St. Jude Medical is elevating the science of neurological disease by empowering our partners to take patient care to a completely new level with some of the most advanced technologies on the market. From our superior2 chronic pain therapies, BurstDR™ stimulation* and DRG therapy,** to our game changing St. Jude Medical Infinity™ DBS system with directional lead technology, we are helping you reach more patients with the right solution. Together we can transform the treatment of chronic pain and movement disorders.

*Study subjects from the ACCURATE clinical study had failed to achieve adequate pain relief from at least two prior pharmacologic treatments from at least two different drug classes and continued their pharmacologic therapy during the clinical study.

**Please note that in 1994, a consensus group of pain medicine experts gathered by the International Association for the Study of Pain (IASP) reviewed diagnostic criteria and agreed to rename reflex sympathetic dystrophy (RSD) and causalgia as complex regional pain syndrome (CRPS) types I and II, respectively.

Visit St. Jude Medical Booth #301 to learn more.

ELEVATING THE SCIENCE

to bring you and your patients the clinical breakthroughs they deserve.

Rx Only

Brief Summary: Prior to using these devices, please review the User’s Manual for a complete listing of indications, contraindications, warnings, precautions, potential adverse events and directions for use.

SCS Indications for Use: Spinal cord stimulation as an aid in the management of chronic, intractable pain of the trunk and/or limbs, including unilateral or bilateral pain associated with the following: failed back surgery syndrome and intractable low back and leg pain.

Contraindications: Patients who are unable to operate the system or who have failed to receive effective pain relief during trial stimulation.

Warnings/Precautions: Diathermy therapy, implanted cardiac systems, magnetic resonance imaging (MRI), explosive or flammable gases, theft detectors and metal screening devices, lead movement, operation of machinery and equipment, postural changes, pediatric use, pregnancy, and case damage. Patients who are poor surgical risks, with multiple illnesses, or with active general infections should not be implanted.

Adverse Events: Painful stimulation, loss of pain relief, surgical risks (e.g., paralysis). Clinicians manual must be reviewed for detailed disclosure.

DRG Indications for Use: The Axium™ Neurostimulator System is indicated for spinal column stimulation via epidural and intra-spinal lead access to the dorsal root ganglion as an aid in the management of moderate to severe chronic intractable lower extremity pain in adult patients with Complex Regional Pain Syndrome (CRPS) types I and II.

DBS Indications for use: The St. Jude Medical™ deep brain stimulation system is indicated for the following conditions: Bilateral stimulation of the subthalamic nucleus (STN) as an adjunctive therapy to reduce some of the symptoms of advanced levodopa-responsive Parkinson’s disease that are not adequately controlled by medications. Unilateral or bilateral stimulation of the ventral intermediate nucleus (VIM) of the thalamus for the suppression of disabling upper extremity tremor in adult essential tremor patients whose tremor is not adequately controlled by medications and where the tremor constitutes a significant functional disability. Contraindications: This system is contraindicated for patients who meet the following criteria: are unable to operate the system have unsuccessful test stimulation. The following procedures are contraindicated for patients with a deep brain stimulation system. Advise patients to inform their healthcare professional that they cannot undergo the following procedures: Diathermy (short-wave diathermy, microwave diathermy, or therapeutic ultrasound diathermy) Electroshock therapy and transcranial magnetic stimulation (TMS).

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*The Precision Montage™ MRI SCS System provides safe access to full body MRI scans only when used with the Avista MRI Leads and exposed to the MRI environment under the specific conditions defined in the ImageReady MRI Full Body Guidelines for Precision Montage™ MRI Spinal Cord Stimulator System.
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Exhibitors .......................................................................................................................... 34

SAVE THE DATE

North American Neuromodulation Society
21st Annual Meeting | Las Vegas, NV
January 13–16, 2018 | Caesars Palace Convention Center
Welcome to the NANS 20th Annual Meeting—the world's largest meeting in the field of neuromodulation!

The 2017 meeting offers opportunities for networking with colleagues, hearing state-of-the-art lectures, and discovering the newest and upcoming advances in devices in our exhibit hall. With participants from more than 20 countries, the NANS Annual Meeting is the premier meeting in the world to capture the latest advances in the science and practice of neuromodulation.

We have an extensive and exciting premeeting educational program scheduled for Thursday, January 19. The agenda includes our popular Advanced Implantable Therapies course, combining didactic lectures and hands-on training for residents and fellows. Also offered is an expanded Neurology Neuromodulation Workshop, featuring implantable devices for managing epilepsy. NANS will present a full-day workshop on intrathecal pump therapy titled “I Just Inherited 100 Pump Patients: What Do I Do Now?” The Certificate of Attendance Workshop is being offered for the third year and will again provide advanced, hands-on training for effective and appropriate uses of advanced implantable devices for pain management. The Advanced Practice Provider Course, now in its eighth year, covers the “A to Z” of neuromodulation. New to the NANS Annual Meeting is a hands-on course directed toward engineers with interests in neuromodulation therapies, as well as a Neuromodulation Coding Workshop.

Also on Thursday, January 19, the 5th Annual NANS Invention, Investment, and Invigoration Forum (I³): Innovation and the Neuromodulation Ecosystem brings together esteemed clinicians, scientists, corporate executives, healthcare regulators, and investors to discuss the challenges and opportunities for neuromodulation strategic growth in North America over the coming decade. Topics for the full-day NANS I³ program will include partnership funding strategies, FDA requirements, and the emerging global ecosystem for neuromodulation devices.

The theme of the NANS 20th Annual Meeting is Neuromodulation: From Frontier to Frontline. Over the past 2 decades, advances in neuromodulation have continued to accelerate. The clinical frontiers of neuromodulation have expanded to include cancer and noncancer pain, movement disorders, psychiatric diseases, sleep disorders, cardiac/autonomic regulation, and more. The science of neuromodulation now includes sophisticated materials, advanced communication technologies, restorative cognitive neuroscience, and brain-machine interface neuroprosthetics.

The NANS 20th Annual Meeting celebrates these advances. Plenary sessions will feature a penetrating survey of the neuromodulation landscape, including the treatment of pain, the modulation of the autonomic nervous system, deep brain stimulation, neuroprosthetics, and the national crisis in opioid therapy. Our keynote speaker, Rosalind W. Picard, ScD, will discuss the first wearable technology to automatically recognize changes in human emotion. This talk will highlight some of the most surprising findings, with implications for autism, anxiety, depression, sleep-memory consolidation, and epilepsy.

The NANS 20th Annual Meeting will focus on the latest advances in the field and explore them in detail. Concurrent sessions will explore the Scientific Foundations of Neuromodulation, Non-Pain Indications of Neuromodulation, Cranial Neuromodulation for Pain, and SAFE Evaluation of Back Pain, among other hot topics in the field.

On Friday and Saturday (January 20–21), the meeting will begin with thematic presentations of original research across the spectrum of neuromodulation. Topics include Nerve Root and DRG Stimulation, Novel Waveforms and Energy Delivery in Spinal Cord Stimulation, Visceral and Autonomic Neuromodulation, Peripheral Neuropathy and Nerve Stimulation, Advances in IT Therapy, Advances in Neuromodulation Technology, and more.

Each day ends with refreshments and the presentation of more than 250 electronic and paper posters.

The meeting will conclude Sunday (January 22) with the top 10 original research presentations and a surprising finish! Thank you for your attendance! We hope you enjoy the NANS 20th Annual Meeting!
Learning Objectives
Upon completion of this program participants should be able to
• recognize new therapeutic modalities and clinical research in neuromodulation
• discuss the principles and management of cancer and non-cancer chronic pain
• describe technological advances in clinical neuromodulation and brain-machine interfaces
• discuss potential applications for neuromodulation in front-line battlefield settings
• describe existing and potential roles of neuromodulation in the regulation of the heart and the autonomic nervous system
• discuss economic, insurance, legal, and regulatory issues pertaining to neuromodulation treatments in North America.

Accreditation and Designation Statements
This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the Congress of Neurological Surgeons (CNS) and the North American Neuromodulation Society. CNS is accredited by ACCME to provide continuing medical education for physicians.

Physicians: CNS designates this live activity for a maximum of 24.75 AMA PRA Category 1 Credit(s)™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

A maximum of 17.75 AMA PRA Category 1 Credit(s)™ may be earned for general sessions only.

CME Credit for Premeeting Courses
Attendees will receive a maximum of 6.5 AMA PRA Category 1 Credit(s)™ for all eligible premeeting courses. Physicians should only claim credit commensurate with the extent of their participation in the activity.

Physicians of Osteopathic Medicine: The American Osteopathic Association (AOA) accepts AMA PRA Category 1 Credit(s)™ as AOA Category 2-B credit.

NANS gratefully acknowledges our corporate supporters.

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The following companies provided educational grants to support this meeting:
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Nevro
Nuvevctra
St. Jude Medical
## Agenda

**PREMEETING WORKSHOPS**

**Thursday, January 19**

<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 am–8:30 pm</td>
<td>Caesars Palace, Octavius, Promenade Level</td>
<td>Meeting Registration</td>
</tr>
<tr>
<td>8 am–5 pm</td>
<td>Caesars Palace, Forum, Pool Level</td>
<td>Exhibitor Registration</td>
</tr>
<tr>
<td>7:15–8 am</td>
<td>Caesars Palace, Augustus Foyer</td>
<td>Breakfast</td>
</tr>
<tr>
<td>8:30 am–4:30 pm</td>
<td>Caesars Palace, Augustus 6</td>
<td>Advanced Practice Provider Course (PAs, NPs, Nurses): A to Z in Neuromodulation</td>
</tr>
<tr>
<td></td>
<td>Directors: Christy Gomez, BSN MSN AG-ACNP; Julie G. Pilitsis, MD PhD; Vishad Sukul, MD; Meghan Wilock, PA</td>
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<tr>
<td>Noon–1:30 pm</td>
<td>Caesars Palace, Augustus 4</td>
<td>Lunch Symposium</td>
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<tr>
<td></td>
<td>Directors: Michael F. Saulino, MD PhD; Erik Shaw, DO</td>
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<tr>
<td>7 am–5:40 pm</td>
<td>Oquendo Center for Clinical Education</td>
<td>Neuromodulation Cadaver Course for Advanced Implantable Therapies: A Hands-On Cadaver Course for Residents and Fellows (non-CME)</td>
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<td></td>
<td>Directors: Michael A. Fishman, MD MBA; Bryan C. Hoelzer, MD; Chengyuan Wu, MD MSBmE</td>
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<tr>
<td>7–8:30 pm</td>
<td>Caesars Palace, Forum Ballroom 11 &amp; 12</td>
<td>Welcome Reception</td>
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<tr>
<td></td>
<td>The Welcome Reception is open to all meeting registrants. Please come to enjoy wine, beer, and hors d'oeuvres with your colleagues and friends.</td>
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<tr>
<td>8:30–10 pm</td>
<td>The Vortex at the LINQ Hotel &amp; Casino</td>
<td>Residents &amp; Fellows Exclusive Reception</td>
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<td>Sponsored by Medtronic. For details, visit the Medtronic booth (501) or simply click on the NANS app.</td>
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<tr>
<td>Time</td>
<td>Session</td>
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<tr>
<td>6 am–5 pm</td>
<td>Meeting Registration</td>
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<tr>
<td>6 am–5 pm</td>
<td>Octavius, Promenade Level</td>
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<tr>
<td>7 am–5 pm</td>
<td>Exhibitor Registration</td>
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<tr>
<td>7–8 am</td>
<td>Octavius 4, Octavius 15, and Forum 4</td>
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<tr>
<td>7–8 am</td>
<td>Breakfast</td>
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<tr>
<td>7–8 am</td>
<td>Thematic Abstract Sessions</td>
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<tr>
<td>7–8 am</td>
<td>Complex Regional Pain Syndrome and Other Challenging Cases</td>
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<tr>
<td>7–8 am</td>
<td>Nerve Root &amp; Dorsal Root Ganglion Stimulation</td>
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<tr>
<td>7–8 am</td>
<td>Novel Waveforms and Energy Delivery in Spinal Cord Stimulation</td>
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**Thematic Abstract Sessions**

**Complex Regional Pain Syndrome and Other Challenging Cases**
Moderator: William S. Rosenberg, MD

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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</thead>
<tbody>
<tr>
<td>7:05–7:15 am</td>
<td>First Two Cases of Dorsal Root Ganglion Stimulation for Complex Regional Pain Syndrome in NJ Amanda M. Carpenter, MD</td>
</tr>
<tr>
<td>7:15–7:25 am</td>
<td>Treatment of Complex Regional Pain Syndrome with High-Frequency Spinal Cord Stimulation at 10kHz: A Case Series Kasra Amirdelfan, MD</td>
</tr>
<tr>
<td>7:35–7:45 am</td>
<td>Spinal Cord Stimulation for Central Poststroke Pain with an Associated Reduction in Spasticity Kantharuby Tambirajoo, MB BCH BAO</td>
</tr>
<tr>
<td>7:45–7:55 am</td>
<td>Three Cases of High-Frequency Spinal Cord Stimulation for Painful Lower Extremity Neuropathy of Varied Etiologies C. Brad Sisson, MD</td>
</tr>
<tr>
<td>7:55–8 am</td>
<td>Closing Discussion William S. Rosenberg, MD</td>
</tr>
</tbody>
</table>

**Nerve Root & Dorsal Root Ganglion Stimulation**
Moderator: Ramana Naidu, MD

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>7:05–7:15 am</td>
<td>Dorsal Root Ganglion Stimulation Amplifies T-Junction Filtering in Primary Sensory Neurons Alexander R. Kent, PhD</td>
</tr>
<tr>
<td>7:15–7:25 am</td>
<td>Dorsal Root Ganglion Stimulation to Treat Diabetic Neuropathy After Therapeutic Failure of Traditional Spinal Cord Stimulation and Ziconotide Marc D. Yelle, MD PhD</td>
</tr>
<tr>
<td>7:25–7:35 am</td>
<td>Can Dorsal Root Ganglion Stimulation for Pain Relief Modulate Sympathetic Efferent Nerve Traffic? Yrsa B. Sverrisdóttir, PhD</td>
</tr>
<tr>
<td>7:35–7:45 am</td>
<td>Relationship Between Pain Relief and Secondary Outcomes: An ACCURATE Sub-Analysis Nagy Mekhail, MD PhD</td>
</tr>
<tr>
<td>7:45–7:55 am</td>
<td>Paresthesia Versus Paresthesia-Free Dorsal Root Ganglion Stimulation: An ACCURATE Sub-Analysis Timothy Deer, MD</td>
</tr>
<tr>
<td>7:55–8 am</td>
<td>Closing Discussion Ramana Naidu, MD</td>
</tr>
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</table>

**Novel Waveforms and Energy Delivery in Spinal Cord Stimulation**
Moderator: Konstantin V. Slavin, MD

<table>
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<tr>
<th>Time</th>
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<tbody>
<tr>
<td>7:05–7:15 am</td>
<td>High-Frequency 10 kHz Spinal Cord Stimulation Used to Treat Refractory, Chronic Pancreatitis Pain Keeley Dohmeier, MD</td>
</tr>
<tr>
<td>7:15–7:25 am</td>
<td>HF10 Salvage Using In Situ Electrodes from Traditional Paresthesia-Based Manufactures: A Case Series Christopher R. Abrecht, MD</td>
</tr>
<tr>
<td>7:25–7:35 am</td>
<td>Comparison of Tonic Versus Burst Spinal Cord Stimulation During Trial: A Multicenter Italian Study Laura Demartini, MD</td>
</tr>
<tr>
<td>7:35–7:45 am</td>
<td>Spinal Cord Stimulation 10 kHz and 1.2 kHz Comparison Concerning Clinical Outcomes and Charge Burden Athanasios Koulousakis, MD</td>
</tr>
<tr>
<td>7:45–7:55 am</td>
<td>Programming Optimization Strategies for Burst May Improve Outcomes Stephen M. Falowski, MD</td>
</tr>
<tr>
<td>7:55–8 am</td>
<td>Closing Discussion Konstantin V. Slavin, MD</td>
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</tbody>
</table>
### Visceral and Autonomic Neuromodulation
*Octavius 5, 6, 7, and 8*
**Moderator:** Lawrence P. Schramm, PhD

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter(s)</th>
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<tbody>
<tr>
<td>7-7:05 am</td>
<td>Welcome</td>
<td>Lawrence P. Schramm, PhD</td>
</tr>
<tr>
<td>7:05–7:15 am</td>
<td>Effects of Sacral Nerve Stimulation on Gastric and Intestinal Motility: A Possible Spinal-Afferent Vagal-Efferent Pathway</td>
<td>Shengai Zhang</td>
</tr>
<tr>
<td>7:15–7:25 am</td>
<td>Blood Pressure Modulation in Anesthetized Sheep with Intrathecal Bupivacaine: A Feasibility Study</td>
<td>Salim M. Hayek, MD PhD</td>
</tr>
<tr>
<td>7:25–7:35 am</td>
<td>Effects of Noninvasive Vagus Nerve Stimulation on Autonomic Output and Brain Following Heat Pain Stimuli</td>
<td>Imanuel R. Lerman, MD MS</td>
</tr>
<tr>
<td>7:35–7:45 am</td>
<td>Crohn’s Disease Abdominal Pain Treatment Utilizing Wireless Spinal Cord Stimulators</td>
<td>Sunil J. Panchal, MD</td>
</tr>
<tr>
<td>7:45–7:55 am</td>
<td>Intrathecal Baclofen Inhibits Pain Responses Evoked by Bladder Distention in a Rat Interstitial Cystitis Model</td>
<td>Keith R. Hildebrand, DVM PhD</td>
</tr>
<tr>
<td>7:55-8 am</td>
<td>Closing Discussion</td>
<td>Lawrence P. Schramm, PhD</td>
</tr>
</tbody>
</table>

### Peripheral Neuropathy and Nerve Stimulation
*Octavius 15, 16, 17, 18, and 19*
**Moderator:** Jason E. Pope, MD DABPM FIPP

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>7-7:05 am</td>
<td>Welcome</td>
<td>Jason E. Pope, MD DABPM FIPP</td>
</tr>
<tr>
<td>7:05–7:15 am</td>
<td>The Novel Implantable Peripheral Nerve Stimulator for Poststroke Shoulder Pain</td>
<td>W. Porter McRoberts, MD</td>
</tr>
<tr>
<td>7:15–7:25 am</td>
<td>High-Frequency Spinal Cord Stimulation for the Treatment of Chronic Intractable Pain from Peripheral Polyneuropathy</td>
<td>Vincent Galan, MD MBA</td>
</tr>
<tr>
<td>7:25–7:35 am</td>
<td>Sacral Lateral Branch Nerve Stimulation for Refractory Sacroiliac Joint Pain</td>
<td>Janice E. Gellis, MD</td>
</tr>
<tr>
<td>7:35–7:45 am</td>
<td>Wireless Stimulation for the Treatment of Knee Surgery Chronic Pain: Case Study</td>
<td>Frank DeLoos, MD</td>
</tr>
<tr>
<td>7:45–7:55 am</td>
<td>Modulating the Nervous System Using Charge Balanced Polarization Current (CBPC) Nerve Block</td>
<td>Tina Vrabec, PhD</td>
</tr>
<tr>
<td>7:55-8 am</td>
<td>Closing Discussion</td>
<td>Jason E. Pope, MD DABPM FIPP</td>
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**Friday, January 20 continued**

**8-10 am**

**Octavius Ballroom 11 and 12**

**Plenary Session I**
**Moderators:** Parag G. Patil, MD PhD; Lawrence Poree, MD PhD

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter(s)</th>
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</thead>
<tbody>
<tr>
<td>8-8:05 am</td>
<td>Welcome and Overview</td>
<td>Parag G. Patil, MD PhD; Lawrence Poree, MD PhD</td>
</tr>
<tr>
<td>8:05–8:20 am</td>
<td>Pain 2025</td>
<td>Joshua P. Prager, MD MS</td>
</tr>
<tr>
<td>8:20–8:40 am</td>
<td>Opioids: What Now?</td>
<td>Daniel Carr, MD</td>
</tr>
<tr>
<td>8:40–9:00 am</td>
<td>Neuromodulation at the Frontline, Homefront, and Beyond: Lessons from Military Neuromodulation, Retired Colonel</td>
<td>Karl E. Friedl, PhD</td>
</tr>
<tr>
<td>9-9:20 am</td>
<td>Groundbreaking Clinical Study I: The First-in-Class Neuromodulation Therapy for Rheumatoid Arthritis</td>
<td>Yaakov Levine, PhD</td>
</tr>
</tbody>
</table>

**9:20–9:40 am**

**Groundbreaking Clinical Study II: A Multicenter, Prospective, Clinical Trial of the High-Frequency Spinal Cord Stimulation at 10 kHz in the Treatment of Chronic Upper Limb and Neck Pain**
Kasra Amirdelfan, MD

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter(s)</th>
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<tbody>
<tr>
<td>9:40–10 am</td>
<td>NIH Roadmap for Pain</td>
<td>Michael L. Oshinsky, PhD</td>
</tr>
</tbody>
</table>

**10-10:30 am**

**Forum Ballroom, Pool Level**

**Break with Exhibitors**

**10:30 am-Noon**

**Octavius Ballroom 11 and 12**

**Plenary Session II**
**Moderators:** Peter Konrad, MD PhD; Julie G. Pilitsis, MD PhD

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter(s)</th>
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<tbody>
<tr>
<td>10:30–10:35 am</td>
<td>Welcome</td>
<td>Peter Konrad, MD PhD; Julie G. Pilitsis, MD PhD</td>
</tr>
<tr>
<td>10:35–10:55 am</td>
<td>The Science of Closed-Loop Deep Brain Stimulation</td>
<td>Jerrold L. Vitek, MD PhD</td>
</tr>
</tbody>
</table>
### 1:30–3 pm Concurrent Sessions I

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>1:30–1:35 pm</td>
<td>Welcome</td>
<td>Jeffrey L. Ardell, PhD; Robert Foreman, PhD</td>
</tr>
<tr>
<td>1:35–1:55 pm</td>
<td>Baroreceptor Stimulation for Resistant Hypertension</td>
<td>John P. Gassler, MD</td>
</tr>
<tr>
<td>1:55–2:15 pm</td>
<td>Neural Tourniquet with Vagal Nerve Stimulation</td>
<td>Jared M. Huston, MD</td>
</tr>
<tr>
<td>2:15–2:35 pm</td>
<td>Sensory Neurons that Detect Stretch and Nutrients in the Digestive System</td>
<td>Stephen Liberles, PhD</td>
</tr>
<tr>
<td>2:35–2:55 pm</td>
<td>Myocardial Infarction Disrupts Networked Cardiac Control: Opportunities for Bioelectric Medicine</td>
<td>Jeffrey L. Ardell, PhD</td>
</tr>
<tr>
<td>2:55–3:00 pm</td>
<td>Closing Discussion</td>
<td>Jeffrey L. Ardell, PhD; Robert Foreman, PhD</td>
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### Scientific and Clinical Advances in Intrathecal Therapy I

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker(s)</th>
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</thead>
<tbody>
<tr>
<td>1:30–1:35 pm</td>
<td>Welcome</td>
<td>Michael F. Saulino, MD; Tony L. Yaksh, PhD</td>
</tr>
<tr>
<td>1:35–2:00 pm</td>
<td>New Chemical Entities and Targets for Spinally Delivered Drugs: What's on the Horizon?</td>
<td>James Campbell, MD</td>
</tr>
<tr>
<td>2:00–2:25 pm</td>
<td>Intrathecal Bolus Versus Infusion: What Are the Principles Involved?</td>
<td>Andreas Linninger, PhD</td>
</tr>
<tr>
<td>2:25–2:50 pm</td>
<td>Where Do We Stand with the Granuloma?</td>
<td>Tony L. Yaksh, PhD</td>
</tr>
<tr>
<td>2:50–3 pm</td>
<td>Closing Discussion</td>
<td>Michael F. Saulino, MD; Tony L. Yaksh, PhD</td>
</tr>
</tbody>
</table>

### 2017 Current Status of Opioid Pain Management (Joint Session with AAPM)

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30–1:35 pm</td>
<td>Welcome</td>
<td>Daniel Carr, MD; Joshua P. Prager, MD MS</td>
</tr>
<tr>
<td>1:35–1:55 pm</td>
<td>Opioids: What's Next?</td>
<td>Daniel Carr, MD</td>
</tr>
<tr>
<td>1:55–2:15 pm</td>
<td>Safe and Effective Opioid Prescribing in 2017: An Overview</td>
<td>Larry C. Driver, MD</td>
</tr>
<tr>
<td>2:15–2:35 pm</td>
<td>Therapeutic Strategies to Address the Opioid Issue—Intrathecal Therapy and Alternatives</td>
<td>Joshua P. Prager, MD MS</td>
</tr>
<tr>
<td>2:35–2:45 pm</td>
<td>Intrathecal Pumps to Control Pain in Patients with Intractable Side Effects from Systemic Opioids</td>
<td>Daniel R. Kloster, MD</td>
</tr>
<tr>
<td>2:45–2:55 pm</td>
<td>Association of Opioid Usage with Spinal Cord Stimulation Outcomes</td>
<td>Ashwini D. Sharan, MD</td>
</tr>
<tr>
<td>2:55–3 pm</td>
<td>Closing Discussion</td>
<td>Daniel Carr, MD; Joshua P. Prager, MD MS</td>
</tr>
</tbody>
</table>
### Resident & Fellows Concurrent Session I: Introduction—The First Year Out

**Moderators:** Michael A. Fishman, MD MBA; Nidal El Baridi, MD

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>1:30–1:35 pm</td>
<td>Welcome</td>
</tr>
<tr>
<td>1:35–1:55 pm</td>
<td>Integrating Neuromodulation into Your Practice</td>
</tr>
<tr>
<td></td>
<td>Steven M. Falowski, MD</td>
</tr>
<tr>
<td>1:55–2:15 pm</td>
<td>Practice Management: Introduction to Revenue Streams</td>
</tr>
<tr>
<td></td>
<td>Jason E. Pope, MD DABPM FIPP</td>
</tr>
<tr>
<td>2:15–2:35 pm</td>
<td>Practice Management: Strategies for Building and Marketing a Neuromodulation Practice</td>
</tr>
<tr>
<td></td>
<td>David A. Provenzano, MD</td>
</tr>
<tr>
<td>2:35–2:55 pm</td>
<td>Contract Negotiation</td>
</tr>
<tr>
<td></td>
<td>Morris Callaman, JD</td>
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<tr>
<td>2:55–3 pm</td>
<td>Closing Discussion</td>
</tr>
<tr>
<td></td>
<td>Michael A. Fishman, MD MBA; Nidal El Baridi, MD</td>
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</tbody>
</table>

### NIC I: Advances in Deep Brain Stimulation

**Moderators:** Peter Konrad, MD PhD; Casey H. Halpern, MD

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>1:30–1:35 pm</td>
<td>Welcome</td>
</tr>
<tr>
<td>1:35–1:55 pm</td>
<td>The State of Clinical Closed-Loop DBS</td>
</tr>
<tr>
<td></td>
<td>Kelly D. Foote, MD</td>
</tr>
<tr>
<td>1:55–2:15 pm</td>
<td>Deep Brain Stimulation for Depression—What’s the Future?</td>
</tr>
<tr>
<td></td>
<td>Clement Hamani, MD PhD</td>
</tr>
<tr>
<td>2:15–2:35 pm</td>
<td>Using Stimulation Modeling to Improve Deep Brain Stimulation Efficiency and Efficacy</td>
</tr>
<tr>
<td></td>
<td>Warren Grill, PhD</td>
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<tr>
<td>2:35–2:45 pm</td>
<td>Deep Brain Stimulation in Early Stage Parkinson’s Disease: Stimulation and Medication Use Through 5 Years</td>
</tr>
<tr>
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<td>Mallory L. Hacker, PhD</td>
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<tr>
<td>2:45–2:55 pm</td>
<td>Long-Term Recharging Behavior and Therapy Settings in Patients Implanted with Rechargeable Deep Brain Stimulation Systems</td>
</tr>
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<td></td>
<td>Peter Konrad, MD PhD</td>
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<tr>
<td>2:55–3 pm</td>
<td>Closing Discussion</td>
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<tr>
<td></td>
<td>Peter Konrad, MD PhD; Casey H. Halpern, MD</td>
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</tbody>
</table>

### 3–3:30 pm

**Forum Ballroom, Pool Level**

**Break with Exhibitors**

### Concurrent Sessions II

### Scientific and Clinical Advances in Intrathecal Therapy II

**Moderators:** Salim M. Hayek, MD PhD; Padma Gulur, MD

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>3:30–3:35 pm</td>
<td>Welcome</td>
</tr>
<tr>
<td>3:35–3:55 pm</td>
<td>Chronic Cyclic Vagus Nerve Stimulation Improves Survival in Hypertensive Rats</td>
</tr>
<tr>
<td></td>
<td>Alena Talkachova, PhD</td>
</tr>
<tr>
<td>3:55–4:15 pm</td>
<td>Vagal Nerve Stimulation for Control of Metabolism</td>
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<tr>
<td></td>
<td>Jiaande Chen, PhD</td>
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<tr>
<td>4:15–4:35 pm</td>
<td>Bioelectric Block of the Paravertebral Chain Stabilizes Ventricular Electrical Function</td>
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<td></td>
<td>Tina Vrabec, PhD</td>
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<tr>
<td>4:35–4:55 pm</td>
<td>Spinal Sympathoexcitatory and Sympathoinhibitory Mechanisms</td>
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<tr>
<td></td>
<td>Lawrence P. Schrammm, PhD</td>
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<tr>
<td>4:55–5 pm</td>
<td>Closing Discussion</td>
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<td></td>
<td>Lawrence P. Schrammm, PhD; Jiaande Chen, PhD</td>
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</table>

### Scientific and Clinical Advances in Intrathecal Therapy II

**Moderators:** Salim M. Hayek, MD PhD; Padma Gulur, MD

<table>
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<tr>
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<tbody>
<tr>
<td>3:30–3:35 pm</td>
<td>Welcome</td>
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<tr>
<td>3:35–3:55 pm</td>
<td>Novel Approaches in Targeted Drug Delivery in Cancer Pain</td>
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<td></td>
<td>Denis Dupoirion, MD</td>
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<tr>
<td>3:55–4:15 pm</td>
<td>Optimizing Targeted Intrathecal Drug Delivery in Cancer Pain</td>
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<td></td>
<td>Shane E. Brogan, MB BC</td>
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<tr>
<td>4:15–4:35 pm</td>
<td>PACC 2016: Trialing, Safety, and Complications</td>
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<td>Jason E. Pope, MD DABPM FIPP</td>
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**Friday, January 20 continued**
<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
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</table>
| 4:35–4:45 pm | Serum Opioid Levels Before and After Intrathecal Therapy for Refractory Cancer Pain  
Carina M. Jackman, MD |
| 4:45–4:55 pm | Effectiveness and Safety of Intrathecal Ziconotide in Patients with Failed Back Surgery Syndrome  
Timothy R. Deer, MD |
| 4:55–5 pm    | Closing Discussion                                                              
Salim M. Hayek, MD PhD; Padma Gulur, MD |

**Safety, Appropriateness, Fiscal Neutrality, Effectiveness (SAFE) Evaluation of Back Pain**  
**Moderators:** Elliot S. Krames, MD PhD; B. Todd Sitzman, MD MPH  
**Octavius 2, 3, and 4**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
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</table>
| 3:30–3:35 pm | Welcome  
Elliot S. Krames, MD; B. Todd Sitzman, MD MPH |
| 3:35–3:50 pm | Radiological Findings in Pain of Spinal Origin  
John A. Carrino, MD MPH |
Sigurd H. Berven, MD |
| 4:05–4:20 pm | Safety, Appropriateness, Fiscal Neutrality, and Effectiveness of Nonoperative Pain Procedures to Treat Back Pain: Indications for Interventional Pain Procedures to Treat Back Pain  
B. Todd Sitzman, MD MPH |
| 4:20–4:35 pm | Safety, Appropriateness, Fiscal Neutrality, and Effectiveness of Neurostimulation. Using SAFE Analysis to Select Appropriate Neuromodulation Construct to Treat Back Pain—50hz, 1 kHz, 10 kHz, Burst, L2 DRG, or PNS/Field Stimulation  
Elliot S. Krames, MD |
| 4:35–4:50 pm | Safety, Appropriateness, Fiscal Neutrality, and Effectiveness of Intrathecal Therapy for Back Pain. When Is Intrathecal Therapy Ideally Implemented to Treat Back Pain and with What Medications?  
Eric J. Grigsby, MD; Jacqueline S. Weisbein, DO |
| 4:50–5 pm    | Panel Discussion  
All Faculty |

**Resident & Fellows Concurrent Session II**  
**Moderators:** Michael A. Fishman, MD MBA; Nidal El Baridi, MD  
**Octavius 5, 6, 7, and 8**

<table>
<thead>
<tr>
<th>Time</th>
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</table>
| 3:30–3:35 pm | Welcome  
Michael A. Fishman, MD MBA; Nidal El Baridi, MD |
| 3:35–3:55 pm | Advocacy: Legislative Issues in Neuromodulation  
Mehul J. Desai, MD; Michael S. Leong, MD |
| 3:55–4:15 pm | Mentorship Program, RFS Committee  
Nidal El Baridi, MD; Dipan Patel, MD; Samuel R. Grodofsky, MD |
| 4:15–4:35 pm | Panel Discussion  
All Faculty |
| 4:35–4:55 PM | RFS Committee Elections  
Nidal El Baridi, MD; Dipan Patel, MD |
| 4:55–5 pm    | Closing Discussion  
Michael A. Fishman, MD MBA; Nidal El Baridi, MD |

**NIC II: Cranial Electrical Modeling and Imaging in Neuromodulation**  
**Moderators:** Julie G. Pilitsis, MD PhD; Sridevi Sarma, PhD  
**Octavius 15, 16, 17, 18, and 19**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
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</thead>
</table>
| 3:30–3:35 pm | Welcome  
Julie G. Pilitsis, MD PhD; Sridevi Sarma, PhD |
| 3:35–3:55 pm | Electrical and Optical Modeling in the Brain  
Cameron McIntyre, PhD |
| 3:55–4:15 pm | Modeling Neural Systems in Epilepsy  
Mark J. Cook, MBBS MD |
| 4:15–4:30 pm | Connectivity-Based Parcellation of ALIC: A Possible Tool for Neuromodulatory Targeting  
Pranav Nanda |
| 4:30–4:45 pm | Image-Guided Deep Brain Stimulation: MRI-Tractography Shows Differences in Responders and Nonresponders  
Jonathan J. Rasouli, MD |
| 4:45–5 pm    | Feasibility of High-Resolution Intraoperative LFP Recording with a Bipolar Microelectrode in Parkinson's Disease  
Ilknur Telkes |
| 5–5:05 pm    | Closing Discussion  
Julie G. Pilitsis, MD PhD; Sridevi Sarma, PhD |
### Agenda

#### Friday, January 20 continued

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5–6 pm</td>
<td>Forum Level; East and North Promenade</td>
<td>Residents and Fellows Job Fair</td>
</tr>
<tr>
<td>6–7 pm</td>
<td>Octavius 9 and 10</td>
<td>Women in Neuromodulation (WIN)</td>
</tr>
</tbody>
</table>
| 5–7 pm  | Forum Ballroom Pub Hub | Poster Session I
> All are welcome to join a wine/cheese reception and discuss the latest research with the authors of over 300 abstracts submitted for presentation. This non-CME activity is sponsored by Nevro. |

#### Saturday, January 21

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 am–5 pm</td>
<td>Octavius, Promenade Level</td>
<td>Meeting Registration</td>
</tr>
<tr>
<td>7 am–5 pm</td>
<td>Forum, Pool Level</td>
<td>Exhibit Registration</td>
</tr>
<tr>
<td>7–8 am</td>
<td>Octavius 4, Octavius 15, and Forum 4</td>
<td>Breakfast</td>
</tr>
</tbody>
</table>
| 7–8 am  | Forum 2, 3, and 4  | Thematic Abstract Sessions
> **Spinal Cord Stimulation Complications & Avoidance**
> *Moderator: Leonardo Kapural, MD PhD*
> **Welcome**
> Leonardo Kapural, MD PhD
> **Spinal Cord Stimulation Infection Rate and Risk Factors: Results from a U.S. Payer Database**
> Steven M. Falowski, MD
> **Drivers of Unplanned 30-Day Readmission Following Spinal Cord Stimulator Implantation**
> Aladine A. Elsamadicy, BE
> **Spinal Cord Stimulator Complications in Complex Regional Pain Syndrome: A Review of 7 Years of Data**
> Michael Hanes, MD
> **Compliance with Guidelines for Preventing Surgical Site Infection During Permanent Implantation of Spinal Cord Stimulators**
> James H. Jones, MD
> **Delayed Hypersensitivity Response to Tecothane During Lumbar Spinal Cord Stimulation Trial: An Unexpected Complication**
> Rajesh K. Sharma, MD
> **Closing Discussion**
> Leonardo Kapural, MD PhD |
| 7–8 am  | Forum 5, 6, 7, and 8 | Advances in Intrathecal Therapy
> *Moderator: Salim M. Hayek, MD PhD*
> **Welcome**
> Salim M. Hayek, MD PhD
> **Management of Pain Due to Nephrogenic Systemic Fibrosis via Implantation of an Intrathecal Pain Pump**
> Mark Dziuba, MD
> **Investigation into the Priming Bolus Behavior of the Medtronic SynchroMed II Implantable Infusion System**
> Jeffrey Bodner, MSME MSBME
> **Targeted Drug Delivery (TDD) Product and Outcomes Registry**
> Linda Page, PharmD
> **Proven Safety and Efficacy of an Outpatient Intrathecal Catheter Trialing Method for Targeted Drug Delivery**
> Vipul Mangal, MD
> **Application of Diamond-Like Carbon Coating Inside an Implantable Medical Device for Enhanced Wear Resistance**
> Alan Shi, PhD
> **Closing Discussion**
> Salim M. Hayek, MD PhD |
| 7–8 am  | Octavius 2, 3, and 4 | Advances in Neuromodulation
> *Moderator: Robert Foreman, PhD*
> **Welcome**
> Robert Foreman, PhD
> **Frequency-Modulated Phase Coding for Cochlear Implants**
> Reagan Roberts |
### Agenda

#### Advances in Neuromodulation (continued)  
**Octavius 2, 3, and 4**

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:25–7:35 am</td>
<td>High-Frequency &amp; Burst Spinal Cord Stimulation on Acute Spinal Neuronal Activity in a Rat Model of Painful Radiculopathy</td>
<td>Alexander R. Kent, PhD</td>
</tr>
<tr>
<td>7:35–7:45 am</td>
<td>Biomarkers for Chronic Neuropathic Pain and Their Potential Application in Spinal Cord Stimulation: A Review</td>
<td>Chibueze Nwagwu, BA</td>
</tr>
<tr>
<td>7:45–7:55 am</td>
<td>Functional Connectivity of the Brainstem Ascending Reticular Activating System in Epilepsy: Uncovering Potential Neuromodulation Targets</td>
<td>Dario J. Englot, MD PhD</td>
</tr>
<tr>
<td>7:55–8 am</td>
<td>Closing Discussion</td>
<td>Robert Foreman, PhD</td>
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#### Neuromodulation for Spinal Cord Injury and Neural Injury  
**Octavius 5, 6, 7, and 8**  
Moderator: Line Jacques, MD

<table>
<thead>
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<tbody>
<tr>
<td>7–7:05 am</td>
<td>Welcome</td>
<td>Line Jacques, MD</td>
</tr>
<tr>
<td>7:05–7:15 am</td>
<td>Acute and Subchronic Modulation of Phantom Limb Pain Using Epidural Spinal Root Stimulation</td>
<td>Ahmed Kashkoush, BS</td>
</tr>
<tr>
<td>7:15–7:25 am</td>
<td>Improved Spinal Cord Injury Patient Outcomes with 10 kHz, High-Frequency Spinal Cord Stimulation</td>
<td>C. Brad Sisson, MD</td>
</tr>
<tr>
<td>7:25–7:35 am</td>
<td>Prospective Study on DRG Stimulation for the Management of Chronic Pain Following Peripheral Nerve Injury</td>
<td>Anders Wahlstedt, MD</td>
</tr>
<tr>
<td>7:35–7:45 am</td>
<td>Case Report: Restoration of Neurologic Function After Trial High-Frequency Spinal Cord Stimulation in Spinal Cord Injury</td>
<td>Michael H. Verdolin, MD</td>
</tr>
<tr>
<td>7:45–7:55 am</td>
<td>Retrograde Percutaneous Spinal Cord Stimulator Trial Lead Placement Due to Prior Spinal Cord Tumor Resection</td>
<td>Omar Ali, MD</td>
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<tr>
<td>7:55–8 am</td>
<td>Closing Discussion</td>
<td>Line Jacques, MD</td>
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#### Advances in Neuromodulation Technology  
**Octavius 15, 16, 17, 18, and 19**  
Moderator: Ellen L. Air, MD PhD

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<tbody>
<tr>
<td>7–7:05 am</td>
<td>Welcome</td>
<td>Ellen L. Air, MD PhD</td>
</tr>
<tr>
<td>7:05–7:15 am</td>
<td>Targeting Treatment of Motor Control Impairment in Chronic Low Back Pain: 1-Year Results from the REACTIV8-Trial</td>
<td>Sam S. Eldabe, MB ChB</td>
</tr>
<tr>
<td>7:15–7:25 am</td>
<td>Brain Neuromodulation for Treating Peripheral Inflammation</td>
<td>Valentin A. Pavlov, PhD</td>
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<tr>
<td>7:25–7:35 am</td>
<td>Identifying Neuromodulation Targets for Obsessive Compulsive Disorder Using Simultaneous EEG-fMRI</td>
<td>Yagna J. Pathak, PhD</td>
</tr>
<tr>
<td>7:35–7:45 am</td>
<td>Development of a Vagus Nerve Stimulator for the Treatment of Inflammatory Diseases</td>
<td>Richard D. Bucholz, MD</td>
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<tr>
<td>7:45–7:55 am</td>
<td>Improved Operative Efficiency Using a Real-Time MRI-Guided Stereotactic Platform for Laser Amygdalohippocampotomy</td>
<td>Allen Ho, MD</td>
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<tr>
<td>7:55–8 am</td>
<td>Closing Discussion</td>
<td>Ellen L. Air, MD PhD</td>
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#### 8–10 am  
**Octavius Ballroom 11 and 12**  
**Plenary Session III**  
Moderators: Parag G. Patil, MD PhD; Lawrence Poree, MD PhD

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<tbody>
<tr>
<td>8:15–8:35 am</td>
<td>Groundbreaking Basic Science: Electrophysiological Investigation of the Effects of 10-kHz Spinal Cord Stimulation on the Excitability of Superficial Dorsal Horn Neurons in Experimental Pain Models in the Rat</td>
<td>Steven B. McMahon, PhD</td>
</tr>
</tbody>
</table>
Saturday, January 21 continued

8:35–8:55 am
Krishna Kumar Memorial Lecture: Computational Analysis of Kilohertz Frequency Spinal Cord Stimulation for Chronic Pain Management
Scott F. Lempka, PhD

8:55–9:15 am
Neuroplasticity and Tolerance to Spinal Cord Stimulation: Occurrence, Mechanisms, and Potential Solutions
Oscar A. deLeon-Casasola, MD

9:15–9:35 am
Incorporating Technological Advances in Stimulation Waveforms and Lead Technologies into Our Practice
Parag G. Patil, MD PhD

9:35–9:55 am
Transforming Deep Brain Stimulation
Emad Eskandar, MD

9:55–10 am
Closing
Parag G. Patil, MD PhD; Lawrence Poree, MD PhD

10:00 am–Noon
Octavius Ballroom 11 and 12
Plenary Session IV
Moderators: Ali R. Rezai, MD; Marc A. Huntoon, MD

10:30–10:35 am
Welcome
Ali R. Rezai, MD; Marc A. Huntoon, MD

10:35–11:15 am
President’s Address
Ashwini D. Sharan, MD

11:15–11:55 am
Keynote Address: What Can a Wristband Tell You About Sleep, Stress, Seizures, and Deep Brain Activity?
Rosalind W. Picard, ScD

11:55 am–Noon
Closing
Ali R. Rezai, MD; Marc A. Huntoon, MD

1:30–3 pm Concurrent Sessions III

Peripheral Nerve and Root-Level Neuromodulation
Moderators: Peter S. Staats, MD MBA; Sam S. Eldabe, MB ChB

1:30–1:35 pm
Welcome
Peter S. Staats, MD MBA; Sam S. Eldabe, MB ChB

1:35–1:50 pm
The Current State of Peripheral Nerve Stimulation
Christopher A. Gilmore, MD

1:50–2:05 pm
Science and Indications for DRG
Sam S. Eldabe, MB ChB

2:05–2:20 pm
Comparing Long-Term Tolerance of Spinal Cord Stimulation and Dorsal Root Ganglion Stimulation
Peter S. Staats, MD MBA

2:20–2:35 pm
Comparison of SCS and DRG Outcomes in Focal and Widespread Pain: An ACCURATE Substudy
Lawrence Poree, MD PhD

2:35–2:50 pm
Neuromonitoring for Confirmation of Lead Placement in Dorsal Root Ganglion Stimulation
Steven M. Falowski, MD

2:50–3 pm
Closing Discussion
Peter S. Staats, MD MBA; Sam S. Eldabe, MB ChB

Moderator: William S. Rosenberg, MD

1:30–1:35 pm
Welcome
William S. Rosenberg, MD

1:35–2:50 pm
Panel Discussion of Five Archetypal Cases, Presented Boards Style
Kanu Sharan, MD; Kristin J. Redmond, MD MPH; Sanjeet Narang, MD; Brian M. Bruel, MD MBA; Ahmed Raslan, MD

2:50–3 pm
Closing Discussion
William S. Rosenberg, MD

The Scientific Foundations of Neuromodulation
Moderators: Yun Guan, MD PhD; Line Jacques, MD

1:30–1:35 pm
Welcome
Yun Guan, MD PhD; Line Jacques, MD

1:35–1:50 pm
Basic Science of Spinal Cord Stimulation
Yun Guan, MD PhD
### The Scientific Foundations of Neuromodulation (continued)

**Octavius 2, 3, and 4**

<table>
<thead>
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<th>Time</th>
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<tbody>
<tr>
<td>1:50–2:05 pm</td>
<td>Dorsal Root Ganglion Stimulation Suppresses Somatic Hyperactivity in Injured Primary Sensory Neurons</td>
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<tr>
<td></td>
<td>Alexander R. Kent, PhD</td>
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<tr>
<td>2:05–2:20 pm</td>
<td>Current State of Closed Loop Spinal Cord Stimulation</td>
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<td></td>
<td>Robert M. Levy, MD PhD</td>
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<tr>
<td>2:20–2:35 pm</td>
<td>Electrophysiological Insight into Dorsal Column Neuroanatomy and the Mechanism of Action of Spinal Cord Stimulation</td>
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<td>Marc A. Russo, MBBS DA (UK)</td>
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<tr>
<td>2:35–2:50 pm</td>
<td>Spinal Cord Stimulation: Molecular View of Mechanism Through Genomics and Proteomics Using an Animal Model</td>
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<td>David L. Cedeno, PhD</td>
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<tr>
<td>2:50–3 pm</td>
<td>Closing Discussion</td>
</tr>
<tr>
<td></td>
<td>Yun Guan, MD PhD; Line Jacques, MD</td>
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**Octavius 5, 6, 7, and 8**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>1:30–1:35 pm</td>
<td>Welcome</td>
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<tr>
<td></td>
<td>David A. Provenzano, MD; Oscar A. deLeon-Casasola, MD</td>
</tr>
<tr>
<td>1:35–1:55 pm</td>
<td>Helping the Pain Practitioner Succeed in the New Environment: ASRA and the Multisociety Response</td>
</tr>
<tr>
<td></td>
<td>Oscar A. deLeon-Casasola, MD</td>
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<tr>
<td>1:55–2:10 pm</td>
<td>MACRA and What It Means to Practitioners</td>
</tr>
<tr>
<td></td>
<td>David A. Provenzano, MD</td>
</tr>
<tr>
<td>2:10–2:25 pm</td>
<td>Developing an Adequate Reimbursement Structure to the CPT Process for New Technology in Pain Medicine</td>
</tr>
<tr>
<td></td>
<td>Kevin E. Vorenkamp, MD</td>
</tr>
<tr>
<td>2:25–2:40 pm</td>
<td>Healthcare Reform 2017: Where Are We Headed Now?</td>
</tr>
<tr>
<td></td>
<td>David S. Kloth, MD</td>
</tr>
<tr>
<td>2:40–3 pm</td>
<td>Panel Discussion</td>
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<td></td>
<td>All Faculty</td>
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</tbody>
</table>

### NIC III: Brain-Machine Interface Neuroprosthetics

**Octavius 15, 16, 17, 18, and 19**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>1:30–1:35 pm</td>
<td>Welcome</td>
</tr>
<tr>
<td></td>
<td>A. Bolu Ajiboye, PhD</td>
</tr>
<tr>
<td>1:35–1:55 pm</td>
<td>Cortical Control of an FES System for Individuals with High Tetraplegia</td>
</tr>
<tr>
<td></td>
<td>A. Bolu Ajiboye, PhD</td>
</tr>
<tr>
<td>1:55–2:10 pm</td>
<td>Restoring Cortical Control of Functional Movements in a Human with Quadriplegia</td>
</tr>
<tr>
<td></td>
<td>Gaurav Sharma, PhD</td>
</tr>
<tr>
<td>2:10–2:25 pm</td>
<td>Preliminary Frequency Discrimination and Response Time Data from Direct Cortical Somatosensory Stimulation in a Human</td>
</tr>
<tr>
<td></td>
<td>Daniel R. Kramer, MD</td>
</tr>
<tr>
<td>2:25–2:40 PM</td>
<td>Implantable Neuroprosthesis for Restoration of Blink Function</td>
</tr>
<tr>
<td></td>
<td>Daniel McDonnell, PhD</td>
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<tr>
<td>2:40–2:55 pm</td>
<td>Evaluation of Reactive Accelerated Aging to Assess the Lifetime of Utah Electrode Arrays</td>
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<tr>
<td></td>
<td>Ryan B. Caldwell, MS</td>
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<tr>
<td>2:55–3 pm</td>
<td>Closing Discussion</td>
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<td></td>
<td>A. Bolu Ajiboye, PhD</td>
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### 3:30–3:30 pm  
**Forum Ballroom, Pool Level**

**Break with Exhibitors**

### 3:30–5 pm  
**Concurrent Sessions IV**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>3:30–3:35 pm</td>
<td>Welcome</td>
</tr>
<tr>
<td></td>
<td>Casey H. Halpern, MD; Kiran V. Patel, MD</td>
</tr>
<tr>
<td>3:35–3:55 pm</td>
<td>Hypoglossal Stimulation for Obstructive Sleep Apnea</td>
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<td></td>
<td>Kingman P. Strohl, MD</td>
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<tr>
<td>3:55–4:15 pm</td>
<td>Sensory Neuromodulation: Cochlear Implants</td>
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<tr>
<td></td>
<td>Claus-Peter Richter, MD PhD</td>
</tr>
<tr>
<td>4:15–4:35 pm</td>
<td>Neurostimulation for Epilepsy</td>
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<td></td>
<td>Peter Konrad, MD PhD</td>
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<tr>
<td>4:35–4:55 pm</td>
<td>SAFE Analysis of Phrenic Nerve Stimulation for Ventilator-Dependent Patients</td>
</tr>
<tr>
<td></td>
<td>Samuel Cheshier, MD PhD</td>
</tr>
<tr>
<td>4:55–5 pm</td>
<td>Closing Discussion</td>
</tr>
<tr>
<td></td>
<td>Casey H. Halpern, MD; Kiran V. Patel, MD</td>
</tr>
</tbody>
</table>
### Cranial Neuromodulation for Pain

**Moderators:** Konstantin V. Slavin, MD; Sameer A. Sheth, MD PhD

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>3:30–3:35 pm</td>
<td>Welcome</td>
<td>Konstantin V. Slavin, MD; Sameer A. Sheth, MD PhD</td>
</tr>
<tr>
<td>3:35–3:55 pm</td>
<td>Cranial PNS for Pain</td>
<td>Konstantin V. Slavin, MD</td>
</tr>
<tr>
<td>3:55–4:15 pm</td>
<td>DBS/MCS for Pain</td>
<td>Andre G. Machado, MD PhD</td>
</tr>
<tr>
<td>4:15–4:35 pm</td>
<td>Cranial Neuroablation for Pain</td>
<td>Sameer A. Sheth, MD PhD</td>
</tr>
<tr>
<td>4:35–4:45 pm</td>
<td>Effect Prediction of Occipital Nerve Stimulation in Cluster Headache, with Transcutaneous Electrical Nerve Stimulation (TENS) Preoperatively</td>
<td>Jens Christian H. Sorensen, MD PhD DMSc</td>
</tr>
<tr>
<td>4:45–4:55 pm</td>
<td>Technical Aspects of SPG Stimulation for Cluster Headache: A New Frontier in Neuromodulation</td>
<td>Jan Vesper, MD PhD</td>
</tr>
<tr>
<td>4:55–5 pm</td>
<td>Closing Discussion</td>
<td>Konstantin V. Slavin, MD; Sameer A. Sheth, MD PhD</td>
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### Novel Stimulation Patterns in Spinal Cord Stimulation

**Moderators:** Robert Foreman, PhD; Bengt G. Linderoth, MD PhD

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<tbody>
<tr>
<td>3:30–3:35 pm</td>
<td>Welcome</td>
<td>Robert Foreman, PhD; Bengt G. Linderoth, MD PhD</td>
</tr>
<tr>
<td>3:35–3:50 pm</td>
<td>Novel Stimulation Algorithms and the Gate Control Concept</td>
<td>Bengt G. Linderoth, MD PhD</td>
</tr>
<tr>
<td>3:50–4:05 pm</td>
<td>Mechanisms of Spinal Cord Stimulation Beyond Gate Control</td>
<td>Robert Foreman, PhD</td>
</tr>
<tr>
<td>4:05–4:20 PM</td>
<td>HF10 and Traditional Stimulation</td>
<td>B. Todd Sitzman, MD MPH</td>
</tr>
<tr>
<td>4:20–4:35 pm</td>
<td>Burst Stimulation</td>
<td>Ricardo Vallejo, MD PhD</td>
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<tr>
<td>4:35–4:50 pm</td>
<td>Outcomes in 1 kHz Subperception Stimulation</td>
<td>James North, MD</td>
</tr>
<tr>
<td>4:50–5 pm</td>
<td>Closing Discussion</td>
<td>Robert Foreman, PhD; Bengt G. Linderoth, MD PhD</td>
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### Clinical Research for Clinicians

**Moderators:** Robert M. Levy, MD PhD; Sam S. Eldabe, MB ChB

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<tbody>
<tr>
<td>3:30–3:35 pm</td>
<td>Welcome</td>
<td>Robert M. Levy, MD PhD; Sam S. Eldabe, MB ChB</td>
</tr>
<tr>
<td>3:35–3:55 pm</td>
<td>Where Do I Begin?</td>
<td>Mariah Tackett</td>
</tr>
<tr>
<td>3:55–4:15 pm</td>
<td>Limits of Interpretation and Analysis in Pain Research</td>
<td>Nathaniel P. Katz, MD MS</td>
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<tr>
<td>4:15–4:35 pm</td>
<td>Investigator Sponsored IDE</td>
<td>Timothy Marjenin, BS</td>
</tr>
<tr>
<td>4:35–4:55 pm</td>
<td>Studies that Advance the Field: The Editor's Perspective</td>
<td>Robert M. Levy, MD PhD</td>
</tr>
<tr>
<td>4:55–5 pm</td>
<td>Closing Discussion</td>
<td>Robert M. Levy, MD PhD; Sam S. Eldabe, MB ChB</td>
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</table>
### NIC IV: Technology of Neuromodulation

**Moderators:** Joseph J. Pancrazio, PhD; Cynthia A. Chestek, PhD

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter(s)</th>
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<tbody>
<tr>
<td>3:30–3:35 pm</td>
<td>Welcome</td>
<td>Joseph J. Pancrazio, PhD; Cynthia A. Chestek, PhD</td>
</tr>
<tr>
<td>3:35–3:55 pm</td>
<td>Material Advances in the Development of Neural Interfaces</td>
<td>Florian Solzbacher, PhD</td>
</tr>
<tr>
<td>3:55–4:15 pm</td>
<td>Problems and Solutions at the Neural Interface</td>
<td>Dominique M. Durand, PhD</td>
</tr>
<tr>
<td>4:15–4:35 pm</td>
<td>Ultra-Small Carbon Fiber Electrode Arrays for High-Density Neural Recording with Minimal Scarring</td>
<td>Cynthia A. Chestek, PhD</td>
</tr>
<tr>
<td>4:35–4:55 pm</td>
<td>MRI Safety Issues for Neuromodulation Systems: Update 2017</td>
<td>Frank G. Shellock, PhD</td>
</tr>
<tr>
<td>4:55–5 pm</td>
<td>Closing Discussion</td>
<td>Joseph J. Pancrazio, PhD; Cynthia A. Chestek, PhD</td>
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</table>

5–7 pm
**Forum Ballroom Pub Hub**
**Poster Session II**

All are welcome to join a wine/cheese reception and discuss the latest research with the authors of over 300 abstracts submitted for presentation. This non-CME activity is sponsored by Nevro.

### Sunday, January 22

**7:30–11:30 am**
**Octavius, Promenade Level**
**Meeting Registration**

**7–8 am**
**Octavius Ballroom 11 and 12**
**Breakfast**

**8–9:15 am**
**Octavius Ballroom 11 and 12**
**Top Abstracts I**

Moderators: Lawrence Poree, MD PhD; Jason E. Pope, MD DABPM FIPP

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>8:05–8:05 am</td>
<td>Welcome</td>
<td>Lawrence Poree, MD PhD; Jason E. Pope, MD DABPM FIPP</td>
</tr>
<tr>
<td>8:05–8:17 am</td>
<td>Spinal Cord Stimulation Infection Rate and Incremental Annual Expenditures: Results from a U.S. Payer Database</td>
<td>David A. Provenzano, MD</td>
</tr>
<tr>
<td>8:17–8:29 am</td>
<td>Examining Reasons for Spinal Cord Stimulation Explant: A Retrospective Chart Review of 18 U.S. Centers</td>
<td>Jason E. Pope, MD DABPM FIPP</td>
</tr>
<tr>
<td>8:29–8:41 am</td>
<td>International Spinal Cord Stimulation Effectiveness Study Reveals Longer-Term Outcomes of the Therapy in 950 Implants</td>
<td>Jean-Pierre Van Buyten, MD</td>
</tr>
<tr>
<td>8:41–8:53 am</td>
<td>NAPS—Non-Awake Versus Awake Placement of Spinal Cord Stimulators: Comparing Safety and Efficacy</td>
<td>Steven M. Falowski, MD</td>
</tr>
<tr>
<td>8:53–9:05 am</td>
<td>The Predictive Value of Short-Term Spinal Cord Stimulation Trials in Determining Long-Term Pain Relief</td>
<td>Ricardo Vallejo, MD PhD</td>
</tr>
<tr>
<td>9:05–9:15 am</td>
<td>Closing Discussion</td>
<td>Lawrence Poree, MD PhD; Jason E. Pope, MD DABPM FIPP</td>
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9:15–9:30 am
**Break**

**9:30–10:45 am**
**Octavius Ballroom 11 and 12**
**Top Abstracts II**

Moderators: Lawrence Poree, MD PhD; Jason E. Pope, MD DABPM FIPP

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>9:30–9:35 am</td>
<td>Welcome</td>
<td>Lawrence Poree, MD PhD; Jason E. Pope, MD DABPM FIPP</td>
</tr>
<tr>
<td>9:35–9:47 am</td>
<td>Burst or Tonic Stimulation? Results of a Placebo-Controlled, Double-Blinded, Randomized Study for the Treatment of FBSS Patients, with a 3-Year Follow-Up</td>
<td>Jan Vesper, MD PhD</td>
</tr>
<tr>
<td>9:47–9:59 am</td>
<td>QST as a Biomarker for Phenotyping Patients Undergoing Spinal Cord Stimulation: A Clinical Investigation</td>
<td>Vivek Mehta, MD MBBS</td>
</tr>
<tr>
<td>9:59–10:11 am</td>
<td>Barriers to Referral for Spinal Cord Stimulator Implementation</td>
<td>Ajay Antony, MD</td>
</tr>
<tr>
<td>10:11–10:23 am</td>
<td>Comparison of Pain Coverage and Excess Paresthesia Between SCS and DRG Stimulation: An ACCURATE Substudy</td>
<td>Robert M. Levy, MD</td>
</tr>
<tr>
<td>10:23–10:35 am</td>
<td>Randomized, Controlled Trial Assessing Burst Stimulation for Chronic Pain: Update of the SUNBURST Study</td>
<td>Konstantin V. Slavin, MD</td>
</tr>
<tr>
<td>10:35–10:45 am</td>
<td>Closing Discussion</td>
<td>Lawrence Poree, MD PhD; Jason E. Pope, MD DABPM FIPP</td>
</tr>
<tr>
<td>10:45–11 am</td>
<td>Meeting Closing</td>
<td>Lawrence Poree, MD PhD; Jason E. Pope, MD DABPM FIPP</td>
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</table>

*Agenda subject to change.*
Legislative Fellows—Commendable Activities

Michael S. Leong, MD

Michael S. Leong, MD, is a specialist in pain medicine with clinical foci in radiculopathy; spinal, abdominal, and cancer pain; postherpetic neuralgia; and workers compensation cases. He received his medical degree from Georgetown University in Washington, DC, and completed his residency in anesthesiology at University of California, Davis and at Stanford University, where he also completed his fellowship in pain medicine. He is board certified by the American Board of Anesthesiology. Dr. Leong is currently a clinical associate professor of anesthesiology and pain medicine at Stanford University.

Haroon Hameed, MD (also an Advocacy Award winner)

Haroon Hameed, MD, is board certified in both physical medicine and rehabilitation and pain medicine by the American Board of Physical Medicine and Rehabilitation (an American Board of Medical Specialties member board). He completed his residency and fellowship at The Johns Hopkins Hospital. He served on the board of trustees of the American Society of Interventional Pain Physicians for 7 years and also represented them at the American Medical Association (AMA) during that time. He is now on the board of directors of NANS and represents them at the AMA, as well as the AMA’s CPT and RVC committees. He also is codirector of NANS’s Legislative Awareness, Health Policy, and Advocacy Fellowship.

Mehul J. Desai, MD MPH

Mehul J. Desai, MD MPH, is board certified in pain medicine and physical medicine and rehabilitation. Dr. Desai completed his residency in physical medicine and rehabilitation at the Georgetown University Hospital. During residency, where he spent 6 months completing a research fellowship at the National Institutes of Health, he conducted groundbreaking research into mechanisms of muscle pain. Upon completion of his residency, he went on to a fellowship in pain medicine at Thomas Jefferson University Hospital in Philadelphia, PA, in the Department of Anesthesiology. His clinical interests include musculoskeletal disease (tendon injuries, osteoarthritis), discogenic pain, and intradiscal therapies, including biologics; neuromodulation, specifically spinal cord stimulation and targeted drug delivery; complex spinal conditions; pelvic pain; outcomes-based research; and healthcare economics. He is committed to the use of cutting-edge technologies in the treatment of musculoskeletal disease and pain.

Dr. Desai is the founder and president of the International Spine, Pain & Performance Center, a collaborative, interdisciplinary practice located in Washington, DC. Formerly, Dr. Desai was assistant professor, Department of Anesthesiology & Critical Care Medicine and of Neurosurgery at the George Washington University Medical Center and served as the director, Pain Medicine and Non-Operative Spine Services, of the GW Spine & Pain Center and director, Sibley Pain Center, at the Sibley Memorial Hospital. Furthermore, he was Director, Outpatient Rehabilitation Center at the George Washington University Hospital. He also served as a clerkship director for Physical Medicine & Rehabilitation at the George Washington University, School of Medicine and mentored both residents in anesthesiology and physical medicine ans rehabilitation.

Kumar New Investigator Best Manuscript Award

Scott F. Lempka, PhD

Scott F. Lempka, PhD, is an assistant professor in the Department of Biomedical Engineering at the University of Michigan (Ann Arbor, MI). In 2004, Dr. Lempka received a bachelor’s degree in biomedical engineering from Saint Louis University (St. Louis, MO). In 2010, Dr. Lempka earned a PhD in biomedical engineering from Case Western Reserve University (Cleveland, OH). His dissertation research focused on experimental and theoretical characterization of the interface between implanted neural stimulation and recording electrodes and the surrounding biological tissue.

From 2010 to 2012, Dr. Lempka performed postdoctoral training in the Department of Biomedical Engineering at the Cleveland Clinic, where he studied deep brain stimulation for Parkinson’s disease. In 2013, Dr. Lempka moved to the Cleveland Clinic’s Center for Neurological Restoration to study clinical neuromodulation for chronic pain management. Dr. Lempka also joined the Cleveland Functional Electrical Stimulation Center and the Cleveland VA Medical Center as a new investigator. Dr. Lempka performed translational research using engineering approaches (e.g., functional neuroimaging, computer models) to investigate the mechanisms of action of neurostimulation therapies in chronic pain management. For this work, Dr. Lempka received the New Investigator Award from The First World Congress on Mechanisms of Action: Electrical Stimulation of the Nervous System and a travel award from the North American Neuromodulation Society.

In 2017, Dr. Lempka will move to the University of Michigan, where his research program will use engineering approaches to characterize the therapeutic mechanisms of neurostimulation therapies for chronic pain management. The goal of this research will be to innovate new technologies that improve clinical outcomes. In particular, Dr. Lempka’s works will focus on current and novel spinal cord stimulation technologies.
Distinguished Service Award

David S. Kloth, MD

David S. Kloth, MD, is the founder and medical director of Connecticut Pain Care. He began practicing medicine in Connecticut in 1991 as a member of the Danbury Hospital Anesthesia Department. During his time at the hospital, Dr. Kloth served as the director of acute pain management and developed the Chronic Pain Service. In 1995, Dr. Kloth decided to open Connecticut Pain Care so that he could focus on meeting the needs of the chronic pain community. Dr. Kloth feels strongly about the importance of education and service in the practice of medicine. Service comes from providing quality patient care while also working with different groups to help maintain access to care for patients on a local, state, and national level.

Dr. Kloth began his education at Union College, where he earned a bachelor's degree in biology and math. While pursuing his degrees, he spent three summers performing research in the Cardiovascular Experimental Surgery Laboratory at the Berg Institute. This experience served to confirm his love of medicine and following graduation, Dr. Kloth enrolled in the New York University School of Medicine. He completed his residency at the Hospital of the University of Pennsylvania, where he focused on cardiothoracic and pain management and served as the codirector of the Resident Journal Club.

Since graduating from his residency program, Dr. Kloth has maintained his commitment to education, attending numerous lectures, classes, and conferences on the practice of pain management and emerging technology and treatments. He maintains multiple certifications, including the American Board of Anesthesiology, with additional certification in the subspecialty of pain management. He also holds certification from the American Board of Interventional Pain Physicians and he is the only physician in the state of Connecticut to hold this certification. He also is a Fellow of Interventional Pain Practice through the World Institute of Pain. Acknowledging the contributions of the people who mentored him during his education, Dr. Kloth routinely teaches courses on various pain management treatments.

Dr. Kloth began his commitment to service locally, serving on the Danbury Hospital Ethics Committee from July of 1997 until April of 2004. He has served as the section chief for interventional pain management at Danbury Hospital from 2004-2011. Impressed with their commitment to preserving patient access to care and providing educational experiences for pain management physicians, Dr. Kloth became an active member of the American Society of Interventional Pain Physicians (ASIPP) from its inception in 1998. He has served this organization as the executive vice president (2001-2005) and the president (2005-2006) and has served continuously on the board of directors from 1998 to the present.

Eager to take what he learned from ASIPP back to his home state of Connecticut, Dr. Kloth founded the Connecticut Pain Society, where he has served as the president (1999-2005 and 2006-2010) and executive director (1999 to present). In Connecticut, Dr. Kloth has served on the Connecticut Medicare Carrier Advisory Committee, the Connecticut Prescription Drug Monitoring Working Group, and the Connecticut Workers’ Compensation Medical Advisory Board.

In 2005, Dr. Kloth became involved with the leadership of NANS. With NANS he has served on the board of directors from 2005 to 2013, and acted as the treasurer from 2009 to 2011, president-elect in 2012 and 2013, and the president in 2013.

Keynote Speaker

Rosalind W. Picard, ScD

Professor Rosalind W. Picard, ScD, is founder and director of the Affective Computing Research Group at the Massachusetts Institute of Technology (MIT) Media Lab, co-director of the Media Lab’s Advancing Wellbeing Initiative, and faculty chair of MIT’s Mind+Hand+Heart Initiative. She co-founded Empatica, Inc., which creates wearable sensors and analytics to improve health, and Affectiva, Inc., which delivers technology to help measure and communicate emotion.

Picard holds a bachelor’s degree in electrical engineering with highest honors from the Georgia Institute of Technology, and master’s and doctorate degrees, both in electrical engineering and computer science, from MIT. She started her career as a member of the technical staff at AT&T Bell Laboratories designing VLSI chips for digital signal processing and developing new algorithms for image compression. In 1991, she joined the MIT Media Lab faculty. She became internationally known for constructing mathematical models for content-based retrieval of images and for pioneering methods of automated search and annotation in digital video, including the creation of the Photobook system. The year before, she was up for tenure she took a risk and published the book Affective Computing, which became instrumental in starting a new field by that name. Today, that field has its own journal, international conference, and professional society. Picard also served as a founding member of the IEEE Technical Committee on Wearable Information Systems in 1998, helping launch the field of wearable computing.

Picard is an active inventor with multiple patents, including wearable and non-contact sensors, algorithms, and systems for sensing, recognizing, and responding respectfully to human affective information. Her inventions have applications in autism, epilepsy, depression, post-traumatic stress disorder, sleep, stress, dementia, autonomic nervous system disorders, human and machine learning, health behavior change, market research, customer service, and human-computer interaction. In 2005 she was named a fellow of the IEEE for contributions to image and video analysis and affective computing. CNN named her one of seven “Tech Super Heroes to Watch in 2015.” Picard has been honored with dozens of distinguished and named lectureships and other international awards. She is a popular speaker and has given more than 100 keynote talks.

Picard has served on numerous international and national science and engineering program committees, editorial boards, and review panels, including the Advisory Committee for the National Science Foundation’s division of Computers in Science and Engineering, the Advisory Board for the Georgia Tech College of Computing, and the Editorial Board of User Modeling and User-Adapted Interaction: The Journal of Personalization Research.
Award Winners and Leadership

NANS Board of Directors
Ashwini D. Sharan, MD, President
B. Todd Sitzman, MD MPH, President-Elect
David S. Kloth, MD, Immediate Past President
Peter Konrad, MD PhD, Vice President
Salim M. Hayek, MD PhD, Secretary
Lawrence Poree, MD PhD, Treasurer
Joshua P. Prager, MD MS, Senior Advisor to the Board

Parag G. Patil, MD PhD
Lawrence Poree, MD PhD

Abstract Committee Chair
David A. Provenzano, MD

Annual Meeting Co-Chairs
Jason E. Pope, MD DABPM FIPP
Steven M. Falowski, MD

President
Ashwini D. Sharan, MD

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Ahmed Badr, MD
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Alexios G. Carayannopoulos, DO MPH
Mehul J. Desai, MD MPH
Dario J. Englott, MD PhD
Steven M. Falowski, MD
James K. Fortman, MD
Fatma Gul, MD MMM
Salim M. Hayek, MD PhD
Bryan C. Hoelzer, MD
Leonardo Kapural, MD PhD
Chong Kim, MD

Elliot S. Krames, MD
Eric Lee, MD MA
Sean Li, MD
Corneliu Luca, MD PhD
Neel Mehta, MD
Susan Moeschler, MD
Alon Mogiler, MD
Charles Munyon, MD
Peter Pahapill, MD PhD
Parag G. Patil, MD PhD
Julie G. Pilitsis, MD PhD
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Certificate of Attendance Advanced Implantable Therapies Workshop
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Coding & Billing Workshop: A MACRA Perspective Amongst an Evolving Environment (non-CME)
Mehul J. Desai, MD MPH

Hands-On Cadaver Course for Engineers (non-CME)
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Al Mashal, PhD
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Chengyuan Wu, MD MSBmE

I Just Inherited 100 Pump Patients: What Do I Do Now?
Michael F. Saulino, MD PhD
Erik Shaw, DO

NANS I3: Innovation and the Neuromodulation Ecosystem (non-CME)
Peter Konrad, MD, PhD
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Neurology Neuromodulation Workshop (non-CME)
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<td>Marc A. Hunteon, MD</td>
<td>Consulting Agreement—Mainstay Medical (10), Boston Scientific (10); Salary—Regional Anesthesia and Pain Medicine (4)</td>
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<td>Marilyn S. Jacobs, PhD ABPP</td>
<td>Salary—St. Jude Medical (2)</td>
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<td>Leonardo Kapural, MD PhD</td>
<td>Honoraria—Best Doctors (2), Guidepoint (2), Halyard (2), NeoV (2), Neuros (2), SPR Therapeutics (2), St. Jude (2)</td>
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<td>Nathaniel R. Katz, MD MS</td>
<td>Consulting Agreement—St. Jude Medical (2), Boston Scientific (2), Medtronic (2)</td>
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<td>Alexander R. Kent, PhD</td>
<td>Ownership Interest—St. Jude Medical (5); Salary—St. Jude Medical (5)</td>
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<td>Nicholas Ketchum, MD</td>
<td>Honoraria—Medtronic (2), Allergan (2), Merz (2)</td>
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<td>Daniel R. Kloster, MD</td>
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<td>David S. Kloth, MD*</td>
<td>Consulting Agreement—Stimwave/Stim Q (2), Waypoint Medical (2); Other—Connecticut Pain Society (10), Connecticut Workers’ Compensation Advisory Board (10), MPN (10)</td>
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<td>Peter Konrad, MD PhD</td>
<td>Consulting Agreement—Medtronic (2), Neuropace (2); Ownership Interest—Neurotargeting (7)</td>
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<td>Eric Lee, MD MA</td>
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<td>Michael S. Leong, MD</td>
<td>Consulting Agreement—Boston Scientific (2), Jazz Pharmaceuticals (2), Scrittela Pharmaceuticals (2)</td>
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<td>Immanuel R. Lerman, MD MS</td>
<td>Research Funding—Boston Scientific (10), Electrocure (10), NeoV (10)</td>
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<td>Yaskov Levine, PhD</td>
<td>Salary—SetPoint Medical, Inc. (5)</td>
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<td>Robert M. Levy, MD PhD</td>
<td>Consulting Agreement—Flownox (2), Nevro (2), Nuvecerta (2), Saluda (2), Spinal Modulation (2), St. Jude Medical (2); Other—Bioness (10), NeoV (10), Spinal Modulation (10), Vertos Medical, Inc. (10)</td>
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<td>Sean Li, MD</td>
<td>Consulting Agreement—NeoV (2), Suture Concepts (2), Medtronic (2); Research Grant—Boston Scientific (10), SPR (10), Haylard Health (10), Vertos (10); Speaker—DepoMed (2); Honoraria—Leerink (2)</td>
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<td>Bengt G. Linderman, MD PhD</td>
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<td>Andreas Linninger, PhD</td>
<td>Ownership Interest—System Science Inc. (1)</td>
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<td>Cornelii Luca, MD PhD</td>
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<td>Daniel McDonnell, PhD</td>
<td>Salary—Ripple LLC (1)</td>
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<td>Cameron McIntyre, PhD</td>
<td>Intellectual Fees—Boston Scientific Neuromodulation (2); Ownership Interest—Surgical Information Sciences (10)</td>
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<td>Gail L. McGlothlen, DNP RN CNS</td>
<td>Honoraria—Medtronic Neurological (2)</td>
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<td>W. Porter McRoberts, MD</td>
<td>Consulting Agreement—Bioness (2), Boston Scientific (2), Flixonox (4), Medtronic (2), NeoV (2), Nuvecerta (2), St. Jude Medical (2); Honoraria—SPR (10)</td>
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<td>Neel Mehta, MD</td>
<td>Honoraria—NeoV (2), Boston Scientific (2)</td>
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<td>Vivek Mehta, MD MBBS</td>
<td>Honoraria—Boston Scientific (2), NeoV (10), St. Jude (2)</td>
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<td>Ramana Naidu, MD</td>
<td>Honoraria—Halyard Health (10)</td>
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<tr>
<td>Linda Page, PharmacD</td>
<td>Salary—Medtronic (5)</td>
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Nothing to Disclose
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5–7 pm
Forum Ballroom Pub Hub

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(6) Long-term Safety and Efficacy of Brain Responsive Stimulation in Adults with Medically Intractable Partial Onset Seizures (11474)
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(10) Post-Market Study to Assess DRG Stimulation for the Management of Chronic Intractable Pain (11475)
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(17) Utility of Strength-Duration Curves for Differentiating Stimulation of the Dorsal Root Ganglion Versus Nerve Root (11472)
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(41) Prospective Study on DRG Stimulation for the Management of Chronic Pain Following Peripheral Nerve Injury (11477)
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(44) Dorsal Root Ganglion Stimulation to Treat Diabetic Neuropathy After Therapeutic Failure of Traditional SCS and Ziconotide (11546)
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The American Society of Interventional Pain Physicians (ASIPP®) is America’s leading interventional pain physician society. Founded in 1998, we now comprise more than 4,500 interventional pain physicians and other practitioners ensuring safe, appropriate, and equal access to essential pain management services for patients suffering with chronic and acute pain. ASIPP comprises 50 affiliated state societies and the Puerto Rico Society. To learn more about ASIPP and our programs, including ASIPP’s 2017 Annual Meeting, THE FUTURE OF IPM: EMBRACE INNOVATION WITH CONFIDENCE, please visit our website: www.asipp.org.

American Society of Regional Anesthesia and Pain Medicine, Booth 617
The American Society of Regional Anesthesia and Pain Medicine (ASRA) is dedicated to advancing the science and practice of regional anesthesia and pain medicine by addressing the clinical and professional educational needs of physicians and scientists, ensuring excellence in patient care and investigating the scientific basis of the specialty.

Basic Home Infusion, Booth 329
Basic Home Infusion (BHI) is a national home infusion company that provides a better quality of life through effective pump management. Specializing only in intrathecal therapies, BHI provides refills and management of implanted pumps for both spasticity and chronic pain.

Bioness, Inc., Booth 221
Bioness is the leading provider of innovative technologies helping people regain mobility and independence. Bioness solutions include external and implantable functional electrical stimulation systems, robotic systems, and software-based therapy programs providing functional and therapeutic benefits for individuals affected by pain, central nervous system disorders, and orthopedic injuries.

Boston Scientific, Booth 401
Investing in innovative products, clinical initiatives, and world-class service, Boston Scientific’s pain portfolio is leading the way by providing better pain relief to a broader spectrum of patients. Contact info: 25155 Rye Canyon Loop Valencia, CA 91355, USA, 661.949.4000, www.controlyourpain.com.

Cirtec Medical, Booth 317
Cirtec Medical provides end-to-end solutions for complex medical device design, development, and manufacturing. We have helped advance neuromodulation devices in the following applications: SCS, DBS, PNS, VNS, neuroprosthetics, FES, and state-of-the-art device component technologies for transcutaneous power and transmission. Cirtec can help bring your device to market quickly and cost effectively.

Clint Pharmaceuticals, Booth 113
Established in 1987, Clint Pharmaceuticals has become an industry-leading provider of high-quality FDA-approved injectable pharmaceuticals. Clint Pharmaceuticals is not a compounding pharmacy. We also distribute interventional pain management procedural trays and needles, orthopedic soft goods, and radiation protection apparel to physician offices and medical clinics throughout the United States.

American Association of Neuroscience Nurses, NANS Lounge
The American Association of Neuroscience Nurses (AANN) is committed to working toward the highest standard of care for neuroscience patients by advancing the science and practice of neuroscience nursing. AANN is the leading authority in neuroscience nursing.

American Interventional Headache Society, Booth 615
The American Interventional Headache Society (AIHS) works for the benefit of people suffering from intractable headache, neck, and orofacial pain that is not responding to conventional treatment. AIHS’s goal is to educate and train pain physicians, neurologists, PMR physicians, and primary care physicians to better manage patients with head, neck, and face pain through both didactic and hands-on training on different interventional treatment options.

American Society of Regional Anesthesia and Pain Medicine, Booth 617
The American Society of Regional Anesthesia and Pain Medicine (ASRA) is dedicated to advancing the science and practice of regional anesthesia and pain medicine by addressing the clinical and professional educational needs of physicians and scientists, ensuring excellence in patient care and investigating the scientific basis of the specialty.
EaglePicher Medical Power, Booth 109

EaglePicher Medical has been active in battery technology since 1922 with a focus on mission-critical, life-sustaining applications. A world leader in battery development and manufacturing, EaglePicher offers primary and rechargeable implantable battery solutions for neuromodulation, cardio, and other applications. Stop by our booth to discuss your neurostimulator’s implantable battery needs and ask us about our state-of-the-art manufacturing site. “The Lithium Ion Center of Excellence.”

elliquence, LLC, Booth 115

elliquence, LLC manufactures patented radiowave technology with innovative devices for orthopedic, neurosurgery, and pain management applications. Surgi-Max® Plus permits precision tissue preservation, non-adherent bipolar effects, and surgical versatility. Cobbra™ Energized Cobb Elevator, and Disc-FX™ Discectomy System are examples of the full line of surgical accessories offered for use with the Surgi-Max Plus energy source. elliquence focuses on sparing healthy tissue while precisely treating pathology.

Epimed International, Booth 210

Epimed International, Inc. will be featuring products designed for chronic and acute pain management techniques. We will display the Expanded Line of Racz® Spring Guide Epidural Catheters; RX™, R.K™, and FIC Epidural Introducer Needles; R-F™ Line of Radiofrequency Products; Coude™ and Straight Blunt Nerve Block Needles; and Mini Trays. Also being shown are Radiation Safety Products, Tens Units, and Anatomical Models.

Evergreen Medical Technologies, Inc., Booth 623

Transforming clinical need into clinical solutions™. Evergreen Medical Technologies provides complete neuromodulation system design, manufacturing, and testing for entrepreneurs, universities, start-ups, and established companies worldwide. Evergreen staff have decades of experience in leads, pulse generators, and accessories to provide high-quality, cost-effective, unique solutions to benefit physicians and their patients.

Flowonix, Booth 311

Flowonix Medical Inc. is dedicated to working with healthcare professionals to help ease suffering associated with chronic pain by allowing patients to reclaim their lives through innovation and therapy advancements. Flowonix has received multiple patents and is focused on working with physicians to rapidly improve drug delivery and management systems.

Halyard Health, Booth 323

Formerly part of Kimberly-Clark, Halyard Health is a medical technology company focused on preventing infection, eliminating pain, and speeding recovery. Solutions for chronic pain include COOLIEF® Cooled Radiofrequency (RF) Treatment, a revolutionary technology that uses cooled RF energy to safely treat the sensory nerves causing pain, providing up to 24 months of relief.

Hartley Medical, Booth 213

Founded in 1979, we are a national, state-of-the-art compounding pharmacy dedicated to providing the highest quality sterile pharmaceuticals for the treatment of malignant and nonmalignant chronic pain and movement disorders. The Hartley staff is both highly trained and disciplined to provide the highest quality sterile pharmaceuticals for improving patients’ quality of life.

Exhibitors

International Neuromodulation Society, NANS Lounge

The International Neuromodulation Society (INS) is a nonprofit group of clinicians, scientists, and engineers dedicated to the scientific development and awareness of neuromodulation—the alteration of nerve activity through the delivery of electrical stimulation or chemical agents to targeted sites of the body. Founded in 1989 and based in San Francisco, CA, the INS educates and promotes the field through its biennial meetings, its peer-reviewed journal, Neuromodulation: Technology at the Neural Interface, and chapter websites. The INS has over 2,100 members worldwide and is composed of 21 regional chapters, the largest of which is NANS.

Jazz Pharmaceuticals, Booth 407

Jazz Pharmaceuticals plc (NASDAQ: JAZZ) is an international biopharmaceutical company focused on improving patients’ lives by identifying, developing, and commercializing meaningful products that address unmet medical needs. The company has a diverse portfolio of products and product candidates in the areas of sleep, hematology/oncology, and pain.

Lone Star Neuromodulation, Booth 619

Lone Star is a research- and development-driven medical technology start-up company producing innovative concepts and solutions in pulse-generator design. Lone Star has integrated pioneering hardware with progressive software to deliver a disruptive device platform aimed at making neurostimulation a more cost-effective therapeutic option.

Mainstay Medical, Booth 211

Mainstay Medical (www.mainstay-medical.com) is a European medical device company focused on bringing to market ReActiv8®, a new implantable stimulation system that targets motor control of the spine stabilizing muscles in people with disabling chronic low back pain and who are not indicated for spine surgery.

Mallinckrodt Pharmaceuticals, Booth 107

Mallinckrodt is a global business that develops, manufactures, markets, and distributes specialty pharmaceutical and biological products and therapies, as well as nuclear imaging products. Mallinckrodt provides multiple product offerings for advancing intrathecal medicine. Visit www.Mallinckrodt.com.

Medtronic, Booths 501, 529

As a global leader in medical technology, services and solutions, Medtronic improves the lives and health of millions of people each year. We use our deep clinical, therapeutic, and economic expertise to address the complex challenges faced by healthcare systems today. Let’s take health care further, together. Learn more at Medtronic.com.

National Manufacturing, Booth 415

ISO 13485-certified; in business for 72 years; specialists in precision deep and shallow drawn metal enclosures for implantable neurostim and cardiac devices, in various grades of titanium and stainless steels. In-house tool design/fab, cell mfg, lean, six-sigma continuous improvement, concurrent engineering and statistical tools to ensure product quality.
NeuroNews, Pub Hub
NeuroNews is a specialized, quarterly newspaper dedicated to physicians in the neuro space. A trusted editorial source, it contains the latest news, opinion from thought leaders, summaries of cutting-edge research, expert analysis, conference coverage, and updates on products in the neuro world.

Oscor, Booth 118
Oscor is a leading contract developer and manufacturer of short- and long-term implantable neurostimulation leads, lead extensions, lead adapters, delivery systems, and tunneling tools. With facilities located in the United States, Dominican Republic, and Germany, Oscor likes to be your outsourcing partner for all of your contact manufacturing needs.

ON Semiconductor, Booth 414
ON Semiconductor is a leading supplier of energy-efficient silicon solutions. We help customers solve their unique design challenges with our broad portfolio of medical products and services tailored specifically to implanted devices. These include custom ASICs, medical-grade standard products, and packaging and foundry services.

PainPathways Magazine, Pub Hub

Pentec Health, Booth 108
Pentec Health, Inc. is a Joint Commission-accredited specialty pharmacy and infusion provider that specializes in providing comprehensive care for patients with implanted pumps treating severe pain and/or spasticity. Our proprietary electronic communications platform ensures all disciplines remain informed and focused on improving patient outcomes.

Quallion/EnerSys, Booth 322
Quallion designs and manufactures lithium ion batteries for the medical, military, and aerospace industries. Quallion has developed the world’s smallest implantable secondary battery and Zero-Volt™ technology. Quallion is a subsidiary of EnerSys, one of the largest manufacturers of industrial batteries in the world. EnerSys develops a wide range of VRLA, ni-cad, li-ion, lithium primary reserve, and thermal batteries.

RCRI, Booth 519
RCRI has the experience to provide strategic consulting and the expertise to deliver effective tactical program execution for all devices. RCRI provides support across the product life cycle including regulatory and clinical strategy, reimbursement, healthcare economics, clinical study design and study operations, biostatistics, data management, FDA/regulatory negotiation, quality systems, and compliance.

Renishaw Mayfield SA, Booth 112
Renishaw is applying cutting-edge precision engineering technology to the challenges of functional neurosurgery. The neuromate® stereotactic robot provides a platform solution for functional neurosurgical procedures. It is used in many world-leading neurosurgical centers across the globe for DBS, SEEG, neuro-endoscopy, biopsy, and R&D applications.

Ripple, Booth 121
Ripple creates neural interface and medical devices to advance research and improve the lives of underserved patient populations. Our Grapevine Neural Interface System for neuroscience research and neuroprosthesis development is compact, portable, and optimized for real-time, high-channel count, closed-loop electrophysiology studies with up to 512 recording, and stimulation electrodes.

Saluda Medical, Booth 516
Saluda Medical was established in 2013 in Australia and has developed a closed-loop SCS system to treat chronic pain. The system regulates the dose of electrical stimulation real-time, with the objective to achieve superior, long-term pain relief. It is currently under investigation in the United States.
Samsung NeuroLogica, Booth 324
Samsung NeuroLogica brings the power of innovative imaging to your patients. With an expertise in CT design and development, Samsung transforms fixed CT technologies into portable platforms. Samsung's imaging solutions are used in intensive care units, operating rooms, emergency departments, and stroke centers. For more information, please visit www.SamsungNeuroLogica.com.

Saol Therapeutics, Booth 611
Saol Therapeutics (pronounced “Sail”) is a privately held specialty pharmaceutical company focused on providing therapies to patients with rare diseases. The company currently markets a therapy for the treatment of severe spasticity and has a strategic growth emphasis on the neurology therapeutic area. For more information, visit www.saolrx.com.

St. Jude Medical, Booths 301, 523
St. Jude Medical is a leading global medical device manufacturer and is dedicated to transforming the treatment of some of the world’s most expensive epidemic diseases. The company does this by developing cost-effective medical technologies that save and improve lives of patients around the world. Headquartered in St. Paul, MN, St. Jude Medical has five major areas of focus that include heart failure, atrial fibrillation, neuromodulation, traditional cardiac rhythm management, and cardiovascular diseases. For more information, please visit www.sjm.com or follow us on Twitter @SJM_Media.

Stimwave, Booth 119
Stimwave Technologies Incorporated is a privately held medical device company engaged in the development, manufacture, and commercialization of wirelessly powered, microtechnology neurostimulators, providing patients with a convenient, safe, minimally invasive, and highly cost-effective pain management solution that is easily incorporated into their daily lives. Stimwave's goal is to evolve its patented, cutting-edge platform into the default for neuromodulation, increasing the accessibility for patients worldwide while lowering the economic impact of pain management.

Stryker, Booth 621
Stryker is one of the world’s leading medical technology companies and, together with our customers, we are driven to make healthcare better. The company offers a diverse array of innovative products and services in orthopaedics, medical and surgical, and neurotechnology and spine that help improve patient and hospital outcomes. Stryker is active in more than 100 countries around the world. Please contact us for more information at www.stryker.com.

Suture Concepts, Booth 613
Suture Concepts Inc. exists to provide simple and effective solutions to physicians who practice in a cost-conscious environment. Our experience and expertise are focused on employing solutions to securing soft tissue to other tissue, to bone, or to medical devices. For more information, contact 1.800.762.9926 / mail@sutureconcepts.com / www.sutureconcepts.com.

TS Consulting, Booth 518

Vertiflex, Booth 318
At Vertiflex®, we are relentlessly focused on providing the most advanced, less invasive treatments for lumbar spinal stenosis (LSS). We believe there is a gap in the continuum of care of long-term conservative management and traditional surgery. With the Superion® Indirect Decompression System, we are revolutionizing the treatment of LSS with a minimally invasive approach that puts patient comfort and safety first. Our commitment to excellence and efficacy has led us to conduct the most rigorous FDA clinical trial for LSS, proving Superion to be effective.
While you push forward to improve the quality of life for those suffering, Cirtec stands behind you producing the highest quality medical devices. From design and development, to complete manufacturing services, we have the resources and expertise to help you bring your neuromodulation products to market—promptly and economically.

Cirtec is committed to being your preferred outsourcing partner for end-to-end, innovative solutions in the development of your life-enhancing therapies. After all, isn’t that exactly what you need?

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- Spinal Cord Stimulation • Deep Brain Stimulation • Peripheral Nerve Stimulation
- Vagus Nerve Stimulation • Neuroprosthetics • Functional Electrical Stimulation
- State-of-the-art Device Component Technologies for Transcutaneous Power and Transmission
Brief Summary: Product Technical Manuals and Information for Prescribers (IFP) must be consulted prior to use of this product. Indications for Use: The Algovita® Spinal Cord Stimulation (SCS) System is indicated as an aid in the management of chronic intractable pain of the trunk and/or limbs, including unilateral or bilateral pain. Contraindications: Diathermy, patients who are poor surgical candidates. Warnings/Precautions: Strong electromagnetic interference (eg, electrocautery, RF or microwave ablation, or MRI) can result in serious patient injury or death, unexpected stimulation, or device malfunction or damage. Rupture or piercing of the neurostimulator may result in severe burns. Safety and effectiveness of SCS have not been established for pediatric patients, for use during pregnancy, or for use with nursing patients. Adverse Events: may include painful stimulation or loss of pain relief, hardware malfunction or migration, allergic response and surgical risks, such as infection, or additional surgery. For full prescribing information, please call Nuvectra at 1.844.727.7897 and/or consult Nuvectra’s website at www.nuvectramd.com. Rx Only. January 2017.

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Please join us

Marshall Stanton, MD, Senior VP/President, Pain Solutions, and his team want to meet you!

Leadership Reception

Saturday, January 21
6:30 p.m.–8:30 p.m.
Mr. Chow | Caesars Palace Hotel

TRANSFORMING HEALTHCARE FURTHER, TOGETHER

DIRECTIONS TO MR CHOW
Enter through the set of private elevators, located on the casino floor level of Caesars Palace. The restaurant is on the second floor, overlooking the Garden of the Gods Pool Oasis.
Please bring your NANS badge for entry.