturbances predisposing to cognitive dysfunction such as chronic sleep deprivation and insomnia, and with other respiratory disorders such as COPD. In addition, a comparison will also be made with specific deficits most commonly found in neurodegenerative disorders such as Alzheimer’s and Parkinson’s diseases. Effects of OSA treatment will be reviewed. The third speaker will summarize the evidence from neuroimaging studies showing how OSA can lead to brain dysfunction, including structural and functional abnormalities, and the effects of OSA treatment. Implications for cognitive function in aging will be discussed. The fourth speaker will describe the relationship between OSA and biomarkers of cognitive decline, and how biomarkers could be used to study the impact of OSA and its treatment on progression to dementia. The last speaker will focus on Parkinson’s disease, the second most common neurodegenerative disorder, and review studies suggesting OSA affects cognitive function also in this context, an effect which appears remediable with OSA treatment. Moreover, preliminary evidence will be discussed suggesting OSA may affect overall progression of neurodegeneration.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

• Explain the proposed mechanisms whereby OSA can predispose to cognitive impairment
• List the specific types of cognitive defects attributable to OSA
• Describe abnormalities in brain imaging found in OSA
• Summarize how biomarkers can help understand the role of OSA in cognitive decline in aging
• Discuss the possible effects of OSA on manifestations of Parkinson’s disease.

Target Audience
Researchers and clinicians in the fields of sleep apnea, sleep and aging, cognitive impairment in aging, dementia, and neurodegenerative disorders, including pulmonologists, neuropsychologists, psychiatrists, neurologists, geriatricians.
Scientific Programme

09:00AM - 09:02AM
Introduction

09:02AM - 09:18AM
Does OSA cause cognitive dysfunction and dementia? Epidemiology & mechanisms
Ivana Rosenzweig (United Kingdom)

09:18AM - 09:34AM
Cognitive defects associated with OSA: comparison with other sleep disturbances, COPD and degenerative disorders
Melinda Jackson (Australia)

09:34AM - 09:50AM
Neuroimaging evidence of OSA effects on the brain
Nadia Gosselin (Canada)

09:50AM - 10:06AM
OSA and dementia: biomarker evidence.
Ricardo Osorio (United States)

10:06AM - 10:22AM
OSA in Parkinson’s disease
Marta Kaminska (Canada)

10:22AM - 10:30AM
Conclusion
Scientific Programme

Symposium, 217-219 - 219

09:00AM - 10:30AM

S56: Effects of perinatal sleep modulation in the mother and offspring: Evidences from preclinical research

Summary

The sleep pattern presented by women during pregnancy and postpartum is substantially different than what is observed in other periods of life. In general, women complain of reduced sleep quality and quantity, as well as present an increased prevalence of sleep disorders such as obstructive sleep apnea, restless legs syndrome and insomnia. Among the possible reasons are the anatomophysiological alterations during the gestation, the increased demands by the newborn, and social and cultural factors that might impact sleep.

Clinical studies have suggested that disturbed sleep during the puerperium (either by sleep deprivation or sleep disorders) might lead into important outcomes to both the mother and child. The correct understanding of the impacts of disturbed sleep during pregnancy and postpartum is of major importance, in order to provide a better maternal-infant care. However, due to the nature of this period, both ethical and methodological issues preclude the performance of sleep-related interventional clinical studies.

Preclinical animal research plays an important role in increasing the knowledge about the consequences of disturbed sleep during pregnancy. In a general sense, both physiological aspects of pregnancy and postpartum and sleep-related variables are comparable between human beings and rodents models, which assure a translational potential for these studies. Additionally, preclinical studies assure ethical and methodological conditions that are not possible in clinical research.

This field of research has been growing considerably with a surge in the number of articles addressing perinatal sleep in animal models in the last few years. In a general sense, preclinical animal research has been useful to demonstrate how problematic sleep disturbances might be to both the mother and the offspring. We now have evidences that sleep deprivation might lead into important outcomes in behavioral, hormonal, electrophysiological, metabolic and epigenetic levels. Also, recent studies are focusing in describing mechanisms that regulate sleep specifically during this life period.

The current symposium intends to present and discuss the most recent evidences and results regarding perinatal sleep modulations and possible outcomes, achieved by means of preclinical animal studies. For that, we aim to bring together researchers from five different countries to share their experiences and results on the use of animal models in perinatal sleep research. Each lecture will be focused on the relationship of sleep during pregnancy and/or postpartum and a different outcome.

By the course of these lectures, the audience should have learned about the most recent advances in the field, understanding how alterations in perinatal sleep might lead into deleterious outcomes to both mother and offspring. Additionally and probably more important, the audience should be able to understand the applicability of animal models on the research about sleep during pregnancy and postpartum, being capable to translate these data into potential clinical findings.

Learning Objectives

Upon Completion of this CME activity, participants should be able to:

• Understand the applicability and recognize the usefulness of preclinical animal models on the research about sleep during pregnancy and postpartum.

• Learn about the most recent achievements from basic and preclinical science about the impacts of perinatal sleep deprivation.

• Understand that sleep during pregnancy and postpartum has specificities on its neurobiology and physiology, which when disturbed might lead into important outcomes to both to mother and the offspring.

Target Audience

Preclinical sleep researchers; Clinical sleep researchers and clinicians with interest in translational research

Chairs:

Monica Levy Andersen (Brazil)
Gabriel Natan Pires (Brazil)

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<td>09:02AM - 09:18AM</td>
<td>Sleep during pregnancy and postpartum and its relationship with maternal behavior</td>
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<tr>
<td>09:18AM - 09:34AM</td>
<td>Functional impact of sleep apnea during pregnancy in mother and offspring: Epigenetic modifications associated with metabolic disorders</td>
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<td>09:34AM - 09:50AM</td>
<td>Preoptic sleep regulation during the postpartum period</td>
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<td>09:50AM - 10:06AM</td>
<td>Sleep deprivation during pregnancy: Neurophysiological and cognitive effects in the offspring</td>
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<td>10:06AM - 10:22AM</td>
<td>Prenatal sleep deprivation and immature neuronal network in full term rat newborn</td>
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<td>10:22AM - 10:30AM</td>
<td><strong>Conclusion</strong></td>
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Scientific Programme

Symposium, 220
09:00AM - 10:30AM

S57: Sleep and memory over the lifespan

Summary
The aim of this symposium is to discuss the current state of knowledge on developmental aspects of sleep for memory consolidation and information processing over the lifespan. We are in the outstanding situation to present sleep and memory data in children, adolescents, young and elderly adults. By discussing the impact of the developmental processes on the relationships between sleep and memory, we can open up new avenues for sleep and developmental research. Kerstin Hoedlmoser will focus on developmental changes in the microstructure of sleep, i.e. sleep spindles and slow oscillations, which are key players in the sleep-dependent memory consolidation process. Recently, it was found that the precise timing of sleep spindles within slow oscillation up-states is crucial for sleep-dependent memory consolidation and that this precise timing deteriorates with aging. The time window with the most rapid and drastic changes to sleep spindles and slow oscillations, however, is during puberty. So far it has not been investigated whether and how slow oscillation-spindle-coupling changes from childhood to adolescence and whether it influences sleep-dependent memory consolidation. Moving forward on the course of human ontogeny, Michael Chee will share data that adds to our understanding of how diurnal sleep can benefit memory encoding especially in adolescents and young adults. Sleep deprivation can affect the processing of visual information even for items that are responded to. Poorer capture of peripheral information, weaker inhibition of distracters, lesser rate of processing and poorer quality of information representation contribute to poorer encoding. Chee’s talk will provide recent findings, that an afternoon nap can restore encoding performance for declarative material in sleep-restricted adolescents. A nap can also yield later recall that is comparable to cramming over the same period. The sleep architecture correlates to test performance will be reviewed. Philippe Peigneux will report on studies in young healthy adults investigating the boundary cognitive and neurophysiological conditions that determine the efficiency of cueing recently learned memories during sleep (targeted memory reactivation) and the brain capacity to process external information and develop novel associations (hypnopedia) during sleep, and sleep-dependent learning-related changes in brain structure. Finally, Rebecca Spencer will raise the question whether in elderly people encoding deficits contribute to age-related changes in sleep-dependent memory consolidation. Sleep-dependent consolidation is reduced with aging, particularly for procedural learning tasks. Given well-known changes in memory encoding with aging, Spencer’s talk will present data on the relationship between aging-related encoding deficits and changes in sleep-dependent consolidation.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Understand the developmental changes in sleep macro- and micro-architecture across the lifespan and their significance
- Be acquainted with ways in which sleep can affect memory encoding, consolidation and retrieval and how effects might evolve across life
- Appreciate how limited information processing can continue during sleep and factors which influence this
- Evaluate the quality of different study designs used in the sleep and memory literature (longitudinal vs. cross-sectional; sleep deprivation; wake vs. sleep; night vs. diurnal sleep etc.)

Target Audience
Sleep Research/Medicine Specialists (psychologists, physicians, pediatricians as well as other healthcare professionals and specialists)

Chairs:
Kerstin Hoedlmoser (Austria)
Scientific Programme

09:00AM - 09:02AM
Introduction

09:02AM - 09:22AM
Functional impact of developmental changes in sleep microstructure on memory
Kerstin Hoedlmoser (Austria)

09:22AM - 09:42AM
Sleep benefits on memory encoding in adolescents and young adults
Michael Chee (Singapore)

09:42AM - 10:02AM
Boundaries for memory cueing and processing capabilities during sleep
Philippe Peigneux (Belgium)

10:02AM - 10:22AM
Do encoding deficits contribute to age-related changes in sleep-dependent memory consolidation?
Rebecca Spencer (United States)

10:22AM - 10:30AM
Conclusion

09:00AM - 10:30AM
Oral Abstract, 216

09:00AM - 10:30AM
Oral abstract: content to be determined
S58: Shift work in Transportation systems

Summary

Shift work in transportation systems (like flight traffic, train services, road and bus transport, sea transport and freight traffic) is regulated in so-called Working Time Regulations (WTR). WTRs normally lay down on a minimum of legal requirements. These include, how to organize working time. Some workers in certain sectors, such as the aviation industry and mobile workers in road and sea transport are currently excluded from normal WTR and are subject by specific regulations, which advice special working times.

Normally workers, who are doing safety-critical work on the airport, railways etc. are underlying specific Airway, Railway and other Transport Systems Safety Regulations. These regulations differ in the various countries, but mostly they include arrangements to prevent serious consequences arising from tired/fatigued employees and therefore endanger safety.

It’s not however sufficient to rely on the above described requirements to ensure that they fulfil the obligations for health and safety in regard to shift-working arrangements.

Organizing and planning of shift work should also include employers’ general duties for health, safety and welfare at work.

Our symposium shall include an overview about the shift work and its guideline, which based on principles of occupational and sleep medicine. Furthermore, it shall include an update of sleep in shift workers; the presentation of different Working Time Regulations for aircrews and road transport staff (e.g. like truck drivers) and their scientific evaluation.

Learning Objectives

Upon completion of this CME activity, participants should be able to:

- Understand and use shift work guidelines, which based on principles of occupational and sleep medicine, and working Time Regulations for shift work in transportation systems
- Be updated about sleep in shift workers
- Be updated about Working Time Regulations for Aircrews and Road transport staff (e.g. like truck drivers)

Target Audience

Sleep specialists, occupational medicine specialists

Chairs:

Andrea Rodenbeck (Germany)
Daniel Aeschbach (Germany)

09:00AM - 09:02AM
Introduction

09:02AM - 09:22AM
Sleep in Shift Workers: Results from the updated, evidence-based German Guideline on Shift Work and Health
Céline Vetter (United States)

09:22AM - 09:42AM
Aircrew scheduling and sleepiness - a large EU study
Torbjörn Åkerstedt (Sweden)
Scientific Programme

09:42AM - 10:02AM
Interaction effects of workload and time awake on aircrew fatigue - implications for duty time regulation
Daniel Aeschbach (Germany)

10:02AM - 10:22AM
The EU driving and rest period regulation and truck drivers’ sleep and sleepiness
Mikael Sallinen (Finland)

10:22AM - 10:30AM
Conclusion

10:00AM - 4:00PM
Exhibition, Exhibition

Exhibition 3
Teen-agers and young adults are recognized more and more with Sleep-Disordered-Breathing (SDB) and Obstructive-Sleep-Apnea (OSA) with polysomnograms showing low apnea-hypopnea-index (AHI) but clear complaints [inattention, hyperactivity, difficulty to concentrate, to memorize, poor-sleep, daytime tiredness, sometimes daytime sleepiness]. Historically, 60% of adenotonsillectomy [T&A] procedures have been performed in pre-pubertal years or evaluation show tonsils stage 2. Evaluation of oro-facial structures indicates the presence of anatomical issues that are available for treatment. These treatments involve a multi-disciplinary team and sleep clinic follow-up to appreciate successes and failures of the approach. The most common anatomic exam finding is a narrow hard palate, normally at birth infant have a palatal width of 20 mm and by puberty at least 25mm width, after early prematurity, the most common cause of abnormal oro-facial development is a short lingual frenulum. Such abnormality can be recognized by performing measurement with variable position of the tongue and mouth, once demonstration of short frenulum a combination of exercise stretching the frenulum should be started before surgical “disinsertion” and must be continued for several months after it, with evaluation of objective SDB gain. Abnormal maxillary growth may be present after rapid-maxillary or bi-maxillary expansion, Midface retraction creates a size deficiency problem in the upper airway that has been improved in children using surgical midface advancement and orthopedic protraction of the maxilla. Recently introduced bone anchored maxillary protraction (BAMP) uses implant inserted devices in the jaws to bring the maxilla forward against a backward pressure to the lower jaw. The use of BAMP is a strategy to treat maxillary retraction and children with obstructive sleep apnea. In teenagers and young adults with OSA and narrow hard palate maxillary expansion is more challenging due to skull maturation resulting in increased resistance to suture separation. Endoscopically-assisted surgical –expansion allows maxillary expansion with limited invasiveness compare to previous surgical proposals and valid results avoiding usage of CPAP. Prematurity is a very common cause of early OSA reeducation of orofacial muscle strength is a critical step in allowing palatal growth and expansion. However. Myofunctional therapy (MFT) is very difficult to apply in young children with usually poor compliance. A neutral mandibular advancement device with tongue beads used only during the sleep period has been tried for over a year in comparison to MFT and has allowed normal growth and development in this group of non-compliant children.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

• Perform a valid evaluation of the palate; recognize short lingual frenulum and perform appropriate treatment of this abnormality with appropriate follow-up protocol

• Recognize abnormal maxillary growth in 10 to 14 years old and understand the indication and treatment of maxillary retrusion with bone-anchored-maxillary-expansion

• In older teenagers and young adults with persistence or new development of OSA, understand the indication and the results obtained with little invasive maxillary expansion using endoscopic-assisted-surgical expansion

• In young children, particularly old premature, with abnormal orofacial development that would be the beneficiary of myofunctional therapy but often non-compliant, understand the results obtained with a neutral-mandibular-advancement-device with tongue beads used only during the sleep period with presentation of results over 1 year of usage

Target Audience
Sleep medicine specialists adults and pediatrics, dentists and orthodontists, oral surgeon and ENT: All physicians dealing with OSA from children to middle-age adults and looking for alternative treatment from nasal CPAP.
### Scientific Programme

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<tr>
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<tr>
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<td>Introduction</td>
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<tr>
<td>10:47AM -</td>
<td>Introduction: orofacial growth and OSA</td>
<td>Christian Guilleminault (United States)</td>
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<tr>
<td>11:03AM -</td>
<td>Short lingual frenulum: diagnosis, and treatment including re-education</td>
<td>Audrey Yoon (United States)</td>
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<tr>
<td>11:03AM -</td>
<td>Maxillary retrusion with treatment with bone-anchored-maxillary-expansion</td>
<td>Stacey Quo (United States)</td>
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<td>11:35AM -</td>
<td>Maxillary expansion using endoscopic-assisted-surgical expansion</td>
<td>Kasey Li (United States)</td>
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<td>11:51AM -</td>
<td>Neutral-mandibular-advancement-device with tongue beads used only during the sleep as myofunctional treatment</td>
<td>Yu-Shu Huang (Taiwan)</td>
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<td>12:07PM -</td>
<td>Conclusion</td>
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Scientific Programme

10:45AM - 12:15PM

S60: Why the role of sleep in memory consolidation is overrated

Summary

There is a plethora of evidence and broad consensus that sleep plays a specialized and perhaps critical role in the consolidation of memories, that is, the conversion of temporary, labile memory traces into long-lasting neural engrams. Important mechanisms thought to mediate memory consolidation during sleep include: the hormonal milieu (particularly low cortisol levels); specific patterns of oscillatory brain activity (e.g., spindles, sharp wave-ripples, delta activity, slow oscillations); neuronal replay or reactivation of encoding-related network activity; and synaptic potentiation occurring during sleep. It is thought that, together, these mechanisms ensure that information acquired during the waking state is reinforced and transformed into long-term memories during subsequent sleep.

Despite strong evidence, the sleep-memory consolidation hypothesis has faced a steady stream of critical commentaries and contradictory evidence. By drawing from several diverse but complementary approaches, the symposium will highlight inconsistent and contentious issues, emphasizing both empirical and theoretical challenges to the sleep-memory hypothesis. The following lines of arguments will be explored:

1. Plasticity mechanisms (e.g., lowered cortisol, sharp wave-ripples, delta activity, slow oscillations) thought to mediate synaptic and behavioral memory consolidation during sleep also operate during wakefulness; empirical data demonstrate that these mechanisms can induce consolidation in the absence of behavioral and polysomnographic sleep (Dringenberg).

2. The state of quiet waking, in particular, appears to share similarities with sleep in terms of the activation of consolidation mechanisms; at least under some conditions, periods of quiet waking (eyes-closed rest) can lead to memory benefits similar to those observed with sleep; thus, sleep might not be a uniquely required state for consolidation (Wamsley).

3. Examinations of the parallels between sleep and states of general anesthesia in both non-human animals and humans also challenge the role of sleep in memory consolidation; based on physiological mechanisms and behavioral measures, states of sleep and anesthesia are incompatible with any form of cognitive processing, including memory consolidation (Vertes).

4. Aquatic mammals can exhibit an adaptive suppression of sleep for prolonged (days to months) periods. Fur seal switching from terrestrial to aquatic life lose REM sleep, and total sleep deprivation for 4.5 days does not cause detectable impairments of general health or cognitive functions. Thus, sleep does not appear to play an obligatory role in cognitive performance and memory functions in fur seals and some other aquatic mammals (Lyamin).

The arguments presented in this symposium can be summarized as follows: (a) consolidation mechanisms are active during both sleep and wakefulness; (b) quiet waking is particularly effective in facilitating consolidation; (c) sleep may severely restrict or prevent the occurrence of cognitive operations; and (d) some mammals can suppress sleep for prolonged periods without apparent impairments in cognitive functioning, including learning and memory. Thus, both empirical observations and theoretical arguments challenge the notion of a truly specialized or critical role of sleep in memory consolidation. Rather, sleep may fall along a continuum of behavioral states that vary in the effectiveness to permit or actively facilitate effective consolidation in neural circuits.

Learning Objectives

Upon completion of this CME activity, participants should be able to:

- Develop an understanding of the neuronal mechanisms of memory consolidation
- Critically evaluate the empirical evidence for memory consolidation during different behavioral states (sleep, active and quiet waking)
- Appreciate the evolutionary and ecological factors that shape cognitive processing in relation to sleep-wake states
- Conceive practical strategies to optimize memory consolidation in healthy and clinical populations (particularly those suffering from sleep disorders and neuropsychiatric disorders affecting sleep)
### Scientific Programme

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<th>Time</th>
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<tr>
<td>10:45AM</td>
<td>Introduction</td>
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<tr>
<td>10:47AM</td>
<td>Consolidation mechanisms are active during wake and sleep</td>
<td>Hans C. Dringenberg (Canada)</td>
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<td>11:07AM</td>
<td>Memory consolidation in facilitated by waking rest</td>
<td>Erin J. Wamsley (United States)</td>
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<td>11:07AM</td>
<td>No cognitive processing in unconscious states: sleep is no exception</td>
<td>Robert P. Vertes (United States)</td>
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<tr>
<td>11:47AM</td>
<td>Altered sleep in aquatic mammals does not impair cognitive functions and performance</td>
<td>Oleg Lyamin (Russian Federation)</td>
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<td>12:07PM</td>
<td>Conclusion</td>
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</table>
S61: The role of sleep in aging: Molecular insights related to inflammation

Summary
Sleep provides the body time to rest, repair, and restore at both the system and cellular level. One of the factors that remarkably affects sleep is aging. Significant alterations in sleep patterns and the quantity and quality of sleep are found as people get older. The elderly population has been found to have a higher prevalence of sleep disturbances such as insomnia, obstructive sleep apnea and overall sleep complaints. These sleep alterations have been found by longitudinal studies to be associated with mortality and other age-related conditions and diseases. Although the sleep pattern of the elderly is well-known, the relationship between sleep and the aging-related mechanisms is not completely clarified. On the other hand, not getting quality sleep may disrupt these restorative processes and lead to greater wear and tear, and eventually contribute to disease risk. Numerous studies have linked short sleep duration, poor sleep quality, and/or insomnia to increased risk for cardiovascular disease, diabetes, and mortality; however the mechanisms are not clearly defined. Biological aging precipitates disease and death, and inadequate sleep may also influence these aging processes. One such mechanism is cellular senescence, which can cause chronic inflammation through the senescence-associated secretory phenotype (SASP), a phenomenon called “inflammaging”. The SASP has many of the paracrine effects one would expect from a pro-inflammatory stimulus, which can be highly deleterious, causing local and potentially systemic inflammation, disrupt tissue architecture, and can cause the exacerbation of telomere attrition and oxidative stress. Therefore, it is suggested that the SASP is the main driver of age-related inflammation and ultimately is associated with a higher risk of cancer and other age-related disorders. This could suggest a bidirectional relationship between sleep and aging, in which sleep disturbances could be triggered and trigger cellular aging. In this sense, this symposium aims to provide the most recent advance regarding the molecular mechanisms of sleep related to aging.

Learning Objectives
Upon Completion of this CME activity, participants should be able to...

- Review the evidence of disturbed sleep as a triggering factor for accelerated aging
- Discuss underlying mechanisms for the interactions between sleep and age-related diseases
- Assemble the tools to age-related biomarkers that can be used as predictors of sleep disturbances

Target Audience
This session is proposed for a general audience since it is a relatively new field for Sleep Medicine, which is growing and needs to be explored. In particular, it may be of great interest for attendees whose research is focused on molecular pathways of sleep related to aging.

Chairs:
Sergio Tufik (Brazil)
Scientific Programme

10:45AM - Introduction
10:47AM - Effects of sleep on age-related conditions
Ronaldo Delmonte Piovezan (Brazil)
11:07AM - Sleep disturbances and biological aging: the wear and tear of insufficient sleep
Judith Carroll (United States)
11:27AM - Telomere length as a marker of sleep disturbances: a link between sleep and cellular senescence
Priscila Farias Tempaku (Brazil)
11:47AM - Mechanisms underlying the association between sleep-wake disruptions and Alzheimer’s disease
Johathan Cedernaes (Sweden)
12:07PM - Conclusion
Scientific Programme

10:45AM - 12:15PM

S62: Biology and biomarkers of unexplained hypersomnolence

Summary
Unexplained hypersomnolence, in which patients are excessively sleepy, often with prolonged sleep duration, is commonly encountered in the practice of sleep medicine. Idiopathic Hypersomnia, the quintessential disorder of unexplained hypersomnolence, is likely a heterogeneous disorder with multiple potential underlying causes. This symposium will present cutting-edge research regarding the biology and biomarkers associated with unexplained hypersomnolence, with a primary focus on Idiopathic Hypersomnia (IH).

Dr. Lynn Marie Trotti of Emory University will present on GABA-related hypersomnolence, and the evidence that at least some proportion of patients with IH may have abnormal potentiation of the GABA-A receptor. Data supporting the use of GABA antagonists, flumazenil and clarithromycin, in IH will also be discussed. Dr. Thien Thanh Dang-Vu of Concordia University will present recent data on neuroimaging in IH, with specific focus on altered regional cerebral blood flow in the disorder. Dr. Robert Thomas of Harvard University will present emerging data that many patients with IH may have circadian rhythm dysfunction as a core feature of the disorder. Finally, Dr. David Plante of the University of Wisconsin-Madison will present recent high-density EEG data examining regional reductions in slow wave activity, which may represent a process that occurs in persons with excessive daytime sleepiness, regardless of the presence or absence of comorbid psychiatric illness.

Each talk will be approximately 20 minutes in duration, leaving time for both brief introductions as well as a comprehensive final discussion. As a collection of talks, this symposium will present to attendees emerging data that suggest potential biological processes that may be responsible for unexplained hypersomnolence. In addition, this symposium will suggest future research directions in this exciting area.

Learning Objectives
Upon Completion of this CME activity, participants should be able to...

- Describe recent evidence for altered GABA-A activity and circadian period in Idiopathic Hypersomnia.
- Appreciate the brain structures neuroimaging and high-density electroencephalography have demonstrated to be abnormal in persons with unexplained hypersomnolence.
- Understand the evidence in support of novel treatment strategies directed towards aberrant biology in Idiopathic Hypersomnia.

Target Audience
Clinicians and Researchers with interest in central disorders of hypersomnolence

Chairs:
David T. Plante (United States)
Scientific Programme

10:47AM - 11:07AM  GABA-related hypersomnolence
Lynn Marie Trotti (United States)

11:07AM - 11:27AM  Neuroimaging findings in CNS hypersomnias
Nathan Cross (United States)

11:27AM - 11:47AM  Altered circadian period in idiopathic hypersomnia
Robert Thomas (United States)

11:47AM - 12:07PM  Altered local slow wave activity in hypersomnolence disorder: A transdiagnostic process?
David T. Plante (United States)

12:07PM - 12:15PM  Conclusion
Scientific Programme

Basic Science Symposium, 211

10:45AM - 12:15PM

S63: The relationship between sleep and torpor: Circuits and mechanisms linking thermoregulation and sleep switch

Summary
The primary aims of this symposium are to address the regulation of torpor, its relationship with sleep and to discuss the common neural mechanisms underlying thermoregulation, sleep and energy homeostasis. Torpor is a unique adaptation to harsh environmental conditions, characterised by a controlled reduction in metabolic rate to levels well below basal metabolic rate, and profound attenuation of physiological functions, wherein body temperature can drop to within a few degrees of ambient temperature. Torpor is a strictly regulated process, yet the mechanisms that regulate this dramatic physiological state remain poorly understood. In mammals, sleep and energy metabolism are intimately linked, as evidenced by the numerous bidirectional connections between the neural circuits that govern these processes. The maintenance of waking and sleep is regulated by several subcortical structures, which provide neuromodulatory action on the forebrain. Critically, all of these homeostatic centres are also implicated in the expression of torpor. Wakefulness and sleep are also shaped by the interaction of two processes: the homeostatic process, and the circadian process, which provides a temporal framework for specific waking behaviours, sleep and metabolism. Behaviourally, torpor resembles sleep, but the relationship between these two fundamental states of the organism remains controversial. While it appears that torpor is a state neurophysiologically distinct from both waking and sleep, evidence suggests that torpor and sleep are closely related. For example, while torpor bouts are often initiated from deep sleep, daily torpor in Djungarian hamsters is followed by deep sleep with high EEG slow-wave activity. In this symposium the speakers will review the knowledge about regulatory mechanisms of sleep, thermoregulation and torpor, and will discuss the effects of torpor on the brain and sleep regulation. In perspective, elucidating neural mechanisms of torpor and clarifying the relationship between torpor and sleep will benefit numerous clinical applications and open novel perspectives for inducing hypometabolic states in humans. The first speaker, Prof Clifford B. Saper, (Harvard Medical School, Boston, USA) will describe the role of hypothalamic preoptic nuclei in sleep and thermoregulation. Then, Prof. William Wisden (Imperial College, London, UK) will outline the circuitry through which an external thermal stimulus may induce sleep and will discuss state-dependent mechanisms of body temperature regulation in mice. Prof. Giovanna Zoccoli (University of Bologna, Italy) will discuss the role of orexins, hypothalamic neuropeptides involved in sleep, body temperature and food intake regulation, in torpor and in sleep alterations accompanying torpor. Prof. Vladyslav Vyazovskiy (University of Oxford, UK) will describe the effects of torpor on cortical neural dynamics and sleep homeostasis, emphasizing differences and similarities in the cortical activity between sleep and torpor in mice. Finally, Prof. Kelly L. Drew (University of Alaska Fairbanks, USA) will describe molecular mechanisms of torpor and arousal in true hibernating species, focusing on adenosine, which is implicated in both energy homeostasis and regulation of sleep.

Learning Objectives
Upon Completion of this CME activity, participants should be able to...

- Describe basic physiological mechanisms underlying sleep regulation
- Understand the role of the hypothalamus in sleep and body temperature control
- Critically evaluate differences and similarities between sleep and torpor
- Demonstrate basic knowledge of methodology used in animal studies aimed at investigating the relationship between sleep and metabolism

Target Audience
basic neuroscientists, clinical researchers, circadian biologists

Chairs:
Giovanna Zoccoli (Italy)
Vladyslav Vyazovskiy (United Kingdom)
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<td>Introduction</td>
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<tr>
<td>10:47AM</td>
<td>Sleep and thermoregulatory control by the preoptic area</td>
<td>Clifford B. Saper</td>
<td>United States</td>
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<td>11:03AM</td>
<td>Neural circuitry binding sleep and temperature regulation</td>
<td>William Wisden</td>
<td>United Kingdom</td>
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<td>Neural circuitry binding sleep and temperature regulation</td>
<td>William Wisden</td>
<td>United Kingdom</td>
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<td>11:19AM</td>
<td>Orexins as a link between thermoregulation, sleep and torpor</td>
<td>Giovanna Zoccoli</td>
<td>Italy</td>
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<td>11:35AM</td>
<td>The relationship between torpor and sleep: focus on cortical network</td>
<td>Vladyslav Vyazovskiy</td>
<td>United Kingdom</td>
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<tr>
<td>11:35AM</td>
<td>The relationship between torpor and sleep: focus on cortical network</td>
<td>Vladyslav Vyazovskiy</td>
<td>United Kingdom</td>
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<td>11:51AM</td>
<td>Neurochemical mechanisms driving sleep and thermoregulation in the</td>
<td>Kelly Drew</td>
<td>United States</td>
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<td>12:07PM</td>
<td>Neurochemical mechanisms driving sleep and thermoregulation in the</td>
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S64: Reconsidering NREM parasomnia: Toward a better understanding of pathophysiology and treatment

Summary

NREM parasomnias are frequent sleep disorders. Usually NREM parasomnias occur during childhood and early adolescence and disappear with aging. But in up to 2-4% they occur in adults with sometimes relevant, psychosocial consequences. In contrast to REM behavior disorder NREM parasomnias are not associated with neurodegeneration. Their pathophysiology is not well understood. Animal models do not exist so far. One SPECT study and few EEG studies could confirm a coexistence of wake and sleep stages during NREM parasomnia episodes. One imaging study showed hypoperfusion during episodes of sleepwalking within the frontal lobe and parietal cortex and activation of the cingulate and thalamus. If these neuroanatomical correlates are the cause or consequence is still unclear. Hypoperfusion of the frontal cortex may explain inhibited response to external stimuli and that of the vermis the inadequate motor behavior. Electrophysiological findings suggest that fragmented sleep with reduced slow wave sleep causes increased slow wave sleep pressure leading to increased susceptibility to incomplete arousal. Recently polysomnographic findings were correlated to behavior showing that arousal leading to wake state allow patients to recall dreams associated with the NREM motor behavior, whereas arousals with diffuse EEG causes confusion. Intracerebral recordings with stereo-EEG of patients with epilepsy and NREM parasomnia confirmed the imaging results. Local fast wake-like EEG activations were recorded in the motor and cingulate cortices while bursts of sleep-like delta waves persisted in the frontal, hippocampal and parietal associative cortices. In one case thalamic activation preceded cortical activation. The extent to which other cortical and subcortical networks may disturb the persistence of slow wave activity in the thalamocortical circuit seems to be of importance for the type of arousal. Both imaging and EEG studies give the key structure for the creation of an animal model for NREM parasomnia. Genetics contribute to the disorder, but seem to be very heterogeneous. An association to the HLA system was found and opens a possible link to neuroimmunology. Until today different therapies have been proposed, but so far none of the therapies has been evaluated in a systematic study and results are conflicting reflecting the gap of knowledge in NREM parasomnia.

Learning Objectives

Upon Completion of this CME activity, participants should be able to...

- understand the current knowledge about the pathophysiology in different dimensions
  - imaging
  - electrophysiology
  - genetics
- Presenting an animal model based on recent findings
- explain the current approaches in therapy
  - animal models - translation into therapy
  - current treatments and what we learn from them
  - future therapy strategies
- interpret and use the approaches to establish diagnostic tools
  - Relating EEG patterns and imaging to behavior and vice-versa
  - machine learning results as possible biomarkers

Target Audience
Neurologists, electrophysiologists, clinical sleep researchers, pediatricians

Chairs:
Geert Mayer (Germany)
# Scientific Programme

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<td>10:47AM -</td>
<td>Animal models for NREM parasomnia</td>
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<td>Pierre-Hervé Luppi (France)</td>
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<td>Imaging findings and behavior in NREM parasomnia</td>
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<td>Régis Lopez (France)</td>
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<td>Is there a genetic link to NREM parasomnia?</td>
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<td>Anna Heidbreder (Germany)</td>
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<td>Neuronal networks from intracerebral recordings</td>
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<td>Lino Nobili (Italy)</td>
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<td>New approaches in polysomnography analysis of NREM parasomnia</td>
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<td>Dagmar Krefting (Germany)</td>
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<td>Geert Mayer (Germany)</td>
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Scientific Programme

10:45AM - S65
12:15PM

**S65: Social aspects of sleep**

Summary

A growing number of studies within sleep research are focusing on social aspects. In this symposium, four speakers at the intersection of sleep and social psychology will present the most up-to-date research in this burgeoning field. This integrative focus includes social effects of sleep deprivation, as well as social determinants of sleep. The speakers are all at the forefront of this research area, and will review the current literature, as well as present new unpublished findings. In the first talk, Dr. Sundelin will review the field and present work on interpersonal communication during sleep deprivation, and how this relates to social impressions of someone who is sleep deprived. Dr. Halfmann will follow this presentation by describing possible mechanisms, as well as data from a large study on how sleep deprivation affects negotiations in a social setting. Dr. Ben Simon will then discuss how sleep deprivation triggers a behavioral and neural phenotype of loneliness that can be perceived by others, and make them feel lonelier as a consequence. Following this model of a self-reinforcing cycle of loneliness, Dr. Prather will present findings on the impact of social rejection on subjective and objective measures of sleep. These findings regard social rejection on a wider scale, such as discrimination, as well as more interpersonal social rejection, indicating that these experiences negatively affect both sleep quality and quantity.

Together, these presentations cover several social aspects of sleep, specifically how communication and negotiation skills are affected by sleep loss, and how the resulting social impressions of sleep-deprived individuals may contribute to a cyclic effect of poor sleep and poor social experiences.

Learning Objectives

- Understanding the impact of sleep deprivation on the social interest and social evaluation of others.
- Having a deeper understanding of the effects of sleep deprivation on interpersonal communication and negotiation outcomes.
- Identifying the relevant neural networks associated with increased social withdrawal following sleep loss.
- Describing the current literature linking sleep and social rejection, including racial discrimination.

Target Audience

Researchers in the field of social aspects of sleep and sleep loss, including those with a focus in the cognitive and emotional domain, practitioners working with sleep-related issues, and anyone interested in the basic research on social effects and determinants of sleep.

**Chairs:**

Tina Sundelin (Sweden)
Scientific Programme

10:47AM - 11:07AM
Effects of sleep loss on interpersonal communication and social impressions
Tina Sundelin (Sweden)

11:07AM - 11:27AM
The effect of total sleep deprivation in negotiations
Emma Halfmann (Germany)

11:27AM - 11:47AM
Sleepless and alone: The neural correlates of social withdrawal without sleep
Eti Ben Simon (United States)

11:47AM - 12:07PM
The impact of social rejection on subjective and objective measures of sleep
Aric Prather (United States)

12:07PM - 12:15PM
Conclusion
Scientific Programme

Symposium, 220

10:45AM - 12:15PM

S66: Depression and sleep: New insights in measurement and treatment

Summary

Depression is highly comorbid with sleep disturbances and shares many overlapping daytime symptoms (e.g., concentration difficulties, reduced sleep, fatigue). In particular, individuals with comorbid depression and insomnia represent a challenging group to treat, as insomnia may predate the depression, and can contribute to suboptimal treatment response, remain after successful depression treatment, and contribute to depressive relapse. Therefore, valid and reliable measurement of sleep disturbance in this population is critical to better understand the mechanisms underlying the relationship between these two related but distinct conditions and has important treatment implications. For instance, various sleep parameters (e.g., sleep duration, sleep efficiency, and circadian rhythm disruptions) are distinct and may differentially influence depression, yet their effects on depression response have not been comprehensively studied. Approaches have focused on using retrospective, self-reported measures to assess sleep disturbance in individuals with depression and have largely ignored the assessment of other related factors (e.g., circadian factors) or other methodologies (e.g., pupillometry). This symposium describes the latest research on approaches to measurement in depression and sleep. Topics include measurement of insomnia improvement in those with insomnia and depression; multifaceted, prospective measurement of sleep and circadian factors in sleep and depression, with a focus on evaluating bidirectional relationships; the importance of measuring specific insomnia beliefs in over and above general negative cognitive style in comorbid insomnia and depression; a comparison of self-reported and pupillometric assessments of sleepiness in individuals with depression; and the importance of measuring circadian preference as it relates to treatment outcome following cognitive behavioral therapy for insomnia in individuals with comorbid insomnia and depression. Attendees will learn about how advances in the measurement of sleep in depression has furthered our understanding of the key role that various sleep disturbances play in maintaining depression, the importance of measuring insomnia-specific beliefs when assessing comorbid insomnia and depression, as well as the importance of valid and reliable measurement of sleep and circadian factors in predicting treatment response in those with comorbid insomnia and depression. Measurement is a critical component of evidence-based assessment and treatment, and investigation into novel methods of measuring sleep disturbance in depression with increased validity and reliability is pertinent when comorbidity is the norm, rather than the exception. The importance of the findings from this symposium is underscored by the implications they have on both the assessment and treatment of sleep and circadian disturbance and depression.

Learning Objectives

Upon completion of this CME activity, participants should be able to:

- About multitrait, multimethod measurement of depression and sleep in those with sleep disruption.
- About the importance of insomnia specific beliefs in predicting insomnia severity in the comorbid depression and insomnia.
- About the mixed results with regards to CBT-I in the treatment of comorbid depression and insomnia.
- About the potential importance of evaluating circadian preference among adults with comorbid insomnia and depression and the benefits.
- About the use of pupillometry versus self-reported measures to assess sleepiness in depression.

Target Audience

Researchers and those who practice in the area of sleep disorders

Chairs:

Nicole Carmona (Canada)
Scientific Programme

10:45AM - 10:47AM
Introduction

10:47AM - 11:03AM
Predicting insomnia improvement in those with comorbid insomnia and depression
Colleen Carney (Canada)

11:03AM - 11:19AM
Multifaceted measurement of sleep and circadian factors in sleep and depression
Daniel Taylor (United States)

11:19AM - 11:35AM
Specificity of insomniatypic beliefs in predicting insomnia severity in those with depression
Nicole Carmona (Canada)

11:35AM - 11:51AM
Self-reported sleepiness versus pupillometrically measured sleepiness in depression
Kathryn Roecklein (United States)

11:51AM - 12:07PM
Circadian preference as a moderator of depression outcome following cognitive behavioral therapy for insomnia plus antidepressant medications
Lauren Asarnow (United States)

12:07PM - 12:15PM
Conclusion

Oral Abstract, 216

10:45AM - 12:15PM
Oral abstract: content to be determined
S67: On light, circadian rhythms and health

Summary
Light is the dominant cue for synchronizing the circadian clock (Roenneberg, Kantermann, Juda, Vetter, & Allebrandt, 2013), through an active process called entrainment. A central pacemaker in the hypothalamic suprachiasmatic nucleus (SCN) generates circa 24-hour rhythms in multiple aspects of physiology and behavior, including the timing of sleep and wakefulness. While humans have evolved under a 24-hour solar day and night, we now spend the majority of our time within constructed environments with artificial lighting. Indoor lighting conditions can disrupt stable circadian entrainment, adversely affecting our sleep, health and well-being.

This symposium, chaired by Dr. Myriam Juda (Psychology Department at Simon Fraser University), will discuss novel multi-component research strategies in the field of circadian biology, that are currently being developed with the aim of improving health and well-being in the general population.

The first two talks will focus on advances and novel approaches to measuring quantities central to circadian biology. Dr. Till Roenneberg (Institute of Medical Psychology at the University of Munich) will report on his growing actimetry database (currently around 20,000 days and nights in 600 participants). With the possibility of concurrently recording activity and light by wrist-worn devices, we now can analyze objectively recorded light-sampling behavior and relate it to objectively recorded sleep-wake behavior. These analyses contain great day-to-day detail, including the relationships between sleep timing, sleep structure, photoperiod and social schedules.

Dr. Céline Vetter (Department of Integrative Physiology at the University of Colorado) will introduce her novel, data-driven approach to quantify light exposure in real-life settings, and demonstrate its usefulness in relation to sleep behavior, mood, and physical health.

Next, Dr. Kenneth Wright (Department of Integrative Physiology at the University of Colorado) will discuss the influence of daylight-saving time on exposure to sunlight and potential consequences for circadian timing, health and safety.

Lastly, we will embark on considering implications of circadian biology as it pertains to specific medical applications. Dr. Elizabeth Klerman (Department of Medicine at Harvard Medical School) will report on two new studies investigating the effects of timing of induction on labor duration and interactions of light exposure on melatonin concentrations and uterine contractions in late-term pregnancy. Since light can suppress melatonin, there may be implications for the use of melatonin agonists or antagonists and lighting conditions in changing the number of uterine contractions and possibly labor duration.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Grasp basic concepts in circadian biology: the circadian clock and entrainment.
- Comprehend circadian disruption and its consequence to our health
- Appreciate the benefits of improved lighting conditions to public health
- Envision the applicability of circadian biology and light therapy in medical interventions

Target Audience
Researchers and practitioners in circadian rhythms and sleep medicine, general medicine, epidemiology, psychiatry, psychology and health sciences; policy makers, general public

Chairs:
Myriam Juda (Canada)
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<th>Time</th>
<th>Topic</th>
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<tr>
<td>10:45AM</td>
<td>Introduction</td>
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<td>10:47AM</td>
<td>Epidemiology of human light-sampling behaviour</td>
<td>Till Roenneberg (Germany)</td>
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<td>11:07AM</td>
<td>Daylight saving time and light exposure</td>
<td>Kenneth Wright (United States)</td>
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<td>11:27AM</td>
<td>A novel data-driven approach to probe the link between light and health</td>
<td>Céline Vetter (United States)</td>
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<td>11:47AM</td>
<td>Circadian rhythms, light, melatonin, and pregnancy</td>
<td>Elizabeth Klerman (United States)</td>
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<td>12:07PM</td>
<td>Conclusion</td>
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S68: Is Narcolepsy a Spectrum Disorder including IH, NT2 and NT1?

Summary
This symposium will address the possibility that some forms of Idiopathic Hypersomnia (IH) and Narcolepsy Type 2 (NT2) may have subtle loss of hypocretin neurons compared with Narcolepsy Type 1 (NT1) and therefore IH, NT2 and NT1 are part of a condition of a Narcolepsy Spectrum Disorder.

Hypocretin is integral to the pathophysiology of narcolepsy and we will review the current understanding of hypocretin in the control of sleep and wakefulness and discuss what is currently known about hypocretin loss in central neurological disorders of excessive sleepiness.

Should some forms of IH be considered a subtype of narcolepsy? Similarities in clinical presentation, electrophysiological similarities, and the association of REM sleep phenomena of IH, NT2 and NT1 with hypocretin loss will be discussed.

Are environmental triggers of narcolepsy similar in IH, NT2 and NT1, therefore leading to a similar pathophysiology?

If IH, NT2 and NT1 are all part of a narcolepsy spectrum disorder, are excessive sleepiness and the degree of REM sleep abnormalities associated with the severity of hypocretin loss? Is the cataplexy of NT1 a manifestation of a high degree of neuronal hypocretin loss, and are the REM sleep manifestations of NT2, and the excessive sleepiness of IH due to lesser degrees of hypocretin loss?

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Understand the impact of the hypocretin system in health and in narcolepsy
- Learn whether hypocretin loss contributes to the clinical features of idiopathic hypersomnia (IH), narcolepsy type 2 (NT2) and narcolepsy type 1 (NT1)
- Learn about the pathogenesis (environmental factors in particular) for the development of narcolepsy
- Understand the clinical features of IH, NT2 and NT1

Target Audience
Sleep specialists, psychologists, technicians

Chairs:
Ulf Kallweit (Germany)
Michael Thorpy (United States)

12:30PM - 12:32PM
Introduction

12:32PM - 1:12PM
The neuronal and csf hypocretin associations with REM sleep phenomena and narcolepsy

Mehdi Tafti (Switzerland)

Thomas Scammell (United States)
Scientific Programme

1:12PM - 1:32PM
Environmental factors for the development of narcolepsy and IH
Fang Han (China)

1:32PM - 1:52PM
Similarities in the clinical features of IH, NT2 and NT1
Yves Dauvilliers (France)

1:52PM - 2:00PM
Conclusion

12:30PM - 2:00PM
D08: Telemedicine in sleep medicine

Summary
Sleep medicine has been an expanding discipline during the last few decades. The prevalence of sleep disorders is increasing, and sleep centers are expanding in hospitals and in the private care environment to meet the demands. Sleep medicine has evidence-based guidelines for the diagnosis and treatment of sleep disorders. However, the number of sleep centers and caregivers in this area is not sufficient. Many new methods for recording sleep and diagnosing sleep disorders have been developed. Many sleep disorders are chronic conditions and require continuous treatment and monitoring of therapy success. Cost-efficient technologies for the initial diagnosis and for follow-up monitoring of treatment are important. It is precisely here that telemedicine technologies can meet the demands of diagnosis and therapy follow-up studies. Wireless recording of sleep and related biosignals allows diagnostic tools and therapy follow-up to be widely and remotely available. Moreover, sleep research requires new technologies to investigate underlying mechanisms in the regulation of sleep in order to better understand the pathophysiology of sleep disorders. Home recording and non-obtrusive recording over extended periods of time with telemedicine methods support this research. Telemedicine allows recording with little subject interference under normal and experimental life conditions.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Background for telemedicine applications in sleep medicine
- Compliance with therapy in sleep apnea using telemedicine
- Telemedicine applications for insomnia
- Smartphone applications use in sleep medicine reviewed systematically

Target Audience
Pulmonologists in sleep medicine, sleep specialists, sleep technologists

Chairs:
Babak Amra (Islamic Republic of Iran)

12:30PM - 12:32PM
Introduction
<table>
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<tr>
<th>Time</th>
<th>Session Title</th>
<th>Presenter Country</th>
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<tbody>
<tr>
<td>12:32PM -</td>
<td>Telemedicine: What can be achieved through engineering</td>
<td>Thomas Penzel (Germany)</td>
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<td>12:48PM</td>
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<td>12:48PM -</td>
<td>Telemedicine guideline in sleep medicine</td>
<td>Christoph Schoebel (Germany)</td>
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<td>1:04PM</td>
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<td>1:04PM - 1:20PM</td>
<td>Effect of CPAP compliance and exercise in patients with OSA and heart failure</td>
<td>Lia Rita A. Bittencour (Brazil)</td>
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<td>1:20PM - 1:36PM</td>
<td>Diagnostic telemedicine applications</td>
<td>Ingo Fietze (Germany)</td>
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<td>1:36PM - 1:52PM</td>
<td>The smartphone tool - consumer and diagnostic apps</td>
<td>Yong K. Choi (United States)</td>
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<td>1:52PM - 2:00PM</td>
<td>Conclusion</td>
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Scientific Programme

Pediatric Symposium, 119-120 - 119

12:30PM - 2:00PM

S69: Sleep and mental health in adolescents

Summary

Adolescence, covering the second decade between childhood and adulthood, is a period of fundamental development in brain and behavior, and also a time of increased vulnerability to mental health problems. Good quality and sufficient sleep is critical for optimal mental health; sleep complaints are a key symptom of psychiatric disorders, and shorter sleep is a known risk factor for depression, substance use disorders, and suicide. Given the substantial changes that occur in sleep across adolescence, with shorter sleep duration, later bedtimes, and altered sleep composition in older adolescents, it is important to focus on sleep-mental health associations during this period to ultimately determine whether sleep modifications are effective at lowering risk for mental health issues. This symposium brings together experts in the area of sleep and mental health in adolescence, who will present new research, considering experimental, observational, and clinical data. Dr. Franzen will present research showing the impact of insufficient sleep on affective functioning and associations between short sleep and suicidality in adolescents. Dr. Goldstone will present longitudinal data in adolescents showing the bidirectional relationships between sleep and mental health issues, particularly in relation to substance use (alcohol and marijuana). Dr. Gruber will present research about the interactions between sleep, emotional regulation and attention in adolescents, in the context of attention deficit disorder. Finally, Dr. Blake will discuss the potential pathways that lead from insomnia to the development of mental health issues, particularly anxiety and depression, in adolescence, also considering the efficacy of cognitive-behavioral sleep interventions in at-risk adolescents. This symposium provides a unique focus on the importance of sleep for mental health, considering adolescence as a critical period when individuals are vulnerable to the development of mental health issues, on the one hand, but also amenable to benefit from treatment interventions that work by modifying behaviors such as sleep, on the other.

Learning Objectives

Upon completion of this CME activity, participants should be able to:

• Understand bidirectional links between sleep and mental health issues during adolescence
• Demonstrate knowledge about the relationship between short sleep and effective functioning and suicidality risk in adolescents
• Demonstrate knowledge about the contribution of poor sleep to the exacerbation of cognitive, emotional, and social deficits in adolescents with ADHD
• Identify who benefits most from cognitive-behavioral sleep interventions in adolescents at-risk for mental health issues

Target Audience
Researchers, trainees, and clinicians

Chairs:
Fiona Baker (South Africa)

12:30PM - 12:32PM

Introduction
Scientific Programme

12:32PM - 12:52PM
Insufficient sleep and affective functioning in adolescents
Peter Franzen (United States)

12:52PM - 1:12PM
A longitudinal view on relationships between sleep, substance use, and mental health in adolescents
Aimee Goldstone (United States)

1:12PM - 1:32PM
The role of sleep in attention deficit hyperactivity disorder in adolescents
Reut Gruber (Canada)

1:32PM - 1:52PM
Efficacy of sleep interventions in at-risk adolescents
Matthew Blake (Australia)

1:52PM - 2:00PM
Conclusion
S70: Neuroscience and neuroimaging insights into central disorders of hypersomnolence

Summary
Central disorders of hypersomnolence are characterized by excessive daytime sleepiness despite normal timing of nocturnal sleep. This symposium will cover the latest neuroscience and neuroimaging findings in these disorders: narcolepsy type 1 & 2 (NT1 & NT 2) and idiopathic hypersomnia (IH).

While NT1 originates from a selective loss of hypothalamic hypocretin-producing neurons, the pathophysiology underlying NT2 and IH remains to be fully elucidated. It is probable that different causes may lead to these phenotypes. All are diagnosed according to the current International Classification of Sleep Disorders - third edition (ICSD-3). This classification distinguishes NT2 and IH based upon one neurophysiological test: the Multiple Sleep Latency Test (MSLT). Clinically, the distinction between NT2 and IH is not clear. Furthermore, the current classification makes no distinction between IH with a short versus a long sleep time. The current classification might actually reflect the pathophysiology of distinct disease entities or might arbitrarily split a heterogeneous group of patients. More understanding of the psychophysiology of these disorders is thus very much needed.

This symposium will cover the latest neurobiological and neuromaging findings, which can help to improve classification and can shed light on the neural mechanisms involved in the regulation of sleep, vigilance and alertness. The chairperson and the proposed speakers represent clinical and fundamental experts in the field worldwide and together will highlight both findings of their recent research and provide an overview of the field.

Chairperson: Dr. Fronczek (Netherlands) will give a short introduction about the clinical aspects and diagnostic difficulties of narcolepsy type 1 and 2 & the idiopathic hypersomnia subtypes.

Speaker 1: Dr. Peever (Canada) will provide the latest data concerning the neurobiological mechanisms of sleepiness and cataplexy involved in narcolepsy in animal models, and relate this to the human perspective.

Speaker 2: Dr. van der Werf (Netherlands) will present recent structural and functional findings on narcolepsy type 1 as compared with healthy matched good sleepers, highlighting neural mechanisms underlying the sleepiness and cognitive characteristics of the disorder.

Speaker 3: Dr. Eun Yeon Joo (South Korea) will present longitudinal MRI data and advocate the presence of progressive cortical thinning in patients with narcolepsy. Intriguingly, this progression seems more rapid in patients with an earlier disease onset.

Speaker 4: Dr. Dang-Vu (Canada) will review recent data investigating changes in brain perfusion and resting-state connectivity during wakefulness, as well as morphometric cortical changes, in patients with idiopathic hypersomnia.

Learning Objectives
Upon Completion of this CME activity, participants should be able to:

- Understand the current limitations in the clinical and pathophysiological distinction between central disorders of hypersomnolence
- Know the different types of anatomical and functional assessments provided by neuroimaging and basic science in the study of central disorders of hypersomnolence
- Learn the latest neurobiological and neuroimaging insights into the pathophysiology of narcolepsy type 1, type 2 and idiopathic hypersomnia

Target Audience
Both basic sleep scientists and sleep clinicians, since the symposium will cover basic and neuroimaging insights in central disorders of hypersomnolence and relate these findings to the clinical phenotypes.

Chairs:
Rolf Fronczek (The Netherlands)
Scientific Programme

12:30PM - Introduction
12:32PM - Central disorders of hypersomnolence: an integrated animal / human perspective
           John Peever (Canada)
12:52PM - Structural and functional MRI findings in Narcolepsy
           Ysbrand Van Der Werf (The Netherlands)
1:12PM - Is narcolepsy a progressive disorder? A neuroimaging perspective
           Eunyeon Joo (Republic of Korea)
1:32PM - Functional and structural neuroimaging of idiopathic hypersomnia
           Thien Thanh Dang-Vu (Canada)
1:52PM - Conclusion
Infra-slow oscillations (ISOs) are periodic alterations in electrophysiological signals reoccurring in cycles that range from 10 to 100 s (corresponding frequencies, 0.01 to 0.1 Hz). Their spontaneous generation in the brain has been observed during both waking and sleep states, in both humans and animals, across brain structures and spatial scales. ISOs include, but are not limited to, the dynamics of single unit firing rates, the periodic variations in the direct electrical potential, amplitude coupling across frequencies, hemodynamic activities, pupil size changes, and leg movement activity during sleep. This makes ISOs interesting candidates for translational approaches in the field concerning sleep disorders. In this symposium we will share our insights into the recent advances of this new field from both, the basic and clinical researcher's perspective. We address four overarching questions: First, how do ISOs signal varying levels of arousability in sleep and are related to the micro- and macrostructure of sleep? Second, how do the cerebral and peripheral correlates of ISOs during sleep relate to each other? Third, what potential functions ISOs might indicate or convey? And fourth, how the strikingly similar findings of ISOs in rodent vs human sleep lead the way towards novel translational approaches concerning the dynamic regulation of healthy and disordered sleep.

The first presentation deals with a 0.02 Hz-oscillation during sleep that was previously identified in mice and confirmed in humans. It divides the non-REM of mice into periods of fragility and continuity based on the resilience to an acoustic noise. We will explore whether this oscillation is a generalizable hallmark of non-REM fragility in mice that shapes the microarchitectural organization of natural sleep through setting time windows permissive for non-REM termination.

The second presentation will focus on how the fluctuations of pupil size and other measures of the autonomic nervous system are related to the changes in sleep states and arousability. We will compare and discuss data acquired in naturally sleeping mice and humans.

The third presentation will deeply classify the 0.02 Hz-oscillation in human non-REM in signal property changes of polysomnography data regarding its presence, properties and cross-frequency and -modality relations. We will explore these alterations and relations in larger human population samples and focus on cross-sectional life-time changes (childhood, adolescence, adult, middle aged, elderly), its potential bearing on general memory consolidation and on clinical populations with subtle sleep and memory alterations (e.g. patients with major depression or schizophrenia).

The fourth presentation will complete the bridge from bench to bed by addressing the role of infra-slow oscillations in sleep disorders such as insomnia and sleep-related movement and respiratory disorders. We will compare ISOs between healthy and disordered sleep and explore their potential role in the diagnosis and treatment of sleep disorders.

Learning Objectives
Upon Completion of this CME activity, participants should be able to...

- get to know infra-slow periodicities in band-limited power dynamics of rodent and human non-REM sleep and their peripheral correlates
- get an overview of the technical advances and limitations of measuring sleep states, pupil size and other parameters in freely sleeping mice and humans.
- judge the clinical and biological relevance and potential functions of ISOs with respect to other prominent sleep oscillations and alterations.
- appreciate the role of ISOs in common sleep disorders.

Target Audience
basic and clinical sleep researchers

Chairs:
Stephany Fulda (Switzerland)
### Scientific Programme

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<tr>
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<td>Introduction</td>
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<td>12:32PM</td>
<td>The 0.02 Hz oscillation times spontaneous transitions out of non-REM sleep</td>
<td>Anita Lüthi (Switzerland)</td>
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<td>12:52PM</td>
<td>Pupil size as a robust readout for cortical states changes in mice and humans</td>
<td>Daniel Huber (Switzerland)</td>
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<td>1:12PM</td>
<td>Deep description of infra-slow alterations in human non-REM sleep, dismantling age and mental health</td>
<td>Frederick D. Weber (The Netherlands)</td>
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<td>1:32PM</td>
<td>Infra-slow oscillations in healthy and disordered sleep</td>
<td>Stephany Fulda (Switzerland)</td>
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<td>1:52PM</td>
<td>Conclusion</td>
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Scientific Programme

12:30PM - 2:00PM

S72: Upper airway stimulation therapy for obstructive sleep apnea: theoretical considerations, clinical evidence, and implementation strategies

Summary

Upper airway stimulation (UAS) is a novel technique for the treatment of select patients with severe obstructive sleep apnea (OSA) who have been unable to tolerate CPAP. It involves an implanted device, which stimulates the hypoglossal nerve to enhance pharyngeal muscle tone, and thereby relieve upper airway obstruction, during sleep.

This symposium is an in-depth and comprehensive review UAS, including its theoretical basis, proof-of-concept validation studies, clinical trials, and postmarketing experience. It will also provide attendees with practical guidelines for the implementation of an UAS program and for the treatment of patients utilizing this device. Faculty members are leading experts in this field, and represent Centers with the highest level of clinical and research experience with this treatment. Below is an outline:

- Neurophysiology of the upper airway and the mechanism of upper airway stimulation in the treatment of OSA
  UAS exploits the pathway of “inadequate muscle activation” to prevent obstruction in the upper airway during sleep. UAS moves the hyoid upward and forward, with a predictable increase in the oro-pharyngeal area but an unexpected increase in the velopharyngeal airway, confirming an action of the hyoid apparatus on potential sites of multisite collapse in OSA

- Efficacy and safety: A summary of clinical studies and experience
  The clinical trials encompassed 126 patients; in the ensuing 2 years, published studies have added more than 150 patients to the database; results with be summarized in terms of efficacy and safety

- Patient screening, selection, and surgical device implantation
  Established recommendations for the evaluation and selection of patients, including patient characteristics, polysomnographic criteria, and use of drug induced sleep endoscopy, will be summarized. More recent modifications will also be summarized, which expand the scope of the procedure to candidates previously considered not appropriate. The surgical implantation process will be demonstrated and reviewed.

- Post-operative management and long-term considerations
  This session will review guidelines surrounding stimulator programming, following implantation, to provide optimal therapy. This relies on polysomnographic voltage titration. It will also review advanced strategies to address unsuccessful titrations and adverse effects. Finally, it will address long term followup strategies.

- Practical aspects of initiating an upper airway stimulation program
  These include critical issues for the success of such a program, including obtaining administrative support, setting up an environment of multidisciplinary professional collaboration, financial assistance for patients, among other

Ample opportunity will be provided for audience participation and discussion with faculty members. Audience members will be polled for knowledge level prior to and following the symposium to gauge course effectiveness.

Learning Objectives

Upon Completion of this CME activity, participants should be able to...

- Describe the theoretical and clinical rationale for upper airway neurostimulation therapy for OSA
- Restate the criteria for patient selection and guidelines for patient evaluation prior to the institution of UAS therapy
- List areas of the upper airway that are structurally altered by unilateral
- Enumerate potential untoward effects and strategies to address these

Target Audience

Sleep practitioners of all primary medical and surgical specialties, sleep technologists, students.
Scientific Programme

12:30PM - 12:32PM
Introduction

12:32PM - 12:48PM
Neurophysiology of the upper airway and the mechanism of upper airway stimulation
Nico DeVries (The Netherlands)

12:48PM - 1:04PM
Efficacy and safety: a summary of clinical studies and experience
Karl Droghamji (United States)

1:04PM - 1:20PM
Patient screening, selection, and surgical device implantation
Maurits Boon (United States)

1:20PM - 1:36PM
Post-operative management and long-term considerations
Clemens Heiser (Germany)

1:36PM - 1:52PM
Practical aspects of initiating an upper airway stimulation program
Olivier Vanderveken (Belgium)

1:52PM - 2:00PM
Conclusion
Scientific Programme

12:30PM - S88  2:00PM
S88: Sleep, Mental Health, and Performance in Elite Athletes

Summary
The issue of sleep in elite athletes has received increased attention in recent years for several reasons, including (1) the recognition by the athletics community that sleep is important to performance, (2) the recognition of the sleep community that athletes represent a population with unique characteristics that are worth studying, and (3) the recognition by sleep health interventionists that see the athletics population as an ideal context for developing healthy sleep interventions. This symposium proposes to provide an update regarding the developments in this area, especially in the contexts of mental health, assessment, and implementation. The first presentation will focus on connections between sleep and mental health in athletes and discuss the highlighting of sleep factors in the forthcoming IOC mental health consensus statement. The second presentation will focus on emerging issues in assessment – namely that many measures developed for the general population may not apply well to athletics; this session will explain why and what can be done scientifically to better handle this issue. The third presentation will address the issue of treating common sleep problems in athletes, and the challenges faced when implementing intervention programs. Finally, there will be a presentation on the current state of the science and practice on dealing with jet lag, which is a major problem for athletes, especially given international travel.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Conceptualize the relationships between sleep and mental health in the context of elite athletes
- Recognize the unique challenges and opportunities regarding assessment of sleep and related factors in athletes
- Understand some of the unique situational factors that play a role in implementing interventions and how they may be overcome
- Understand the limitations of current approaches to jet lag in athletics populations and consider strategies for implementing interventions

Target Audience
Clinicians interested in treating sleep problems with athletes or working with athletics (or other) organizations. Also, researchers interested in real-world applications of sleep interventions and challenges.

Chairs:
Michael Grandner (United States)
Charles Samuels (Canada)

12:30PM - 12:32PM
Introduction
Mental Health in Elite Athletes and the Role of Sleep: An Update on the International Olympic Committee Consensus Statement on Mental Health
Michael Grandner (United States)
Scientific Programme

12:52PM - 1:12PM  
Assessment of Sleep in Elite Athletes: Standardized Approaches for when Everyone is an Outlier  
Charles Samuels (Canada)

1:12PM - 1:32PM  
Treating Sleep Problems and Disorders in Elite Athletes: Adaptive Solutions to Varied Clinical Challenges  
Jonathan Charest (Canada)

1:32PM - 1:52PM  
Travel and Sport: Current Approaches to Optimizing Performance in the Context of Travel  
Ian Dunican (Australia)

1:52PM - 2:00PM  
Conclusion
Scientific Programme

12:30PM - 2:00PM

S73: Role of sleep and sleep therapies in the pathogenesis and outcomes of neurologic disorders

Summary
The role of sleep and sleep therapies in the pathogenesis and outcomes of several highly prevalent neurologic disorders associated with substantial morbidity and healthcare costs is becoming increasingly established. Bidirectional relationships between sleep and neurologic disorders represent a critical opportunity to impact outcomes in neurologic populations. While the prevalence of sleep-disordered breathing in some neurologic populations exceeds general population estimates, routine screening is rare and appreciation of the diagnostic and therapeutic challenges posed by neurologic disease is lacking. The goal of this symposium is to bolster awareness of the expanding role of sleep and sleep therapies on the pathogenesis and outcomes of neurologic disorders.

Speakers will discuss the impact of sleep and its treatments including sleep apnea, insomnia and circadian rhythm disorders on prevalent neurologic disorders emphasizing the role of sleep on brain health and existing evidence exploring effects of sleep therapies on neurologic outcomes. The faculty will focus on Alzheimer’s disease (AD)/Mild cognitive impairment (MCI), stroke, traumatic brain injury (TBI), and epilepsy reviewing firmly established clinical, neurobiological and electrophysiological relationships and cutting edge literature underscoring the expanding role of sleep in the neurosciences. Madeleine Grigg-Damberger, MD will discuss recent studies which identify: 1) sleep fragmentation, short sleep duration and excessive daytime sleepiness as early biomarkers for MCI, incipient AD, and future cognitive decline; 2) how increased cerebrospinal fluid (CSF) orexin levels parallel cognitive decline and sleep deterioration in AD; and 3) how sleep loss in AD alters CSF beta-amyloid (Aβ) dynamics, decrements in NREM 3 sleep decrease clearance of Aβ from brain, and intermittent nocturnal hypoxemia increases Aβ production. Brian Murray, MD will review: 1) increasing evidence in large prospective populations that untreated OSA is an independent risk factor for ischemic stroke particularly in adults younger than 50 years of age; 2) the roles of OSA in increasing arterial stiffness, atrial fibrillation, damaging carotid endothelium, and intermittent hypoxemia triggering the production of reactive oxygen species; and 3) whether early PAP therapy truly improves long-term rehabilitative and survival outcomes. Nancy Foldvary-Schaefer, DO, MS will review: 1) crucial links between late-onset or poorly controlled epilepsy and unrecognized OSA; 2) recent studies which confirm PAP therapy can improve seizure control; 3) and the relationship between sleep and sudden unexpected death in epilepsy (SUDEP). Lastly, Christian Baumann, MD will discuss: 1) the most prevalent sleep-wake disturbances associated with traumatic brain injury; 2) the role of disturbed sleep on morbidity; and 3) the impact of sleep-related interventions on recovery in patients with traumatic brain injury.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Understand how and why short sleep duration, fragmented sleep, varying degrees of intermittent nocturnal hypoxemia, and excessive daytime sleepiness (EDS) in older adults are associated with Minimal Cognitive Impairment, incident Alzheimer’s disease and rates of cognitive decline
- Know the research which confirms associations and even causative relationships between OSA and ischemic stroke occurrence, recurrence, severity, location, and whether early and/or compliant PAP therapy improves short- and long-term neurologic outcomes and reduces mortality
- Recognize the association between sleep loss on seizures and epileptic EEG abnormalities, the prevalence and predisposing factors for OSA in epilepsy populations, the role of PAP therapy in improving seizure control, and the relationship between sleep and sudden unexpected death in epilepsy (SUDEP)
- Identify the most prevalent sleep-wake disturbances associated with traumatic brain injury, the role of sleep disorders on recovery, and the impact of sleep-related interventions on recovery in patients with traumatic brain injury

Target Audience
Sleep physicians, neurologists, advanced practice providers, nurses and technologists

Chairs:
Nancy Foldvary-Schaefer (United States)
Scientific Programme

12:30PM - Introduction
12:32PM - Role of Sleep in the Neurobiology of Alzheimer’s disease and Mild Cognitive Impairment
Madeleine Grigg-Damberger (United States)
12:48PM - Stroke and Sleep: Pathogenic Mechanisms and Treatment Effects
Brian Murray (Canada)
1:04PM - Traumatic brain injury: What’s sleep got to do with it?
Christian Baumann (Switzerland)
1:20PM - Practical Implications of Sleep and Sleep Therapies on Epilepsy
Nancy Foldvary-Schaefer (United States)
1:36PM - Conclusion

Oral Abstract, 216

12:30PM - Oral abstract: content to be determined
Summary
Sleepiness is the key cause of 20% of road accidents. Obstructive sleep apnea and shift work clearly increase the risk of sleepiness-related road crashes and are common in commercial drivers, with many patients still driving without treatment. There is substantial individual variability in the impact of these factors on sleepiness and driving impairment. Subjective sleepiness may help to identify individuals at high risk of road crashes, particularly sleepiness while driving, however, responses may be falsified when drivers are concerned about the impact on their license or work. The maintenance of wakefulness test (MWT) is the current standard for objectively measuring sleepiness, and is related to driving impairment in sleep apnea although there is only limited evidence relating it to crash risk.

This symposium will present new data from a large cohort evaluating the relationship between subjective sleepiness, polysomnographic measures, MWT results and crash risk, providing the most robust results for using these measures to assess fitness to drive.

The MWT is based on assessing sleepiness from EEG sleep latency on a single day in the laboratory. The symposium will present the following data on novel measures and paradigms to objectively assess sleepiness in sleep disorders patients. The assessment of sleep latency, vigilance and simulated driving performance following sleep deprivation discriminates which sleep apnea patients are vulnerable to restricted sleep and their daytime driving performance. Novel analysis of the nocturnal EEG in sleep apnea patients can also determine which individuals have impaired daytime driving.

Oculomotor function offers an alternative method to assess sleepiness related impairment that can be measured in real time during a range of tasks including driving, more closely resembling the real-life scenario of driving. Slowing of eye and eyelid movements, periods of long eyelid closure and changes in gaze patterns are evident following sleep deprivation, in shift workers and in sleep apnea patients. The symposium will present results from new studies demonstrating the use of ocular parameters to identify shift workers and sleep apnea patients at risk of driving impairment.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Understand the impact of sleep disorders on road safety and motor vehicle crash risk
- Understand the individual variability in sleep disorders on the impact of crash risk
- Know how to use current biomarkers to assess individual road safety and crash risk and fitness to drive, including the latest evidence for these measures
- Be introduced to novel paradigms and biomarkers for assessment of alertness, sleepiness and assessing fitness to drive and the current evidence for these measures

Target Audience
Clinical sleep specialists, road safety and occupational sleep researchers, occupational physicians, and policymakers

Chairs:
Mark Howard (Australia)
### Scientific Programme

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<td>12:30PM -</td>
<td>Introduction</td>
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<tr>
<td>12:32PM -</td>
<td>The impact of sleep restriction</td>
<td>Markku Partinen (Finland)</td>
<td>The impact of sleep restriction and sleep disorders in road safety</td>
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<td>12:52PM -</td>
<td>What are the best biomarkers</td>
<td>Pierre Philip (France)</td>
<td>What are the best biomarkers to determine fitness to drive in sleep apnea?</td>
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<td>1:12PM -</td>
<td>Novel methods to assess alertness</td>
<td>Andrew Vakulin (Australia)</td>
<td>Novel methods to assess alertness failure and driving risk in sleep apnea</td>
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<td>1:32PM -</td>
<td>Ocular biomarkers for prediction</td>
<td>Mark Howard (Australia)</td>
<td>Ocular biomarkers for prediction and monitoring alertness in sleep apnea and shift work</td>
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<td>1:52PM -</td>
<td>Conclusion</td>
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<td>Malhotra K11: Sleep apnea</td>
<td>Atul Malhotra (United States)</td>
<td>Malhotra K11: Sleep apnea endotypes and phenotypes: Use of new technology in obstructive sleep apnea</td>
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<td>Atul Malhotra (United States)</td>
<td>Sleep apnea endotypes and phenotypes: Use of new technology in obstructive sleep apnea</td>
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<td>Keynote, 211</td>
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<td>Dauvilliers K12: From somnolence</td>
<td>Yves Dauvilliers (France)</td>
<td>Dauvilliers K12: From somnolence in the general population to narcolepsy</td>
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<td>From somnolence in the general</td>
<td>Yves Dauvilliers (France)</td>
<td>From somnolence in the general population to narcolepsy</td>
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S75: Brain iron as a central factor in the pathophysiology of RLS: emerging evaluation methods and therapeutic opportunities

Summary
A number of epidemiological and clinical studies support the notion that a brain iron dysregulation, despite normal peripheral iron, plays a key role in the pathophysiology of RLS. Such a concept is also supported by an increasing number of experimental and animal data. In addition, new, large multicentric studies show a complete, long-lasting remission of RLS symptoms for some patients when this brain iron deficit is addressed by treatment with intravenous iron.

The present symposium will discuss the latest concepts on brain iron homeostasis, along with very recent studies that show how a brain iron deficit causes an increased corticostriatal hyperexcitability by means of changes in extracellular adenosine, leading to a hyperdopaminergic and hyperglutamatergic state. It will also discussed methods to evaluate brain iron homeostasis in RLS. The Symposium will discuss most recent neuroimaging data (3 and 7 Tesla MRI), identification of critical brain regions, and the goals and safety of iron treatments. Preliminary data will be presented on transcranial sonography of the substantia nigra which demonstrate its potential as a new clinical tool predicting benefit from intravenous iron treatment.

Learning Objectives
Upon Completion of this CME activity, participants should be able to...

- Understand the mechanisms regulating brain homeostasis
- Understand current existing methods to evaluate brain iron
- Understand the emerging therapeutic opportunities to treat refractory RLS

Target Audience
- Neurologists
- Sleep Specialists
- Health care providers

Chairs:
Diego García-Borreguero (Spain)

3:00PM - 3:02PM
Introduction

3:02PM - 3:22PM
Brain iron deficiency relation to dopamine dysfunction and augmentation in RLS
Christopher Earley (United States)
Scientific Programme

3:22PM - 3:42PM  Brain iron dysregulation in RLS relation to brain adenosine and glutamate  
Sergi Ferre (Spain)

3:42PM - 4:02PM  MRI evaluation of regional brain iron relation to RLS symptoms and iron treatments  
Richard Allen (United States)

4:02PM - 4:22PM  Transcraneal sonography evaluation of substantia nigra iron: a potential clinical tool to predict IV iron treatment outcome  
Celia Garcia Malo (Spain)

4:22PM - 4:30PM  Conclusion
Scientific Programme

Panel Discussion, 118
3:00PM - 4:30PM

D09: Innovative therapies for obstructive sleep apnea care delivery worldwide

Summary
Obstructive Sleep Apnea (OSA) is a highly prevalent disorder associated with myriad of adverse cardiovascular and psychosocial outcomes. The degree to which we impact OSA patients depends not only on the strength of science, but also upon how the care is delivered. OSA care delivery is constantly evolving, is multidimensional and requires collaboration with many stakeholders. There is considerable heterogeneity in the way OSA care is delivered across the world. This symposium will discuss novel, cost-effective and efficient methods of OSA management worldwide and will discuss some of the barriers and opportunities in different healthcare environments related to their countries. This will provide an opportunity to share unique best practices for OSA care delivery spanning from reporting quality measures, evolving OSA health care from volume to value care model, ambulatory care models, team-based approach and the role of non-sleep providers in the care for OSA.

Topics will include
1. Dr. Harneet K. Walia, MD. Introduction to the quality measures for OSA in United States (US). Novel methods of OSA delivery such as sleep apnea management (SAM) group clinic in US will be discussed.
2. Dr. Nancy Foldvary-Schaefer, DO, MS. Volume to value based model of health care for OSA delivery in US. Population health initiatives and team-based care approach of OSA in US.
3. Dr. Preeti Devnani, MD. Current OSA health care delivery in United Arab Emirates (UAE) and Asia. Barriers of effective healthcare, need and measures for improving OSA health care in UAE/Asian countries.
4. Dr. Brian Murray, MD. Current diagnostic and therapeutic strategies in Canada: Barriers, facilitators, and opportunities in a “universal” healthcare environment.
5. Dr. Ching Li Chai-Coetzer, MD: Novel strategies for sleep health service delivery that have been developed in Australia, i.e., the evidence for ambulatory care models for OSA, including the potential role for health care providers other than sleep physicians (i.e., sleep specialist nurses and primary care physicians) in OSA diagnosis and management.

Learning Objectives
Upon Completion of this CME activity, participants should be able to:

- Identify novel and emerging methods of OSA health care delivery worldwide
- Recognize current management strategies for OSA in different countries
- Identify opportunities to improve OSA care pertaining to different health care environment

Target Audience
Sleep providers, physician extenders, providers who provide sleep care

Chairs:
Harneet K. Walia (United States)

3:00PM - 3:02PM

Introduction
Scientific Programme

3:02PM - 3:18PM  Introduction to the Quality Measures and Sleep Apnea Management Group Clinic for OSA
Harneet K. Walia (United States)

3:18PM - 3:34PM  Volume to value based model and population health initiatives for OSA in US
Nancy Foldvary-Schaefer (United States)

3:34PM - 3:50PM  Current OSA health care delivery in United Arab Emirates (UAE) and Asia
Preeti Devnani (United Arab Emirates)

3:50PM - 4:06PM  Current diagnostic and therapeutic strategies in Canada for OSA
Brian Murray (Canada)

4:06PM - 4:22PM  Novel strategies for sleep health service delivery in Australia
Ching-Li Chai-Coetzer (Australia)

4:22PM - 4:30PM  Conclusion
**Scientific Programme**

3:00PM - S76
4:30PM

**S76: The impact of short and disturbed sleep on pain: New mechanistic insights, sex differences, and clinical implications**

**Summary**
Short or disturbed sleep has been well established as a behavior that increases hyperalgesia and the risk of developing chronic pain. Chronic pain conditions are one of the primary health problems worldwide, and together with the high prevalence of individuals cutting back on sleep duration or suffer from disturbed sleep, advancing our mechanistic understanding is crucial in the development of strategies aiming to prevent pain augmentation secondary to sleep loss. This symposium will focus on new findings that contribute to our mechanistic understanding of the sleep-to-pain directionality. Emphasis will be placed on the effects of pharmacological agents (i.e., caffeine, ibuprofen, morphine) in modulating the impact of disturbed sleep on pain, the role of disturbed sleep in postsurgical pain and opioid analgesia, and on the question of whether women and men differ in their pain, fatigue, and inflammatory responses to disturbed sleep. The purpose of this scientific symposium is to highlight recent advances in the sleep-pain field and their clinical implications with respect to the management of chronic pain, postsurgical pain, and the opioid crisis. The symposium will feature a renowned group of experts in the sleep-pain field. In addition, this scientific session will stimulate the pursuit of approaches to translate novel findings into the clinical setting.

Dr. Monika Haack is an Associate Professor at Harvard Medical School, Boston, and will organize and chair the symposium. She will present new data on sex differences in the inflammatory, pain, and fatigue responses to chronic short and disturbed sleep, which will enhance our understanding of the female preponderance of many chronic pain conditions.

Dr. Giancarlo Vanini is a Research Assistant Professor in Anesthesiology at the University of Michigan, and will show that sleep disruption prior to surgery worsens postsurgical pain in animals and that adenosine signaling plays a critical role in the prevention of these effects. He will also discuss ongoing studies aiming at identifying mechanisms by which sleep loss facilitates the transition from acute to chronic pain.

Dr. Chloe Alexandre is an Instructor at Johns Hopkins University, Baltimore, and will present data on the effects of wake-promoting (caffeine, modafinil) and analgesic agents (ibuprofen, morphine) on hyperalgesia in chronically sleep deprived animals, which reveal an unsuspected critical role of alertness in setting pain sensitivity.

Dr. Michael Smith is a Professor of Psychiatry, Neurology & Nursing, Johns Hopkins University, School of Medicine, and Director of the Center for Behavior and Health. He will provide evidence that sleep may play a role in impaired pain inhibition in clinical pain populations, present new data indicating that sleep disruption may attenuate the analgesic effects of morphine, and discuss the implications of this research for the opioid crisis.

**Learning Objectives**
Upon completion of this CME activity, participants should be able to:

- Recognize that short or disturbed sleep increases pain sensitivity and the risk of chronic pain development
- Recognize that women respond differently to sleep disturbances with respect to inflammation, pain, and fatigue than men
- Understand how pharmacological agents (ibuprofen, caffeine, morphine) modulate the effect of sleep disturbances on pain
- Recognize that sleep disturbances affect opioid analgesia
- Understand the clinical implications of new findings on the management of chronic pain, postsurgical pain, and the opioid crisis

**Target Audience**
Basic, clinical, and translational researchers, physicians, nurses, health care providers, sleep and pain medicine trainees
Scientific Programme

3:00PM - 3:02PM  Introduction

3:02PM - 3:22PM  Do women and men respond differently to short or disrupted sleep? Inflammation, pain, and fatigue
Monika Haack (United States)

3:22PM - 3:42PM  Preoperative sleep disruption worsens surgical pain in the rat: Role of preoptic adenosine signaling in sleep-pain interactions
Giancarlo Vanini (United States)

3:42PM - 4:02PM  Effects of acute and chronic sleep disturbance on pain sensitivity and analgesic treatments in mice
Chloe Alexandre (United States)

4:02PM - 4:22PM  The effects of sleep disruption and loss on endogenous analgesia and opioidergic pain control
Michael Smith (United States)

4:22PM - 4:30PM  Conclusion
S77: Protective and risk factors of treating insomnia in youth

Summary
Insomnia is common among children, adolescents, and young adults, but pharmacological treatments are often not a preferred option. Furthermore, treating insomnia in youths compared to adults can provide additional challenges that can be extrinsic (such as environmental or social factors) or intrinsic (high comorbidity with psychiatric illnesses). This symposium will first give an overview of the myriad of extrinsic and intrinsic factors that can influence young people’s sleep. The second talk will discuss non-pharmacological management of NREM-related parasomnias in young children, especially night terrors or sleepwalking. NREM-related parasomnias are specifically disorders of arousal from NREM sleep, and extrinsic factors such as co-sleeping, breastfeeding, or sleep disorders of the co-sleeping parent may serve as triggering factors for these disorders. Additionally, there may be interactions with intrinsic factors, such as dysfunctional beliefs of parents that catastrophize sleep disturbance in children. The third talk will discuss cognitive-behavioral therapy for insomnia, in targeting sleep disturbance in the context of treating depression in adolescents. This talk will discuss the evidence of CBTi for insomnia in adolescents and share preliminary findings from a clinical trial of CBTi for comorbid insomnia and depression in youths. The fourth talk will discuss treatment for bedtime procrastination in young adults. Bedtime procrastination is defined as the delaying of bedtime than originally intended without any external reason for delaying bedtime. The talk will discuss a treatment protocol that is in development based on integrating evidence-based treatment, such as motivational interviewing and behavior modification principles targeted toward reducing bedtime procrastination. The final talk will discuss the negative impact of mobile phone technology on sleep and mood. This talk will summarize the current evidence of various mobile phone use behaviors on sleep and mood, with emphases on prospective data and intervention data. In particular, the speaker will address a recent large prospective study in young college students, where long mobile phone use was associated with a number of sleep and mood problems.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Identify protective and risk factors associated with treatment of insomnia in children, adolescents, and young adults
- Identify the influence of extrinsic factors affecting children’s sleep
- Understand non-pharmacological treatments that can be applied to children, adolescents, and young adults
- Understand the impact of mobile phone technology on mental health and sleep in children, adolescents, and young adults
- Understand novel treatment targets in the modern world that can be a problem for sleep in adolescents and young adults, such as bedtime procrastination due to mobile phone use

Target Audience
Sleep researchers, clinicians, students

Chairs:
Eric Zhou (United States)
## Scientific Programme

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| 3:02PM - 3:18PM | Identifying protective and risk factors to improve the sleep health of the young  
Kate Bartel (Australia) |
| 3:18PM - 3:34PM | Non-pharmacological management of parasomnia in children  
Seockhoon Chung (Republic of Korea) |
| 3:34PM - 3:50PM | Cognitive-behavioural therapy for comorbid insomnia and depression in adolescents  
Shirley Xin Li (Hong Kong) |
| 3:50PM - 4:06PM | Treatment development for bedtime procrastination in young adults: The BED-PRO study  
Sooyeon Aly Suh (Republic of Korea) |
| 4:06PM - 4:22PM | Mobile phone use and sleep and mood disturbances in adolescents and young adults  
Jihui Zhang (Hong Kong) |
| 4:22PM - 4:30PM | Conclusion                                           |
Scientific Programme

Basic Science Symposium, 211

3:00PM - 4:30PM  S78

S78: Functional networks of the sleepy and sleeping brain

Summary
Over the last decades, a particular attention has been paid on the functional brain networks associated with brain states and their dynamics across changes of states of vigilance. This global perspective of the brain activity, which accounts for the brain mechanisms underlying the functional integration of the segregated activities, has been recently extended to the sleep state. For instance, studies demonstrated a significant increase in local cortical functional connectivity (FC) during NREM sleep whereas long-range cortico-cortical FC decreases with the descent from wakefulness to slow-wave sleep. Cognitive impairments and sleep disorders can be also associated with abnormal FC and altered interactions between functional brain networks. The aim of this symposium is to discuss new advancements in our understanding of how cerebral networks, from micro to macro scales, are modulated the transitions between sleep stages, in various conditions of aging and sleep disorders. From the spiking activity to the local field potentials of neural populations, Umberto Olcese will present recent findings on how directional transfer of information varies between wakefulness and sleep, across various scales in space and time. Raphael Vallat will then address the sleep inertia, i.e. the transition from sleep to awakening. Beside significant correlations between functional magnetic resonance imaging (fMRI) and EEG functional connectivity measures of the awakening brain, this presentation will also show significant correlations between the behaviour aspects of sleep inertia and measures of the cerebral functional connectivity at awakening (in both EEG and fMRI). On a more clinical setting, the presentation from Dr. Luigi Ferini-Strambi will describe the effects of obstructive sleep apnea (OSA) on working-memory performance and brain connectivity. This presentation will show how much the changes in effective functional connectivity during a working memory challenge may provide new biomarker on the mechanisms supporting preserved performance despite functional (and structural) brain changes in patients with OSA. Finally, Julie Carrier will present on the effects of age on cerebral functional connectivity during sleep, using EEG (imaginary coherence) and fMRI-EEG. She will also discuss how functional connectivity during sleep may be a marker of cognitive integrity in older individuals.

Learning Objectives
Upon Completion of this CME activity, participants should be able to...

- To interpret the usual metrics used in functional connectivity (FC) applied to sleep research,
- To understand cerebral integration processes during sleep and transition to wakefulness from cellular scale activities to macroscopic functional connectivity networks,
- To appreciate the contributions of functional connectivity studies to our understanding of the functions of sleep with aging
- To consider the functional connectivity as a biomarker of particular sleep disorders (i.e.OSA)

Target Audience
Clinicians and confirmed researchers, doctoral and post-doctoral fellows involved in neuroimaging and fundamental sleep research

Chairs:
Jean-Marc Lina (Canada)
Julie Carrier (Canada)
Scientific Programme

3:00PM - 3:02PM   Introduction

3:02PM - 3:18PM   Introduction: an overview in functional connectivity in recent sleep studies

Jean-Marc Lina (Canada)

3:18PM - 3:34PM   From action potentials to neural oscillations: how brain regions exchange information across wakefulness and sleep

Umberto Olcese (The Netherlands)

3:34PM - 3:50PM   The neural correlates of sleep inertia

Raphael Vallat (United States)

3:50PM - 4:06PM   Abnormal brain connectivity and cognitive performance in OSA

Luigi Ferini-Strambi (Italy)

4:06PM - 4:22PM   NREM sleep functional connectivity: a window on the aging brain

Julie Carrier (Canada)

4:22PM - 4:30PM   Conclusion
S79: Sleep health disparities among children across three continents

Summary
The social ecology model (SEM) is a theory-based framework for understanding the complex and interactive effects of personal, interpersonal, community and social factors on behavior that is commonly used to examine health disparities. Framed by the SEM, this symposium aims to present research on sleep health disparities among children in three countries. Individual factors such as children’s self-regulation, emotion-regulation, and temperament have been well reported with respect to sleep health. However, minimal studies have examined children’s biological stress response system in relation to sleep health. Furthermore, there is a paucity of research describing individual sleep characteristics among children living with socioeconomic adversity. The first presentation will report sleep characteristics and the associations between sleep characteristics and biomarkers of stress response among toddlers living with socioeconomic adversity.

At the interpersonal level, children’s sleep is affected by parental psychopathology and sleep disturbances. Accumulating evidence suggests that parents with high adverse childhood experiences (ACE) are likely to develop psychopathology and sleep disturbances as well as parenting difficulties that may compromise children’s sleep. The second presentation includes results from a longitudinal and prospective cohort of 262 mother-child dyad from the prenatal period to child age 6 years in Shanghai, China. The impact of parental ACEs on sleep development in young children will be discussed.

At the community level, disrupted sleep can contribute to the cycle of disadvantage. Environmental conditions (noise, light) and circumstances (family disruption, trauma) disrupt children’s sleep and capacity to regulate emotions and behavior. Nearly a third of young children living in disadvantaged communities in Australia report being ‘tired and hungry’. This study presents data from a consultation in a remote community characterized by high levels of socioeconomic adversity. The focus is sleep insecurity and co-design of community interventions to support sleep health.

Childcare is impacted by social policies and plays a significant role in the lives of young children, setting trajectories for health and development. Yet few studies have examined childcare sleep practices and their impacts. The third presentation reports findings from the first comprehensive data set on children’s sleep within diverse Australian communities collected during two large observational studies. Results indicate a divergence between childcare sleep practices and normative patterns of sleep development, especially in lower socioeconomic settings. The findings raise questions about the impacts of social disparity in the quality of childcare care environments on sleep development.

In summary, sleep is a foundation for a happy, stable, healthy and inclusive social life. The family plays a major role in shaping children’s sleep behavior, and the family dynamic interacts with externalities, such as the demands of work, education, neighborhood and broader social participation. As such, the child, their family, and cultural context are each key factors in a strong social fabric. Sleep provides an opportunity to understand the impact of care environments on the child in a new way, and identifies new points for change to reinforce family function, health, and social harmony. This approach, drawing upon the SEM model, could have impacts in the broader community, especially for those families experiencing adversity.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Understand the discrepancies in sleep health recommendations among children living with socioeconomic adversity across three continents
- Discuss the interactive effects of personal, interpersonal, community and social factors that impact children’s sleep
- Appreciate the need for a holistic approach to address sleep health disparities early in life.
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<td>3:00PM - 3:02PM</td>
<td>Introduction</td>
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</table>
| 3:02PM - 3:18PM | Individual determinants of sleep in children living with socioeconomic adversity  
                        Monica Roosa Ordway (United States) |
| 3:18PM - 3:34PM | The impact of parental adverse childhood experiences on children's sleep in China  
                        Guanghai Wang (China) |
| 3:34PM - 3:50PM | Sleep insecurity within Australian communities and co-design of community interventions to support children's sleep health  
                        Karen Thorpe (Australia) |
| 3:50PM - 4:06PM | Social impact on children's health: the role of childcare  
                        Sally Staton (Australia) |
| 4:06PM - 4:22PM | Cross cultural (Asian, Australian, American) differences of SEM model of sleep: putting it all together  
                        Simon Smith (Australia) |
| 4:22PM - 4:30PM | Conclusion                                                              |
Scientific Programme

3:00PM - 4:30PM
S80: Targeting sleep to improve mental health

Summary
According to the World Health Organization (WHO), mental disorders are among the most prevalent and devastating disorders worldwide. Critically, less than one-half of patients show full remission with current first-line mental health treatments, indicating the need for additional research to elucidate mechanisms and develop novel therapies. The aim of this symposium is to interrogate the proposal that targeting sleep has the potential to improve mental health. This concept is based on the longstanding observation that mental disorders and sleep difficulties, primarily in the form of insomnia, are strongly associated. Building upon advances in both the basic and clinical sciences it is now time to systematically test whether modifying sleep can improve mental health. The symposium integrates a range of approaches; from novel randomized controlled clinical trials of sleep-based interventions to improve mental health (in adults and adolescents), to basic science aspects of sleep and memory and the potential of using non-invasive brain stimulation techniques during sleep to treat major depression. Together, the symposium aims at advancing our understanding on the potential of sleep-based interventions to treat mental disorders, which would be of high public health relevance.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Reflect the strong bi-directional clinical association of sleep and mental disorders
- Explain some possible psychosocial and neural mechanisms of this interaction
- Discuss the potential of sleep-based interventions to improve mental health and future research directions

Target Audience
Neuroscientists, clinicians, psychologists, medical doctors, and clinicians from related fields

Chairs:
Christoph Nissen (Switzerland)

3:00PM - 3:02PM
Introduction

3:02PM - 3:22PM
The effect of treating sleep in depression on emotion perception: results from a randomized controlled trial of cognitive behavioural therapy for insomnia
Simon Kyle (United Kingdom)

3:22PM - 3:42PM
Text messages to maintain sleep, circadian, and health improvement 12-months following treatment for adolescents with an eveningness chronotype: A randomized controlled trial
Michael Dolsen (United States)
# Scientific Programme

<table>
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| 3:42PM - 4:02PM | **Sleep and memory in medicated vs. unmedicated patients with major depression**  
Leonore Bovy (The Netherlands) |
| 4:02PM - 4:22PM | **Closed-loop modulation of sleep slow waves to treat major depression**  
Christoph Nissen (Switzerland) |
| 4:22PM - 4:30PM | **Conclusion**                                                          |
Scientific Programme

Symposium, 220

3:00PM - S81
4:30PM

S81: Cluster analysis, biomarkers, and physiologic phenotyping: towards a precision medicine approach to OSA?

Summary
The purpose of this symposium is to discuss cutting edge techniques that may help pave the way for a precision medicine approach to OSA in the not too distant future. Specifically, this symposium will summarize recent data and the future of using circulating biomarkers, deep physiologic phenotyping, and symptom/PSG cluster analysis in directing treatment and predicting adverse outcomes in patients with OSA. The hope is that eventually, these may be used to tailor specific (e.g., sedatives, anti-inflammatories) or more aggressive OSA treatment in certain patient sub-groups. In addition, identification of high risk sub-groups may help direct future randomized controlled trials in the field by enriching these trials with patients at greater risk of adverse outcomes (intervention trials of cardiovascular disease prevention, for instance). The speakers/chairs are experts in these fields (clinicians, epidemiologists, physiologists), there is global representation (Australia, Canada, USA), with a mix of junior and senior investigators.

Speaker 1: Dr. Klar Yaggi from Yale (20 minutes) will focus on recent successes using symptom and PSG cluster analyses to predict long term adverse outcomes (e.g. cardiovascular disease).

Speaker 2: Dr. Brad Edwards from Melbourne (20 minutes) will focus on the use of deep physiologic phenotyping from PSG (e.g. assessment of loop gain, anatomy, upper airway activation, arousal response) to help direct therapies, and as a tool to predict future events.

Speaker 3: Dr. Scott Sands from US (20 minutes) will discuss the potential utility of circulating biomarkers in predicting risk of adverse outcomes in patients with OSA, and the potential for more targeted therapies based on these markers.

Speaker 4: Dr. Robert Owens from San Diego (15 minutes) will summarize the talks, and discuss how these tools may be potentially integrated towards a personalized care approach to OSA.

There will be a panel discussion (15 minutes) at the end of the session.

-Sands SA, et al. (Edwards, Owens co-authors) Identifying OSA patients responsive to supplemental oxygen therapy. EurRespir J. 2018.
-Sandford A, et al. (Ayas co-author) Adhesion Molecule Gene Variants and Plasma Protein Levels in Patients with Suspected OSA. In review, PLOS One.

Learning Objectives
Upon Completion of this CME activity, participants should be able to...

-Understand the current literature in terms of the strengths and limitations of cluster analysis, biomarkers, and deep physiologic phenotyping with respect to OSA
-Understand how these techniques could be used in the future to tailor OSA care using a precision medicine approach
-Understand how these techniques could be used in the future to help design clinical trials
Scientific Programme

3:00PM - 3:02PM  Introduction
3:02PM - 3:22PM  Cluster analysis of symptoms and polysomnographic data: a useful predictive tool?
                 Klar Yaggi (United States)
3:22PM - 3:42PM  Can biomarkers be used to predict adverse outcomes in patients with OSA?
                 Scott Sands (United States)
3:42PM - 4:02PM  Deep phenotyping using PSG: limitations and future promises
                 Brad Edwards (Australia)
4:02PM - 4:22PM  Towards a precision based medicine approach to OSA
                 Robert L. Owens (United States)
4:22PM - 4:30PM  Conclusion

Oral Abstract, 216

3:00PM - 4:30PM  Oral abstract: content to be determined
Scientific Programme

3:00PM - 4:30PM

S82: Sleep & Fatigue in Healthcare Professionals

Summary
Sufficient and restorative sleep is a prerogative for well-being and adequate functioning in private and professional life. Lack of sleep causes daytime sleepiness, fatigue, attention deficits, memory disturbance and/or increased risk of accidents and mistakes.
Fatigue and consequent impairments are common in healthcare professionals, in whom maximum performance and productivity is expected on a 24-hour basis. Prolonged hours of duty on call, reduced opportunities for sleep with minimal recuperation time and/or shift work contribute significantly to impairments in physical, cognitive and emotional functioning in this population.
Modern societies expect performance and productivity on a 24-hour basis and destructive, detrimental and/or disadvantageous effects include those on personal health and well-being. Health and safety, performance of job-related tasks, and professionalism can be involved.
The implementation of effective strategies for fatigue management on a personal and system wide level is challenging.
In our symposium we suggest to adopt successful fatigue management strategies from other occupational settings and adapt them to the health care environment.
In the starting talk, we want to clarify the terminology of fatigue and related concepts, which are used with different connotations in various scientific areas.
Then we give an overview of available research strategies for the evaluation of sleep conditions. We update on the causes and consequences of unhealthy, non-restorative and insufficient sleep in healthcare professionals and sum up by a review of the consequences of fatigue on professional life.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Understand the terminology of fatigue and related concepts
- Learn successful fatigue management strategies
- Provide an overview of available research strategies for the evaluation of sleep conditions
- Be updated on the causes and consequences of unhealthy, non-restorative and insufficient sleep in healthcare professionals, and on the consequences of fatigue on professional life

Target Audience
Sleep specialists, occupational medicine specialists, technicians

Chairs:
Antje Büttner-Teleagă (Republic of Korea)
Kneginja Richter (Germany)

3:00PM - 3:02PM
Introduction

3:02PM - 3:22PM
Delimitation Fatigue, Sleepiness and Tiredness
Peter Geisler (Germany)
<table>
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<th>Time</th>
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| 3:22PM - 3:42PM | **Even night owls need sleep! Why night owls and morning larks need different work schedules. - Different technologies and devices of Sleep and Fatigue measurements**  
Gerhard Klöesch (Austria) |
| 3:42PM - 4:02PM | **Fatigue and Fatigue-related accidents in Healthcare Professionals**  
Maritta Orth (Germany) |
| 4:02PM - 4:22PM | **Sleep, well-being and ill-health in healthcare**  
Francesco Cappuccio (United Kingdom) |
| 4:22PM - 4:30PM | **Conclusion** |
S83: Genetics of sleep and its disorders: An update

Summary
Over the last two years, there has been substantial advances in knowledge of common genetic variants associated with different aspects of sleep (e.g., sleep duration) and with specific sleep disorders, in particular, insomnia. Moreover, new approaches are being implemented based on institutions with large biobanks. This symposium will discuss the following: recent findings published in high impact journals such as Nature Genetics (these are based on GWAS analyses from data from the UK Biobank) (Saxena); what these findings mean in terms of causative genes and how to go from gene variants so identified to identifying the causative genes (Gehrman); identifying extreme phenotypes that facilitate a novel approach to elucidating rare gene variants. This will be illustrated for obstructive sleep apnea (Magalang). How to use large biorepositories to identify gene variants in patients in whom there are existing genetic data for both common and rare variants (Pack). This is currently being applied to obstructive sleep apnea.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Develop an understanding about the role of common and rare genetic variants
- Understand the implications of recently published findings from GWAS analyses of data in the UK Biobank
- Become knowledgeable about the next steps to be taken to identify the causative genes
- Develop comprehension of the concept of extreme phenotypes and how these can be used to identify causative genes
- To become familiar with the infrastructure that has been developed to facilitate genetic research and how this can be used to identify genes conferring risk or protection for OSA.

Target Audience
Clinical investigators, basic investigators, clinicians

Chairs:
Allan Pack (United States)

4:30PM - 4:32PM
Introduction

4:32PM - 4:52PM
Recent Advances in Elucidating Common Genetic Variants Associated with Sleep and Sleep Disorders
Richard Saxena (United States)

4:52PM - 5:12PM
Going from GWAS to Identifying Causative Genes
Philip R. Gehrman (United States)

5:12PM - 5:32PM
Identifying Extreme Phenotypes: Using Obstructive Sleep Apnea as an Example
Ulysses J. Magalang (United States)
Scientific Programme

5:32PM - 5:52PM  Utilizing Large Biobanks for Studies of the Genetics of Sleep Disorders
Allan Pack (United States)

5:52PM - 6:00PM  Conclusion
### D10: Sleep medicine in Latin America: Past, present and future

**Summary**

1996 the American Medical Association recognized sleep medicine as a Medical Specialty, however research in sleep started much earlier. The advances in science and technology contributed to the expansion of knowledge about sleep medicine. With the development of electroencephalography, neurophysiology and neurochemistry, the understanding of sleep and sleep disorders has increased exponentially in the last century. In 1961 the Association for the Psychophysiological Study of Sleep (APSS), composed of a group of clinical sleep researchers was founded, followed in 1971 by the European Sleep Research Society (ESRS) and in 1986, the foundation of the Latin American Sleep Society (LASS). Latin America constitutes 9% of the world’s population. Research has shown that people from Latin American countries can be at higher risk of some sleep disorders, and there are some medical and social conditions unique to Latin American countries, yet data presenting these findings if often lacking. In the current symposium founders and leaders of Latin American Sleep Medicine societies will present data on past, present and future of sleep medicine in Latin America. Dr. Marisa Pedemonte, Professor in Physiology at CLAEH University (Centro Latinoamericano de Economía Humana) and vice-president of the Federation of Latin American Sleep Societies, will present a historical background of the development and growth of sleep medicine research and education in Latin America. Dr. Darwin Vizcarra, Associate Professor at the Universidad Cayetano Heredia and President and Founder of the Peruvian Sleep Society, will present data from a published study on the status of sleep medicine societies and training programs in Latin America. Dr. Pablo Brockmann president of the Chilean sleep society, has pioneered and led research in Latin America. Dr. Brockmann will present the current research trends and advances in the field, innovation and data specific to sleep disorders in Latin America. Dr. Dalva Poyares, president of the Brazilian sleep society will present future trends for sleep medicine in Latin America.

**Learning Objectives**

Upon Completion of this CME activity, participants should be able to:

- Identify the history and development of sleep medicine in Latin America
- Comprehend the uniqueness of research in Latin America
- Develop awareness about the future projects and growth of sleep medicine in Latin America

**Target Audience**

Sleep physicians of all subspecialties; sleep trainees with interest in global health; researchers and academicians seeking collaborative opportunities in Latin America

**Chairs:**

Lourdes DelRosso (Peru)
Scientific Programme

4:32PM - 4:52PM  The road from neuroscience to sleep medicine  
Marisa Pedemonte (Uruguay)

4:52PM - 5:12PM  Sleep societies and training programs in Latin America  
Darwin Vizcarra (Peru)

5:12PM - 5:32PM  Current research and innovation in Latin America  
Pablo Brockmann (Chile)

5:32PM - 5:52PM  The future of Sleep Medicine in Latin America  
Dalva Poyares (Brazil)

5:52PM - 6:00PM  Conclusion
**S84: Global perspectives on adolescent sleep and health: Predictors, treatments and policies**

**Summary**
Sleep disorders are common among adolescents around the world, including insomnia, delayed sleep-wake phase disorder, and insufficient sleep syndrome. In order to improve sleep among adolescents, it is essential to understand the biological and environmental factors that contribute to sleep disorders, and there is a critical need to develop and validate novel interventions to improve sleep duration and sleep quality in this age group. This symposium brings together international experts on adolescent sleep disorders, examining both contributing factors and interventions for adolescents from multiple perspectives. First, Dr. Candice Alfano will present longitudinal data from a study of 70 adolescents who underwent comprehensive sleep and psychiatric evaluation as children. She will examine early predictors of adolescent sleep patterns, chronotype, and mental health outcomes. Next, Dr. Ed de Bruin will discuss treatment for adolescent insomnia, comparing delivery approaches, the additional effects of mindfulness-based techniques, and the impact of treatment on mental health outcomes. This will be followed by the presentation of two novel interventions for the circadian phase delays that are common during adolescence, yet are often difficult to treat. Dr. Allison Harvey will present results from a randomized controlled trial of a Transdiagnostic Sleep and Circadian Intervention to modify the impact of adolescent evening preference (“night owls”) on sleep and health outcomes. Dr. Michael Gradisar will discuss the use of bright light therapy and physical activity to improve sleep and mental health outcomes for adolescents with delayed sleep-wake phase disorder – specifically, he will examine what mechanisms may link an improvement in sleep with a decline in depression symptoms. Finally, Dr. Lisa Meltzer will present longitudinal data from before and after a large school district in the United States delayed high school start times, demonstrating the importance of this major policy shift on sleep and health outcomes among adolescents.

**Learning Objectives**
Upon completion of this CME activity, participants should be able to:

- Recognize predictors of sleep patterns, chronotype, and mental health outcomes in adolescents
- Describe how CBT-I with mindfulness improves insomnia and mental health outcomes in adolescents
- Identify innovative treatments for delayed circadian phase in adolescents, and how these treatments impact adolescent health
- Discuss the importance of delaying high school start times on adolescent sleep and well-being

**Target Audience**
Sleep medicine physicians, psychologists, and nurses interested in evidence-based strategies to improve sleep in adolescents; sleep and circadian researchers interested in predictors and outcomes of adolescent sleep; sleep health advocates, educators and policy makers interested in improving adolescent sleep health

**Chairs:**
Lisa J. Meltzer (United States)
<table>
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<th>Time</th>
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<tr>
<td>4:30 PM - 4:32 PM</td>
<td>Introduction</td>
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| 4:32 PM - 4:48 PM | Pre-pubertal sleep patterns forecast adolescent sleep preferences and mental health functioning  
Candice A. Alfano (United States) |
| 4:48 PM - 5:04 PM | Internet- and group-CBT for adolescents with insomnia; the contribution of mindfulness techniques, and the effects on sleep and mental health  
Ed J. de Bruin (The Netherlands) |
| 5:04 PM - 5:20 PM | Modifying the Impact of Eveningness Chronotype (‘Night-Owls’) in Youth: A Randomized Controlled Trial  
Allison G. Harvey (United States) |
| 5:20 PM - 5:36 PM | Bright light therapy and physical activity for adolescents with Delayed Sleep-Wake Phase Disorder: Effects on sleep and depression symptoms  
Cele Richardson (Australia) |
| 5:36 PM - 5:52 PM | Impact of delaying high school start times on adolescent sleep and health  
Lisa J. Meltzer (United States) |
| 5:52 PM - 6:00 PM | Conclusion                                        |
Scientific Programme

4:30PM - 6:00PM

S85: REM Sleep Behavior Disorder and REM sleep without atonia across the lifespan

Summary

Isolated/idiopathic REM sleep behavior disorder (iRBD) involves clinical dream enactment and its neurophysiologic signature is polysomnographic REM sleep without atonia (RSWA). In older adults, iRBD and RSWA are strongly associated with synucleinopathy neurodegenerative diseases with an up to 75-91% risk for phenocconversion to Parkinson disease, dementia with Lewy bodies, and multiple system atrophy, and in most elderly iRBD is thought to represent a prodromal synucleinopathy. However, through the lifespan RBD and RSWA may have more heterogeneous causes. Recent evidence from preclinical studies has shown that in infants and young children, REM sleep atonia is yet developing, so that muscle activity and phasic twitching during REM sleep may be a manifestation of motor network plasticity and motor circuit mapping. Through the first decade of life, children manifest a higher amount of RSWA than adults, presumably due to normal continuing development of central nervous system REM atonia control. However, in some exceptional cases, children and adolescents may have forms of apparent REM sleep behavior disorder related to non-synucleinopathy pathologies including narcolepsy, neurodegenerative disorders, or medication-induction.

In younger (<50 years) adults, RBD also appears to have a more heterogeneous clinical expression with relatively even involvement between women and men vs. strong predominance in older (>50 years), and greater associations with antidepressant use and co-morbid autoimmunity. Recent studies of autoimmune encephalopathies in particular have suggested that RBD is a relatively frequent consequence of CNS autoimmunity in syndromes such as the IgLON5, DPPX, and voltage-gated potassium channel (especially LGI1 and Caspr2) autoimmunity syndromes. Finally, normative polysomnography studies in adults have shown that isolated RSWA without clinical dream enactment is relatively common, involving between 15-25% of community dwelling adults, which roughly parallels the prevalence of incidental Lewy body disease in pathologic studies in the community. Could it be that isolated RSWA, in addition to isolated/idiopathic RBD, also reflects a state of prodromal Lewy body disease?

This symposium will feature the clinical expressions and implications of iRBD and RSWA throughout the lifespan, beginning with preclinical evidence for its involvement in normal human development of cerebral motor mapping; progressing to a review of basic animal models demonstrating the structural, neurochemical, and neurophysiologic characteristics that may underlie human RBD pathophysiology; and finishing with the varying clinical presentations, neurophysiologic characteristics, prognostic implications, and treatment strategies for RBD and RSWA in children, adolescents, and younger and older adults, including its strong association with synucleinopathies.

Learning Objectives

Upon completion of this CME activity, participants should be able to:

- Reflect upon the role of REM sleep atonia and phasic muscle activity in the developing brain for motor circuit mapping
- Understand the structural, neurochemical, and neurophysiological basis underlying human RBD pathophysiology from review of preclinical animal models
- Become familiar with the concept of isolated RSWA and recognize its polysomnographic presentations and potential clinical significance
- Diagnose isolated RSWA and isolated/incidental RBD in children, adolescents, and adults throughout the lifespan
- Offer effective treatment strategies for RBD
Scientific Programme

4:30PM - 4:32PM  Introduction

4:32PM - 4:52PM  RSWA and RBD: preclinical evidence for roles in normal motor
development and disease
John Peever (Canada)

4:52PM - 5:12PM  RSWA and RBD in children and adolescents
Suresh Kotagal (United States)

5:12PM - 5:32PM  REM sleep behavior disorder in younger and older adults
Erik K. St. Louis (United States)

5:32PM - 5:52PM  Isolated RSWA: Normal Variant or Prodromal Synucleinopathy?
Birgit Högl (Austria)

5:52PM - 6:00PM  Conclusion
Scientific Programme

4:30PM - 6:00PM  S86

**S86: Neuroscience of Dreaming**

Summary
Conscious experience varies strikingly across the sleep-wake cycle, but also during sleep. While dreaming, we are functionally disconnected from the environment, and experience characteristic cognitive impairments and emotional intensifications. Traditionally, dreaming has been linked to the wake-like electroencephalographic activity of REM sleep, however it has become increasingly clear that dreaming can also occur in NREM sleep, challenging the understanding of the neural correlates of conscious sleep experiences. In this symposium, several recent lines of investigation will shed new light on the neuroscience of dreaming.

First, Francesca Siclari will present a series of studies investigating the neural correlates of dreaming using a serial awakening paradigm and high-density EEG recordings. She will show how local EEG features, including spectral power in different frequency bands, slow waves and spindles relate to the presence and absence of dreaming, and to specific dream contents. The results suggest that local EEG correlates may account for the presence of conscious experiences in behavioral states with radically different global EEG signatures.

Second, Perrine Ruby will explore the cerebral correlates of dream recall frequency. She will present EEG, PET and EEG-fMRI investigations of participants with high and low dream recall frequency, allowing to identify cerebral traits associated with high dream recall frequency. She will conclude that the cerebral activity during sleep but also at wake in the minutes following awakening seem to impact our ability to report dreams.

Third, Benjamin Baird will focus on the phenomenon of lucid dreaming, i.e. the state of becoming aware of the fact that one is dreaming during ongoing sleep. Despite having been physiologically validated for decades, the neurobiology of lucid dreaming is still poorly characterized. The talk will discuss recent neuroimaging findings that converge with previous results in providing preliminary evidence for a role of anterior prefrontal, parietal and temporal cortices in lucid dreaming. Furthermore, studies suggest that a state of the brain conductive to lucid dreaming can be induced pharmacologically with acetylcholinesterase inhibition. Finally, recent findings will be discussed that illustrate the potential of lucid dreaming as a useful methodology for the cognitive neuroscience of consciousness.

Fourth, Enzo Tagliazucchi will introduce novel natural language processing (NLP) tools as a methodological framework for the automatic and unbiased scientific analysis of dream reports. He will report results from large-scale analyses of dream databases, revealing the presence of stereotypical “arcs” of emotional and semantic content. Such analyses factor in the temporal dimension of retrospective dream reports, allowing to associate subjective dream experiences with neuroimaging data.

Together, the talks of this symposium will elucidate the brain basis of different kinds of dream experiences, and will highlight several novel approaches in the neuroscientific investigation of cognitive processing during sleep.

Learning Objectives
Upon completion of this CME activity, participants should be able to:

- Understand and evaluate the current state of the field of neuroscientific dream research
- Conceptualize, plan, execute and analyze neuroscientific studies on dreaming
- Integrate novel behavioral and neuroscientific measures of dream content into their sleep studies

Target Audience
Sleep researchers focusing on human sleep, particularly psychologists, psychiatrists, and neurologists.

Chairs:
Martin Dresler (The Netherlands)
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<td>4:30PM - 4:32PM</td>
<td>Introduction</td>
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<tr>
<td>4:32PM - 4:52PM</td>
<td>The EEG correlates of dreaming</td>
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<td>Francesca Siclari (Switzerland)</td>
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<td>4:52PM - 5:12PM</td>
<td>The cerebral correlates of high dream recall frequency</td>
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<td>Perrine Ruby (France)</td>
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<td>5:12PM - 5:32PM</td>
<td>The cognitive neuroscience of lucid dreaming</td>
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<td>Benjamin Baird (United States)</td>
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<td>5:32PM - 5:52PM</td>
<td>The emotional and semantic arcs of dream narratives</td>
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<td>Enzo Tagliazuci (Argentina)</td>
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<td>5:52PM - 6:00PM</td>
<td>Conclusion</td>
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Scientific Programme

4:30PM - 6:00PM  S87

S87: Is obstructive sleep apnea a primary care disease?

Summary

Obstructive sleep apnea (OSA) is highly prevalent and has significant medical consequences, including poor quality of life and an increased risk of cardiovascular disease and motor vehicle crashes. OSA patients use the healthcare system more frequently than the general population, with annual healthcare costs exceeding age- and sex-matched controls two- to threefold. Treatment of OSA improves health outcomes and is cost effective. Patients in many jurisdictions experience long delays for diagnosis and treatment of OSA, due to a demand for care exceeding the supply of sleep specialist physicians. These delays are problematic for a disease with a high prevalence, high rate of underdiagnosis, significant risk for adverse health outcomes and for which there are therapies that could mitigate this risk. Without a significant increase in the supply of sleep physicians, there is a need to explore new service delivery models that could improve timely access to OSA care.

Management of OSA by primary care providers (PCPs) is one such innovation that is a major focus of current research and a source of much debate. Management of OSA by PCPs aligns with patient preference for care within the medical home but must be balanced by potential barriers that have been identified in research, such as gaps in PCPs’ clinical knowledge of OSA, lack of confidence in managing OSA, or time constraints. The shift of OSA management into primary care settings represents a departure from the traditional paradigm in which OSA is considered to be strictly in the domain of sleep specialists; thus, translating existing research into the implementation of primary care delivery models for OSA requires multidisciplinary collaboration between clinicians, researchers and patients.

The aim of the proposed symposium is to provide a state-of-the-art, multi-national review of PCP management of OSA, drawing from both published evidence and experience with implementation. Each speaker is a leader in research on primary care delivery models for OSA and will provide a unique perspective from work within their country.

Learning Objectives

Upon Completion of this CME activity, participants should be able to:

- Appreciate the burden of OSA and implications for timely access to care
- Describe the current evidence for the management of OSA by primary care providers
- Understand the barriers and facilitators related to primary care management of OSA as identified by providers and patients
- Discuss innovative models of care to address current challenges with OSA management in primary care

Target Audience

Clinicians and researchers who are interested in health service delivery for OSA. The incorporation of both research data and implementation experience in each session will also appeal to frontline providers who manage patients with OSA

Chairs:

Sachin R. Pendharkar (Canada)
Scientific Programme

4:30PM - 4:32PM  |  Introduction
4:32PM - 4:52PM  |  Diagnosis and treatment of OSA by primary care providers: The Australian Experience
                               Ching-Li Chai-Coetzer (Australia)
4:52PM - 5:12PM  |  Effectiveness of different models of primary care management of OSA: Lessons from Spanish randomized controlled trials
                               Fernando Masa (Spain)
5:12PM - 5:32PM  |  Challenges to the effective implementation of primary care management of OSA
                               Vishesh K. Kapur (United States)
5:32PM - 5:52PM  |  Community-based management of sleep disordered breathing in Alberta, Canada: Stakeholder perspectives and an integrated model of care
                               Sachin R. Pendharkar (Canada)
5:52PM - 6:00PM  |  Conclusion

4:30PM - 6:00PM  |  Oral abstract: content to be determined

4:30PM - 6:00PM  |  Oral abstract: content to be determined

4:30PM - 6:00PM  |  Oral abstract: content to be determined

6:00PM - 7:00PM  |  Closing Ceremony