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 superior1,2 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.

*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.

**BurstDR™ neurostimulation, exclusively from St. Jude Medical, is also referred to as Burst stimulation in clinical literature.

When compared to traditional tonic stimulation.

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All Superiority and Paresthesia-free claims are supported by the Senza Summary of Safety and Effectiveness Data (SSED). Published May 8, 2015, Kapural L, et al. Comparison of 10-kHz High-Frequency and Traditional Low-Frequency Spinal Cord Stimulation for the Treatment of Chronic Back and Leg Pain: 24-month Results from a Multicenter, Randomized, Controlled Pivotal Trial. Neurosurgery. Published 09 2016 [Epub ahead of Print].
Multiple Waveforms. Customized Therapy.

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<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welcome</td>
<td>6</td>
</tr>
<tr>
<td>About the Meeting</td>
<td>7</td>
</tr>
<tr>
<td>Premeeting Workshops Agenda</td>
<td>8</td>
</tr>
<tr>
<td>Scientific Program Agenda</td>
<td>9</td>
</tr>
<tr>
<td>Award Winners and Leadership</td>
<td>20</td>
</tr>
<tr>
<td>Keynote Speaker</td>
<td>21</td>
</tr>
<tr>
<td>Faculty</td>
<td>23</td>
</tr>
<tr>
<td>Disclosures</td>
<td>25</td>
</tr>
<tr>
<td>Poster Presentations</td>
<td>27</td>
</tr>
<tr>
<td>Exhibitors by Booth Number</td>
<td>33</td>
</tr>
<tr>
<td>Exhibitors</td>
<td>34</td>
</tr>
</tbody>
</table>
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 (I$): Innovation and the Neuromodulation Ecosystem brings together esteemed clinicians, scientists, corporate executives, healthcare regulators, and investors to discuss the challenges and opportunities for neuromodulation strategic growth in North America over the coming decade. Topics for the full-day NANS I$ 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.
Thursday, January 19

7 am–8:30 pm
Caesars Palace, Octavius, Promenade Level
Meeting Registration

8 am–5 pm
Caesars Palace, Forum, Pool Level
Exhibitor Registration

7:15–8 am
Caesars Palace, Augustus Foyer
Breakfast

8:30 am–4:30 pm
Caesars Palace, Augustus 6
Advanced Practice Provider Course (PAs, NPs, Nurses): A to Z in Neuromodulation
Directors: Christy Gomez, BSN MSN AG-ACNP; Julie G. Pilitsis, MD PhD; Vishad Sukul, MD; Meghan Wilock, PA

8 am–4:30 pm
Caesars Palace, Octavius 2
Coding & Billing Workshop: A MACRA Perspective Amongst an Evolving Environment (non-CME)
Director: Mehul J. Desai, MD MPH

8 am–5 pm
Caesars Palace, Augustus 3
I Just Inherited 100 Pump Patients: What Do I Do Now?
Directors: Michael F. Saulino, MD PhD; Erik Shaw, DO

Noon–1:30 pm
Caesars Palace, Augustus 4
Lunch Symposium
Differentiate Yourself with Targeted Drug Delivery: An Expert Panel
Panelists: Shane E. Brogan, MB BCh; Vipul Mangal, MD; Mary Elizabeth Nelson, DNP APNP
This non-CME activity is supported by Medtronic.

7 am–5:40 pm
Oquendo Center for Clinical Education
Neuromodulation Cadaver Course for Advanced Implantable Therapies: A Hands-On Cadaver Course for Residents and Fellows (non-CME)
Directors: Michael A. Fishman, MD MBA; Bryan C. Hoelzer, MD; Chengyuan Wu, MD MSBmE

Oquendo Center for Clinical Education
Neurology Neuromodulation Workshop (non-CME)
Directors: Joohi Jimenez-Shahed, MD; Fenna T. Phibbs, MD MPH

Oquendo Center for Clinical Education
Hands-On Cadaver Course for Engineers
Directors: Steven M. Falowski, MD; Al Mashal, PhD; Jason E. Pope, MD DABPM FIPP; David A. Provenzano, MD

Oquendo Center for Clinical Education
Certificate of Attendance Advanced Implantable Therapies Workshop
Directors: Steven M. Falowski, MD; Jason E. Pope, MD DABPM FIPP; David A. Provenzano, MD

7–8:30 pm
Caesars Palace, Forum Ballroom 11 & 12
Welcome Reception
The Welcome Reception is open to all meeting registrants. Please come to enjoy wine, beer, and hors d’oeuvres with your colleagues and friends.

8:30–10 pm
The Vortex at the LINQ Hotel & Casino
Residents & Fellows Exclusive Reception
Sponsored by Medtronic. For details, visit the Medtronic booth (501) or simply click on the NANS app.

Visit the Pub Hub, sponsored by Nevro.
View more than 300 abstracts! Enjoy a quiet space to view and print copies with meeting space to come together as a group. Enter a drawing to win a text authored by our Annual Meeting chairs, Steven M. Falowski, MD; and Jason E. Pope, MD DABPM FIPP.
### SCIENTIFIC PROGRAM

**Friday, January 20**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 am–5 pm</td>
<td>6 am–5 pm: SCIENTIFIC PROGRAM <strong>Octavius, Promenade Level</strong> Meeting Registration</td>
</tr>
<tr>
<td>7 am–5 pm</td>
<td>7 am–5 pm: SCIENTIFIC PROGRAM <strong>Forum, Pool Level</strong> Exhibitor Registration</td>
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<tr>
<td>7–8 am</td>
<td><strong>Thematic Abstract Sessions</strong> <strong>Forum 2, 3, and 4</strong></td>
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<tr>
<td>7–7:05 am</td>
<td>Welcome, William S. Rosenberg, MD</td>
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<tr>
<td>7:05–7:15 am</td>
<td>First Two Cases of Dorsal Root Ganglion Stimulation for Complex Regional Pain Syndrome in NJ</td>
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<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</td>
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<tr>
<td>7:25–7:35 am</td>
<td>High-Frequency Spinal Cord Stimulation for Coccydynia: Report of Two Cases</td>
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<tr>
<td>7:35–7:45 am</td>
<td>Spinal Cord Stimulation for Central Poststroke Pain with an Associated Reduction in Spasticity</td>
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<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</td>
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<tr>
<td>7:55–8 am</td>
<td>Closing Discussion, William S. Rosenberg, MD</td>
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<tr>
<td>7–7:05 am</td>
<td><strong>Nerve Root &amp; Dorsal Root Ganglion Stimulation</strong> <strong>Forum 5, 6, 7, and 8</strong></td>
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<tr>
<td>7:05–7:15 am</td>
<td>Welcome, Ramana Naidu, MD</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</td>
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<tr>
<td>7:25–7:35 am</td>
<td>Can Dorsal Root Ganglion Stimulation for Pain Relief Modulate Sympathetic Efferent Nerve Traffic?</td>
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<td>7:35–7:45 am</td>
<td>Relationship Between Pain Relief and Secondary Outcomes: An ACCURATE Sub-Analysis</td>
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<tr>
<td>7:45–7:55 am</td>
<td>Paresthesia Versus Paresthesia-Free Dorsal Root Ganglion Stimulation: An ACCURATE Sub-Analysis</td>
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<tr>
<td>7:55–8 am</td>
<td>Closing Discussion, Ramana Naidu, MD</td>
</tr>
<tr>
<td>7–7:05 am</td>
<td><strong>Novel Waveforms and Energy Delivery in Spinal Cord Stimulation</strong> <strong>Octavius 2, 3, and 4</strong></td>
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<tr>
<td>7:05–7:15 am</td>
<td>Welcome, Konstantin V. Slavin, MD</td>
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<tr>
<td>7:15–7:25 am</td>
<td>Comparison of Tonic Versus Burst Spinal Cord Stimulation During Trial: A Multicenter Italian Study</td>
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<td>7:25–7:35 am</td>
<td>HF10 Salvage Using In Situ Electrodes from Traditional Paresthesia-Based Manufactures: A Case Series</td>
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<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</td>
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<tr>
<td>7:45–7:55 am</td>
<td>Programming Optimization Strategies for Burst May Improve Outcomes</td>
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<tr>
<td>7:55–8 am</td>
<td>Closing Discussion, Konstantin V. Slavin, MD</td>
</tr>
</tbody>
</table>
## Visceral and Autonomic Neuromodulation
**Moderator:** Lawrence P. Schramm, PhD

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-7:05 am</td>
<td>Welcome</td>
<td>Lawrence P. Schramm, PhD</td>
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<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
**Moderator:** Jason E. Pope, MD DABPM FIPP

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter</th>
</tr>
</thead>
<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>
</tr>
</tbody>
</table>

### 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</th>
</tr>
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<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>9:00–9:20 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**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter</th>
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<tbody>
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<td>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</td>
<td>Kasra Amirdelfan, MD</td>
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### 9:40–10 am

**NIH Roadmap for Pain**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter</th>
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<tr>
<td>9:40–10 am</td>
<td>NIH Roadmap for Pain</td>
<td>Michael L. Oshinsky, PhD</td>
</tr>
</tbody>
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### 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</th>
</tr>
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<tbody>
<tr>
<td>10:30 am–Noon</td>
<td>The Science of Closed-Loop Deep Brain Stimulation</td>
<td>Jerrold L. Vitek, MD PhD</td>
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### 10:30–10:35 am

**Welcome**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter</th>
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<td>10:30–10:35 am</td>
<td>Welcome</td>
<td>Peter Konrad, MD PhD; Julie G. Pilitsis, MD PhD</td>
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### 10:35–10:55 am

**The Science of Closed-Loop Deep Brain Stimulation**

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<th>Time</th>
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<td>The Science of Closed-Loop Deep Brain Stimulation</td>
<td>Jerrold L. Vitek, MD PhD</td>
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</tbody>
</table>
### 1:30–3 pm Concurrent Sessions I

**Afferent Stimulation and Modulation of the Autonomic Nervous System**

**Forum 2, 3, and 4**

**Moderators:** Jeffrey L. Ardell, PhD; Robert Foreman, PhD

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30–1:35 pm</td>
<td>Welcome</td>
</tr>
<tr>
<td>1:35–1:55 pm</td>
<td>Baroreceptor Stimulation for Resistant Hypertension</td>
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<tr>
<td>1:55–2:15 pm</td>
<td>Neural Tourniquet with Vagal Nerve Stimulation</td>
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<tr>
<td>2:15–2:35 pm</td>
<td>Sensory Neurons that Detect Stretch and Nutrients in the Digestive System</td>
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<tr>
<td>2:35–2:55 pm</td>
<td>Myocardial Infarction Disrupts Networked Cardiac Control: Opportunities for Bioelectric Medicine</td>
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<tr>
<td>2:55–3:00 pm</td>
<td>Closing Discussion</td>
</tr>
</tbody>
</table>

**Scientific and Clinical Advances in Intrathecal Therapy I**

**Forum 5, 6, 7, and 8**

**Moderators:** Michael F. Saulino, MD; Tony L. Yaksh, PhD

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30–1:35 pm</td>
<td>Welcome</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>
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<tr>
<td>2:00–2:25 pm</td>
<td>Intrathecal Bolus Versus Infusion: What Are the Principles Involved?</td>
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<tr>
<td>2:25–2:50 pm</td>
<td>Where Do We Stand with the Granuloma?</td>
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<tr>
<td>2:50–3 pm</td>
<td>Closing Discussion</td>
</tr>
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</table>

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

**Octavius 2, 3, and 4**

**Moderators:** Daniel Carr, MD; Joshua P. Prager, MD MS

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</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>Opioids: What's Next?</td>
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<tr>
<td>1:55–2:15 pm</td>
<td>Safe and Effective Opioid Prescribing in 2017: An Overview</td>
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<tr>
<td>2:15–2:35 pm</td>
<td>Therapeutic Strategies to Address the Opioid Issue—Intrathecal Therapy and Alternatives</td>
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<tr>
<td>2:35–2:45 pm</td>
<td>Intrathecal Pumps to Control Pain in Patients with Intractable Side Effects from Systemic Opioids</td>
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<tr>
<td>2:45–2:55 pm</td>
<td>Association of Opioid Usage with Spinal Cord Stimulation Outcomes</td>
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<td>2:55–3 pm</td>
<td>Closing Discussion</td>
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<td>Time</td>
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<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>1:55–2:15 pm</td>
<td>Practice Management: Introduction to Revenue Streams</td>
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<tr>
<td>2:15–2:35 pm</td>
<td>Practice Management: Strategies for Building and Marketing a Neuromodulation Practice</td>
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<tr>
<td>2:35–2:55 pm</td>
<td>Contract Negotiation</td>
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<tr>
<td>2:55–3 pm</td>
<td>Closing Discussion</td>
</tr>
</tbody>
</table>

**NIC I: Advances in Deep Brain Stimulation**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30–1:35 pm</td>
<td>Welcome</td>
<td>Peter Konrad, MD PhD; Casey H. Halpern, MD</td>
</tr>
<tr>
<td>1:35–1:55 pm</td>
<td>The State of Clinical Closed-Loop DBS</td>
<td>Kelly D. Fooote, MD</td>
</tr>
<tr>
<td>1:55–2:15 pm</td>
<td>Deep Brain Stimulation for Depression—What’s the Future?</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>
<td>Warren Grill, PhD</td>
</tr>
<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>
<td>Mallory L. Hacker, PhD</td>
</tr>
<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>
<td>Peter Konrad, MD PhD</td>
</tr>
<tr>
<td>2:55–3 pm</td>
<td>Closing Discussion</td>
<td>Peter Konrad, MD PhD; Casey H. Halpern, MD</td>
</tr>
<tr>
<td>3–3:30 pm</td>
<td>Break with Exhibitors</td>
<td></td>
</tr>
</tbody>
</table>

**Concurrent Sessions II**

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

**Scientific and Clinical Advances in Intrathecal Therapy II**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>3:30–3:35 pm</td>
<td>Welcome</td>
<td>Salim M. Hayek, MD PhD; Padma Gulur, MD</td>
</tr>
<tr>
<td>3:35–3:55 pm</td>
<td>Novel Approaches in Targeted Drug Delivery in Cancer Pain</td>
<td>Denis Dupoirion, MD</td>
</tr>
<tr>
<td>3:55–4:15 pm</td>
<td>Optimizing Targeted Intrathecal Drug Delivery in Cancer Pain</td>
<td>Shane E. Brogan, MB BCH</td>
</tr>
<tr>
<td>4:15–4:35 pm</td>
<td>PACC 2016: Trialing, Safety, and Complications</td>
<td>Jason E. Pope, MD DABPM FIPP</td>
</tr>
</tbody>
</table>
## Scientific and Clinical Advances in Intrathecal Therapy II (continued)

### 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

**Octavius 2, 3, and 4**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Moderators</th>
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</thead>
<tbody>
<tr>
<td>3:30–3:35 pm</td>
<td>Welcome</td>
<td>Elliot S. Krames, MD PhD; B. Todd Sitzman, MD MPH</td>
</tr>
<tr>
<td>3:35–4:05 pm</td>
<td>Radiological Findings in Pain of Spinal Origin</td>
<td>John A. Carrino, MD MPH</td>
</tr>
<tr>
<td>4:20–4:35 pm</td>
<td>Safety, Appropriateness, Fiscal Neutrality, and Effectiveness of Nonoperative Pain Procedures to Treat Back Pain: Indications for Interventional Pain Procedures to Treat Back Pain</td>
<td>B. Todd Sitzman, MD MPH</td>
</tr>
<tr>
<td>4:35–4:50 pm</td>
<td>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?</td>
<td>Eric J. Grigsby, MD; Jacqueline S. Weisbein, DO</td>
</tr>
<tr>
<td>4:50–5 pm</td>
<td>Panel Discussion</td>
<td>All Faculty</td>
</tr>
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</table>

### Resident & Fellows Concurrent Session II

**Octavius 5, 6, 7, and 8**

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

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

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Moderators</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:30–3:35 pm</td>
<td>Welcome</td>
<td>Julie G. Pilitsis, MD PhD; Sridevi Sarma, PhD</td>
</tr>
<tr>
<td>3:35–3:55 pm</td>
<td>Electrical and Optical Modeling in the Brain</td>
<td>Cameron McIntyre, PhD</td>
</tr>
<tr>
<td>3:55–4:15 pm</td>
<td>Modeling Neural Systems in Epilepsy</td>
<td>Mark J. Cook, MBBS MD</td>
</tr>
<tr>
<td>4:15–4:30 pm</td>
<td>Connectivity-Based Parcellation of ALIC: A Possible Tool for Neuromodulatory Targeting</td>
<td>Pranav Nanda</td>
</tr>
<tr>
<td>4:30–4:45 pm</td>
<td>Image-Guided Deep Brain Stimulation: MRI-Tractography Shows Differences in Responders and Nonresponders</td>
<td>Jonathan J. Rasouli, MD</td>
</tr>
<tr>
<td>4:45–5 pm</td>
<td>Feasibility of High-Resolution Intraoperative LFP Recording with a Bipolar Microelectrode in Parkinson's Disease</td>
<td>Ilknur Telkes</td>
</tr>
<tr>
<td>5–5:05 pm</td>
<td>Closing Discussion</td>
<td>Julie G. Pilitsis, MD PhD; Sridevi Sarma, PhD</td>
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</tbody>
</table>
Friday, January 20 continued

5–6 pm
Forum Level; East and North Promenade
Residents and Fellows Job Fair

5–6 pm
Octavius 9 and 10
Women in Neuromodulation (WIN)

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

6 am–5 pm
Octavius, Promenade Level
Meeting Registration

7 am–5 pm
Forum, Pool Level
Exhibit Registration

7–8 am
Octavius 4, Octavius 15, and Forum 4
Breakfast Symposium
Evidence-Based Management of Lumbar Spinal Stenosis
This non-CME activity is supported by Vertiflex.

7–8 am
Octavius 5, 6, 7, and 8
Advances in Intrathecal Therapy
Moderator: Salim M. Hayek, MD PhD

7–7:05 am
Welcome
Salim M. Hayek, MD PhD

7:05–7:15 am
Management of Pain Due to Nephrogenic Systemic Fibrosis via Implantation of an Intrathecal Pain Pump
Mark Dziuba, MD

7:15–7:25 am
Investigation into the Priming Bolus Behavior of the Medtronic SynchroMed II Implantable Infusion System
Jeffrey Bodner, MSME MSBME

7:25–7:35 am
Targeted Drug Delivery (TDD) Product and Outcomes Registry
Linda Page, PharmD

7:35–7:45 am
Proven Safety and Efficacy of an Outpatient Intrathecal Catheter Trialing Method for Targeted Drug Delivery
Vipul Mangal, MD

7:45–7:55 am
Application of Diamond-Like Carbon Coating Inside an Implantable Medical Device for Enhanced Wear Resistance
Alan Shi, PhD

7:55–8 am
Closing Discussion
Salim M. Hayek, MD PhD

7–8 am
Augustus 1 and 2
Breakfast Symposium
Evidence-Based Management of Lumbar Spinal Stenosis
This non-CME activity is supported by Vertiflex.

7–8 am
Octavius 2, 3, and 4
Advances in Neuromodulation
Moderator: Robert Foreman, PhD

7–7:05 am
Welcome
Robert Foreman, PhD

7:05–7:15 am
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>Session</th>
<th>Presenter(s)</th>
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</thead>
</table>
Alexander R. Kent, PhD |                                                                                   |
| 7:25–7:35 am | High-Frequency & Burst Spinal Cord Stimulation on Acute Spinal Neuronal Activity in a Rat Model of Painful Radiculopathy  
Alexander R. Kent, PhD |                                                                                   |
| 7:35–7:45 am | Biomarkers for Chronic Neuropathic Pain and Their Potential Application in Spinal Cord Stimulation: A Review  
Chibueze Nwagwu, BA |                                                                                   |
Dario J. Englot, MD PhD |                                                                                   |
| 7:55–8 am   | Closing Discussion  
Robert Foreman, PhD |                                                                                   |

#### Neuromodulation for Spinal Cord Injury and Neural Injury  
**Octavius 5, 6, 7, and 8**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter(s)</th>
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</thead>
</table>
| 7–7:05 am  | Welcome  
Line Jacques, MD |                                                                                   |
| 7:05–7:15 am | Acute and Subchronic Modulation of Phantom Limb Pain Using Epidural Spinal Root Stimulation  
Ahmed Kashkoush, BS |                                                                                   |
| 7:15–7:25 am | Improved Spinal Cord Injury Patient Outcomes with 10 kHz, High-Frequency Spinal Cord Stimulation  
C. Brad Sisson, MD |                                                                                   |
| 7:25–7:35 am | Prospective Study on DRG Stimulation for the Management of Chronic Pain Following Peripheral Nerve Injury  
Anders Wahlstedt, MD |                                                                                   |
| 7:35–7:45 am | Case Report: Restoration of Neurologic Function After Trial High-Frequency Spinal Cord Stimulation in Spinal Cord Injury  
Michael H. Verdolin, MD |                                                                                   |
| 7:45–7:55 am | Retrograde Percutaneous Spinal Cord Stimulator Trial Lead Placement Due to Prior Spinal Cord Tumor Resection  
Omar Ali, MD |                                                                                   |
| 7:55–8 am   | Closing Discussion  
Line Jacques, MD |                                                                                   |

#### Advances in Neuromodulation Technology  
**Octavius 15, 16, 17, 18, and 19**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter(s)</th>
</tr>
</thead>
</table>
| 7–7:05 am  | Welcome  
Ellen L. Air, MD PhD |                                                                                   |
| 7:05–7:15 am | Targeting Treatment of Motor Control Impairment in Chronic Low Back Pain: 1-Year Results from the REACTIV8-Trial  
Sam S. Eldabe, MB ChB |                                                                                   |
| 7:15–7:25 am | Brain Neuromodulation for Treating Peripheral Inflammation  
Valentin A. Pavlov, PhD |                                                                                   |
| 7:25–7:35 am | Identifying Neuromodulation Targets for Obsessive Compulsive Disorder Using Simultaneous EEG-fMRI  
Yagna J. Pathak, PhD |                                                                                   |
| 7:35–7:45 am | Development of a Vagus Nerve Stimulator for the Treatment of Inflammatory Diseases  
Richard D. Bucholz, MD |                                                                                   |
| 7:45–7:55 am | Improved Operative Efficiency Using a Real-Time MRI-Guided Stereotactic Platform for Laser Amygdalohippocampotomy  
Allen Ho, MD |                                                                                   |
| 7:55–8 am   | Closing Discussion  
Ellen L. Air, MD PhD |                                                                                   |

#### Plenary Session III

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

<table>
<thead>
<tr>
<th>Time</th>
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</thead>
</table>
| 8–10 am    | 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  
Steven B. McMahon, PhD |                                                                                   |
| 8:15–8:35 am |  
Welcome and Overview  
Parag G. Patil, MD PhD; Lawrence Poree, MD PhD |                                                                                   |
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

10:30 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
Forum 2, 3, and 4

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

10–10:30 am
Forum Ballroom, Pool Level
Break with Exhibitors

10:30 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

Noon–1:30 pm
Augustus 5 and 6
Lunch Symposium
Advancing Patient Outcomes: New Insights, Clinical Data, and Research Findings with HF10 Therapy
This non-CME activity is supported by Nevro.
# The Scientific Foundations of Neuromodulation (continued)

**1:50–2:05 pm**  
**Dorsal Root Ganglion Stimulation Suppresses Somatic Hyperactivity in Injured Primary Sensory Neurons**  
Alexander R. Kent, PhD

**2:05–2:20 pm**  
**Current State of Closed Loop Spinal Cord Stimulation**  
Robert M. Levy, MD PhD

**2:20–2:35 pm**  
**Electrophysiological Insight into Dorsal Column Neuroanatomy and the Mechanism of Action of Spinal Cord Stimulation**  
Marc A. Russo, MBBS DA (UK)

**2:35–2:50 pm**  
**Spinal Cord Stimulation: Molecular View of Mechanism Through Genomics and Proteomics Using an Animal Model**  
David L. Cedeno, PhD

**2:50–3 pm**  
**Closing Discussion**  
Yun Guan, MD PhD; Line Jacques, MD

---


**Moderators:** David A. Provenzano, MD; Oscar A. deLeon-Casasola, MD

**1:30–1:35 pm**  
**Welcome**  
David A. Provenzano, MD; Oscar A. deLeon-Casasola, MD

**1:35–1:55 pm**  
**Helping the Pain Practitioner Succeed in the New Environment: ASRA and the Multisociety Response**  
Oscar A. deLeon-Casasola, MD

**1:55–2:10 pm**  
**MACRA and What It Means to Practitioners**  
David A. Provenzano, MD

**2:10–2:25 pm**  
**Developing an Adequate Reimbursement Structure to the CPT Process for New Technology in Pain Medicine**  
Kevin E. Vorenkamp, MD

**2:25–2:40 pm**  
**Healthcare Reform 2017: Where Are We Headed Now?**  
David S. Kloth, MD

**2:40–3 pm**  
**Panel Discussion**  
All Faculty

---

# NIC III: Brain-Machine Interface Neuroprosthetics

**Moderators:** A. Bolu Ajiboye, PhD

**1:30–1:35 pm**  
**Welcome**  
A. Bolu Ajiboye, PhD

**1:35–1:55 pm**  
**Cortical Control of an FES System for Individuals with High Tetraplegia**  
A. Bolu Ajiboye, PhD

**1:55–2:10 pm**  
**Restoring Cortical Control of Functional Movements in a Human with Quadriplegia**  
Gaurav Sharma, PhD

**2:10–2:25 pm**  
**Preliminary Frequency Discrimination and Response Time Data from Direct Cortical Somatosensory Stimulation in a Human**  
Daniel R. Kramer, MD

**2:25–2:40 PM**  
**Implantable Neuroprosthesis for Restoration of Blink Function**  
Daniel McDonnall, PhD

**2:40–2:55 pm**  
**Evaluation of Reactive Accelerated Aging to Assess the Lifetime of Utah Electrode Arrays**  
Ryan B. Caldwell, MS

**2:55–3 pm**  
**Closing Discussion**  
A. Bolu Ajiboye, PhD

---

**3–3:30 pm**  
*Forum Ballroom, Pool Level*  
*Break with Exhibitors*

---

# Non-Pain Indications of Neuromodulation

**Moderators:** Casey H. Halpern, MD; Kiran V. Patel, MD

**3:30–3:35 pm**  
**Welcome**  
Casey H. Halpern, MD; Kiran V. Patel, MD

**3:35–3:55 pm**  
**Hypoglossal Stimulation for Obstructive Sleep Apnea**  
Kingman P. Strohl, MD

**3:55–4:15 pm**  
**Sensory Neuromodulation: Cochlear Implants**  
Claus-Peter Richter, MD PhD

**4:15–4:35 pm**  
**Neurostimulation for Epilepsy**  
Peter Konrad, MD PhD

**4:35–4:55 pm**  
**SAFE Analysis of Phrenic Nerve Stimulation for Ventilator-Dependent Patients**  
Samuel Cheshier, MD PhD

**4:55–5 pm**  
**Closing Discussion**  
Casey H. Halpern, MD; Kiran V. Patel, MD
### Cranial Neuromodulation for Pain
**Moderators:** Konstantin V. Slavin, MD; Sameer A. Sheth, MD PhD

<table>
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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>
</tr>
</tbody>
</table>

### Novel Stimulation Patterns in Spinal Cord Stimulation
**Moderators:** Robert Foreman, PhD; Bengt G. Linderoth, MD PhD

<table>
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<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>
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<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>
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<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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<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>Robert M. Levy, MD PhD; Sam S. Eldabe, MB ChB</td>
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<tr>
<td>3:35–3:55 pm</td>
<td>Where Do I Begin?</td>
<td>Mariah Tackett</td>
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<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>
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<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

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<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>
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<tr>
<td>4:35–4:55 pm</td>
<td>MRI Safety Issues for Neuromodulation Systems: Update 2017</td>
<td>Frank G. Shellock, PhD</td>
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<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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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.

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### 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

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<thead>
<tr>
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<tbody>
<tr>
<td>8–8:05 am</td>
<td>Welcome</td>
<td>Lawrence Poree, MD PhD; Jason E. Pope, MD DABPM FIPP</td>
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<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>
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<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 Valleyo, MD PhD</td>
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<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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<tr>
<td>9:15–9:30 am</td>
<td>Breakfast</td>
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<tr>
<td>9:30–9:45 am</td>
<td>Top Abstracts II</td>
<td>Lawrence Poree, MD PhD; Jason E. Pope, MD DABPM FIPP</td>
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<tr>
<td>9:30–9:35 am</td>
<td>Welcome</td>
<td>Lawrence Poree, MD PhD; Jason E. Pope, MD DABPM FIPP</td>
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<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>
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<td>9:59–10:11 am</td>
<td>Barriers to Referral for Spinal Cord Stimulator Implementation</td>
<td>Ajay Antony, MD</td>
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<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>
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<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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*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 Institute 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 Well-being 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 lecturerships 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.
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Bryan C. Hoelzer, MD
Leonardo Kapural, MD PhD
Chong Kim, MD

Premeeting Workshop Directors
Advanced Practice Provider Course (PAs, NPs, Nurses): A to Z in Neuromodulation
Christy Gomez, BSN MSN AG-ACNP
Julie G. Pilitsis, MD PhD
Vishad Sukul, MD
Meghan Wilock, PA

Certificate of Attendance Advanced Implantable Therapies Workshop
Steven M. Falowski, MD
Jason E. Pope, MD DABPM FIPP
David A. Provenzano, MD

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)
Steven M. Falowski, MD
Al Mashal, PhD
Jason E. Pope, MD DABPM FIPP
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
Ali R. Rezai, MD
Ashwini D. Sharan, MD

Neurology Neuromodulation Workshop (non-CME)
Joohi Jimenez-Shahed, MD
Fenna T. Phibbs, MD MPH

Neuromodulation Cadaver Course for Advanced Implantable Therapies: A Hands-On Cadaver Course for Residents and Fellows (non-CME)
Michael A. Fishman, MD MBA
Bryan C. Hoelzer, MD
Chengyuan Wu, MD MSBmE
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Henry Ford Hospital
Detroit, MI

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Case Western Reserve University
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Salt Lake City, UT

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Milwaukee, WI

David S. Kloth, MD
Connecticut Pain Care
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Peter Konrad, MD PhD
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Nashville, TN
### Faculty

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Location</th>
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<tbody>
<tr>
<td>Elliot S. Krames, MD</td>
<td>Pacific Pain Treatment</td>
<td>San Francisco, CA</td>
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<tr>
<td>Eric Lee, MD MA</td>
<td>Ainsworth Institute of Pain Management</td>
<td>New York, NY</td>
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<tr>
<td>Scott F. Lempka, PhD</td>
<td>Cleveland Clinic</td>
<td>Cleveland, OH</td>
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<tr>
<td>Michael S. Leong, MD</td>
<td>Stanford Pain Management Center</td>
<td>Stanford, CA</td>
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<tr>
<td>Robert M. Levy, MD PhD</td>
<td>Northwestern Medical Group</td>
<td>Chicago, IL</td>
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<tr>
<td>Sean Li, MD</td>
<td>Premier Pain Centers</td>
<td>Shrewsbury, NJ</td>
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<tr>
<td>Stephen Liberles, PhD</td>
<td>Harvard Medical School</td>
<td>Boston, MA</td>
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<td>Bengt G. Linderoth, MD PhD</td>
<td>Karolinska Institut</td>
<td>Stockholm, Sweden</td>
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<tr>
<td>Andreas Linninger, PhD</td>
<td>University of Illinois at Chicago</td>
<td>Chicago, IL</td>
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<tr>
<td>Andre G. Machado, MD PhD</td>
<td>The Cleveland Clinic</td>
<td>Cleveland, OH</td>
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<tr>
<td>Timothy Marjenin, BS</td>
<td>U.S. Food and Drug Administration, Neurostimulation Devices Branch</td>
<td>Washington, DC</td>
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<tr>
<td>Gail L. McClothin, DNP RN CNS</td>
<td>Self</td>
<td>Denton, TX</td>
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<tr>
<td>Cameron McIntyre, PhD</td>
<td>Cleveland FES Center</td>
<td>Cleveland, OH</td>
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<tr>
<td>Ramana Naidu, MD</td>
<td>University of California, San Francisco</td>
<td>San Francisco, CA</td>
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<td>Sanjeet Narang, MD</td>
<td>Brigham and Women's Hospital</td>
<td>Boston, MA</td>
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<td>James North, MD</td>
<td>Carolinas Pain Institute</td>
<td>Winston Salem, NC</td>
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<td>Michael L. Oshinsky, PhD</td>
<td>National Institutes of Health/National Institute of Neurological Disorders and Stroke</td>
<td>Bethesda, MD</td>
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<td>Joseph J. Pancrazio, PhD</td>
<td>University of Texas at Dallas</td>
<td>Richardson, TX</td>
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<tr>
<td>Dipan Patel, MD</td>
<td>New York University</td>
<td>New York, NY</td>
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<tr>
<td>Kiran V. Patel, MD</td>
<td>The Spine &amp; Pain Institute of New York</td>
<td>New York, NY</td>
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<td>University of Michigan</td>
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<td>Ashwini D. Sharan, MD</td>
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<td>St. Jude Medical</td>
<td>St. Paul, MN</td>
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<td>Minneapolis, MN</td>
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<tr>
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<td>Bloomington, IL</td>
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<td>1 CEO</td>
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<th>Robert Foreman, PhD</th>
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<tr>
<td>John P. Gassler, MD</td>
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<td>Christopher A. Gilmore, MD</td>
<td>Consulting Agreement—Medtronic Neuromodulation (2), SPR Therapeutics (2), St. Jude Neuromodulation (2)</td>
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<tr>
<td>Eric J. Grigsby, MD MBA</td>
<td>Consulting Agreement—Medallion Therapeutics (2), Medtronic (2), Medtronic (2), Myocutaneous (2), NeuroPhage Pharmaceuticals (2), Medtronic (2), Medtronic (2), Myocutaneous (2), NeuroPhage Pharmaceuticals (2), St. Jude Medical (2), Tenex Health, Inc. (2), VerteX, Inc. (2), VertiFlex, Inc. (2), Vertical Health, Inc. (2), VerteX, Inc. (2), VertiFlex, Inc. (2), Tenex Health, Inc. (2), VerteX, Inc. (2), Tenex Health, Inc. (2), VerteX, Inc. (2)</td>
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<th>Robert Bolash, MD</th>
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<td>Honoraria—BOSTON SCIENTIFIC (2), Medtronic (2)</td>
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<td>Richard D. Bucholz, MD</td>
<td>Ownership Interest—SetPointe (2)</td>
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<td>David L. Cedeno, PhD</td>
<td>Ownership Interest—StimGenics (3), Salary—Millennium Pain Center (5)</td>
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<tr>
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<td>Consulting Agreement—St. Jude Medical (2), NeuroX (2), Saluda Medical (10)</td>
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<td>Honoraria—Axonics Modulation Technologies (2), Bioness, Inc. (2), Ethics Laboratories (2), Flownex Medical (2), Jazz Pharmaceuticals (2), Medtronic (2), NeuroX (2), Verto Medical, Inc. (2), Meeting Travel Support—Jazz Pharmaceuticals (6), Medtronic, Inc. (6), NeuroX (6), Verto Medical (6), Spinal Modulation (6), St. Jude Medical (6), Other—Axonics Modulation Technologies (10), Bioness, Inc. (10), Flownex Medical (10), Jazz Pharmaceuticals (10), Medtronic, Inc. (10), NeuroX (10), Verto Medical (10), Spinal Modulation (10), SpineThera (10), St. Jude Medical (10), Stock Shares—Axonics Modulation Technologies (10), Bioness, Inc. (10), Ethics Laboratories (10), NeuroX (10), Verto Medical (10), Spinal Modulation (10), SpineThera (10), Verto Medical, Inc. (10)</td>
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| Warren Grill, PhD | Ownership Interest—Deep Brain Innovations, LLC (3) |
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Anders Wahlstedt, MD
Christopher Welker, MBA
Meghan Wilcock, PA
**Epilepsy**

(1) Medtronic Registry for Epilepsy (MORE) Interim Baseline and Safety Results (11430)  
Jon Giftakis  
(2) Quality of Life Metrics with Vagus Nerve Stimulation for Epilepsy from Provider Survey Data (11367)  
Kevin Hassnain  
(3) Improved Operative Efficiency Using a Real-Time MRI-Guided Stereotactic Platform for Laser Amygdalohippocampotomy (11455)  
Allen Ho, MD  
(4) Laser Interstitial Thermal Therapy Outcomes for Intractable Epilepsy: A Single Institution’s Initial Experience (11713)  
Allen Ho, MD  
(5) Deep Brain Stimulation for Medically Refractory Epilepsy: Single Centre Experience and Clinical Outcomes (11466)  
Kantharuby Tambirajoo, MB BCh BAO  
(6) Long-term Safety and Efficacy of Brain Responsive Stimulation in Adults with Medically Intractable Partial Onset Seizures (11474)  
Ashwini D. Sharan, MD

**Nerve Root and DRG Stimulation I**

(7) Successful Dorsal Root Ganglion Stimulation for Treatment of Lower Extremity Complex Regional Pain Syndrome (11699)  
Hazeez Adigun, MD  
(8) Dorsal Root Ganglion Stimulation for Post-Thoracotomy Pain Syndrome (11326)  
Rehan Ali, MD  
(9) High Frequency Spinal Cord Stimulation of the S1 Dorsal Root Ganglia for Refractory Sural Neuropathy (11412)  
Viet Cai, MD  
(10) Post-Market Study to Assess DRG Stimulation for the Management of Chronic Intractable Pain (11475)  
William Cusack, PhD  
George Girardi, MD  
(12) Case Study: Relief of Somatic Knee Joint Pain from DRG Stimulation (11429)  
Kevin Trinh, MD  
(14) Prospective Study to Evaluate the Effectiveness of DRG Stimulation for Treating Discogenic Low Back Pain (11450)  
JW. Kallewaard, MD  
(15) Acute and Sub-Chronic Modulation of Phantom Limb Pain Using Epidural Spinal Root Stimulation (11366)  
Ahmed Kashkoush, BS  
(16) Dorsal Root Ganglion Stimulation Suppresses Somatic Hyperactivity in Injured Primary Sensory Neurons (11471)  
Alexander R. Kent, PhD  
(17) Utility of Strength-Duration Curves for Differentiating Stimulation of the Dorsal Root Ganglion Versus Nerve Root (11472)  
Alexander R. Kent, PhD  
(18) Dorsal Root Ganglion Stimulation Amplifies T-Junction Filtering in Primary Sensory Neurons (11479)  
Alexander R. Kent, PhD  
(19) Comparison of Evoked Paresthesia Between SCS and DRG Stimulation: An ACCURATE Substudy (11505)  
Nagy Mekhail, MD PhD  
(20) Superior Pain Control with DRG Stimulation for CRPSI Compared to Conventional SCS (11633)  
Chad Pletnick, MD

**Novel Applications of SCS**

(22) Multimodality Management of Complex Regional Pain Syndrome with Secondary Dystonia: A Case Report (11624)  
Kathryn Altonji  
(23) Spinal Cord Stimulation Following Traumatic Spinal Cord Hemisection: A Successful Trial (11617)  
Samuel Espiritu, DO  
(24) Spinal Cord Stimulator Implantation and Resolution of RLS Symptoms (11800)  
Kevin Pelletier, MD

**Peripheral Nerve Stimulation**

(28) Occipital and Trigeminal Field Stimulation for Treatment of Trigeminal Neuropathic Pain: Case with Long-term Follow-up (11703)  
Christy Anthony, MD  
(29) Evaluation of Intracranial Usage of Burst Stimulation (11804)  
Greg Bara, MD  
(30) Clinical Outcomes and Predictive Factors Associated with Peripheral Nerve Field Stimulation for Low Back Pain (11435)  
Sylvine Carrondo Cottin, PhD  
(31) New Implantable Neuromodulation System for Peripheral Nerve Stimulation: Efficacy on Pain and Mental Status (11537)  
Alessandro Dario, MD  
(32) Sacral Lateral Branch Nerve Stimulation for Refractory Sacroiliac Joint Pain (11664)  
Janice Gellis, MD  
(33) Treatment of Chronic Refractory Sacroiliac Joint Pain with Percutaneous Peripheral Nerve Stimulation (11344)  
Victor Leslie, MD  
(34) Successful Treatment of Post-stroke Shoulder Pain with Peripheral Nerve Stimulation of the Axillary Nerve (11601)  
Vincent Miccio, MD  
(35) Peripheral Neuromodulation of the Suprascapular Nerve for Treatment of Trauma-Induced Chronic Shoulder Pain (11392)  
Janus Patel, MD MPH  
(36) Hybrid Stimulation: More Than a Case (11721)  
Jose Paz, MD  
(37) Modulating the Nervous System Using Charge-Balanced Polarization Current (CBPC) Nerve Block (11730)  
Tina Vrabec, PhD

**SCS Placement, Programming, and Efficacy I**

(40) Barriers to Referral for Spinal Cord Stimulator Implementation (11312)  
Ajay Antony, MD  
(41) Spinal Cord Stimulation Treatment of Bilateral Hand Pain with Low Profile Multicolumn Paddle Lead (11519)  
Giancarlo Barolat, MD
**SCS Waves and Energy Delivery**

- (60) HF10 Salvage Using In Situ Electrodes from Traditional Paresthesia-Based Manufacturers: A Case Series (11428)  
  Christopher Abrecht, MD

- (61) HF10 SCS Therapy for the Treatment of Nonsurgical Refractory Back Pain: 36-month Follow-Up Data (11754)  
  Adnan Al-Kaisy, MB ChB

- (62) Treatment of Complex Regional Pain Syndrome with High-Frequency SCS at 10 kHz: A Case Series (11538)  
  Kasra Amirdelfan, MD

- (63) Optimization of Burst Spinal Cord Stimulation by Amplitude Titration (11803)  
  Greg Bara, MD

- (64) Utilization of Multiple Spinal Cord Stimulation Waveforms in Chronic Pain Patients (11488)  
  Anthony Berg, MD

- (65) Cervical Avulsion Treated with High-Frequency Spinal Cord Stimulation at 10 kHz: A Case Report (11802)  
  Taisa Cherry, MD

- (66) Treatment of Intractable Loin Pain with High-Frequency Spinal Cord Stimulation at 10 kHz (11371)  
  Kathryn Davies, MBBS

- (67) New Modalities of Neurostimulation: HF and Burst Stimulation in Patients with FBSS (11351)  
  Giuliano De Carolis, MD

- (68) Comparison of Tonic Versus Burst Spinal Cord Stimulation During Trial: A Multicenter Italian Study (11585)  
  Laura Demartini, MD

- (69) High-Frequency 10 kHz Spinal Cord Stimulation Used to Treat Refractory, Chronic Pancreatitis Pain (11554)  
  Keeley Dohmeier, MD

- (70) Programming Optimization Strategies for Burst May Improve Outcomes (11771)  
  Steven M. Falowski, MD

- (71) High-Frequency Spinal Cord Stimulation for the Treatment of Chronic Intractable Pain from Peripheral Polyneuropathy (11622)  
  Vincent Galan, MD MBA

- (72) Spinal Cord Stimulation Trial Outcomes After Conversion to a Multiple Waveform SCS System (11493)  
  Nameer Haider, MD

- (73) Subject Therapy Preference Post-Randomized Phase in a Spinal Cord Stimulation Study Using Higher Frequencies (11587)  
  Adnan Al-Kaisy, MD MB ChB

- (74) Burst Spinal Column Stimulation, Leeds Experience in Optimization Programming to Enhance Patient Outcome and Satisfaction (11563)  
  Jenny Jennings, MSc BSc RGN

- (75) High-Frequency Spinal Cord Stimulation for the Treatment of Intractable Leg Pain (11752)  
  Jan Willem Kallewaard, MD

- (76) High-Frequency Spinal Cord Stimulation at 10 kHz for the Treatment of Intractable Leg Pain (11523)  
  Leonardo Kapural, MD PhD

- (77) Single Center Experience Salvaging Failed Traditional Spinal Cord Stimulation Patients with 1 kHz Stimulation (11630)  
  Leonardo Kapural, MD PhD

- (78) Dorsal Column Fiber Response is Dependent on the Temporal Pattern of Burst Spinal Cord Stimulation (11484)  
  Alexander R. Kent, PhD

- (79) Burst or High-Frequency (10 kHz) Spinal Cord Stimulation in Failed Back Surgery Syndrome Patients with Predominant Back Pain: Long-Term Comparative Data (11725)  
  Thomas Knfe, MD PhD

- (80) Burst Spinal Cord Stimulation Significantly Increased Peripheral Antineuroinflammatory Interleukine 10 Plasma Levels in Failed Back Surgery Syndrome Patients with Predominant Back Pain (11727)  
  Thomas Knfe, MD PhD

- (81) High-Frequency Spinal Cord Stimulation in a Patient with an Implanted Cardiac Device (11421)  
  Narayan Kissoon, MD

- (82) Long-Term Results in Leg Pain Patients Treated with High-Frequency Spinal Cord Stimulation at 10 kHz (11370)  
  Sarah Love-Jones, MBBS

- (83) The Bristol Clinical Experience with BurstDR™ Spinal Cord Stimulation for Treatment of Chronic Limb Pain (11731)  
  Sarah Love-Jones, MBBS
**Targeted Drug Delivery I**

(84) Compatibility of a Baclofen 3 mg/mL Intrathecal Formulation with the Implantable Flowonix Prometra Programmable Pump (11521)
Taryn Bagby, PhD

(85) Investigation into the Priming Bolus Behavior of the Medtronic SynchroMed II Implantable Infusion System (11447)
Jeffrey Bodner, MSME MSBME

(86) Exposed Pump in Situ: Saving the Intrathecal Catheter in a Difficult Situation (11710)
Maria Calvo, MD

(87) Analysis on the Efficacy of Flex Dosing Versus Continuous Infusion of Intrathecal Baclofen (11321)
Julian Cockerell

(88) The Role of Ziconotide in the Reduction of Spasticity: A Case Report (11322)
Julian Cockerell

(89) Intrathecal Morphine Alone Managing Spasticity and Chronic Pain Following Spinal Cord Injury: A Case Report (11314)
Gregory Condie, DO

(90) Effectiveness and Safety of Intrathecal Ziconotide in Patients with Failed Back Surgery Syndrome (11433)
Timothy Deer, MD

(91) Dorsal Root Ganglion Stimulation for Lower Extremity CRPS with Concurrent Intrathecal Drug Delivery: Case Report (11669)
Jay Grider, DO PhD MBA

(92) Design Enhancement to the SynchroMed II Implantable Infusion Pump to Address Internal Electrical Shorting (11672)
Ann Gronda, PhD

(93) Intrathecal Baclofen Inhibits Pain Responses Evoked by Bladder Distention in a Rat Interstitial Cystitis Model (11346)
Keith Hildebrand, DVM PhD

(94) Physician Assistant and Nurse Practitioner Involvement in Intrathecal Drug Delivery System Monitoring and Maintenance (11657)
Chelsey Hoffmann, RD PA-C

(95) Immediate Contralateral Exchange of Baclofen Pump for Incisional Drainage in a Tetraplegic Patient (11598)
Ali Idrees, MD

(96) Low Dose Ziconotide Therapy Leads to Symptomatic Creatine Kinase Elevation and Renal Dysfunction (11611)
Kenneth Ike, MD

(97) Intrathecal Pumps to Control Pain in Patients with Intractable Side Effects from Systemic Opioids (11686)
Daniel Kloster, MD

(98) Intrathecal Catheters for Targeted Drug Delivery: Replicating Clinical Scenarios on the Benchtop (11588)
Elizabeth Kregel

(99) Intrathecal Catheters for Targeted Drug Delivery: Computer Modeling of Bending the Ascenda Catheter (11591)
Elizabeth Kregel

(100) Intrathecal Catheters for Targeted Drug Delivery: CT Scanning of Ascenda Catheter Kinks (11592)
Elizabeth Kregel

(101) Intrathecal Catheters for Targeted Drug Delivery: Data Mining and Trending of the Ascenda Catheter (11593)
Elizabeth Kregel

(102) Intrathecal Catheters for Targeted Drug Delivery: Scanning Electron Microscope Analysis of Ascenda Catheter Kinking (11594)
Elizabeth Kregel

**Technology Advances**

(103) Improved Targeting of Lateral Dorsal Columns with a 64-Contact, Current-Steering Paddle for Axial Low Back Pain (11438)
Bryan McLaughlin, PhD

(104) Design and Testing of a Low Power Neural Interface Module for the Networked Neuroprosthesis System (11734)
Autumn Bullard

(105) Wireless Stimulation for the Treatment of Knee Surgery Chronic Pain: Case Study (11783)
Frank DeLoos, MD

(106) The Use of High-Intensity Focused Ultrasound for the Treatment of Cutaneous Alloodynia Associated with Chronic Migraine (11762)
Lucy Gee, PhD

(107) Electrical Vagus Nerve Stimulation Reduces Bleeding Following Tissue Injury (11784)
Jared Huston, MD

(108) When Neuromodulation Becomes Mind Control (11706)
Andrew Koivuniemi, MD PhD

(109) Effects of Noninvasive Vagus Nerve Stimulation on Autonomic Output and Brain Following Heat Pain Stimuli (11561)
Imanuel Lerman, MD MS

(110) A Prospective, Multicenter, Randomized, Double-Blind Study of Closed-Loop SCS (11676)
Robert M. Levy, MD PhD

(111) Optimizing BCI-Driven Assistive Manipulators for Quadriplegic Spinal Cord Injury Subjects (11674)
Patrick Manni

(112) Implantable Neuroprosthesis for Restoration of Blink Function (11758)
Daniel McDonnell, PhD

(113) Development of a 64-Channel Implantable Closed-Loop Stimulation and Recording System (11618)
Dan Merrill, PhD

(114) Scapula Pain Treatment with SCS Wireless Neurostimulation (11650)
Sunil Panchal, MD

(115) Transverse Current Steering in SCS Using a 4-Column Lead: Clinical Validation of Computational Modeling Data (11545)
Julie G. Pilitsis, MD PhD

(116) Parameters That Dictate the Design for an Optical Cochlear Implant in Humans (11523)
Claus-Peter Richter, MD PhD

(117) A Novel Telehealth-Neurostimulation Intervention for At-Home Symptom Management in Chronically Ill Patients with Multiple Symptoms (11583)
Alexa Riggs, MPHc

(118) Frequency Modulated Phase Coding for Cochlear Implants (11732)
Reagan Roberts

(119) Restoring Cortical Control of Functional Movements in a Human with Quadriplegia (11679)
Gaurav Sharma, PhD

(120) In Vitro MRI Evaluation of the Open-Coil Lead Used for Percutaneous Peripheral Nerve Stimulation (11514)
Frank Sherlock, PhD

(121) UPDATE: WIKISTIM.org (11520)
Jane Shipley, BA

(122) Current State of Wearable Technology in the Field of Neuromodulation (11559)
Justin Turpin

(123) Flexible Printed Polymer Electrodes for Neural Signal Recording and Stimulation (11759)
Alexander Thiessen, PhD
**SESSION II**

**Saturday, January 21**

**5-7 pm**

*Forum Ballroom Pub Hub*

### Basic Science and Mechanisms

   - David Cedeno, PhD

2. Sacral Nerve Stimulation with Optimized Parameters Improves Visceral Hypersensitivity in Rats Mediated via the Autonomic Mechanisms and Opioid Pathway (11589)
   - Liuqin Jiang

   - Alexander R. Kent, PhD

4. Longitudinal Study of Pain Area Pattern Changes and Development in Neuropathic Pain Patients (11678)
   - Sherry Lin, PhD

   - Chibueze Nwagwu, BA

6. Electrophysiological Insight into Dorsal Column Neuroanatomy and the Mechanism of Action of Spinal Cord Stimulation (11635)
   - Marc A. Russo, MBBS DA (UK)

7. Systemic Inflammatory and Th17 Activation Is Greater in Lumbar Radiculopathy Patients than Neuropathic Pain Patients (11336)
   - Mohammed Shamji, MD PhD

8. Stimulation Parameters Leading to Tissue Damage in Rat Sciatic Nerve (11678)
   - Yunyan Jennifer Wang

9. Sacral Nerve Stimulation Improved Intestinal Inflammation in Dextran Sodium Sulfate-Induced Colitis Rats Model (11578)
   - Han Zhang, MD PhD

10. Effects of Sacral Nerve Stimulation on Gastric and Intestinal Motility: A Possible Spinal-Afferent Vagal-Efferent Pathway (11632)
    - Shengai Zhang

### Brain Stimulation

    - Binith Cheeran

12. Simulation of Targeting Two Simultaneous Nuclei with a Single 8-contact DBS Lead for Movement Disorders (11595)
    - Nevar Galleri, MD

13. Deep Brain Stimulation in Early-Stage Parkinson’s Disease: Stimulation and Medication Use Through 5 Years (11507)
    - Mallory Hacker, PhD

    - Allen Ho, MD

15. Is a 13-Year-Old Brain Adult-Like? The AC-AC Distance Perspective (11795)
    - Changqing Kao, MD

16. Long-Term Recharging Behavior and Therapy Settings in Patients Implanted with Rechargeable Deep Brain Stimulation Systems (11799)
    - Peter Konrad, MD PhD

17. Adaptive Deep Brain Stimulation for Parkinson’s Disease: 8-Hours Application and Monitoring in Freely Moving Patients (11737)
    - Sara Marceglia, PhD

18. Identifying Neuromodulation Targets for OCD Using Simultaneous EEG-fMRI (11765)
    - Yagna Pathak, PhD

19. Asleep Robot-Assisted DBS: An Initial Institutional Experience (11904)
    - Jonathan Riley

20. Impact of Segmented Leads for DBS (11459)
    - Jan Vesper, MD PhD

    - Todd Weaver, PhD

### Cancer Pain

22. Serum Opioid Levels Before and After Intrathecal Therapy for Refractory Cancer Pain (11687)
    - Carina Jackman, MD

23. Lymphedema Pain in a Breast Cancer Survivor Successfully Treated with Spinal Cord Stimulation (11388)
    - Peggy Kim, MD MS MBA

24. Intrathecal Pain Pump Infusions for Intractable Cancer Pain: An Algorithm for Dosing Without a Trial (11788)
    - Innocent Njoku

25. Cooled Radiofrequency Ablation in Combination with Kyphoplasty for Treating Primary and Metastatic Osteolytic Disease (11689)
    - Christian Samuelson, MD

26. Intrathecal Ziconotide and Morphine for Refractory Pain in Patients with Metastatic Prostate Cancer (11575)
    - Lara Tollapi, MD

### Cranial Neuromodulation for Pain

27. Effect Prediction of Occipital Nerve Stimulation in Cluster Headache, with Transcutaneous Electrical Nerve Stimulation Preoperatively (11605)
    - Jens Christian Sorensen, MD PhD DMSc

28. Long-Term Outcomes of Occipital Nerve Stimulation in Management of Trigeminal Autonomic Cephalgias and Occipital Neuralgia (11536)
    - Kantharuby Tambirajoo, MB BCh BAO

29. Technical Aspects of SPG Stimulation for Cluster Headache: A New Frontier in Neuromodulation (11741)
    - Jan Vesper, MD PhD

30. Successful Combination of SPG and ONS for Cluster Headache (11751)
    - Jan Vesper, MD PhD

### Nerve Root and DRG Stimulation II

31. Comparison of SCS and DRG Outcomes in Focal and Widespread Pain: An ACCURATE Substudy (11529)
    - Lawrence Poree, MD PhD

32. Case Series: DRG Stimulation Salvage for Failed SCS in Patients with CRPS (11363)
    - Ann Shah, MD

33. Cervical and High-Thoracic Dorsal Root Ganglion Stimulation in Chronic Pain (11456)
    - Philipp Slotty, MD PhD

34. Comparing Effectiveness of Spinal Cord Stimulation and Dorsal Root Ganglion Stimulation: An ACCURATE Subanalysis (11476)
    - Peter S. Staats, MD MBA

35. Can Dorsal Root Ganglion Stimulation for Pain Relief Modulate Sympathetic Efferent Nerve Traffic? (11515)
    - Yrsa Sverrisdottir, PhD

36. Dorsal Root Ganglion Spinal Cord Stimulation as a Treatment for Intractable Post-Surgical Groin Pain (11357)
    - Paul Verrills, MD
(39) Subthreshold Stimulation of the Dorsal Root Ganglia: Retrospective Study (11473)
Paul Verrills, MD
(40) Dorsal Root Ganglion Stimulation in Chronic Pain: 2 Center Experience with 114 patients (11739)
Jan Vesper, MD PhD
(41) Prospective Study on DRG Stimulation for the Management of Chronic Pain Following Peripheral Nerve Injury (11477)
Anders Wahlestedt, MD
(42) Assessing Performance of Dorsal Root Ganglion Stimulation for Management of Surgical Pain: A Post-Market Observational Study (11463)
Frank Wille, MD
(43) Dorsal Root Ganglion Stimulation in the Treatment of Medically Refractory Drug-Induced Painful Peripheral Neuropathy (11542)
Marc Yelle, MD PhD
(44) Dorsal Root Ganglion Stimulation to Treat Diabetic Neuropathy After Therapeutic Failure of Traditional SCS and Ziconotide (11546)
Marc Yelle, MD PhD
(45) Comparison of Pain Coverage and Excess Paresthesia Between SCS and DRG Stimulation: An ACCURATE Substudy (11528)
Robert M. Levy, MD PhD

SCS Complications and Avoidance
(46) Delayed Intracranial Hypotension Presented 10 Days After Percutaneous Removal of Spinal Cord Stimulator Leads (11418)
Maria Calvo, MD
(47) Delayed Reimplantation of Spinal Cord Stimulator After Extrusion of Implantable Pulse Generator (11628)
Paul Cheng, MD
(48) The Effect of Hospital Size on Unplanned 30-Day Readmission Rate Following Spinal Cord Stimulator Implantation (11566)
Aladine Elsamadicy, BE
(49) Obesity Independently Predicts Unplanned 30-Day Readmissions Following Spinal Cord Stimulator Implantation (11567)
Aladine Elsamadicy, BE
(50) Severity of Illness Predicts Unplanned 30-Day Readmission Following Spinal Cord Stimulator Implantation (11569)
Aladine Elsamadicy, BE
(51) Spinal Cord Stimulation Infection Rate and Risk Factors: Results from a U.S. Payer Database (11760)
Steven M. Falowski, MD
(52) Surgical Complications Following Removal of Spinal Cord Stimulation Paddle Electrodes (11470)
Andres Maldonado, MD
(53) Unusual Complication of Electrical Injury in Patient with Spinal Cord Stimulator (11448)
Ashraf Sakr, MD
(54) Epidural Abscess During Spinal Cord Stimulator Trial (11651)
Brian Wetherington, MD

SCS Placement, Programming, and Efficacy II
(55) QST as a Biomarker for Phenotyping Patients Undergoing Spinal Cord Stimulation: A Clinical Investigation (11911)
Vivek Mehta, MD MBBS
(56) Detailed Analysis of Implantable Pulse Generators for SCS: A 10-year Single-Center Experience (11462)
Kaare Meier, MD PhD
(57) Combined Cervical Spinal Cord Stimulator and Brachial Plexus Stimulator Lead Placement (11809)
Mohamed Osman, MD
(58) Low Back Pain Relief Using a 32-Contact Surgical Lead and 3D Neural Targeting Algorithm (11453)
Julie G. Pilitsis, MD PhD

(59) Use of a Psychological Evaluation Tool as a Predictor of Spinal Cord Stimulation Outcomes (11770)
Julie G. Pilitsis, MD PhD
(60) Prospective Evaluation of Patient Usage Patterns with Subparesthesia Waveforms (11612)
Julia Prusik, BS
(61) C1 Retrograde Spinal Cord Stimulation for Trigeminal Deafferentation Pain: Case Study with Long-Term Follow-Up (11446)
Bertram Richter, MD
(62) Spinal Cord Stimulation for Loin Pain Hematuria Syndrome: Case Report (11451)
Bertram Richter, MD
(63) Spinal Cord Neuromodulation Therapy for Levofloxacin-Induced Complex Regional Pain Syndrome and Neurotoxicity (11444)
Ashraf Sakr, MD
(64) Differentiating Postoperative Patients with Neuropathic Pain Versus Structurally Correctable Pathology (11786)
Mohammed Shamji, MD PhD
(65) Managing Electrical Interference with Neuromodulation Devices in the Operating Room (11614)
Prasad Shirvalkar, MD PhD
(66) International Spinal Cord Stimulation Effectiveness Study Reveals Longer-Term Outcomes of the Therapy in 950 Implants (11512)
Jean-Pierre Van Buyten, MD
(67) Long-Term Outcomes of Anatomically Guided (3D) Neural Targeting Spinal Cord Stimulation: LUMINA Study Final Results (11327)
Elias Veizi, MD PhD
(68) Successful Pain Relief Using MICC Technology and 3D-Illumina TM Programming Following Failure of the Conventional SCS Systems (11745)
Jan Vesper, MD PhD
(69) Multi-Contact Leads: Is It an Advantage? (11811)
Atilla Yilmaz, MD

SCS Waveforms and Energy Delivery II
(70) Salvo 10-kHz High-Frequency Spinal Cord Stimulation for the Treatment of Chronic Back and Leg Pain in Nonresponder to Traditional Low-Frequency SCS Therapy (11905)
Mohammad Maarouf, MD
(71) Outcomes of 1 kHz Subperception Spinal Cord Stimulation in Patients with Failed Paresthesia Based Stimulation (11508)
James North, MD
(72) Therapeutic Efficacy of Alternating High-Frequency Stimulation with Traditional Stimulation (11414)
Julia Prusik, BS
(73) Improved Spinal Cord Stimulation Outcomes Associated with Percutaneous Lead Placement and Multiple Waveform Programming Technique (11500)
Stephen Pyles, MD
(74) High-Frequency Spinal Cord Stimulation in Patients with Cardiac Pacemakers: Case Report (11499)
Sherif Said, MD
(75) A Single-Center Experience with High-Frequency Spinal Cord Stimulation at 10 kHz (11790)
Dawood Sayed, MD
(76) Improved Spinal Cord Injury Patient Outcomes with 10 kHz High-Frequency Spinal Cord Stimulation (11606)
C. Brad Sisson, MD
(79) Three Cases of High-Frequency Spinal Cord Stimulation for Painful Lower Extremity Neuropathy of Varied Etiologies (11607)
C. Brad Sisson, MD

(80) Treatment of Chronic Pain from Cauda Equina Syndrome with High-Frequency Spinal Cord Stimulation (11608)
C. Brad Sisson, MD

(81) Randomized, Controlled Trial Assessing Burst Stimulation for Chronic Pain: Update of the SUNBURST Study (11773)
Konstantin Slavin, MD

(82) 10 kHz Spinal Cord Stimulation After Second- and Third-Degree Burns of Both Lower Legs: Case Report (11362)
Karl Steinbach, MD

(83) High-Frequency Spinal Cord Stimulation for Coccydynia: Report of Two Cases (11531)
Girish Vajramani

(84) Combined Burst Spinal Cord Stimulator and Dorsal Root Ganglion DRG SCS in Controlling Intractable Pain (11599)
Girish Vajramani

(85) Use of BurstDR™ Stimulation in Salvaging a Tonic Stimulation Nonresponder: A Case Report (11766)
Girish Vajramani

(86) Long-Term Outcomes of High-Frequency Spinal Cord Stimulation at 10 kHz in Routine Practice (11377)
Jean-Pierre Van Buyten, MD

(87) High-Frequency Spinal Cord Stimulation for Intractable-Chronic Leg Pain: 4 Years Single Center Experience (11516)
Ida van der Voort, MA NP

(88) Treatment of Chronic Upper Limb Pain Using BurstDR™ Spinal Cord Stimulation: 3-Month Belgian Clinical Experience (11403)
Tony Van Havenbergh, MD PhD

(89) Treatment of Chronic Vulvodynia Using BurstDR Spinal Cord Stimulation: Report of First Case (11440)
Nicolas Varela, MD DESA

(90) Salvage SCS High-Density Waveform Anatomic Reprogramming in Six Consecutive Patients Produced Clinically and Statistically Significant Improvement (11381)
Michael Verdolin, MD

(91) Prospective, SCS Trialing High-Density Waveforms at T9-10 Produce Clinically and Statistically Significant Improvement in Pain (11580)
Michael Verdolin, MD

(92) Burst or Tonic Stimulation? Results of a Placebo-Controlled, Double-Blinded, Randomized Study for the Treatment of FBSST Patients: 3-Year Follow-Up (11458)
Jan Vesper, MD PhD

(93) Burst Spinal Cord Stimulation Improves Catastrophizing and Quality of Life for Chronic Pain Patients (11631)
Jan Vesper, MD PhD

(94) Therapeutic Efficacy of BurstDR™ Microdosing in Treatment of Chronic Pain (11681)
Jan Vesper, MD PhD

(95) Altering Conventional to High-Density Spinal Cord Stimulation: An Energy Dose-Response Relationship in Neuropathic Pain Therapy (11397)
Frank Wille, MD

(96) Properties and Underlying Mechanisms of Multiple Modalities of SCS: Review and Hypotheses (11562)
Tianhe Zhang, PhD

Targeted Drug Delivery II

(97) Sustained Effectiveness of Intrathecal Ziconotide Use in Patients with Severe Chronic Pain (11441)
Gladstone McDowell, MD

(98) Impact of Infusion Parameters on Cerebrospinal Fluid Dynamics with Intrathecal Targeted Drug Delivery (11668)
Linda Page, PharmD

(99) Targeted Drug Delivery Characterization of On- Versus Off-Label Pumps from Product Surveillance Registry (11746)
Linda Page, PharmD

(100) Targeted Drug Delivery Product and Outcomes Registry (11775)
Linda Page, PharmD

(101) Targeted Drug Delivery Characterization of Treatment of Back Pain from Product Surveillance Registry (11777)
Linda Page, PharmD

(102) Targeted Drug Delivery Product Surveillance Registry and Motor Stall Due to MRI (11779)
Linda Page, PharmD

(103) Integrating Intrathecal Pump Patient Activator into Postoperative Pain Management: Lessons and Challenges (11660)
Alec Peniche, MD

(104) A Tale of Two Trials: The Case for Intrathecal Catheter Trialing Trials (11714)
Yawar Qadri, MD PhD

(105) Effect of Intrathecal Ziconotide as the First Agent in Pump on Patient-Reported Outcomes (11613)
Richard L. Rauck, MD

(106) Successful Management of Cervical Pain Following a C1 Fracture with Intrathecal Targeted Drug Delivery (11544)
Justin Roh, MD

(107) CT Myelography of Intrathecal Catheters Despite Negative Side Port Aspiration: A Case Series (11465)
Michael F. Saulino, MD PhD

(108) Effectiveness and Safety of Intrathecal Ziconotide Use as Monotherapy or Combination Therapy (11487)
Michael F. Saulino, MD PhD

(109) Design Enhancement to the SynchroMed II Implantable Infusion Pump to Address Motor Corrosion (11680)
Alan Shi, PhD

(110) Application of Diamond-Like Carbon Coating Inside an Implantable Medical Device for Enhanced Wear Resistance (11768)
Alan Shi, PhD

(111) Conversion from Systemic to Intrathecal Morphine Sulfate: A Case Report (11772)
Robert Spencer, MS MBA

(112) Accuracy in Intrathecal Drug Delivery with an Implanted Infusion System: Important Clinical Considerations (11774)
Robert Spencer, MS MBA

(113) Effectiveness and Safety of Intrathecal Ziconotide Use as the First Agent in Pump (11590)
Mark Wallace, MD
AIS Pain Care, Booth 413
AIS Pain Care is the industry leader in injectable medications for patients with implanted intrathecal pain pumps. Founded in 1998 and serving more than 16,000 pump patients from our state-of-the-art pharmacy and clean room at AIS headquarters in Jackson, MS, AIS is USP 797 compliant and licensed to provide medications to all 50 states. Our patient-first approach combined with knowledgeable and experienced pharmacists with more than 400 years of combined experience can meet all of your intrathecal needs, 24 hours a day, 7 days a week.

Alpha Omega, Booth 316
Alpha Omega offers clients breakthrough technology, unrivaled dependability, and dedicated service with its microelectrode recording technology. Our competitive edge is in our custom design, manufacturing, and international marketing of products. We provide solutions for neuroscientists and neurosurgeons that can be found in advanced research institutions, hospitals, and universities across the globe.

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 Interventional Pain Physicians, Booth 330
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.

Celling Biosciences, Booth 125
As the innovative leader in regenerative medicine, Celling Biosciences has redefined the future of medicine through our best-in-class products. From aspiration to concentration, our devices are designed to recover the greatest percentage of bone marrow-derived stem cells at point-of-care, and our technologies allow physicians an opportunity to provide personalized cellular treatment to their patients.

Custom Interventional Pain Management, Booth 212
Custom Interventional Pain Management (CIPM) specializes in custom procedural trays and injection products. CIPM delivers a high level of quality and customer service and can turn around a first-time custom order in less than 30 days with no supply agreement and the flexibility to make changes at any time. Contact: 888.392.4514, www.cipmtrays.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.
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.

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 candidate in the areas of sleep, hematologic/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 a disruptive device platform aimed at making neurostimulation a more cost-effective therapeutic option.

Mallinckrodt Pharmaceuticals, Booth 107
Mallinckrodt is a global business that develops, manufactures, markets, and distributes specialty pharmaceutical and biopharmaceutical 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.
NeuroScience Trials Australia, Booth 110
NeuroScience Trials Australia is an Australian-based contract research organization specializing in neuroscience clinical research. Our services include specialties, study feasibility, project management, monitoring, medical writing, data management and biostatistics, and safety.

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.

Nevro, Booths 201, 229
Nevro, located in Redwood City, CA, is a global medical device company focused on providing innovative therapies that improve the quality of life of patients suffering from debilitating chronic pain. Nevro’s Senza® spinal cord stimulation system is an evidence-based neuromodulation platform developed for the treatment of chronic pain and is the only SCS system that delivers Nevro’s proprietary HF10™ therapy.

North American Spine Society, Booth 517
The North American Spine Society (NASS) is a global multidisciplinary medical society that utilizes education, research, and advocacy to foster the highest quality, ethical, value- and evidence-based spine care for patients. Representing more than 8,000 members from multiple specialties, NASS is your link to health care professionals invested in advancing spine care. New members may apply for FREE 2017 MEMBERSHIP at www.spine.org/nans.

Nova Innovations, Booth 325
Nova Innovations’ mission is to increase self-esteem and confidence in the business world. We are a national distributor for business solutions in various industries.

Nuvecra, Booth 511
Nuvecra™ is a neurostimulation company focused on improving the outcomes and usability of implantable medical devices. Nuvecra’s Algovita® SCS system is approved for the treatment of chronic intractable pain of the trunk and/or limbs. In addition, its NeuroNexus team provides leading-edge neural interface technology.

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.

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.

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?

- Leads design and manufacturing including standard contact, paddle, cuff, multi-contact & multi-lead systems
- IPG design & manufacturing
- Hermetic sealing/welding/testing
- Ultra-precision machining

Call 888.924.7832
or visit us at CirtecMed.com

ADVANCING DEVICES IN THE FOLLOWING APPLICATIONS:

- 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
Patient control like no other.

Experience for yourself
the smallest and most discreet
SCS programmer on the market.

NANS BOOTH #511

Algovita®
Powerfully versatile, patient-centric SCS.

Brief Summary: Product Technical Manuals and Information for Prescribers (IPF) 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 NuVection at 1.844.727.7897 and/or consult NuVection’s website at www.nuvectramed.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.