The RLS Track at World Sleep 2019 will include some of the biggest names in the field offering cutting-edge science and information.

23 HOURS OF RLS content have been added to the final Scientific Program. Register today to learn more about RLS research and treatment options.

RegISTRATION OPTIONS:

<table>
<thead>
<tr>
<th>COURSE</th>
<th></th>
<th>$125</th>
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</thead>
<tbody>
<tr>
<td>IRLSSG Study Group Annual Meeting &amp; Course</td>
<td></td>
<td>$165</td>
</tr>
<tr>
<td>Both Courses + Congress Registration (Member)</td>
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<td>$685</td>
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FOR MORE INFORMATION & ALL PRICING VISIT worldsleepcongress.com/register
C05 Recent advances in RLS treatment  
Saturday, September 21, 2019  |  8:00am - 12:00 pm  |  Room 120  
Chairs Richard Allen (United States); Diego García-Borreguero (Spain)

ADDITIONAL REGISTRATION REQUIRED

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.

8:00am – 8:05am  
Introduction

OPIOIDS
8:05am – 8:35am  
Biological differences of opioids: Low abuse potential of methadone  
Sergi Ferre (United States)

8:35am – 9:15am  
USA Clinical guidelines/experience with opioid use in RLS  
Christopher Earley (United States)

Iron
9:55am – 10:40am  
IV iron: choices, advantages and limitations  
Richard Allen (United States)

EXPERIMENTAL TREATMENTS: RATIONALE AND CLINICAL EXPERIENCE
10:40am – 11:20am  
Adenosine  
Diego García-Borreguero (Spain)

11:20am – 11:40am  
Cannabinoid/Cannabis  
Imad Ghorayeb (France)

11:40am – 12:00pm  
Discussion – Questions to speakers
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.

Program Committee
Denise Sharon (United States); Federica Provini (Italy); Garima Shukla (Canada); Rochelle Zak (United States); Cornelius Bachman (Germany)

Presentation
8:00am – 08:30am
Networking and Coffee
Denise Sharon (United States); Federica Provini (Italy); Garima Shukla (Canada); Rochelle Zak (United States); Cornelius Bachman (Germany)

8:30am – 08:45am
Welcome to Vancouver & Introductions
Denise Sharon (United States); Allan O’Bryan (United States)

ANIMAL MODELS TASK FORCE
Mauro Manconi (Switzerland); Diego Garcia-Borreguero (Spain)

8:45am – 09:00am
Behavioral Animal Models: When phenotype matters and objective markers are missing
Jerome Siegel (United States)

9:00am – 09:15am
Critical review of outcome measures of the past models: Rationale and need of consensus
Mauro Manconi (Switzerland)

9:15am – 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)

9:30am – 09:45am
Update on RLS animal models and iron
Richard Allen (United States)

9:45am – 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)
### INTERNATIONAL RESTLESS LEGS SYNDROME STUDY GROUP
#### ANNUAL MEETING & COURSE

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker</th>
<th>Location</th>
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<tbody>
<tr>
<td>10:50am - 11:10am</td>
<td>Update on blood pressure and endothelial dysfunction in RLS</td>
<td>Yves Dauvilliers (France)</td>
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<tr>
<td>11:10am - 11:30am</td>
<td>New MRI findings in RLS</td>
<td>Ambra Stefani (Austria)</td>
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<td>11:30am - 11:45am</td>
<td>A proteomic and system biology approach reveal novel biomarker signatures for RLS</td>
<td>Raffaele Ferri (Italy)</td>
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<tr>
<td>11:45am - 12:00pm</td>
<td>The lifespan course of short-interval, periodic and isolated leg movements during sleep</td>
<td>Raffaele Ferri (Italy)</td>
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<td>12:00pm-12:15pm</td>
<td>Iron treatment</td>
<td>Richard Allen (United States)</td>
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<td>12:15pm - 1:00pm</td>
<td>Lunch break</td>
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<tr>
<td>1:00pm - 1:03pm</td>
<td>Neurologic co-morbidities of RLS</td>
<td>Rochelle Zak (United States)</td>
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<tr>
<td>1:03pm - 1:23pm</td>
<td>Restless legs syndrome and Parkinson’s disease - the dopaminergic connection and treatment challenges</td>
<td>Luigi Ferini-Strambi (Italy)</td>
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<tr>
<td>1:23pm - 1:40pm</td>
<td>Restless legs syndrome in acute neurological conditions - lessons from stroke and acute neuropathies</td>
<td>Garima Shukla (Canada)</td>
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<tr>
<td>1:40pm - 2:00pm</td>
<td>How RLS contributes to quality of life in Multiple Sclerosis</td>
<td>Mauro Manconi (Switzerland)</td>
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<td>2:00pm - 2:15pm</td>
<td>Young Investigator Presentation #1</td>
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<td>2:15pm - 2:30pm</td>
<td>Young Investigator Presentation #2</td>
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<td>3:15pm - 3:30pm</td>
<td>IRLSSG Projects</td>
<td>Denise Sharon (United States)</td>
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<tr>
<td>3:30pm - 3:45pm</td>
<td>Diagnostic accuracy of RLS screening tools</td>
<td>Stephany Fulda (Switzerland)</td>
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<tr>
<td>3:45pm - 4:00pm</td>
<td>Update on PLMS scoring program certification</td>
<td>Stephany Fulda (Switzerland)</td>
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<tr>
<td>4:00pm - 4:15pm</td>
<td>National RLS Opioid Registry: 1-2 year longitudinal results</td>
<td>John Winkelman (United States)</td>
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<tr>
<td>4:15pm - 4:30pm</td>
<td>Establishing RSD as a new diagnosis</td>
<td>Lourdes DelRosso (Peru)</td>
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<td>4:30pm - 4:45pm</td>
<td>Pediatric RLS and GP Task Force update</td>
<td>Arthur Walters (United States)</td>
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<tr>
<td>4:45pm - 4:50pm</td>
<td>Ideas for projects from the attendees</td>
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<td>4:50pm - 5:00pm</td>
<td>Outgoing chair summary</td>
<td>Diego García-Borreguero (Spain)</td>
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<td>5:00pm - 5:15pm</td>
<td>Break</td>
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<tr>
<td>5:15pm - 6:00pm</td>
<td>Business meeting</td>
<td>Diego García-Borreguero (Spain)</td>
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<tr>
<td>6:00pm - 9:00pm</td>
<td>Dinner</td>
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**Pathophysiological insights from animal models of restless legs syndrome**

3:00pm – 4:30pm | Room 219

**Chair**
Yuqing Li (United States)

**Summary**
Iron deficiency, which produces changes in dopaminergic neurons and receptors in the substantia nigra and putamen, has been reported to correlate with restless legs syndrome (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.

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 speakers are established scientists in the RLS pathophysiology and published extensively in this and related topics.

3:00pm – 3:02pm
**Introduction**

3:02pm – 3:22pm
**Pathophysiological insights from the iron deficient rats**
Yuan-Yang Lai (United States)

3:22pm – 3:42pm
**Pathophysiological studies of RLS using BTBD9 mutant animal models**
Yuqing Li (United States)

3:42pm – 4:02pm
**MEIS1-based animal models and the pathophysiology of RLS**
Aaro Salminen (Germany)

4:02pm – 4:22pm
**Use of animal models for the pathophysiological study of RLS**
Mauro Manconi (Switzerland)

4:22pm – 4:30pm
**Conclusion**
The sensory experience of RLS and its relationship to pain, itch and Tourette's
John Winkelman (United States)

Peripheral mechanisms in restless legs syndrome
Dirk Czesnik (Germany)

The sensory experience of RLS and its relationship to pain, itch and Tourette's
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Conclusion

Brain iron as a central factor in the pathophysiology of RLS: Emerging evaluation methods and therapeutic opportunities
3:00pm – 4:30pm | Ballroom A

Brain iron as a central factor in the pathophysiology of RLS: Emerging evaluation methods and therapeutic opportunities
3:00pm – 4:30pm | Ballroom A

Chair
Diego Garcia-Borreguero (Spain)

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 discuss 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.

Keynote
Diego Garcia-Borreguero (Spain)

Summary
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.

Introduction

Brain iron deficiency relation to dopamine dysfuntion and augmentation in RLS
Christopher Earley (United States)

Brain iron dysregulation in RLS relation to brain adenosine and glutamate
Sergi Ferre (United States)

MRI evaluation of regional brain iron relation to RLS symptoms and iron treatments
Richard Allen (United States)

Transcranial sonography evaluation of substantia nigra iron: A potential clinical tool to predict IV iron treatment outcome
Celia Garcia Malo (Spain)

Conclusion

Registration:
Canadian Sleep Society
Sociétés Canadienne du Sommeil

World Sleep Society
Advancing Sleep Health Worldwide