SPINE SUMMIT 2020
FOCUS on Data-driven Innovation
The Cosmopolitan of Las Vegas

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**WELCOME TO SPINE SUMMIT 2020**

On behalf of the Joint Section on Disorders of the Spine and Peripheral Nerves Executive Committee, welcome to Spine Summit 2020 at The Cosmopolitan of Las Vegas. This year’s meeting promises to be a thrilling and thought-provoking exploration of topics under our 2020 theme, “Focus on Data-driven Innovation.”

This year, we are proud to honor Neurosurgery Honored Guest Daniel K. Resnick; Orthopedics Honored Guest, K. Daniel Riew; and Peripheral Nerve Meritorious Awardee, Robert K. Spinner. These outstanding leaders in the field will be sharing their knowledge during award presentations, Happy Hour debates, and at the Cahill Controversies.

In addition to oral presentations showcasing the best ongoing research in our field, we will showcase residents’ scientific contributions with the Charles Knutz IV Awards, the J.A.N.E. Award, the Mayfield Award, and the Kline Peripheral Nerve Top Abstract Award.

The most exciting spine meeting of the year will also feature leading insights from our “can’t miss” special speakers. Research scientist at Google and distinguished professor at Georgia Tech, Irfan Essa will discuss informatics in healthcare while author Travis N. Rieder, PhD will discuss America’s opioid crisis in a special session.

Don’t forget to attend an unforgettable Opening Reception at the The Cosmopolitan of Las Vegas’ Chelsea Pool. Enjoy dazzling Cirque-style entertainment, classic rock and roll music, and more, as we bring the best of Las Vegas entertainment straight to you.

Thank you for taking time out of your busy schedules to join us at Spine Summit 2020. We wish you an insightful and enjoyable meeting.

Sincerely,

Zoher Ghogawala  
Section Chair

Domagoj Coric  
Annual Meeting Chair

Luis M. Tumialán  
Scientific Program Chair
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**Complimentary Wi-Fi** is available to all attendees throughout the The Cosmopolitan of Las Vegas meeting space.

**NETWORK NAME:** CosmopolitanMeeting  
**PASSWORD:** SPINE2020
Zoher Ghogawala, MD, FACS, serves as the Charles A. Fager Chair of Neurosurgery at Lahey Hospital and Medical Center and is Professor of Neurosurgery at Tufts University School of Medicine. He is active in the surgical treatment of patients with disorders of the spine and carotid vascular disease. His research focuses on comparative effectiveness, cost-effectiveness, and neurosurgical outcomes, exploring the effectiveness, benefits and sometimes harmful results of different treatment options. He was the principal investigator of the recently completed national, externally funded SLIP study, a randomized clinical trial that compared fusion versus no fusion following spinal decompression. This study was published in New England Journal of Medicine. Dr. Ghogawala has recently received NIH and PCORI funding support to conduct a multi-center prospective RCT that aims to compare ventral versus dorsal surgery options for cervical spondylotic myelopathy (CSM-S Trial). The trial randomized 163 patients with cervical myelopathy, and results of the trial will be available shortly. He has published over 100 scientific publications and has given over 70 invited visiting professor lectures. Dr. Ghogawala recently edited and published a textbook entitled, “The Evidence for Neurosurgery” as well as co-authored the newly updated Lumbar Fusion Guidelines. Dr. Ghogawala has recently served as the Vice President of the Congress of Neurological Surgeons and is the past-Chair of the Research Committee for the Cervical Spine Research Society. He is also on the Board of Directors of the North American Spine Society (NASS) and the Cervical Spine Research Society. He is currently the Health Policy Chair for NASS and he is currently the Chair of the Joint Section on Disorders of the Spine and Peripheral Nerves. Dr. Ghogawala completed his undergraduate degree magna cum laude at Harvard University, and graduated from Harvard Medical School with high honors in 1991. He completed his residency training in neurological surgery at Massachusetts General Hospital.
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SPINE SUMMIT 2020
Annual Meeting App

Conveniently manage your schedule, browse program content, and keep up with what's going on.

Download the free EventPilot app at m.cns.org, then log in with event code: SPINE2020
Daniel K. Resnick, MD, is Professor, Vice Chairman, and Residency Program Director of Neurological Surgery at the University of Wisconsin School of Medicine and Public Health. He is a summa cum laude graduate of Princeton University, and an Alpha Omega Alpha graduate of the University of Pennsylvania School of Medicine. He performed his residency training in neurosurgery at the University of Pittsburgh and earned a Master’s degree in Neuroscience from Pittsburgh, based on his spinal cord injury research. Dr. Resnick completed a rotation with Dr. Benzel in New Mexico during his residency to further study spinal biomechanics.

Dr. Resnick is an internationally known spinal surgeon and has particular expertise in minimally-incisional surgery, spinal tumors and degenerative disorders of the spine. His current research focuses on improving the quality of spinal surgery and he is particularly interested in tracking and improving meaningful patient outcomes.

Dr. Resnick has served in multiple leadership roles in organized neurosurgery and spine surgery. He is Past President of the Joint Spine Section, Past President of the Congress of Neurological Surgeons, and Past President of the North American Spine Society. He is currently a Director of the American Board of Neurological Surgeons.

He has over 200 peer-reviewed publications, more than 250 invited publications, and has presented over 600 scientific presentations. Among his presentations, he has been honored to serve as the Sonntag Lecturer for the American Association of Neurological Surgeons, The Fager Lecturer for the Lahey Clinic, The Jannetta Lecturer for the University of Pittsburgh, the Ved Sachdev Endowed Lecturer for Mount Sinai, the Whitcomb Lecturer for the New England Medical Society, and the Art Steffee Lecturer at the Cleveland Clinic.
K. Daniel Riew, MD is Professor of Orthopedic Surgery at Columbia University Medical Center’s College of Physicians and Surgeons in NYC. He is also the Co-Chief, Spine Division, Director of Cervical Spine Surgery and Co-Director of the Columbia Spine Fellowship. Dr. Riew graduated from Harvard University, where he was awarded the Class Ames Award for Character and Leadership; and from Case Western Reserve University Medical School, where he was inducted into the Alpha Omega Alpha honorary medical society for top students in his junior year. He finished residency in Internal Medicine at Cornell Medical Center and Orthopedics at George Washington University. He then completed fellowship training under the world-renowned cervical spine surgeon, Dr. Henry Bohlman in Cleveland. He is board-certified in Internal Medicine as well as Orthopaedic Surgery. His practice is exclusively devoted to the operative treatment of the cervical spine, a rarity among spine surgeons. He has been recognized in the lists of America’s Top Doctors and Best Doctors in America since 2002. He is also listed as a Vitals Top 10 Doctor (top 1%, based on patient ratings and reviews); Orthopedics This Week Journal’s Top 28 Spine Surgeons in North America 2012, 2013, Top 18 Spine Surgeons in North America 2014. He is active in research and has over 300 peer-reviewed papers and over 70 chapters and other manuscripts. He has received multiple outstanding research paper awards from the Cervical Spine Research Society and the North American Spine Society, as well as the Hibbs Outstanding paper award from the Scoliosis Research Society. He has served as a visiting professor, grand rounds speaker, key or named lecturer over 100 times in more than 17 countries on six continents. He served as President of the Cervical Spine Research Society in 2012-13. He currently serves on the board of AOSpine International as Past-Chair of the Board, having served as its International Research Commission Chair (2012-15) and Chair of the International Board (2015-18). He is a member of the American Orthopaedic Association, the Interurban Orthopedic Club, and the Association of Bone and Joint Surgeons, all honorary orthopaedic societies. He serves as a Deputy or Associate Editor of the Global Spine Journal, Clinics in Orthopedic Surgery, Spine, European Spine Journal and Neurosurgery.
Robert J. Spinner, MD, is chair of the Department of Neurologic Surgery at the Mayo Clinic in Rochester, Minnesota. He is the Burton M. Önofrio, MD Professor of Neurologic Surgery and a Professor of Orthopedics and Anatomy. He has been chair of the Academic Appointments and Promotions Committee at Mayo Clinic College of Medicine and Science since 2012. He is board certified in both orthopedics and neurosurgery. His clinical practice is limited to peripheral nerve surgery. He completed full residency programs in orthopedics (Duke University) and neurosurgery (Mayo Graduate School of Medicine); a 1-year peripheral nerve fellowship with Dr. David Kline in New Orleans; and a 6-month traveling fellowship to several international centers as a CNS Cushing Fellow. He is the President of the American Association of Clinical Anatomists, and has served as President of the American Society for Peripheral Nerve and the Sunderland Society.
11:30–11:50 am

Special Speaker:
Data Driven Innovation

Irfan Essa

Irfan Essa is a Distinguished Professor in the School of Interactive Computing (iC) and an Associate Dean of Research in the College of Computing (CoC), at the Georgia Institute of Technology (GA Tech), in Atlanta, Georgia, USA. He is serving as the Director of the new Interdisciplinary Research Center for Machine Learning at Georgia Tech (ML@GT). He also serves as a Research Scientist at Google Inc. Professor Essa works in the areas of Computer Vision, Machine Learning, Computer Graphics, Computational Perception, Robotics, Computer Animation, and Social Computing, with potential impact on Autonomous Systems, Video Analysis, and Production (e.g., Computational Photography & Video, Image-based Modeling and Rendering, etc.) Human Computer Interaction, Artificial Intelligence, Computational Behavioral/Social Sciences, and Computational Journalism research. He has published over 150 scholarly articles in leading journals and conference venues on these topics and several of his papers have also won best paper awards. He has been awarded the NSF Career Award and was elected to the grade of IEEE Fellow. He has held extended research consulting positions with Disney Research and Google Research, and also was an Adjunct Faculty Member at Carnegie Mellon’s Robotics Institute. He joined GA Tech Faculty in 1996 after his earning his MS (1990), Ph.D. (1994), and holding research faculty position at the Massachusetts Institute of Technology (Media Lab) [1988-1996].
8:57–9:27 am

Special Speaker:
America’s Opioid Dilemma: Responsible Pain Medicine During an Epidemic

*Travis N. Rieder*

Travis N. Rieder, PhD, is a bioethicist, philosopher and author, currently serving as Director of the Master of Bioethics degree program and a Research Scholar at the Johns Hopkins Berman Institute of Bioethics.

Travis has published widely in both the academic and popular literature on a variety of issues. In recent years, however, virtually all of his attention has turned to the ethical and policy issues raised by pain, opioids, and America’s problem with the two. On this subject, he has written for the medical, health policy, and bioethics literature; he has co-authored a Special Publication by the National Academy of Medicine; he advises many hospitals and healthcare systems; and he speaks around the country to clinicians and various members of the public. His TED talk on opioid withdrawal and physician responsibility has been viewed well over two million times.

In 2019, Travis published “In Pain: A Bioethicist’s Personal Struggle with Opioids,” in which he combines narrative from his own experience as a pain and opioid therapy patient with his expertise in philosophy and bioethics to identify, explain, and attempt to solve some of the most profound questions raised by pain and addiction medicine. “In Pain” has received significant positive attention, including a review in Science and an author interview by Terry Gross on NPR’s Fresh Air.
Opening Reception

THURSDAY, MARCH 5

6:30–8:30 pm
The Cosmopolitan of Las Vegas
Chelsea Pool

Attend the most unforgettable Opening Reception in Spine Summit history! Join us for:

- Classic rock and roll music brought to you by a world-famous Elvis tribute artist
- Choreographed Cirque-style dance performances on land and water
- Amazing feats of strength from mind and body-bending contortionists
- Honored Guest Daniel K. Resnick on saxophone

This event is complimentary for all registered meeting attendees.
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AMBASSADOR
Accreditation

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 Congress of Neurological Surgeons and the Section on Disorders of the Spine and Peripheral Nerves. The Congress of Neurological Surgeons is accredited by the ACCME to provide continuing medical education for physicians.

AMA Credit Designation Statement
The CNS designates this live activity for a maximum of 28 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity. This activity meets the criteria for opioid education. Attendees will receive a maximum of 1.5 AMA PRA Category 1 Credits™ for the eligible Scientific Session.

Several states have similar requirements. Please check with your Board to determine if this activity will fulfill your state’s specific requirements.

CME Credit
*A maximum of 18.5 AMA PRA Category 1 Credits™ may be earned for Scientific Sessions only.

Additional CME Credits can be earned by attending the following:

Special Courses
Attendees will receive a maximum of 3.75 AMA PRA Category 1 Credits™ for an eligible half-day Thursday Special Course. Attendees will earn an additional 2 AMA PRA Category 1 Credits™ for attending the Thursday Evening Dinner Seminar. Attendees will receive a maximum of 3.75 AMA PRA Category 1 Credits™ for an eligible Saturday afternoon Special Course. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Nursing Credit
This continuing nursing education activity was submitted to the American Association of Neuroscience Nurses, an accredited approver by the American Nursing Credentialing Center Commission on Accreditation.

Physician’s Assistant Credit
This program is being reviewed for a maximum of 28 AMA PRA Category 1 Credits™ by the AAPA Review Panel. PAs should claim only the credit commensurate with the extent of their participation in the activity.

This program was planned in accordance with AAPA CME Standards for Live Programs and for Commercial Support of Live Programs.
Disclosures

The Accreditation Council for Continuing Medical Education Updated Standards for Commercial Support requires that anyone in a position to control the content of the educational activity has disclosed all financial relationships with any commercial interest. The ACCME defines a “commercial interest” as any entity producing, marketing, re-selling, or distributing healthcare goods or services consumed by, or used on, patients. All reported conflicts are managed by a designated official to ensure a bias-free presentation. Failure or refusal to disclose, or the inability to satisfactorily resolve the identified conflict, may result in the withdrawal of the invitation to participate in any of the CNS educational activities. A list of disclosures is available in the addendum.

FDA Statement

Some drugs or medical devices demonstrated at Spine Summit have not been cleared by the FDA, or have been cleared by the FDA for specific purposes only. The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice. The CNS policy provides that “off label” uses of a drug or medical device may be described at the DSPN Spine Summit so long as the “off label” use of the drug or medical device is also specifically disclosed. Any drug or medical device is “off label” if the described use is not set forth on the products approval label. It is also each speaker’s responsibility to include the FDA clearance status on any device or drug requiring FDA approval discussed or described in their presentation or to describe the lack of FDA clearance for any “off label” uses discussed. Speakers from the audience are also required, therefore, to indicate any relevant personal/professional relationships as they discuss a given topic. Handout materials are prepared and submitted for distribution by the presenters who are solely responsible for their content.
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THURSDAY
MARCH 5, 2020

11:00 am–5:30 pm
Registration

12:00–1:00 pm
Industry Sponsored Non-CME
Pre-Meeting Lunch Symposia

1:30–3:30 pm
Seminar for APRN and PAs

1:30–5:30 pm
Special Course 1
Novel and Emerging Technologies
in Spine Surgery

Special Course 2
Spinal Deformity: Applying Current
Deformity Concepts to Your
Practice, a Cased-Based Approach

Special Course 3
Challenges in the Surgical
Treatment of Pain

Special Course 4
Introduction to Spinal Coding:
From Decompression to Deformity

6:30–8:30 pm
Opening Reception

FRIDAY
MARCH 6, 2020

6:30 am–6:30 pm
Registration

6:30–7:30 am
Continental Breakfast

7:00–7:45 am
Challenging Cases 1
Oral Board-style Challenging
Cases: Cervical

7:45–8:00 am
Opening Remarks

8:00–9:30 am
Scientific Session 1
Focus on Data Driven Innovation

9:00 am–4:30 pm
Exhibit Hall Open

9:30–10:15 am
Beverage Break and What’s New
Session in the Exhibit Hall

10:15 am–12:00 pm
Scientific Session 2
The Trajectory of Spinal Surgery

12:00–1:00 pm
• Industry Sponsored
Non-CME
Lunch Symposia
• Lunch in the Exhibit Hall

1:00–2:30 pm
Scientific Session 3
Innovative Technology Special
Session: Operative Video
Segments

2:30–3:15 pm
Beverage Break and What’s New
Session in the Exhibit Hall

2:30–4:30 pm
Case-based Approaches to
Peripheral Nerve Trauma and Other
Conditions

3:15–4:25 pm
• Kuntz Scholar Abstracts
Concurrent Session 1
• Kuntz Scholar Abstracts
Concurrent Session 2
• Kuntz Scholar Abstracts
Concurrent Session 3
• Minimally Invasive/Motion
Preservation/Spondylolisthesis
Abstract Breakout Session

4:30–6:30 pm
Beer and Wine Happy Hour
Debates: Orthopedics versus
Neurosurgery
SATURDAY
MARCH 7, 2020

6:30 am–5:30 pm
Registration

6:30–7:30 am
Continental Breakfast

7:00–8:00 am
Challenging Cases 2
Oral Board-style Challenging Cases: Lumbar

8:00–9:30 am
Scientific Session 4
Opioids and Spine Surgery

9:00 am–1:15 pm
Exhibit Hall Open

9:30–10:15 am
Beverage Break and What’s New Session in the Exhibit Hall

10:15 am–12:15 pm
The Cahill Controversies

12:15–1:15 pm
• Industry Sponsored Non-CME Lunch Symposia
• Lunch in Exhibit Hall

1:30–3:30 pm
Special Course 5
Spine Summit Grand Rounds: Difficult Cases–The Decision-Making Dilemma

1:30–4:30 pm
Special Course 6
Treatment and Complication Avoidance in the Management of Spinal Tumors

1:30–3:30 pm
Special Course 7
Causes and Treatments for Neurologic Loss Associated with Spine Surgery

1:30–5:30 pm
Special Course 8
Spine Specialty Specific Oral Board Review Course

1:30–5:30 pm
Non-CME Hands-on Cadaver Lab

5:30–6:30 pm
Reception with WINS and Pain

6:00–8:00 pm
Young Neurosurgeons’ Reception and Dinner

SUNDAY
MARCH 8, 2020

6:30 am–12:30 pm
Registration

6:30–7:30 am
Continental Breakfast

7:00–7:30 am
Challenging Cases 3
Oral Board-style Challenging Cases: Peripheral Nerve

7:30–9:30 am
• General Spine Surgery 1/Trauma/Spinal Cord Injury Breakout
• General Spine Surgery 2/Tumor/Opioids Breakout
• Peripheral Nerve/Basic Science/General Spine 3 Breakout
• Spinal Deformity Breakout

9:30–11:10 am
Scientific Session 5
A Focus on Innovation to Improve Spine Care

11:15 am–12:10 pm
Special Session: Business of Neurosurgery

12:10–12:30 pm
DSPN Business Meeting

12:30 pm
Meeting Adjourns
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Congratulations to the 2020 Award Recipients!

Jetan H. Badhiwala  
J.A.N.E AWARD

Nima Alan  
MAYFIELD CLINICAL SCIENCE AWARD

Nikhil Murthy  
KLINE PERIPHERAL NERVE TOP ABSTRACT

Daniel Umansky  
KLINE PERIPHERAL NERVE RESEARCH AWARD

CHARLES KUNTZ IV SCHOLARS

Oliver G.S. Ayling  
Jacob C. Hoffmann

John F. Burke  
Michael Karsy

Andrew K.H. Chan  
Mena G. Kerolus

Ken Chang  
Darryl Lau

Lee Onn Chieng  
Allan R. Martin

Samuel H. Farber  
Anthony L. Mikula

Nida Fatima  
Harry M. Mushlin

Yaroslav J. Gelfand  
Roberto Perez-Roman

Jakub Godzik  
Chencai Wang

Anshit Goyal  
Michael M.H. Yang
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| 12:00–1:00 pm      | Pre-meeting, Non-CME Sponsored Lunch Symposia  
See page 102 for detailed information and locations. |
| Seminar for APRN and PAs | Gracia Ballroom 2  
1:30–3:30 pm  
Complimentary for Registered Nurses & PAs |

**Course Directors:** Megan Bellman, Eric A. Potts  
**Speakers:** Robert Evans, Erin Harrison, Sara M. McEvoy, Emma Schulte, Andrea L. Strayer, Eric Truumees  
**Course Description:** Neurosurgery Advanced Practice Providers and Physician Assistants are the target audience for this course, which will cover the preoperative evaluation, perioperative management and postoperative management of neurosurgical spine patients. Special emphasis will be on teamwork, non-narcotic pain control, communication and use of order sets.  
**Learning Objectives:** Upon completion of this course, participants will be able to:  
- Generate a differential diagnosis for leg and arm pain - Identify the impact of comorbidities on patient outcomes  
- Describe the impact of preoperative and postoperative patient communication and setting expectation  
- Identify the impact preoperative opioid use on postoperative pain control  

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| 1:30–1:42 pm       | Overview of MRI Imaging Basics in the Cervical, Thoracic and Lumbar Spine  
*Eric A. Potts* |
| 1:43–1:55 pm       | Management of Medical Comorbidities (DM, Anticoagulation, Nutrition)  
*Sara M. McEvoy* |
| 1:56–2:08 pm       | Advanced Perioperative Management: Support Staff, Patient Education  
*Emma Schulte* |
| 2:09–2:21 pm       | Intraoperative Challenges  
*Megan Bellman* |
| 2:22–2:34 pm       | Post–operative Pain Management  
*Erin Harrison* |
2:35–2:47 pm
Essential Surgical Spine Anatomy for Advanced Providers: How to be the Ideal Surgical Assistant
Robert Evans

2:48–3:00 pm
Preoperative Optimization for Postoperative Success
Andrea L. Strayer

3:01–3:13 pm
The Future of Spine Surgery without Opioids: The ERAS Effect

3:14–3:26 pm
Triaging Spinal Cord Injuries and Injuries to the Vertebral Column
Eric Truumees

3:27–3:30 pm
Questions and Discussion

Special Course 1  Nolita Ballroom 2
1:30–5:30 pm  $200
Novel and Emerging Technologies in Spine Surgery
*Attendees of this course are offered discounted registration of $300 (from $500) for the Saturday Non-CME cadaver lab to apply the techniques described in this course. Visit Registration for details.

Course Directors: Paul Park, Juan S. Uribe

Course Description: This course will cover the latest technological advances in the field of spinal surgery including surface technology, new biologics for fusion, expandable cages, new applications for navigation, robotics, among others. Many of these innovations have the potential to improve surgical efficiency, safety, and outcomes. Attendees will gain a better understanding of the basis for the technology, its applications clinically, evidence for the technology, outcomes and costs.

Learning Objectives: Upon completion of this course, participants will be able to:
- Identify current evidence supporting newer technologies such as expandable cages and surface technology
- Identify the role of robotics and its integration into spinal surgery
- Identify new applications for spinal navigation in minimally invasive and deformity surgery
- Evaluate the potential benefits of new imaging technology such as exoscopes

1:30–1:35 pm
Introduction
Paul Park, Juan S. Uribe
1:36–1:45 pm
Navigation in Minimally Invasive Surgery
Roger Härtl

1:46–1:55 pm
Navigation–Spinal Deformity
J. Patrick Johnson

1:56–2:05 pm
Navigation–Lateral Applications
Paul Park

2:06–2:15 pm
Pitfalls and Complication Avoidance with Navigation
Juan S. Uribe

2:16–2:25 pm
Robot–assisted Pedicle Screw Placement
Jay D. Turner

2:26–2:35 pm
Future Robotic Applications in Spinal Surgery
Michael Y. Wang

2:36–2:45 pm
Cost Effectiveness of Navigation/Robotics
Eric W. Nottmeier

2:46–2:50 pm
Questions and Discussion

2:51–3:20 pm
Hands–on Workshop (Navigation)

3:20–3:40 pm
Break

3:41–3:50 pm
Expandable Cage Technology–Worth the Cost?
Victor W. Chang

3:51–4:00 pm
Surface Technology–Hype or Not?
Khoi D. Than

4:01–4:10 pm
Cellular Allograft–the next BMP?
William R. Taylor

4:11–4:20 pm
Novel Screw Technologies (“One–step MIS Pedicle Screw, Fenestrated Screws, Etc.)
David S. Xu

4:21–4:30 pm
Exoscopes and Virtual Reality: Moving Beyond Traditional Loupes and Microscopes
W. Christopher Fox

4:31–4:40 pm
How to Advocate for New Technology at Your Hospital
Michael P. Steinmetz
4:41–4:50 pm  Questions and Discussion

4:51–5:30 pm  Hands–on Workshop (Robotics)
Educational Grant Provided by: Globus Medical, Olympus America

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<th>Special Course 2</th>
<th>Mont Royal Ballroom 1</th>
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**Spinal Deformity: Applying Current Deformity Concepts to Your Practice, a Cased Based Approach**

*Attendees of this course are offered discounted registration of $300 (from $500) for the Saturday Non-CME cadaver lab to apply the techniques described in this course. Visit registration for details.

**Course Directors:** Kai–Ming G. Fu, Praveen V. Mummaneni

**Speakers:** Shay Bess, Dean Chou, Adam S. Kanter, David W. Polly, Christopher I. Shaffrey, Juan S. Uribe, Michael S. Virk, Michael Y. Wang

**Course Description:** Through an interactive case–based format, this course will address deformity concerns commonly encountered by the practicing spine surgeon.

**Learning Objectives:** Upon completion of this course, participants will be able to:

– Identify deformity principles in regards to degenerative pathology
– Analyze the current state of less invasive techniques and deformity
– Identify the current operative options for managing deformity

1:30–1:35 pm  Welcome and Explanation of Course Format
Kai–Ming G. Fu, Praveen V. Mummaneni

1:36–2:00 pm  Applying Deformity Principles to Patients with Degenerative Cervical Disease
Dean Chou

2:01–2:25 pm  Indications for MIS versus Open Deformity Surgery: MISDEF2 Algorithm
Michael Y. Wang

2:26–2:50 pm  Multi–rod Solutions for Deformity: When to Consider?
Christopher I. Shaffrey

2:51–3:15 pm  Sacro–pelvic Considerations in Deformity Surgery
David W. Polly

3:15–3:30 pm  Break
3:31–3:55 pm
Using Navigation in Spinal Deformity
Michael S. Virk

3:56–4:20 pm
Minimally Invasive Approach Selection in Adult Deformity (Anterior, Lateral, and Posterior)
Juan S. Uribe

4:21–4:45 pm
Complication Avoidance an Optimizing Long Term Outcomes in MIS Adult Deformity Surgery
Adam S. Kanter

4:46–5:10 pm
Complication Management in Open Adult Deformity Surgery
Shay Bess

5:11–5:30 pm
Discussion and Participant Cases

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Special Course 3 Gracia Ballroom 1
1:30–5:30 pm $200
Challenges in the Surgical Treatment of Pain

Course Directors: Line G. Jacques, Mark A. Mahan, Jason M. Schwab, William S. Rosenberg
Speakers: Jeffrey E. Arle, Allan J. Belzberg, Nicholas M. Boulis, Justin M. Brown, Zaman Mirzadeh, Konstantin V. Slavin, Robert J. Spinner, Jennifer A. Sweet, Christopher J. Winfree

Course Description: This course will explore the diverse surgical options for treatment of pain including decompression, neurologic reconstruction, ablative and stimulation procedures, including up-to-date research findings on clinical evaluation, patient reported outcomes, procedural options and outcomes. New and emerging technologies will be discussed, including the rational use and expectations of developing therapies, especially for the non-narcotic treatment of pain.

Learning Objectives: Upon completion of this course, participants will be able to:
- Define appropriate patient characteristics for surgical treatment of pain
- Discuss the differential benefits of treatment options within reconstructive, ablative, and stimulation surgeries, for the non–narcotic management of pain
- Describe risks and a tiered approach for salvage options

1:30–1:35 pm
Introduction
Mark A. Mahan, William S. Rosenberg

1:36–1:50 pm
Reconstruction for Pain: New Surgical Treatments for Neuromas
Mark A. Mahan
1:51–2:05 pm
Ablative Surgery: DREZotomy, Cordotomy
William S. Rosenberg

2:06–2:20 pm
Decompression Surgery: Can it Work for Pain?
Allan J. Belzberg

2:21–2:35 pm
Medical Management: Non–narcotic Regimens
Christopher J. Winfree

2:36–2:50 pm
Pre–operative Decisions: How to Manage the Psychiatric Difficulties
Jennifer A. Sweet

2:51–3:20 pm
Panel Discussion
Justin M. Brown, Nicholas M. Boulis, Robert J. Spinner

3:20–3:35 pm
Break

3:36–3:50 pm
Dorsal Root Ganglion Stimulation: When to Use
Line G. Jacques

3:51–4:05 pm
Epidural Stimulation: Update on Waveforms
Jeffrey E. Arle

4:06–4:20 pm
Peripheral Nerve Stimulation: Is it Successful
Konstantin V. Slavin

4:21–4:35 pm
Intrathecal Pumps: Who is the Right Patient
Zaman Mirzadeh

4:36–4:50 pm
Integrating Pain Treatments into your Spine Practice
Jason M. Schwalb

4:51–5:20 pm
Panel Discussion
Jason M. Schwalb, Konstantin V. Slavin

5:21–5:30 pm
Questions and Conclusion
Introduction to Spinal Coding: From Decompression to Deformity

Course Directors: Mark E. Oppenlander, John K. Ratliff
Speakers: Owoicho Adogwa, Kurt M. Eichholz, Kristopher T. Kimmell, Mark E. Oppenlander, Cheerag D. Upadhyaya, Anand Veeravagu

Course Description: What every graduating resident, spine fellow or young attending needs to know about coding spinal procedures in the first few years of practice. Origins of CPT and RVU will be presented along with the fundamentals of spinal coding. The course then transitions to case-based coding. The entire spectrum of spine cases from simple decompression to complex deformity will be presented and the correct coding reviewed.

Learning Objectives: Upon completion of this course, participants will be able to:
- Identify the origins of CPT, RVU and the RUC process
- Demonstrate knowledge in the correct application of CPT codes for a variety of spinal procedures
- Identify elements of practice management with an emphasis on spine

1:30–1:35 pm
Introduction
John K. Ratliff

1:36–1:50 pm
Medicare, RVUs, CPT: How We Got Here
John K. Ratliff

1:51–2:05 pm
Basic Spine Coding: Cervical
Mark E. Oppenlander

2:06–2:20 pm
Basic Spine Coding: Lumbar
Owoicho Adogwa

2:21–2:35 pm
Anand Veeravagu

2:36–2:50 pm
Kurt M. Eichholz

2:51–3:05 pm
Cheerag D. Upadhyaya
3:06–3:30 pm
Anand Veeravagu

3:30–3:45 pm
Break

3:46–4:00 pm
Case Based Spinal Deformity Coding
John K. Ratliff

4:01–4:20 pm
Case Based Cervical Trauma Coding
Anand Veeravagu

4:21–4:40 pm
Case Based Thoracolumbar Trauma Coding
Cheerag D. Upadhyaya

4:41–5:00 pm
Obtaining an Authorization for Surgery and the Peer to Peer Process
Kristopher T. Kimmell

5:01–5:15 pm
Survival Guide for Your First Year in Practice: ABNS, Running Clinic, Scheduling Surgery, Academics & Life Balance
Mark E. Oppenlander

5:16–5:30 pm
Questions and Conclusion

Opening Reception

6:30–8:30 pm
Thursday, March 5, 2020
The Cosmopolitan of Las Vegas
Chelsea Pool

Attend an unforgettable Opening Reception with dazzling Cirque-style entertainment, classic rock and roll music, and more, as we bring the best of Las Vegas entertainment straight to you.

One ticket to the Opening Reception is included with registration; additional tickets are available for purchase at registration.
Dinner Seminar
(include three–course dinner and beverages)

8:30–10:30 pm

Moderators: Domagoj Coric, Zoher Ghogawala
Faculty: Asdrubal Falavigna, Yoon Ha, Daniel K. Resnick, K. Daniel Riew, Robert J. Spinner, Jeffrey C. Wang

Dinner held at Estiatorio Milos. Touted as one of North America’s finest Greek restaurants, Estiatorio Milos features Mediterranean cuisine at its best and has a long-standing reputation for serving the freshest, most pristine seafood. This unique Greek restaurant spares no effort in finding the most delicious fish from around the world and preparing it in the subtlest, most flavorful ways.

Course Description:
Join Honored Guests, Daniel K. Resnick, K. Daniel Riew and Robert Spinner along with Jeffrey C. Wang to learn their perspectives on the future of spine surgery. Asdrubal Falavigna and Yoon Ha will present the future of spine from Brazilian and Asian perspectives.

Learning Objectives: Upon completion of this course, participants will be able to:
- Identify the various trajectories that technology may lead the future of spinal surgery
- Recognize how the future of healthcare will affect the practice of spinal surgery in years to come
- Identify those characteristics needed to remain relevant in the future world of spine care.
6:30 am–6:30 pm  Belmont Commons
Registration

6:30–7:30 am  Belmont Commons
Complimentary Continental Breakfast

Challenging Cases 1  Belmont Ballroom 4 & 8

7:00–7:45 am  Oral Board–style Challenging Cases: Cervical
Moderators: Marcus D. Mazur, Laura A. Snyder, Hesham M. Soliman

7:45–8:00 am
Opening Remarks

7:45–7:55 am
Welcome
Luis M. Tumialán

7:55–8:00 am
Introduction
Zoher Ghogawala

Scientific Session 1  Belmont Ballroom 4 & 8

8:00–9:30 am  Focus on Data Driven Innovation

Moderators: John J. Knightly, Michael Y. Wang
Floor Moderator: Regis W. Haid
Speakers: Steven D. Glassman, Roger Härtl, Praveen V. Mummaneni, Laurence D. Rhines, Christopher I. Shaffrey

Learning Objectives: Upon completion of this session, participants will be able to:

- Analyze critically the impact that data registries have on management of spinal conditions such as spondylolisthesis and adult deformity
- Describe the natural history of cervical myelopathy and the timing of intervention
- Describe how technological advances in spine surgery can positively impact patient care

8:00–8:10 am  Management of Metastatic Disease to the Spine in Community Settings: You Can Do Separation Surgery
Laurence D. Rhines

8:11–8:16 am  Discussion

8:17–8:27 am  Developing Competencies in Minimally Invasive Spinal Surgery
Roger Härtl
8:28–8:33 am
Discussion

8:34–8:44 am
The Data of Adult Deformity Correction: Age Appropriate Correction
Christopher I. Shaffrey

8:45–8:50 am
Discussion

8:51–9:01 am
Spondylolisthesis and QOD: Data Driven Innovation in Clinical Decision Making
Praveen V. Mummaneni

9:02–9:07 am
Discussion

9:08–9:18 am
Evolution of Big Data in Spinal Surgery: The AANS/AAOS Spinal Registry
Steven D. Glassman

9:19–9:30 am
Discussion and Summary of the Session

9:00 am–4:30 pm  Belmont Ballroom Salons 1-3, 5-7
Exhibit Hall Open
Visit for the latest products and technology.

9:30–10:15 am  Belmont Ballroom Salons 1-3, 5-7
Beverage Break and What’s New Session in the Exhibit Hall. See page 100 for detailed information and schedule

Scientific Session 2  Belmont Ballroom 4 & 8
10:15 am–12:00 pm
The Trajectory of Spinal Surgery

Moderators: Michael W. Groff, John K. Ratliff, Christopher E. Wolfe
Floor Moderator: Charles L. Branch
Learning Objectives: Upon completion of this session, participants will be able to:
– Identify the evolution of the management of lumbar degenerative disc disease
– Discuss the progress and current trajectory of the current management of the degenerating cervical spine
– Recognize the importance of big data in the realm of spinal surgery
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:19–10:34 am</td>
<td>Neurosurgery Honored Guest Presentation</td>
<td>Daniel K. Resnick</td>
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<tr>
<td>10:35–10:38 am</td>
<td>Introduction of Orthopedics Honored Guest</td>
<td>Michael S. Chang</td>
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<tr>
<td>10:39–10:54 am</td>
<td>Orthopedics Honored Guest Presentation</td>
<td>K. Daniel Riew</td>
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<tr>
<td>10:55–10:58 am</td>
<td>Introduction of DSPN Chair</td>
<td>Edward C. Benzel</td>
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<tr>
<td>10:59–11:14 am</td>
<td>DSPN Chair’s Address</td>
<td>Zoher Ghogawala</td>
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<tr>
<td>11:15–11:25 am</td>
<td>Round Table Discussion with Zoher Ghogawala, Daniel K. Resnick, and K. Daniel Riew</td>
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<tr>
<td>11:26–11:29 am</td>
<td>Introduction of Irfan Essa–Google Medical Analytics</td>
<td>Zoher Ghogawala</td>
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<tr>
<td>11:30–11:50 am</td>
<td>Special Lecture: Data Driven Innovation</td>
<td>Irfan Essa</td>
</tr>
<tr>
<td>11:51 am–12:00 pm</td>
<td>Discussion and Summary of the Session</td>
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<tr>
<td>12:00–1:00 pm</td>
<td>Lunch with Exhibitors or Attend a Non–CME Sponsored Lunch. See page 102 for detailed information and schedule</td>
<td></td>
</tr>
</tbody>
</table>
Scientific Session 3  Belmont Ballroom 4 & 8

1:00–2:30 pm
Innovative Technology Special Session: Operative Video Segments

Moderators: Michael P. Steinmetz, Marjorie C. Wang
Floor Moderator: Praveen V. Mummaneni
Speakers: Giuseppe Barbagello, Roger Härtl, Larry T. Khoo, Daniel K. Resnick, Christopher I. Shaffrey

Learning Objectives: Upon completion of this session, participants will be able to:

- Express a greater understanding of a variety of surgical techniques for the management of the degenerating spine
- Identify those patients who are ideal candidates for minimally invasive cervical and lumbar procedures
- Discuss limitations of deformity correction in a particular age group

1:00–1:08 pm
Minimally Invasive Posterior Cervical Foraminotomy: Nuances of an Operative Technique
Roger Härtl

1:09–1:14 pm
Discussion

1:15–1:23 pm
Image Guided Minimally Invasive Lumbar Laminectomy: Anatomical Basis and Rationale
Larry T. Khoo

1:24–1:29 pm
Discussion

1:30–1:38 pm
The Pearls of the Lumbar Microdiscectomy
Daniel K. Resnick

1:39–1:44 pm
Discussion

1:45–1:53 pm
Adult Deformity with the Kickstand Technique: How and Why I Do It
Christopher I. Shaffrey

1:54–1:59 pm
Discussion

2:00–2:08 pm
Operative Nuances of C1–2 Fixation
Giuseppe Barbagallo

2:09–2:14 pm
Discussion

2:15–2:23 pm
Cervical Laminoplasty: Complication Avoidance
K. Daniel Riew

2:24–2:30 pm
Discussion and Summary of the Session
Peripheral Nerve Session  Gracia Ballroom 1

2:30–4:30 pm  
Case–based Approaches to Peripheral Nerve Trauma and Other Conditions

Course Directors:  Line G. Jacques, Mark A. Mahan

Course Description:  This course will cover management of various peripheral nerve disorders. Using a case-based format, faculty will review indications, timing of intervention, and surgical approaches. Relevant anatomy, clinical presentation, and outcomes will be discussed. This course is an excellent review for oral board and maintenance of certification.

Learning Objectives:  Upon completion of this session, participants will be able to:
– Describe a systematic approach to patients with a wide range of peripheral nerve disorders
– Develop a non-operative or operative management strategy for these conditions
– Discuss advantages and disadvantages and expected outcomes of various surgical approaches

2:30–2:39 pm  
Peripheral Nerve History and Physical Exam
Allan J. Belzberg

2:40–2:49 pm  
Fundamentals of Nerve Injury and Regeneration
Rajiv Midha

2:50–2:59 pm  
Brachial Plexus Trauma
Justin M. Brown

3:00–3:09 pm  
Upper Extremity Nerve Trauma
Wilson Z. Ray

3:10–3:19 pm  
Lower Extremity Nerve Trauma
Mark A. Mahan

3:20–3:39 pm  
Panel Discussion: Nerve Trauma

3:40–3:49 pm  
Upper Extremity Entrapment
Elias B. Rizk

3:50–3:59 pm  
Lower Extremity Entrapment
Thomas J. Wilson
4:00–4:09 pm  
**Nerve Tumors**  
Zarina S. Ali

4:10–4:24 pm  
**Panel Discussion: Entrapments and Tumors**  
Holly Gilmer, Amgad S. Hanna, Line G. Jacques, Christopher J. Winfree

4:25–4:30 pm  
**Questions and Conclusion**  
Robert J. Spinner

3:15–4:25 pm  
**Oral Abstract Presentations**

**Learning Objectives:** Upon completion of this session, participants will be able to:

- Analyze the findings of contemporary neurosurgical studies, critically evaluate the design and methodology of these studies
- List areas of future research and critical investigation
- Compare indications, relative contraindications and clinical outcomes for various minimally invasive and motion preserving techniques

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**Kuntz Scholar Oral Abstract  Nolita Ballroom 2**  
**Presentations Concurrent Session 1**  
**Moderators:** Erica F. Bisson, Dean Chou, Michael S. Virk

3:15–3:20 pm  
**The Risk of Peripheral Nerve Tumor Biopsy in Suspected Benign Etiologies**  
Roberto Perez-Roman, Shelby Burks, Iahn Cajigas, Luca Debs, Allan D. Levi

3:20–3:25 pm  
**Discussant:** Robert J. Spinner

3:25–3:30 pm  
**Decompression and Fusion Versus Decompression Alone for Grade I Degenerative Lumbar Spondylolisthesis**  

3:30–3:35 pm  
**Discussant:** Daniel K. Resnick
3:35–3:40 pm
Radial and Clinical Outcomes of Three-level Cervical Disc Arthroplasty
Ken Hsuan-kan Chang, Jau-Ching Wu

3:40–3:45 pm
Discussant: Vincent C. Traynelis

3:45–3:50 pm
An ERAS Pathway Following Single-level MIS TLIF Significantly Decreases LOS
Mena G. Kerolus, Ketan Yerneni, Christopher D. Witiw, Ricardo B.V. Fontes, Harel Deutsch, Richard G. Fessler, John E. O’Toole

3:50–3:55 pm
Discussant: Michael Y. Wang

3:55–4:00 pm
Outcomes and Complications with Age in Spondylolisthesis: An Evaluation from the Quality Outcomes Database

4:00–4:05 pm
Discussant: Gerald E. Rodts

4:05–4:10 pm
Effect of Cage Type on Radiographic Outcomes in TLIF
Yaroslav J. Gelfand, Joshua Benton, Rafael De la Garza Ramos, Vijay Yanamadala, Reza Yassari, Merritt D. Kinon

4:10–4:15 pm
Discussant: Zoher Ghogawala

4:15–4:20 pm
Kline Top Peripheral Nerve: Could Botulinum Toxin Pre-conditioning be an Ancillary Therapy to Improve Motor Nerve Transfer Surgery?
Nikhil Murthy, Dominic D’Andrea, Audrey Leung, Colin Franz

4:20–4:25 pm
Kline Top Peripheral Nerve Discussant: Allan D. Levi

Kuntz Scholar Oral Abstract Mont Royal Presentations Concurrent Ballroom 1 Session 2

Moderators: Victor W. Chang, Yi Lu, Eve C. Tsai

3:15–3:20 pm
Development of Predictive Model for 30-days Complications Following Posterior Cervical Fusion
Nida Fatima, John H. Shin

3:20–3:25 pm
Discussant: Regis W. Haid
3:25–3:30 pm
The Natural History of Degenerative Cervical Myelopathy: An Ambispective Longitudinal Cohort Study
Allan R. Martin, Sukhvinder Kalsi-Ryan, Muhammad Akbar, Jetan H. Badhiwala, Jefferson R. Wilson, Lindsay Tetreault, Aria Nouri, Anna Rienmuller, Eric M. Massicotte, Michael G. Fehlings

3:30–3:35 pm
Discussant: Michael G. Groff

3:35–3:40 pm
The Effect of Elevated Mean Arterial Blood Pressure in Cervical Traumatic Spinal Cord Injury with Hemorrhagic Contusion
Harry M. Mushlin, Timothy Chryssikos, Noah Lessing, Nathan L. Pratt, Nicholas Caffes, Jeffrey Oliver, Aaron P. Wessell, Bizhan Aarabi, Gary T. Schwartzbauer

3:40–3:45 pm
Discussant: R. John Hurlbert

3:45–3:50 pm
Ultra-Early Surgery (<12 hrs) Correlates with Improvement in Motor Recovery after Spinal Cord Injury: A TRACK-SCI Study

3:50–3:55 pm
Discussant: Michael G. Fehlings

3:55–4:00 pm
The Association of Preoperative Narxcheck Scores and Perioperative Outcomes in Posterior Cervical Surgery Patients
Jacob Hoffmann, Robert Winkelman, Michael P. Steinmetz, Thomas E. Mroz

4:00–4:05 pm
Discussant: Christopher E. Wolfla

4:05–4:10 pm
Long-Term Radiographic Outcomes in Patients Undergoing Four and Five Level ACDF Without Posterior Supplementation

4:10–4:15 pm
Discussant: John J. Knighlty

4:15–4:20 pm
Peripheral Nerve: Long-Term Radiographic Outcomes in Patients Undergoing Four and Five Level ACDF Without Posterior Supplementation

4:20–4:25 pm
Discussant: John E. O’Toole

Kuntz Scholar Oral Abstract Mont Royal Presentations Concurrent Ballroom 2 Session 3
Moderators: Sanjay S. Dhall, Kristen E. Jones, John H. Shin

3:15–3:20 pm
Does Spinopelvic Parameters Matter in Short-Segment Posterior Lumbar Spinal Fusion? A Meta-Analysis
Lee Onn Chieng, Mick J. Perez-Cruet

3:20–3:25 pm
Discussant: Robert F. Heary

3:25–3:30 pm
Multiple Rod Constructs and use of BMP2 Results in Lower Rod Fracture Following Lumbar Pedicle Subtraction Osteotomy
Darryl Lau, Qiunan Lyu, Vedat Deviren, Alexander F. Haddad, Christopher P. Ames

3:30–3:35 pm
Discussant: David O. Okonkwo

3:35–3:40 pm
High Radiation Burden of Minimally Invasive Approaches to Adult Spinal Deformity
Jakub Godzik, Gregory M. Mundis, Celene Bardales Mulholland, Corey T. Walker, Jay D. Turner, Juan S. Uribe, Robert Eastlack

3:40–3:45 pm
Discussant: Praveen V. Mummaneni

3:45–3:50 pm
Impact of Opioid Prescribing Guidelines on Postoperative Narcotic Prescriptions Following Elective Spine Surgery
William E. Krauss, Elizabeth B. Habermann, Anshit Goyal, Mohammed A. Alvi, Daniel Ubl, Daniel Whipple, Amy E. Glasgow, Halena Gazelka, Mohammad Bydon

3:50–3:55 pm
Discussant: Domagoj Coric
3:55–4:00 pm
Patients with Bilateral Sacroiliac Joint Vacuum Sign have a Change in Pelvic Incidence between Supine and Standing
Jeremy L. Fogelson, Anthony L. Mikula, Soliman Oushy, Zachariah Pinter, Pierce Peters, David W. Polly, Benjamin D. Elder

4:00–4:05 pm
Discussant: Juan S. Uribe

4:05–4:10 pm
Patient Reported Outcomes for Lumbar Spinal Stenosis: Comparison of a Universal and Multi-tier Health Care System
Oliver G.S. Ayling, Tamir Ailon, Nicolas Dea, Raphaelle Charest-Morin, Charles Fisher

4:10–4:15 pm
Discussant: Daniel J. Hoh

4:15–4:20 pm
Development and Validation of a Prediction Score for Poor Postoperative Pain Control Following Elective Spine Surgery
Michael M.H. Yang, Jay Riva-Cambrin, Jonathan Cunningham, Nathalie Jette, Tolulope Sajobi, Steven Casha

4:20–4:25 pm
Discussant: Eric A. Potts

Minimally Invasive/ Nolita Ballroom 3
Motion Preservation/
Spondylolisthesis
Abstract Breakout Session
Moderators: Larry T. Khoo, Hesham M. Soliman, Lee A. Tan

3:15-3:17 pm
Variability in Recommendations for Treating Grade 1 Spondylolisthesis, in 114 Patients Evaluated by 28 Spine Surgeons
Eric N. Momin, Bradley T. Schmidt, Scott Hetzel, Frederick G. Barker, Zoher Ghogawala, Daniel K. Resnick

3:17–3:19 pm
Machine Learning Segmentation of Lumbar Spinal Canal in Lumbar Stenosis
Azim Laiwalla, Bilwaj K. Gaonkar, Bryan Yoo, Banafsheh Salehi, Mark A. Attia, Wi Jin Kim, Bayard Wilson, Joel S. Beckett, Luke Macyszyn

3:19–3:21 pm
Full Endoscopic Posterior Cervical Foraminotomy: Early Experience and Comparison with Open Surgery
Masahiko Akiyama, Hisashi Koga
3:21–3:23 pm
Transforaminal Endoscopic Lumbar Approaches with Radiofrequency Nerve Stimulation and Continuous Electromyography
Ibrahim Hussain, Benjamin I. Rapoport, Katie Krause, Gregory Kinney, Christoph Hofstetter, Eric H. Elowitz

3:23–3:25 pm
Minimum Clinically Important Difference in Outcomes after Surgery for Grade 1 Spondylolisthesis: A QOD Analysis
Mohamad Bydon, Praveen V. Mummaneni, John J. Knightly, Anshit Goyal, Mohammed A. Alvi, Andrew Kai-Hong Chan, Jian Guan, Steven D. Glassman, Kevin T. Foley, Jonathan Slotkin, Eric A. Potts, Mark E. Shaffrey, Christopher I. Shaffrey, Regis W. Haid, Kai-Ming G. Fu, Michael Y. Wang, Paul Park, Anthony L. Asher, Erica F. Bisson

3:25–3:27 pm
Patient Satisfaction after MIS Lumbar Fusion: Comparison of Three Interbody Techniques
W.H. Andrew Ryu, Alia Rathore, Brian T. David, Richard G. Fessler

3:27–3:29 pm
Radiographic Parameters of Listhesis are Not Associated with Health Status in Grade 1 Degenerative Spondylolisthesis
Joseph Laratta, Aidin Kashigar, Erica F. Bisson, Leah Carreon, Andrew Y. Yew, Tino Mkorombindo, Steven D. Glassman

3:29–3:31 pm
Fusion Versus Decompression Alone for Lumbar Spondylolisthesis: Impact on the 10 Sub-Items of Oswestry Disability Index

3:31–3:33 pm
Multi-level MIS Transforaminal Lumbar Interbody Fusion in the Elderly: A Predictive Modeling Comparative Cohort
Chad F. Claus, Evan J. Lytle, Doris Tong, Matthew Bahoura, Lucas Garmo, Elise J. Yoon, Jake Jasinski, Ascher Kaufmann, Boyd F. Richards, Teck M. Soo

3:33–3:35 pm
Preliminary Radiographic Results of the Prone Transpoas Technique PTP - Multi Center
Luiz Pimenta, William R. Taylor, Antoine Tomeh, Rodrigo A. Amaral, Gabriel Pokorny
3:35–3:37 pm
Hounsfield Units by Computed Tomography Correlates with Cage Subsidence after Transforaminal Lumbar Interbody Fusion
Zhuo Xi, Chih-Chang Chang, Pingguo Duan, Sigurd Berven, Praveen V. Mummaneni, Dean Chou

3:37–3:39 pm
Increasing Intraoperative Efficiency in Circumferential Lumbar Surgery: Eliminating the Flip
Richard A. Hynes, Ron Lehman, Olumide Aruwajoye, Daniel Refaj, Russ P. Nockels

3:39–3:41 pm
Types and Timing of Reoperation Following Surgery for Grade 1 Degenerative Lumbar Spondylolisthesis

3:41–3:43 pm
Cervical Disc Arthroplasty: Comparison of 4 Semi-Constrained Implants Using FEA
Yuvi Purushothaman, Davidson Jebaseelan, Hoon Choi, Jamie Baisden, Narayan Yoganandan

3:43–3:45 pm
Biomimetic 3D-printed Titanium-Alloy Interbody Spacers Demonstrate Uniform Bone Growth over 12 Weeks in an Ovine Model
Margaret Van Horn, Roland Beard, Bryan W. Cunningham, Ken Mullinix, Brandon Bucklen

3:45–3:47 pm
Rough Biomimetic Titanium Surface is Associated with Increased Alkaline Phosphatase Activity in Mesenchymal Stem Cells
Margaret Van Horn, Roland Beard, Brandon Bucklen

3:47–3:49 pm
Surgical Outcomes of Dynamic Cervical Implants vs Total Disc Replacement and ACDF: A Systematic Review and Meta-Analysis
Aya Akhrs, Waseem Wahood, Atiq Bhatti, Mohammed A. Alvi, Anshit Goyal, Mohamad Bydon

3:49–3:51 pm
Does Meyerding Slippage Reduction in Spondylolisthesis Correlate with Patient Outcomes?
Rory R. Mayer, Andrew Kai-Hong Chan, Erica F. Bisson, Michael S. Virk, Brenton H. Pennicooke, Mohammed A. Alvi, Eric A. Potts, Mohamad Bydon, Regis W. Haid, Steven D. Glassman, Kevin T. Foley, Dean Chou
3:51–3:53 pm

3:53–3:55 pm
Minimally Invasive TLIF Results in Less Reoperation than Open TLIF
Barry Cheaney II, Diana Ko, Brittany Stedelin, Ahmed M.T. Raslan, Khoi D. Than MD

3:55–3:57 pm
Four Complications Associated with Lateral and Oblique Fusion Treatable with Endoscopic Spine Surgery
Sohail Syed

3:57–3:59 pm
Risk Factors of 30-days Reoperation after First and Second Interspace Cervical Arthroplasty
Nida Fatima, John H. Shin

3:59–4:01 pm
Safety & Efficacy of Bicortical Pedicle Screw Instrumentation in Lumbar Fusion: Controlled-Cohort Study of 521 Patients
Robert W. McCabe, Doris Tong, Lucas Garmo, Matthew Bahoura, Boyd Richards, Teck M. Soo

4:01–4:03 pm
Comorbidities Do Not Affect Minimum Clinically Important Difference (MCID) for Fusion in Grade 1 Spondylolisthesis
Joseph Laratta, Leah Carreon, Avery L. Buchholz, Andrew Y. Yew, Erica F. Bisson, Praveen V. Mummaneni, Steven D. Glassman

4:03–4:05 pm
Correlation of Return to Work with Patient Satisfaction After Surgery for Lumbar Spondylolisthesis: A QOD Analysis

4:05–4:07 pm
Minimally Invasive Posterior Cervical Foraminotomy versus Anterior Cervical Fusion and Arthroplasty: A Systematic Review
Andrew Platt, John E. O’Toole
MEETING AGENDA

– THURSDAY

4:07–4:09 pm
Age as a Predictor for Complications and Outcomes in Multilevel TLIF: Michigan Spine Surgery Improvement Collaborative
Chad F. Claus, Evan J. Lytle, Doris Tong, Chenxi Li, Matthew Bahoura, Richard Easton, Muwaffak Abdulhak, Peter L. Bono, Paul Park, Clifford M. Houseman, Boyd Richards, Teck M. Soo

4:09–4:11 pm
Effect Of Cage Type On Subsidence In Transposa Lateral Lumbar Interbody Fusion
Ifije Ohiorhenuan, Corey T. Walker, Jakub Godzik, Jay D. Turner, Juan Uribe

4:11–4:13 pm
Cost Comparison of Single Level Posterior and Anterior/Lateral Lumbar Interbody Fusions
Shashank V. Gandhi, Justin N. Virojanapa, Ahmad Latefi

4:13–4:15 pm
A Cost Benefit Analysis of Increasing Surgical Technology in Lumbar Spine Fusion

4:15–4:17 pm
Two Year Comparative Effectiveness of Adjustable Lordotic Expandable vs. Static Lateral Lumbar Interbody Fusion Devices
Yan M. Li, Richard F. Frisch, Zheng Huang, James Towne, Yanicy Li, Jessica Riggelman, Charles Ledinio

4:17–4:19 pm
Radiographic Outcomes and Comparison of Sagittal Alignment after TLIF with Expandable versus Static Cage
Chih-Chang Chang, Brenton Pennicooke, Joshua Rivera, Dean Chou, Praveen V. Mummaneni

4:19–4:21 pm
Percutaneous Lumbar Interbody Fusion: Short Term Radiographical and Quality of Life Outcomes
Vikram Mehta, Timothy Y. Wang, Eric W. Sankey, Mostafa A. Gabr, Alexia Bwensa, C. Rory Goodwin, Isaac O. Karikari, Muhammad M. Abd-El-Barr

4:21–4:23 pm
Patient Reported Outcomes Following Lumbar Disc Herniation: Comparison of a Universal and Multi-tier Health Care System
Oliver G.S. Ayling, Tamir T. Ailon, Nicolas Dea, Raphaele Charest-Marin, Charles Fisher

4:23–4:25 pm
One-Level Versus Two-Level Cervical Disc Arthroplasty: A Biomechanical Study
Hoon Choi, Yuvaraj Purushothaman, Jamie Baisden, Davidson Jebusselan, Narayan Yoganandan
Beer and Wine Happy Hour
Debates: Orthopedics versus Neurosurgery

4:30–6:30 pm
Moderators: Domagoj Coric, Luis M. Tumialán
Neurosurgery Speakers: James S. Harrop, Christopher I. Shaffrey, Juan S. Uribe, Michael Y. Wang
Discussants: Hyun Bae, Sigurd Berven, Zoher Ghogawala, Daniel K. Resnick

Learning Objectives: Upon completion of this session, participants will be able to:
– Demonstrate an understanding of the limitations of minimally invasive spinal surgery in the management of deformity
– Describe the advantages and limitations of available technology in the management of the post-operative spine patient
– Identify those patients who would be ideal candidates for lumbar arthroplasty and those patients who would benefit more from arthrodesis than motion preservation

4:30–5:00 pm
Topic 1: MIS for Deformity is Feasible, Cost Effective and Sustainable

4:30–4:38 pm
PRO: Minimally Invasive Deformity Results in a Lower Incidence of PJK
Neel Anand

4:39–4:47 pm
CON: MIS Deformity Surgery Under Corrects and Under Treats the Deformity
Christopher I. Shaffrey

4:48 pm–4:53 pm
Summary of Points Made by the Debaters and Questions from the Audience
Sigurd Berven

4:54–4:56 pm
PRO: Rebuttal
Neel Anand

4:57–4:59 pm
CON: Rebuttal
Christopher I. Shaffrey

5:00–5:30 pm
Topic 2: 21st Century Rounds for a 21st Century Surgeon

5:00–5:08 pm
PRO: Virtual Rounding on Spine Patients Improves Patient Care and Patient Experience
Alexander R. Vaccaro

5:09–5:17 pm
CON: Technology Will Only Take You so Far. Be a Doctor, Round on Your Patients in Person
James S. Harrop
5:18–5:23 pm  
Summary of Points Made by the Debaters and Questions from the Audience  
Zoher Ghogawala

5:24–5:26 pm  
PRO: Rebuttal  
Alexander R. Vaccaro

5:27–5:29 pm  
CON: Rebuttal  
James S. Harrop

5:30–6:00 pm  
Topic 3: Preservation of Motion at the Lumbosacral Junction is a Good Thing

5:30–5:38 pm  
PRO: Lumbar Arthroplasty is Alive and Well and Underutilized  
Rolando Garcia

5:39–5:47 pm  
CON: Fusion of the Lumbosacral Spine is Part of the Natural Aging Process, Just Fuse It  
Juan S. Uribe

5:48–5:53 pm  
Summary of Points Made by the Debaters and Questions from the Audience  
Hyun Bae

5:54–5:56 pm  
PRO: Rebuttal  
Rolando Garcia

5:57–5:59 pm  
CON: Rebuttal  
Juan S. Uribe

6:00–6:30 pm  
Topic 4: Spine Surgery Should Be Its Own Specialty

6:00–6:08 pm  
PRO: Merge Orthopedic Spine and Neurosurgery Spine into One Spine  
K. Daniel Riew

6:09–6:17 pm  
CON: Neurosurgery and Orthopedic Surgery Are Better Off As They Are: Separate  
Michael Y. Wang

6:18–6:23 pm  
Summary of Points Made by the Debaters and Questions from the Audience  
Daniel K. Resnick

6:24–6:26 pm  
PRO: Rebuttal  
K. Daniel Riew

6:27–6:29 pm  
CON: Rebuttal  
Michael Y. Wang
SATURDAY | March 7, 2020

6:30 am–5:30 pm Belmont Commons
Registration

6:30–7:30 am Belmont Commons
Complimentary Continental Breakfast

Challenging Cases 2 Belmont Ballroom 4 & 8

7:00–8:00 am
Oral Board–style Challenging Cases: Lumbar Degenerative
Moderators: Oren N. Gottfried, Jeffrey P. Mullin, Corinna C. Zygourakis

Scientific Session 4 Belmont Ballroom 4 & 8

8:00–9:30 am
Opioids and Spine Surgery
This session is eligible for up to 1.5 hours of Opioid Specific CME
Moderators: Praveen V. Mummaneni, Gerald E. Rodts
Speakers: Richard G. Fessler, Jean–Pierre Mobasser, Jason M. Schwalb, Jennifer A. Sweet, Michael Y. Wang
Learning Objectives: Upon completion of this session, participants will be able to:
– Analyze the impact that data registries have on management of spinal conditions such as spondylolisthesis and adult deformity
– Describe the natural history of cervical myelopathy and the timing of intervention
– Describe how technological advances in spine surgery can positively impact patient care

8:00–8:10 am
Strategies for Spine Surgery Without Opioids
Jean–Pierre Mobasser

8:11–8:15 am
Discussion

8:16–8:26 am
ERAS and the Impact it has on Opioid Use in Spine Surgery
Michael Y. Wang

8:27–8:32 am
Discussion

8:33–8:36 am
Introduction of the Pain Section Address
Jason M. Schwalb
8:37–8:52 am  
Pain Section Chair’s Address  
Jennifer A. Sweet (Presented on Behalf of William S. Rosenberg)

8:53–8:56 am  
Introduction of Guest Speaker Travis N. Rieder  
Richard G. Fessler

8:57–9:27 am  
America’s Opioid Dilemma: Responsible Pain Medicine During an Epidemic  
Travis N. Rieder

9:28–9:30 am  
Discussion and Summary of the Session

9:00 am–1:30 pm  
Belmont Ballroom  
Salons 1-3, 5-7

Exhibit Hall Open  
Visit for the latest products and technology.

9:30–10:15 am  
Beverage Break and What’s New Session in the Exhibit Hall. See page 100 for detailed information and schedule

10:15 am–12:15 pm  
The Cahill Controversies

Moderators: Ziya L. Gokaslan, Robert F. Heary  

Learning Objectives: Upon completion of this session, participants will be able to:

– Discuss the difference that a payor model has on the delivery of spine care in a country  
– Identify the role and limitations of separation surgery in the management of metastatic disease  
– Identify those patients who may benefit from spinal cord stimulation in lieu of further spinal surgery

10:15–10:45 am  
Topic 1: Spinal Surgery is Superior in Canada Compared to the United States

10:15–10:22 am  
PRO: Canadians Manage Spine Care Better in a Single Payer System  
W. Bradley Jacobs

10:23–10:30 am  
CON: The U.S. Healthcare System Fosters Competition, Competition Offers Innovation  
Joseph S. Cheng
10:31–10:36 am  Summary of Points Made by the Debaters and Questions from the Audience  
R. John Hurlbert

10:37–10:39 am  PRO: Rebuttal  
W. Bradley Jacobs

10:40–10:42 am  CON: Rebuttal  
Joseph S. Cheng

10:43–10:44 am  Vote and Summary

10:45–11:15 am  Topic 2: The Data is Unequivocal: A Posterior Approach at L4–5 has Less Risk and Better Outcomes than A Lateral Approach

10:45–10:52 am  PRO: The Decade of the Transpsoas is Over and the Decade of the MIS TLIF has Just Begun  
Praveen V. Mummaneni

10:53–11:00 am  CON: The Decade of the Transpsoas Continues: The Data and the Lessons Learned  
Adam S. Kanter

11:01–11:06 am  Summary of Points Made by the Debaters and Questions from the Audience  
Edward C. Benzel

11:07–11:09 am  PRO: Rebuttal  
Praveen V. Mummaneni

11:10–11:12 am  CON: Rebuttal  
Adam S. Kanter

11:13–11:15 am  Vote and Summary

11:15–11:45 am  Topic 3: Thermal Ablation of Spinal Tumors

11:15 am–11:22 am  PRO: Newer Technology Promises to Decrease the Need for Surgery  
Claudio E. Tatsui

11:23–11:30 am  CON: Thermal Ablation of Spinal Tumors Decompression for Metastatic Epidural Spinal Cord Compression-- Separation Surgery vs. SLITT: A No Brainer  
Mark H. Bilsky

11:31–11:36 am  Summary of Points Made by the Debaters and Questions from the Audience
11:37–11:39 am
PRO: Rebuttal
Claudio E. Tatsui

11:40–11:42 am
CON: Rebuttal
Mark H. Bilsky

11:43–11:45 am
Vote and Summary

11:45 am–12:15 pm
Topic 4: Spinal Cord Stimulation versus Further Surgery

11:45–11:52 am
PRO: Addressing the Underlying Structural Issue Will Help the Patient the Most
Gerald E. Rodts

11:53 am–12:00 pm
CON: Enough Surgery, Spinal Cord Stimulation Offers the Greatest Relief at the Lowest Risk
Joshua M. Rosenow

12:01–12:06 pm
Summary of Points Made by the Debaters and Questions from the Audience
Domagoj Coric

12:07–12:09 pm
PRO: Rebuttal
Gerald E. Rodts

12:10–12:12 pm
CON: Rebuttal
Joshua M. Rosenow

12:13–12:15 pm
Vote and Summary

12:15–1:15 pm
Lunch with Exhibitors or Attend a Non–CME Sponsored Lunch. See page 100 for detailed information and schedule

Special Course 5  Nolita Ballroom 2
1:30–3:30 pm  $150
Spine Summit Grand Rounds: Difficult Cases– The Decision–Making Dilemma

Course Directors: John H. Chi, Langston T. Holly, Shekar N. Kurpad
Speakers: Sigurd Berven, Daniel K. Resnick, Alexander R. Vaccaro, Jeffrey C. Wang
Discussants: Domagoj Coric, Zoher Ghogawala, Gregory M. Mundis

Course Description: Spine Summit Grand Rounds is a new course with the focus on member participation. The course is intended for audience members to bring difficult cases they have managed or are currently managing, where they would like to seek an opinion from the panel of experts. Attendees who
submitted a case that was accepted for the course received complimentary registration to this course. Submitted cases were reviewed by the course directors who made the final selection.

**Learning Objectives:** Upon completion of this course, participants will be able to:
- Describe a variety of decision-making approaches in the complex case
- Demonstrate knowledge base in complication management in cervical and lumbar operations
- Discuss complication avoidance strategies for management of complex lumbar and cervical conditions

1:30–1:35 pm  
**Introduction**  
*John H. Chi, Langston T. Holly, Shekar N. Kurpad*

1:36–1:46 pm  
**Medicolegal**  
*Alexander R. Vaccaro*

1:47–1:57 pm  
**The Difficult Anterior Cervical Case**  
*Jeffrey C. Wang*

1:58–2:08 pm  
**The Difficult Lumbar Case**  
*Daniel K. Resnick*

2:09–2:19 pm  
**The Difficult Deformity Case**  
*Sigurd Berven*

2:20–3:05 pm  
**Case Discussion**  
*Domagoj Coric, Zoher Ghogawala, Gregory M. Mundis*

3:06–3:30 pm  
**Questions and Conclusion**

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**Special Course 6  Mont Royal Ballroom 1**

1:30–4:30 pm  
**Treatment and Complication Avoidance in the Management of Spinal Tumors**  
*$150*

**Course Directors:** John E. O’Toole, Daniel M. Sciubba  
**Speakers:** Mark H. Bilsky, Dean Chou, Nicolas Dea, Ziya L. Gokaslan, Ilya Laufer, Paul C. McCormick, Ehud Mendel, Ganesh Rao, Lawrence D. Rhines, John H. Shin  
**Course Description:** This seminar is designed to review the myriad presentations of spinal tumors and to discuss the multi-disciplinary management options involving medical, radiation and surgical treatments.

**Learning Objectives:** Upon completion of this course, participants will be able to:
- Analyze various treatment approaches to address spinal tumor pathologies
- Discuss incorporating innovative technologies to facilitate avoidance in spinal tumor surgery
- Discuss multi modal treatment of spinal tumors
1:30–1:34 pm
Introduction
John E. O’Toole, Daniel M. Sciubba

1:35–2:26 pm
Management of Vertebral Column Tumor Metastasis

1:35–1:47 pm
Nuances in Surgical Management of Metastatic Epidural Cord Compression (When You’re Not Practicing at an Academic Cancer Center!)
Ilya Laufer

1:48–2:00 pm
When do Metastatic Spine Tumor Patients Require Stabilization (and When Should You Not Instrument)?
John H. Shin

2:01–2:13 pm
Selecting Patients for Surgery for Metastatic Spine Disease Based on Overall Prognosis
Nicolas Dea

2:14–2:26 pm
Complication Avoidance/Management in Metastatic Spine Tumor Surgery
Daniel M. Sciubba

2:27–3:05 pm
Management of Solitary Primary Malignant Lesion of the Mobile Spine

2:27–2:39 pm
Pitfalls in the Initial Management of Isolated Spinal Tumors
Laurence D. Rhines

2:40–2:52 pm
For Which Patients is En Bloc Resection and Instrumented Fusion Appropriate?
Ziya L. Gokaslan

2:53–3:05 pm
For Which Patients is Separation Surgery with SRS/ SBRT Appropriate?
Mark H. Bilsky

3:05–3:20 pm
Break

3:21–3:46 pm
Management of Primary Giant Cell Tumor of the Sacrum

3:21–3:33 pm
Modern Management of Giant Cell Tumor of the Sacrum (Medical, Embolization, Radiation and Surgery)
Dean Chou
Complication Avoidance/Management in Surgery for Primary Sacral Tumors
Ehud Mendel

Management of Intradural Spinal Tumors

Surgical Approaches to Intradural Extramedullary Spinal Cord Tumors
John E. O’Toole

Patient Selection and Complication Avoidance in Intradural Spinal Cord Tumor Resection
Paul C. McCormick

Case Presentation: Resection of Intradural Extramedullary Lesion: How I Do It.
Ganesh Rao

Questions and Discussion

Causes and Treatments for Neurologic Loss Associated with Spine Surgery

Course Directors: Justin M. Brown, Mark A. Mahan

Course Description: New weakness, either before or after spine surgery, is a vexing problem and may not have a causal relationship with spine pathology. It is crucial to understand non–spinal causes, intraoperative considerations and potential treatments for these problems. This course will explore the potential causes and remedies for neurologic loss associated with spine surgery. The course will focus on alternative causes of weakness—particularly when the degree of weakness or atrophy is out of proportion to spinal stenosis, intraoperative complication avoidance and algorithmic steps for the management and treatment of post–operative weakness. Newer techniques on neurologic reconstruction for remedy of weakness will be reviewed.

Learning Objectives: Upon completion of this course, participants will be able to:
- Describe the differential diagnosis of new onset weakness, clinical patterns, and natural histories
- Discuss the intraoperative surgical strategies for complication avoidance, including appropriate use of neurophysiologic studies
- Define the surgical treatment options for neurologic loss and the considerations on timing for neurologic reconstruction
Introduction
Mark A. Mahan

Clinical Work-up of Weakness–Is it a Radiculopathy or Not?
Robert J. Spinner

Electrodiagnostic Work-up of Weakness
Justin M. Brown

Weakness after Cervical Spine Surgery–Avoidance
Nicholas Theodore

Weakness after Cervical Spine Surgery–Evaluation and Management
Gregory R. Trost

Weakness after Cervical Spine Surgery–Treatment Options and Outcomes
Wilson Z. Ray

Case Discussion: Post–operative C5 Palsy
Justin M. Brown, Wilson Z. Ray, Gregory R. Trost

Weakness after Direct Lateral Approach to Lumbar Spine–Avoidance
Juan S. Uribe

Weakness after Posterior Approach to Lumbar Spine–Avoidance
Nicholas Theodore

Weakness after Lumbar Surgery–Evaluation and Management
Andrew T. Dailey

Weakness after Lumbar Surgery–Treatment Options and Outcomes
Mark A. Mahan

Case Discussion: Post–operative Foot Drop
Andrew T. Dailey, Mark A. Mahan, Nicholas Theodore, Juan S. Uribe

Course Conclusion
Desert Pines Golf Outing

Desert Pines offers a taste of the Carolina Pines in the middle of the desert! With numerous bunkers and water hazards, Desert Pines rewards a player with good course management skills. Narrow tee shots will challenge you, but find the fairway and you will be rewarded. Not too long by modern standards, Desert Pines is a 2nd shot course with undulating, beautiful putting surfaces. The Desert Pines Practice Center is a 20,000 square-foot, state-of-the-art driving range. The two-tiered, climate-controlled facility includes target greens that are modeled after some famous par 3 courses throughout the country.

The outing is on Saturday afternoon. Shuttles will depart the hotel at 12:30 pm, and will return at approximately 5:30 pm. The cost to play is $99 per player, which includes round-trip shuttle transportation. Visit registration to sign up. Tickets are based on availability.
Special Course 8  Nolita Ballroom 3
1:30–5:30 pm  Spine Specialty Specific Oral Board Review Course  $150

Course Directors:  Yakov Gologorsky, Wilson Z. Ray

Course Description:  This is an interactive case-based format designed to prepare recent graduates or fellow level participants for the new spine specialty specific oral boards. Enrollment will be limited to the first 20 registrants. Limited enrollment allows for dedicated one-on-one mock oral board sessions along with feedback using both submitted cases and cases prepared by the faculty. Each participant will spend 10 minutes of dedicated time with eight different reviewers who will present 1-3 cases in oral board format.

Learning Objectives:  Upon completion of this course, participants will be able to:

- Identify the more recent format of the ABNS oral boards
- Demonstrate knowledge base across an array of spine related scenarios
- Describe conveying diagnosis, surgical options and complication management to an examiner

1:30–1:49 pm  Introduction  John J. Knightly
1:50–3:30 pm  All Faculty—1:1 Oral Boards Style Case Presentations
3:30–3:50 pm  Break
3:50–5:30 pm  All Faculty—1:1 Oral Boards Style Case Presentations

Non-CME Cadaver Lab  Gracia Ballroom 7/8
1:30–5:30 pm  Hands-on Cadaver Session with the Masters (Non-CME)  $500

Course Directors:  Ajit A. Krishnaney, Mark A. Mahan
Course Description:  Participants will engage in hands-on learning of innovative new technologies in spine and peripheral nerve surgery. In this four-hour cadaver lab, participants will learn advanced techniques in minimally invasive deformity spine surgery and peripheral nerve repair. Rotations will include various MIS and deformity approaches and instrumentation, as well as peripheral nerve grafting. One-on-one instruction will be performed with experienced faculty using the latest state-of-the-art devices. Surgeons interested
in exploring novel technology they are considering applying in their practice may benefit from working with the technology in a cadaveric setting. Those with advanced experience will have the opportunity to share surgical technique refinement with expert faculty, and to survey a variety of new technologies.

**Title:** Robotic Navigated Interbody, An Evolution In The Continuum of Care  
**Faculty:** Hoon Choi  
**Sponsored by:** Globus Medical

**Endoscopic Spine Surgery Solutions.**  
**Faculty:** Junseok Bae  
**Sponsored by:** Joimax

**Navigated TLIF**  
**Faculty:** Lee A. Tan  
**Sponsored by:** Medtronic

**Navigated Posterior Cervical**  
**Faculty:** Christopher M. Holland  
**Sponsored by:** Medtronic

**Lateral Single Position Surgery**  
**Faculty:** Juan S. Uribe, Julianne Santarosa  
**Sponsored by:** NuVasive

**Providing Orbeye exoscopes to enhance the learning experience**  
**Sponsored by:** Olympus America

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<thead>
<tr>
<th><strong>Reception with WINS</strong></th>
<th><strong>Gracia Ballroom 3</strong></th>
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<tbody>
<tr>
<td><strong>5:30–6:30 pm</strong></td>
<td><strong>Join your colleagues from WINS and Pain for an hour of complimentary food, drink, and networking.</strong></td>
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<tr>
<th><strong>Young Neurosurgeons’ Reception and Dinner</strong></th>
<th><strong>Gracia Ballroom 4</strong></th>
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<tbody>
<tr>
<td><strong>6:00–8:00 pm</strong></td>
<td><strong>All residents, fellows, and young neurosurgeons are invited to enjoy a delicious dinner with Neurosurgery Honored Guest, Daniel K. Resnick. RSVP is required, to RSVP please email <a href="mailto:meetings@cns.org">meetings@cns.org</a> or stop by the registration desk before 12:00pm on Thursday, March 5, 2020.</strong></td>
</tr>
</tbody>
</table>
6:30 am–12:30 pm Belmont Commons
Registration

6:30–7:30 am Belmont Commons
Complimentary Continental Breakfast

**Challenging Cases 3** Belmont Ballroom 4 & 8

7:00–7:30 am
Board-style Challenging Cases: Peripheral Nerve
Moderators: Line G. Jacques, Robert J. Spinner

**Abstract Breakout Sessions**

7:30–9:30 am

**Learning Objectives:** Upon completion of this session, participants will be able to:
- Identify the importance of the spinopelvic parameters in planning surgical interventions
- Describe the science behind surface technology in attempting to achieve an arthrodesis in lumbar and cervical spine surgeries
- Explain the biomechanical principles in fixation and stabilization for long segment constructs

**General Spine Surgery 1/ Nolita Ballroom 3**

Trauma/Spinal Cord Injury
Moderators: Christopher M. Bonfield, Gregory M. Mundis, Alexander E. Ropper

7:30–7:32 am
Predictors of Thirty-day Complications Following Anterior Cervical Fusion
Nida Fatima, John H. Shin

7:32–7:34 am
Association Between Intraoperative ALIF Complications and Number of Prior Abdominal Surgeries
Arbaz Momin, Edward Barksdale, Zaeem Lone, Jacob Enders, Michael P. Steinmetz

7:34–7:36 am
Chiropractic Adjustment and Temporal Association with Vertebral Artery Dissections
Akash Mitra, Hooman Azad, Nikil Prasad, Michael Cloney, Nader S. Dahdaleh
7:36–7:38 am
The Effect of Anticoagulation vs. Antiplatelet Therapy on Neurologic Status Following Vertebral Artery Dissections
Nikil Prasad, Hooman Azad, Akash Mitra, Michael Cloney, Nader S. Dahdaleh

7:38–7:40 am
Utilization of Intraoperative Neuromonitoring During the Treatment of Cervical Myelopathy
Michael Karsy, Austin Gamblin, Al-Wala Awad, Jian Guan, Marcus D. Mazur, Erica F. Bisson, Orhan Bican, Andrew T. Dailey

7:40–7:42 am
How Does Bias Influence SCI Care? A National Study of Gender and Age in Surgical Decision Making
Theresa Williamson, Sarah E. Hodges, Zidanyue Yang, Isaac O. Karikari, C. Rory Goodwin, Shivananad P. Lad, Muhammad Abd-El-Barr

7:42–7:44 am
Correlation Between Neurosurgery and ISNCSCI Motor Scores After Acute Spinal Cord Injury: A TRACK-SCI Study
John F. Burke, Anthony M. DiGiorgio, Leigh H. Thomas, Xuan Duong Fernandez, Lisa U. Pascual, Jonathan Pan, Debra P. Hemmerle, Vineeta Singh, Abel Torres, Ferguson Adam, Jacqueline Bresnahan, Michael Beattie, Sanjay S. Dhall

7:44–7:46 am
Operative versus Non-Operative Treatment of Geriatric Odontoid Fractures: A Study of North American Trauma Centers
Jetan H. Badhiwala, Christopher D. Witiw, Jefferson R. Wilson, Leo da Costa, Avery Nathens, Michael G. Fehlings

7:46–7:48 am
Candidates for Percutaneous Pedicle Screw Fixation without Fusion in Thoracolumbar Fractures

7:48–7:50 am
First in Human Implementation of a Novel Spinal Cord Perfusion Pressure Protocol in Acute Traumatic Spinal Cord Injury

7:50–7:52 am
Cervical Collar, Halo Brace and Surgery for Treatment of Type II Odontoid Fractures in the Elderly: A Markov Analysis
Mark A. Attiah, Jane Kim, Allison Portnoy, Andrew Schoenfeld, Luke Macyszyn
Same Day Surgical Intervention Dramatically Minimizes Complication Occurrence for Central Cord Syndrome

Cole Bortz, Avery Brown, Haddy Alas, Katherine Pierce, Sara Naessig, Burhan Janjua, Aaron Hackley, Alex Soroceanu, Daniel M. Sciubba, Bassel G. Diebo, Michael Gerling, Peter G. Passias

Predictors of Thoracic and Lumbar Spine Injuries in Patients with Traumatic Brain Injury: A Nationwide Analysis

Blake M. Hauser, John McNulty, Mark M. Zaki, Saksham Gupta, David J. Cote, Joshua Bernstock, Yi Lu, John Chi, Michael Groff, Ayaz M. Khawaja, Timothy R. Smith, Hasan Zaidi

Results of an Institutional ED Protocol to Expedite MRI for Patients with Suspected Spinal Cord Compression

Jay K. Nathan, Zoey Chopra, Paul Park, Mark E. Oppenlander

Targeting the K+/Cl- co-transporter KCC2 Facilitates Rapid Recovery after Acute Cervical Spinal Cord Injury

Zachary A. Medress, Vanessa M. Doulames, Adrian Rodrigues, Giles W. Plant

Conservative vs Surgical Management of Type II Odontoid Fractures: A Retrospective Analysis of Sixty-six Patients

Nathan A. Shlobin, Akash Mitra, Hooman Azad, Nikil Prasad, Michael Cloney, Nader S. Dahdaleh

Survival and Extension of Motor and Sensory Neuron Constructs (Micro-TENNs) in Spinal Cord Injury


3-Dimensional Bioprinted Spinal Cord Scaffolds Encourage Neuronal Network Formation

Nicholas Lavoie, Daeha Joung, Manuel Esguerra, Michael McAlpine, Ann M. Parr

Traumatic Spinal Injuries from Border Wall Jumping at the U.S.-Mexico Border: A Single Institution’s 6-Year Experience

Wyatt L. Ramey, Peyton L. Nisson, Travis M. Dumont, R. John Hurlbert

Predictors of Neurological Improvement after Posterior Fusion Surgery in Degenerative Cervical Spine Disease

Nida Fatima, John H. Shin
8:10–8:12 am
Analysis of Transfusions and Effect of Anemia on Transfusion Rates in Common Elective Spine Surgery Procedures
Yaroslav J. Gelfand, Rafael De la Garza Ramos, Michael Longo, Vijay Yanamadala, Reza Yassari

8:12–8:14 am
Inter-Observer Reliability of the Modified Japanese Orthopedic Association Score in Degenerative Cervical Myelopathy
Allan R. Martin, Jamie R.F. Wilson, Thorsten Jentsch, Fan Jiang, Jetan H. Badhiwala, Ali Moghaddamjou, Muhammad Akbar, Anna Rienmuller, Mario Ganau, Eric M. Massicotte, Michael G. Fehlings

8:14–8:16 am
Relationship Between Gastrointestinal Comorbidities, Clinical Presentation and Surgical Outcome in Patients with Degenerative Cervical Myelopathy: Analysis of a Global Cohort
Aria Nouri, Jetan H. Badhiwala, So Kate, Hamed Reihani-Kermani, Kishan Patel, Jefferson R. Wilson, Insa Janssen, Enrico Tessitore, Karl Schaller, Joseph S. Cheng, Michael G. Fehlings

8:16–8:18 am
Predictors of the Timing of Decompressive Surgery in Metastatic Spinal Cord Compression
Nida Fatima, John H. Shin

8:18–8:20 am
Validation of 5-Item Modified Frailty Index for Patients following Posterior Cervical Fusion Surgery
Nida Fatima, John H. Shin

8:20–8:22 am
Influence of Socioeconomic Disparities on Management and Outcomes After Traumatic Upper Cervical Spine Fracture
Aladine A. Elsamadicy, Erica Giles, Wyatt David, Andrew B. Koo, Adam Kundishora, Christopher S. Hong, Kristopher T. Kahle, Michael DiLuna

8:22–8:24 am
Role of Cervical Collar on Outcomes Following Cervical Laminectomy and Fusion: CSM-S Trial Sub-group Analysis
Mehdi Khani, Melissa Dunbar, Robert G. Whitmore, Zoher Ghogawala, Subu N. Magge

8:24–8:26 am
Which MRI Findings are Associated with Long-term Disability?
Peter Udby, Leah Carreon

8:26–8:28 am
Complications and Survival in Octogenarians Undergoing Surgery for Spinal Metastases with Instrumented Stabilization
Ibrahim Hussain, Lily McLaughlin, Ilya Laufer, Mark H. Bilsky, Ori Barzilai
8:28–8:30 am
Real Time Cervical Spine MRI for the Assessment of Dynamic Spinal Instability
Basem I. Awad, Khaled Zaghloul, Donia Sobh

8:30–8:32 am
A Feasible Benefit Of The Renin-Angiotensin System Blockage: Looking For Clues In Cervical Spondylotic Myelopathy

8:32–8:34 am
Associated Risk Factors for Extended Length of Stay Following PCF for Cervical Spondylotic Myelopathy
Aladine A. Elsamadicy, Andrew B. Koo, Wyatt David, Megan Lee, Adam Kundishora, Ramana Gorrepati, Gregory A. Kuzmik, Joaquin Camara-Quintana, Luis Kolb, Maxwell Laurans, Khalid M. Abbed

8:34–8:36 am
Institutional Review of the Management of Type II Odontoid Fractures: Associations and Outcomes with Fibrous Non-union
Christopher Wilson, Christopher Wilson, Mariana Hoyos, Andrew Huh, Stephen Avila, Stephen K. Mendenhall, Miracle C. Anokwute, George Eckert, David Stockwell

8:36–8:38 am
Predicting Survival in Patients with Metastatic Renal Cell Carcinoma: Which Scoring System is the most Accurate?
Elie Massaad, Nida Fatima, Ganesh Shankar, John H. Shin

8:38–8:40 am
Effects of Prophylactic Hypothermia in Evoked Motor Potentials after Iatrogenic Spinal Cord Impact Injury
Ahmed Jorge, Sourik Roy, Erika Fish, Edward Dixon, David Hamilton, Jeffrey Balzer, Parthasarathy Thirumala

8:40–8:42 am
Spinal Cord Injury in the United States Army Special Forces

8:42–8:44 am
Analysis of Non-Motor Vehicle Accident Etiologies of Spinal Cord Injury in the United States from 1972-2018

8:44–8:46 am
Mesenchymal Stem Cells and Curcumin Enhance Spinal Cord Injury Recovery by Modulating the Immune Response
Variation in Elective Anterior Cervical Discectomy and Fusion Outcomes Between Patients With or Without Mental Illness
Jake Berg, Mohammed A. Alvi, Waseem Wahood, Allie J. Canoy Illies, Anshii Goyal, Panagiotis Kerezoudis, Benjamin D. Elder, Mohamad Bydon

Prognostic Factors in Degenerative Cervical Myelopathy for Patients Managed Operatively and Non-Operatively
Allan R. Martin, Sukhinder Kalsi-Ryan, Muhammad Akbar, Jetan H. Badhiwala, Jefferson R. Wilson, Lindsay Tetreault, Aria Nouri, Anna Rienmuller, Eric M. Massicotte, Michael G. Fehlings

Spine Injury Transport Times to Level 1 Trauma Facility
Robert Sterner, Nathaniel P. Brooks, Clayton Haldeman

Radiographic Predictors of Mechanical Failure Following Posterior Fusion Surgery in Degenerative Cervical Spine Disease
Nida Fatima, John H. Shin

Hounsfield Units in the Thoracic Spine Correlate with Bone Mineral Density on Dual Energy X-ray Absorptiometry
Pierce Peters, Anthony L. Mikula, Soliman Oushy, Jeremy L. Fogelson, Benjamin D. Elder

Peri-Operative and Swallowing Outcomes in Patients Undergoing Four and Five Level ACDF Surgery

Early versus Late Surgical Decompression for Central Cord Syndrome: An Analysis of Prospective, Multicenter Data
Jetan H. Badhiwala, Jefferson R. Wilson, Michael G. Fehlings

Cervical Fractures with Associated Vertebral Artery Dissections: An Analysis of a 310 Patient Cohort
Michael Cloney, Hooman Azad, Nikil Prasad, Akash Mitra, Tyler R. Koski, Nader S. Dahdaleh

Self-Assembling Peptide Material to Optimize Human Stem Cell-Based Repair of the Traumatically Injured Spinal Cord
Christopher S. Ahuja, Mohammad Khazaeei, Maryam Dadabhoy, Nitya Gulati, Niharikaa Aiyar, Vjura Senthilnathan, Nayab Punjani, Ali Hasan, Inara Walji, Yao Yao, Michael G. Fehlings
9:04–9:06 am
The Utility of Preoperative Laboratory Testing in Assessing Risk of Adverse Outcomes Following ACDF: Insights from NSQIP
Mohamad Bydon, Jad Zreik, Anshit Goyal, Mohammed A. Alvi, Brett Freedman

9:06–9:08 am
Nutritional Status as a 30-d Predictor of Complications and Mortality Following Posterior Cervical Fusion
Nida Fatima, John H. Shin

9:08–9:10 am
Jetan H. Badhiwala, Gerald Lebovic, Jefferson R. Wilson, Michael G. Fehlings, Christopher D. Witiw

9:10–9:12 am
Quantitative Romberg using a Force Plate: An Objective Measure for Cervical Myelopathy
Jeffrey L. Gum, Steven D. Glassman, Morgan Brown, Christy Daniels, Joseph Laratta, Leah Carreon

9:12–9:14 am
Anterior Discectomy and Fusion (ACDF): Does the Teaching Status of the Hospital Matter?
Aya Akhras, Waseem Wahood, Mohammed A. Alvi, Anshit Goyal, Yagiz U. Yolcu, Mohamad Bydon

9:14–9:16 am
Local Retropharyngeal Space Anesthetic for Dysphagia Reduction After Anterior Cervical Discectomy and Fusion Surgery
Alan T. Villavicencio, Ewell L. Nelson, Sharad Rajpal, Kara D. Beasley, Vinod Kantha, Sigita Burneikiene

9:16–9:18 am
Clinical and Radiographic Benefits of Skipping C7 Instrumentation in Posterior Cervicothoracic Fusion
Saavan Patel, Matthew K. Tobin, Cristian Gragnaniello, Sergey Neckrysh

9:18–9:20 am
ASA Class Surpasses the Diagnosis-Related Group System in Predicting Costs of Posterior Cervical Discectomy and Fusion
Annie E. Arrighi-Allisan, Sean N. Neifert, Rebecca Baron, Frank Yuk, Jeffrey Gilligan, John M. Caridi

9:20–9:22 am
Anterior Hybrid Fusion For Degenerative Cervical Myelopathy: Case Series, Systematic Review, and Meta-analysis
Andrew Platt, W.H. Andrew Ryu, Harel Deutsch
9:22–9:24 am  
**Cost Analysis of Three Surgical Approaches for Cervical Spondylotic Myelopathy**  
Zoher Ghogawala, Aniksha Balamurugan, Melissa Dunbar, Jenna Whooley, Subu N. Magge, Robert G. Whitmore

9:24–9:26 am  
**Prevalence and Impact of Anemia on Neurological Status in Patients with Degenerative Cervical Myelopathy**  

9:26–9:28 am  
**Diagnosis-Related Group Classification Best Predicts Episode-Based Costs for Anterior Cervical Discectomy and Fusion**  
Annie E. Arrighi-Allisan, Sean N. Neifert, Rebecca Baron, John M. Caridi, Frank Yuk, Jeffrey Gilligan, Jonathan Gal

9:28–9:30 am  
**Frailty Predicts Complications Better Than Age after Surgery for Cervical Myelopathy: A NSQIP Database Study**  
Jamie R.F. Wilson, Jethan H. Badhiwala, Robert Ravinksy, Fan Jiang, Michael G. Fehlings

**MEETING AGENDA**

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7:30–7:32 am  
**Vertebral Hemangiomas: Diagnosis and Management. A Single Center Experience**  
Nahom T. Teferi

7:32–7:34 am  
**Can We Make Them Walk Again? Predictors of Ambulatory Function in Metastatic Spinal Cord Compression**  
Nida Fatima, John H. Shin

7:34–7:36 am  
**Impact of Dialysis on 30-day Outcomes Following Spinal Fusion Surgery for Pathological Fractures: Insights from NSQIP**  
Mohammed A. Alvi, Jad Zeerik, Waseem Wahood, Anshit Goyal, Brett Freedman, Mohamad Bydon

7:36–7:38 am  
**Predictors of Survival and Scoring System after Decompressive Surgery in Metastatic Spinal Cord Compression**  
Nida Fatima, John H. Shin
7:38–7:40 am  
Surgery and Radiation Therapy versus High Dose Definitive Radiation Therapy for the Treatment of Mobile Spine Chordomas  
Nida Fatima, Elie Massaad, Ganesh Shankar, John H. Shin

7:40–7:42 am  
Identification of Factors Associated with Outcomes in Surgical Decompression for Metastatic Spinal Cord Compression  

7:42–7:44 am  
Predictors of Neurological Recovery after Decompressive Surgery in Metastatic Spinal Cord Compression  
Nida Fatima, John H. Shin

7:44–7:46 am  
Predictive Ability of Metabolic Syndrome-ATP III For Survival and Complications in Metastatic Spinal Cord Compression  
Nida Fatima, John H. Shin

7:46–7:48 am  
The Effect of Red Blood Cell Transfusion on Perioperative Morbidity after Metastatic Spinal Tumor Surgery  
Joshua Benton, Rafael De la Garza Ramos, Yaroslav J. Gelfand, Phillip C. Cezayirli, Murray Echt, Vijay Yanamadala, Reza Yassari

7:48–7:50 am  
Operative Predictors of Discharge Disposition, Hospital Stay Duration, and Expenditures After Intradural Tumor Removal  
Michael C. Jin, Allen L. Ho, Atman Desai

7:50–7:52 am  
Variation in Opioid Prescribing Patterns and Impact on Refill Prescriptions Following Elective Lumbar Spine Surgery  
Anshit Goyal, Stephanie Payne, Lindsey Sangaralingham, Mohammed A. Alvi, Molly Jeffery, James Naessens, Halena Gazelka, Elizabeth B. Habermann, Benjamin D. Elder, Robert J. Spinner, Mohammad Bydon

7:52–7:54 am  
Risk Factors for Dysphagia Following Posterior Cervical Fusion: A 10-year Single Institutional Experience  
Nida Fatima, John H. Shin

7:54–7:56 am  
Long-Term Assessment of Post-Surgical Opioid Use in Patients after Resection of Intradural-Extramedullary Tumors  
Allen L. Ho MD, Michael C. Jin, Atman Desai
7:56–7:58 am
Bauer and Spinal Instability Neoplastic Scores as Predictors of Blood Transfusion After Metastatic Spinal Tumor Surgery
Rafael De la Garza Ramos, Joshua Benton, Yaroslav J. Gelfand, Phillip C. Cezayirli, Murray Echt, Vijay Yanamadala, Reza Yassari

7:58–8:00 am
Variation in Opioid Prescribing Patterns and Impact on Refill Prescriptions Following Elective Cervical Spine Surgery
Anshit Goyal, Mohamad Bydon, Stephanie Payne, Lindsey Sangaralingham, Mohammed A. Akvi, Molly Jeffery, James Naessens, Halena Gazelka, Elizabeth B. Habermann, Benjamin D. Elder, Robert J. Spinner

8:00–8:02 am
Outcomes after Decompressive Surgery in Patients with Metastatic Spinal Cord Compression: A 70,734 Person-year Study
Nida Fatima, John H. Shin

8:02–8:04 am
Thirty- and 90- Day Readmissions after Spinal Surgery for Spine Metastases: A National Trend Analysis
Aladine A. Elsamadicy, Andrew B. Koo, Wyatt David, Cheryl Zogg, Adam Kundishora, Christopher S. Hong, Gregory A. Kuznik, Ramana Gorrepati, Pedro O. Coutinho, Luis Kolb, Maxwell Laurans, Khalid M. Abbed

8:04–8:06 am
Differential Bone Marrow Immune Landscape May Foster Permissive Tumor Growth in the Spine
Michael J. Strong, Aqila Ahmed, Sabrina Rocco, Anda-Alexandra Calinescu, Nicholas J. Szerlip

8:06–8:08 am
Use of Preoperative Nutrition Consults Predicts Fewer Complications and Faster Discharge after Spine Metastasis Surgery

8:08–8:10 am
Application of Cooperative Game Theory Principles to Interpret Machine Learning Models of Readmission in Spine Surgery
Michael L. Martini, Eric K. Oermann, Sean N. Neifert, Jonathan Gal, Dominic A. Nistal, John M. Caridi

8:10–8:12 am
Machine Learning-Based Feature Importance Analysis Enhances Prediction of Nonroutine Discharge Following Spine Surgery
Michael L. Martini, Eric K. Oermann, Sean N. Neifert, Jonathan Gal, Dominic A. Nistal, John M. Caridi
8:12–8:14 am
Spine Surgery is Safe and Effective in the Extremely Elderly, An Ambispective Study of 722 Patients Over 75 Years Old
Jamie R.F. Wilson, Jetan H. Badhiwala, Robert Ravinsky, Hetshree Joshi, Omar Khan, Fan Jiang, Raja Y. Rampersaud, Stephen Lewis, Eric M. Massicotte, Michael G. Fehlings

8:14–8:16 am
Preoperative Factor Evaluation in Patients Undergoing Elective Spine Surgery: Results from a Single-Center Online Survey
Kyle Mueller, Matthew R. D’Antuono, Nathan Nair

8:16–8:18 am
The Impact of Preoperative Opioid Use on Patient Satisfaction in the Outpatient Spine Surgery Setting
Nicholas M. Rabah, Hammad A. Khan, Jay M. Levin, Robert Winkelman, Thomas E. Mroz, Michael P. Steinmetz

8:18–8:20 am
Value of the Hospital Frailty Risk Score for Predicting Adverse Postoperative Outcomes in Spinal Surgery
Theodore Hannah, Sean N. Neifert, Jonathan Gal, Michael Martini, Alexander J. Schupfer, Trevor Hardigan, John Caridi

8:20–8:22 am
A Multidisciplinary Spine Surgical Indications Conference Leads to Alterations in Surgical Plans in a Significant Number of Cases
Joshua Benton, Rafael De la Garza Ramos, Yaroslav J. Gelfand, Phillip C. Cezayirli, Murray Echt, Reza Yassari, Vijay Yanamadala

8:22–8:24 am
Perioperative and Long-Term Opioid Use in Spine Surgery: An Analysis of the Medical Expenditure Panel Survey Data
Luke Wooster, Robert Winkelman, Dominic Pelle, Thomas Mroz, Michael P. Steinmetz

8:24–8:26 am
Reducing Wrong Level Spinal Surgeries Through Root Cause Analyses: Analysis of an Institution’s Iterative Policy Changes
Shaarada R. Srivatsa, Shaleen Vira, Ajit A. Krishnaney

8:26–8:28 am
Limb and Extremity Undergrowth in Perineuriomas: An Under-recognized Association
Courtney Pendleton, Karina Lenartowicz, Robert J. Spinner

8:28–8:30 am
Three Fraction Stereotactic Body Radiation Therapy Results in Similar Functional Outcomes as Single Dose Therapy
8:30–8:32 am  
Fractionated Stereotactic Body Radiation Therapy Results in Improved Pain Outcomes For Patients with Spinal Neoplasms  

8:32–8:34 am  
Separation Surgery and Adjuvant Stereotactic Radiation for Renal Cell Carcinoma Spinal Metastases: Analysis of 91 Cases  
Ibrahim Hussain, Lily McLaughlin, Ilya Lauffer, Mark H. Bilsky, Ori Barzilai

8:34–8:36 am  
Surgical Treatment of Cervicothoracic Junction Tumors  
Ibrahim Hussain, Joseph Carnevale, Jemma Villavieja, Lily McLaughlin, Ori Barzilai, Ilya Lauffer, Mark H. Bilsky

8:36–8:38 am  
The Change in Chronic Opioid Use Rates After Lumbar Decompression Surgery Following a State-Level Prescribing Reform  
Robert Winkelman, Pavitra Ravishankar, Edward Barkdale, Michael Kavanagh, Joseph E. Tannenbaum, Dominic Pelle, Edward C. Benzel, Thomas E. Mroz, Michael P. Steinmetz

8:38–8:40 am  
Opiate Epidemic Consequences in Kentucky: Trends of Spinal Infections from 2014 to 2019 at a Tertiary Referral Center  

8:40–8:42 am  
Ketorolac Significantly Reduces Opioid Use After MIS Thoracolumbar Fusions: Results from a Randomized Controlled Trial  
Chad F. Claus, Evan J. Lytle, Doris Tong, Diana Sigler, Matthew Bahoura, Lucas Garmo, Michael H. Lawless, Dejan Slavnic, Jacob Jasinski, Robert W. McCabe, Ascher Kaufmann, Gustavo Anton, Karl Kado, Daniel A. Carr, Prashant S. Kelkar, Clifford M. Houseman, Peter L. Bono, Boyd Richards, Teck M. Soo

8:42–8:44 am  
Surgical Treatment of Intradural Extramedullary Nerve Sheath Tumors with Neurofibromatosis 1 (NF1) at a Cancer Center  
Kimberly B. Hoang, John Slopis, Claudio E. Tatsui, Ian E. McCutcheon

8:44–8:46 am  
The “Hit Rate” For Determining Malignancy in Percutaneous Biopsy of Peripheral Nerve Tumors of Uncertain Behavior  
Courtney Pendleton, Robert J. Spinner
8:46–8:48 am
Predictive Modeling of Long-Term Postoperative Opioid Use after Spine Surgery
Yi Zhang, Parastou Fatemi, John K. Ratliff

8:48–8:50 am
Impact of Preventative Multimodal Analgesia on Opioid Requirement and Pain Control in Patients Undergoing Lumbar Fusions
Alan T. Villavicencio, Sharad Rajpal, Ewell L. Nelson, Steven L. Hobbs, Christopher Zielenski, Kara D. Beasley, Vinod Kantha, Sigita Burneikiene

8:50–8:52 am
Trends in Spine Surgery Training during Neurological and Orthopedic Surgery Residency: A Ten-Year Analysis of ACGME Data
Martin H. Pham, Arvin R. Wali, Andre M. Jakoi, Lawrence Lenke

8:52–8:54 am
Race is a Predictor of All-Cause Mortality in Patients Diagnosed with a Primary Spine Tumor

8:54–8:56 am
Survival and Fusion Outcomes after Surgery for Spinal Metastatic Disease
Timothy J. Yee, Yamaan S. Saadeh, Michael J Strong, Clay M. Elswick, Ayobami Ward, Paul Park, Mark E. Oppenlander, Nicholas J. Szerlip

8:56–8:58 am
Targeting Histone and DNA Methylation as a Therapeutic Strategy for Chordoma
Sakibul Huq, Jayanidhi Kedda, Tianna Zhao, Riccardo Serra, Andy Ding, Manuel Morales, Jeffrey Ehresman, Henry Brem, Gary L. Gallia, Daniel M. Sciubba, Betty Tyler

8:58–9:00 am
Impact of Frailty on Outcomes following Elective Spine Surgery: A Prospective Cohort Analysis of 668 Patients
Nitin Agarwal, Ezequiel Goldschmidt, Tavis Taylor, Sowik Roy, Stephanie Dunn, Andrew Bilderback, Robert M. Friedlander, Adam S. Kanter, David O. Okonkwo, Peter Gerszten, David Hamilton, Daniel Hall

9:00–9:02 am
Outcomes and Hypercoagulable Complications Associated with Tranexamic Acid During Thoracolumbar Three Column Osteotomies
Darryl Lau, Alexander F. Haddad, Rushikesh S. Joshi, Vedat Deviren, Christopher P. Ames
9:02–9:04 am
Predictors of Indirect Neural Decompression with Lateral Transpsoas Interbody Fusion

9:04–9:06 am
A Retrospective Analysis of High Opioid Use Patients Undergoing a Preoperative Pain Program Prior to Spine Surgery
Karl Wittnebel, Lindsey Ross, Jeanne Black, Keith Siegel, Terrence T. Kim, Eli M. Baron, Alexander Tuchman, Tiffany Perry, Mark Vrahas, J. Patrick Johnson, Sang Do Kim

9:06–9:08 am
Nida Fatima, Steven D. Chang, Antonio Meola

9:08–9:10 am
A Naïve Bayes Model to Predict 3-Month Post-Surgical Survival in Metastatic Epidural Spinal Cord Compression Patients
Vikram Anjur, Chang Hu, Krishnakant Saboo, Ravishankar Iyer, Paul M. Arnold

9:10–9:12 am
Tracking Neurosurgical Opioid Prescribing Rates in the Medicare Population from 2013-2017
Colin Lamb, Sean N. Neifert, Michael Martini, Frank Yuk, Jeffrey Gilligan, John Caridi

9:12–9:14 am
The Effect of Opioid Dependence on Postoperative Urinary Retention Following Elective Lumbar Fusion Surgery
Ronan Doherty, Waseem Wahood, Yagiz U. Yoleu, Jad Zreik, Anshit Goyal, Mohammed A. Alvi, Elizabeth B. Habermann, Mohammad Bydon

9:14–9:16 am
Risk Factors for Kyphosis and Revision After Surgery for Spinal Metastasis
Shashank V. Gandhi, Katherine Wagner, Justin Turpin, Ahmad Latefi

9:16–9:18 am
Rates of Inpatient Palliative Care Consultation for Patients with Brain and Spine Metastases
Elizabeth P. Howell, Meghan Price, Tara Dalton, Theresa Williamson, Vikram Mehta, Brice Painter, C. Rory Goodwin

9:18–9:20 am
Single–cell RNA Sequencing of Prostate Metastases to the Spine Reveals an Immunosuppressive Bone Marrow Microenvironment
John H. Shin, Ninib Baryawno, Philip Saylor, David Sykes, David Scadden, Peter Kharchenko
9:20–9:22 am
MIS versus Open Surgery for Intradural-Extramedullary Spinal Cord tumor Resection: A Systematic Review and Meta-Analysis
Soliman Oushy, Yagiz U. Yolcu, Amika Kamath, Waseem Wahood, Anshit Goyal, Mohammed A. Alvi, Mohamad Bydon

9:22–9:24 am
The Effect of Pre-operative Opioid Use on Hospital Length of Stay in Patients Undergoing Elective Spine Surgery
Eve C. Tsai, Alexandra Stratton, Sarah Tierney, Eugene Wai

9:24–9:26 am
Preoperative Radiation is an Independent Predictor of Time to Death in Metastatic Spine Patients

9:26–9:28 am
Characterizing the Rates and Causes of Spinal Cord Compression in Patients with Known Spinal Metastases
Joshua Benton, Rafael De la Garza Ramos, Yaroslav J. Gelfand, Phillip C. Cezayirli, Murray Echt, Reza Yassari, Vijay Yanamadala

9:28–9:30 am
Minimally Invasive Surgery for Intradural Extramedullary Spinal Cord Pathologies: A Case Series
Ryan Kelly, Islam Fayed, Anthony G. Conte, Amjad N. Anaizi

7:30–7:32 am
The Association of Education on Patient-Reported Outcomes after Elective Lumbar Spine Surgery: A MSSIC Study
Mohamed Macki, Travis M. Hamilton, Michael Bazydlo, Lonni Schultz, Hesham M. Zakaria, Jad Khalil, Miguelangelo Perez-Cruet, Ilyas Aleem, Paul Park, David Nerenz, Jason M. Schwalb, Muwaffak Abdulhak, Victor W. Chang

7:32–7:34 am
Impact of Body-Mass Index on Clinical and Radiographic Outcomes Following Posterior Cervical Fusion Surgery
Nida Fatima, John H. Shin

7:34–7:36 am
Utility of Venous Thromboembolism Chemoprophylaxis: An Institutional Analysis
Allen L. Ho, Austin Y. Feng, Paras Fatemi, Zachary A. Medress, Atman Desai, Anand Veeravagu, John K. Ratliff
7:36–7:38 am  
Posterior Cervical Fusion for Treatment of Atlantoaxial Arthrosis: Case Series and Review of Literature  
Andrew Platt, Brian T. David, Victoria D. Vuong, John E. O'Toole, Vincent C. Traynelis

7:38–7:40 am  
Jack M. Haglin, Kent Richter, Jordan Pollock, Jakub Godzik, Naresh P. Patel

7:40–7:42 am  
Medicare Reimbursement of Implantable Spinal Cord Stimulators from 2000–2019  
Kent Richter, Jack M. Haglin, Jordan Pollock, Jakub Godzik, Naresh P. Patel

7:42–7:44 am  
Robot Assisted Neuro-navigation for Pedicle Screw Fixation: Protocol Modification for the Procedure Optimization  
Komal Naeem, Malika Bhargava, Randall W. Porter

7:44–7:46 am  
Shashank V. Gandhi, Daniel Toscano, Ahmad Latefi

7:46–7:48 am  
The Use of the Hospital Frailty Risk Score to Predict Outcomes Following Anterior and Posterior Cervical Fusions  
Rebecca Baron, Sean N. Neifert, Michael Martini, Georgios A. Maragkos, Ian T. McNeill, Eric Oermann, John Caridi

7:48–7:50 am  
Effect of Simulation Training on Resident Proficiency in Placement of Navigated Thoracolumbar Pedicle Screws  
Andrew M. Gardeck, Xuan Pu, Qiuju Yang, David W. Polly, Kristen E. Jones

7:50–7:52 am  
Comparative Analysis of Transforaminal Endoscopic Discectomy and Microscopic Discectomy for Thoracic Disc Herniation  
Jun Seok Bae, Sang-Ho Lee

7:52–7:54 am  
Does Attachment of the Dorsolumbar Fascia to a Spinous Process Prosthesis Affect the Kinematics of the Lumbosacral Spine  
Daina Brooks, Bryan W. Cunningham, Mohit Kukreja, Ken Mullinix, Nicholas Rolle, P. Justin Tortolani
7:54–7:56 am
Accuracy of Cortical Bone Trajectory Screw Placement with Intraoperative Cone Beam Navigation
Joseph Laratta, Jamal Shillingford, Andrew Pugely, Avery L. Buchholz, Mladen Djurasovic, Jeffrey L. Gum, Steven D. Glassman, Charles H. Crawford III

7:58–8:00 am
Promising Biomimetic Delivery System with Osteoinductive Bone Particles in Biodegradable Grafts For Spinal Fusion
Alexander Perdomo-Pantoja, Alexandra Rindone, Christina Holmes, Kathleen Noller, Warren Grayson, Timothy F. Witham

8:00–8:02 am
Patient Rated Outcomes - The Difference Between Satisfaction with Care and Perception of Surgical Outcome
Ben Z. Roitberg, Ying Cao, Jingjing Shen

8:02–8:04 am
Factors Associated With C5 Palsy Following Cervical Spine Surgery: A Systematic Review

8:04–8:06 am
Engineering Biomaterial for Mesenchymal Stem Cells Delivery to Regenerate Nucleus Pulposus
Lee Onn Chieng

8:06–8:08 am
Diabetes is a Predictor of Postoperative C5 Nerve Root Palsy after Posterior Cervical Laminectomy and Fusion
Yaroslav J. Gelfand, Joshua Benton, Michael Longo, Rafael De la Garza Ramos, Vijay Yanamadala, Reza Yassari

8:08–8:10 am
Lumbar Intervertebral Disc mRNA Sequencing Identifies the Regulatory Pathway in Patients with Degenerative Conditions
Mohamad Bydon, F. M. Moinuddin, Yagiz U. Yolcu, Waseem Wahood, Mohammed A. Alvi, Anshit Goyal, Mohammed Elminaawy, Amel Dudakovic, Ahmad Nassr, Noelle Larson, Andre van Wijnen

8:10–8:12 am
The Current State of Knowledge of Providers Caring for Patients with Neonatal Brachial Plexus Palsy
Brandon W. Smith, Molly McNeely, Kate Chang, Lynda Jun-San Yang, John E. McGillicuddy

8:12–8:14 am
Comparison of Various Methods of Axillar Nerve Reconstruction in Upper Brachial Plexus Palsy
Pavel Haninec, Libor Mencl
8:14–8:16 am
An Analysis of Medicare Reimbursement for Neurosurgeon Office Visits: 2010-2018
Maya Harrington, Jordan Pollock, Jack M. Haglin, Kent Richter, Naresh P. Patel

8:16–8:18 am
Postoperative Urinary Retention (POUR) in Elective Lumbar Spinal Surgery: A Quality Improvement Project - Final Results
Jake Jasinski, Doris Tong, Chad F. Claus, Evan J. Lytle, Matthew Bakhoura, Clifford Houseman, Peter L. Bono, Teck M. Soo

8:18–8:20 am
Long-term Results after Surgical or Non-surgical Treatment of Lumbar Spinal Stenosis: A Prospective Multi-center Study
Jakob M. Burgstaller, Johann Steurer, Isaac Gravestock, Florian Brunner, Tomas Fekete, Giuseppe Pichiervi, Nils H. Ulrich, Sebastian Winkhofer, Francois Porchet, Mazda Farshad

8:20–8:22 am
Growth Hormone Enhances Response to Therapeutic Electrical Stimulation in Rat Sciatic Injury Model
Richard Price, Ying Yan, Nathan Birenbaum, Christopher Dibble, Matthew R. MacEwan, Zack Ray

8:22–8:24 am
Comparison of Outcomes in Spinal Epidural Abscess Patients with Medical versus Surgical Initial Management
Yaroslav J. Gelfand, Michael Longo, Zach Pennington, Rafael De la Garza Ramos, Vijay Yanamadala, Daniel M. Sciubba, Reza Yassari

8:24–8:26 am
Novel MRI-based Score for Assessment of Bone Density in Operative Spine Patients
Jeff Ehresman, Zach Pennington, Andrew Schilling, Daniel Lubelski, A. Karim Ahmed, Ethan Cottrill, Majid Khan, Daniel M. Sciubba

8:26–8:28 am
Prognosticators of Return-to Work Among Employees Undergoing Lumbar Surgery: A MSSIC Study
Mohamed Macki, Travis M. Hamilton, Hesham M. Zakaria, Michael Basyal, Lomi Schults, Jad Khalil, Miguelangelo Perez-Cruet, Ilyas Aleem, Paul Park, David Nerenz, Jason M. Schwab, Muwaffak Abdulhak, Victor W. Chang

8:28–8:30 am
Using Machine Learning to Predict 30-Day Readmissions after Posterior Lumbar Fusion: A NSQIP Study of 23,264 Patients
Benjamin Hopkins, Jonathan T. Yamaguchi, Hannah Weiss, Roxanna Garcia, Tyler R. Koski, Nader S. Dahdah
8:30–8:32 am
Mesenchymal Stem Cell-Seeded High-Density Collagen Gel for Annular Repair: 16-Week Results From In Vivo Sheep Models
Sertac Kirnaz, Christoph Wipplinger, Stephen Sloan, Franziska A. Schmidt, Lawrence J. Bonassar, Roger Hartl

8:32–8:34 am
Prophylactic Closed-Incisional Negative Pressure Therapy In Spine Surgery: A Multi-center, Observational Study
Kyle Mueller, Matthew R. D’Antuono, Nirali Patel, Gnel Pivazyan, Edward Auisci, Karen Evans, Nathan Nair

8:34–8:36 am
The Impact of Preoperative Depression on Patient Satisfaction with Spine Surgeons in the Outpatient Setting
Hammad A. Khan, Nicholas M. Rabah, Jay M. Levin, Robert Winkelman, Thomas E. Mroz, Michael P. Steinmetz

8:36–8:38 am
The Role of Neuromonitoring in Anterior Lumbar Interbody Fusion
Anan Shtewe, Kartik Kesavabholla, Nader S. Dahdaleh, Tyler R. Koski

8:38–8:40 am
Bariatric Surgery Diminishes Spinal Symptoms in a Morbidly Obese Population: A 2-Year Survivorship Analysis
Peter G. Passias, Avery Brown, Huddy Alas, Cole Bortz, Katherine Pierce, Walid Ahmad, Sara Naessig, Erik Wang, Hamid Hassanzadeh, Lawal Labaran, Varun Puvanesarajah, Aaron J. Buckland, Michael Gerling

8:40–8:42 am
The Effect of Obesity on Adjacent Segment Revision Surgery after TLIF for Spondylolisthesis
Ping G. Duan, Praveen V. Mummaneni, Sigurd Berven, Rory R. Meyer, Bo Li, Dean Chou

8:42–8:44 am
Utilization of Posterior Lumbar Fusion Varies By Yearly Quarter: Insights from The National Inpatient Sample
Waseem Wahood, Alex Alexander, Mohammed A. Alvi, Anshit Goyal, Elizabeth Habberman, Mohamad Bydon

8:44–8:46 am
Mild and Severe Obesity Reduce Effectiveness of Lumbar Fusions: One Year Patient-Reported Outcomes in 8,171 Patients
Graham Mulvaney, Matthew J. McGirt, Vincent Rossi, David Peters, Olivia Rice, Joshua Patt, Deborah Pfortmiller, Anthony L. Asher

8:46–8:48 am
Medicare Reimbursement For Services Billed By Neurosurgeons From 2010-2018
Jordan Pollock, Kent Richter, Jack M. Haglin, Naresh P. Patel
Comparing the Predictive Ability of DRGs with Comorbidity Measures in ALIF
Sean N. Neifert, Rebecca Baron, John M. Caridi, Ian T. McNeill, Travis Ladner, Jonathan Gal

Adipose Tissue-Derived Stromal Vascular Fraction Cells With Neither Culture Expansion Nor Priming in Spinal Fusion

Predictors of Unemployed Patients Returning to Work After Lumbar Surgery
Mohamed Macki, Travis M. Hamilton, Michael Bazydlo, Lonni Schultz, Hesham M. Zakaria, Jad Khalil, Miguelangelo Perez-Cruet, Ilyas Alem, Paul Park, David Nerenz, Jason M. Schwalb, Muweifjak Abdulhak, Victor W. Chang

Preoperatively Predicting Discharge Disposition After Lumbar Laminectomy Using a Machine-Learning Classification Model
Robert Winkelman, Rod Nault, Ghaith Habboub, Matthew M. Grabowski, Vikram Chakrwarthy, Sebastian Salas-Vega, Jason Savage, Thomas E. Mroz

Antibiotic Stewardship and Single-Dose Antibiotic Prophylaxis: A Word of Caution for Spine Surgery
Allen L. Ho, Martin N. Stienen, John K. Ratliff

Vascularized Scapular Grafts: A Novel Approach for Spinal Fusion
Terence Verla, Aditya Vedantam, Matthew Davis, Edward Reece, Michael R. Raher, David S. Xu, Alexander E. Ropper

The Impact of Surgical Chronology on Outcomes of Patients Receiving Lumbar Spine and Lower Extremity Joint Surgeries
Karam Atli, Gabriel A. Smith, Konrad Knusel, Edward C. Benzel, Ajit A. Krishnaney, Michael P. Steinmetz, Thomas Mroz

The Utility of Neuromonitoring on Posterior Lumbar Fusions - Analysis of the National Inpatient Sample Database
William Steele, Ryan Austerman, Sean Barber, Suraj Sulhan

Three-Dimensional Printing of Titanium Without Bone Graft Outperforms PEEK + Autologous Iliac Crest Bone Graft
Jesus Pino, Rosa Villar, Antonio Cantalapiedra, Fernando Munoz, Ramiro Gouveiro, Jeffrey L. Gum, Andrew Pugely, Joseph Lavatta
9:06–9:08 am
Surgical Management of Anterior Cervical Osteophytes Causing Dysphagia
Joshua Kolz, Mohammad A. Alvi, Atiq Bhatti, Mohamad Bydon, Yagiz U. Yoleu, Ahmad Nassr, Bradford L. Currier, Brett Freedman

9:08–9:10 am
The Effect of Estimated Blood Loss on Lumbar Spinal Fusion Outcomes
Mohamed Macki, Travis M. Hamilton, Michael Bazydlo, Lonni Schultz, Hesham M. Zakaria, Jad Khalil, Miguelangelo Perez-Cruet, Ilyas Aleem, Paul Park, David Nerenz, Jason M. Schwalb, Muwaffak Abdulhak, Victor W. Chang

9:10–9:12 am
Optimization of a Disc Degeneration Model in the Rat Lumbar Spine
Stephen Stephan, Juliane Glaeser, Wafa Tawackoli, Derek Ju, Jae Hyuk Yang, Linda Kanim, Khosrowlad Salehi, Victoria Yu, Zhanna Khnkoyan, Zachary Napier, Hyun Bae, Dmitriy Sheyn

9:12–9:14 am
Inhibitory Effects of Vancomycin on Rat Bone Marrow-Derived Mesenchymal Stem Cell Viability and Differentiation
Kari Hanson, Carly Isder, Kristen Shogren, Anthony L. Mikula, Michael J. Yaszemski, Benjamin D. Elder

9:14–9:16 am
Factors Associated With C5 Palsy Following Cervical Spine Surgery: A Systematic Review

9:16–9:18 am
Serial Electrical Stimulation Improves Functional Recovery in Sciatic Nerve Transection and Isograft Repair in Rats
Arman Odabas, Nathan Birenbaum, Ying Yan, Wilson Z. Ray, Matthew R. MacEwan

9:18–9:20 am
Distal Wrist Crease vs Traditional Longitudinal Incision for Open Carpal Tunnel Release
Robert Y. North, Caroline Hadley, James Bayley, Bruce L. Ehni

9:20–9:22 am
Brachial Plexus Nerve Root Avulsion Resulting in Delayed Cervical Spinal Cord Herniation

9:22–9:24 am
Resident Peripheral Nerve Surgery Exposure and Nerve Repair Technical Ability Assessment
Andrew S. Jack, Beata Durcanova, Line G. Jacques
9:24–9:26 am
Neural Degeneration Underlies Cancer Cachexia Induced Respiratory Failure
Daryl Fields, Andrew Judge, David Fuller, Gordon Mitchell

9:26–9:28 am
The F2RaD Score: A Novel Prediction Score and Calculator Tool to Identify Patients at Risk of Postoperative C5 Palsy
Daniel Lubelski, Zach Pennington, James Feghali, Allan J. Belzberg, Ali Bydon, Daniel M. Sciubba

9:28–9:30 am
Preoperative Exercise History: A Possible Risk Factor for Spinal Fusion Patients
Rami Elsabeh, John M. Abrahams

Spinal Deformity Mont Royal Ballroom 2
Moderators: Kai-Ming G. Fu, Tyler R. Koski, Hasan Aqdas Zaidi

7:30–7:32 am
Full Correction or Limited Fusion in Adult Scoliosis Surgery: Differences in Pain Alleviation and Morbidity
Minghao Wang, Rory R. Mayer, Gregory W.J. Hawryluk, Darryl Lau, Ratnesh N. Mehra, Dean Chou

7:32–7:34 am
Timothy Chryssikos, Joshua R. Olexa, Madeleine Smith, Harry M. Mushlin, Nathan L. Pratt, Gary T. Schwartzbauer, Kenneth M. Crandall, Charles A. Sansur

7:34–7:36 am
Predictors of Early versus Late Distal Junctional Kyphosis Following Posterior Cervical Fusion
Nida Fatima, John H. Shin

7:36–7:38 am
BMI Is Correlated with Functional Disability and Depression Following Adult Spinal Deformity Surgery
Jianning Shao, Arbaz Momin, Jonathan J. Rasouli, Jacob Enders, Edward C. Benzel, Michael P. Steinmetz

7:38–7:40 am
Frailty is An Important Predictor of Proximal Junction Kyphosis Development Following Adult Spinal Deformity Surgery
Jianning Shao, Arbaz Momin, Jonathan J. Rasouli, Jacob Enders, Edward C. Benzel, Michael P. Steinmetz

7:40–7:42 am
Pelvic Parameters Directly Influence S2 Alar-Iliac (S2AI) Screw Trajectory
Joseph Laratta, Jamal Shillingford, Jeffrey L. Gum, Andrew Pugely, Avery L. Buchholz, Steven D. Glassman, Ronald A. Lehman, Lawrence Lenke
Comparing and Contrasting the Clinical Utility of Sagittal Alignment Classification Frameworks: Roussouly vs. SRS-Schwab
Cole Bortz, Peter G. Passias, Lafage Renaud, Christopher P. Ames, Bassel G. Diebo, Eric Klineberg, Frank Schwab, Justin S. Smith, Virginie Lafage, ISSG International Spine Study Group

Acute Failure Mechanisms of S2-Alar-Iliac Screws for Pelvic Fixation in Adult Spine Deformity
Kristen E. Jones, Christophe T. Martin, Jose San Miguel, Melissa Albersheim, Jonathan N. Sembrano, David W. Polly

Assessment of the Utility of Vertebral Body Hounsfield Units as a Predictor of Proximal Junctional Kyphosis
Luke Wooster, Robert Winkelman, Dominic Pelle, Thomas Mroz, Michael P. Steinmetz

Use of Intraoperative Rod Strain Sensors in Adult Spinal Deformity Surgery
Andrew Ronald, Rolando M. Puno, Jeffrey L. Gum, Richard R. Navarro, Peter J. Baszuk, Leah Y. Carreon, Douglas Orr, Michael P. Steinmetz

Depiction of Comorbidity Profiles in Adolescent Idiopathic Scoliosis Patients with and without Syringomyelia
Katherine Pierce, Avery Brown, Cole Bortz, Haddy Alas, Sara Naessig, Jordan Manning, Bassel G. Diebo, Carl Paulino, Daniel M. Sciuabba, Michael Gerling, Peter G. Passias

The Effect of Hospital Characteristics on Pediatric Neuromuscular Scoliosis Fusion Cost
Jonathan Dallas, Chevis Shannon, Christopher Bonfield

Biomechanics of Pedicle Subtraction Osteotomy with Different Constructs: A Cadaveric Study of Stability and Strain
Bernardo De Andrada, Jakub Godzik, Jennifer Lehrman, Anna Newcomb, Juan Uribe, Brian Kelly, Jay D. Turner

Changes in Spino pelvic Parameters in the First Three Months Following Corrective Surgery for Adult Spinal Deformity
7:58–8:00 am
Incidence and Risk Factors of Mechanical Complications After Osteotomies for Correction of Cervicothoracic Deformities
Darryl Lau, Rushikesh S. Joshi, Alexander F. Haddad, Vedat Deviren, Christopher P. Ames

8:00–8:02 am
Significance of Posterior Fusion Bone Density on Mechanical Complications Following Thoracolumbar Three-column Osteotomy
Darryl Lau, Jae Hwan Cho, Vedat Deviren, Christopher P. Ames

8:02–8:04 am
Anterior Column Realignment: A Single Institution Retrospective Series
Meng Huang, Saeed S. Sadrameli, Vitaly Davidov, Jonathan J. Lee, Sunaj Sulhan, Virendra Desai, Sean Barber, Blake Staub, Todd W. Trask, Paul J. Holmam

8:04–8:06 am
Frailty Does Not Negatively Affect Cost Utility in Adult Spinal Deformity
Avery Brown, Katherine Pierce, Cole Bortz, Sara Naessig, Haddy Alas, Waleed Ahmad, Aaron J. Buckland, Themistocles Protopsaltis, Shaleen Vira, Peter G. Passias

8:06–8:08 am
A Systematic Review of Operative and Non-operative Management for Scheuermann Kyphosis
Sakibul Huq, Jeff Ehresman, Ethan Cottrill, A. Karim Ahmed, Zach Pennington, Erick M. Westbroek, Daniel M. Sciubba

8:08–8:10 am
Intraoperative Long Cassette Films and Pelvic Kickstand in Long Thoracolumbar Adult Deformity Correction
Ryan C. Hofler, Russ P. Nockels

8:10–8:12 am
Predictors of Reoperation in Medicare Patients Undergoing Primary Adult Thoracolumbar Deformity Surgery
Kunal Varshneya, Parastou Fatemi, Zachary A. Medress, John K. Ratiliff, Anand Veeravagu

8:12–8:14 am
Single-Position Lateral Surgery with Transpsoas Fixation is an Effective Treatment for Adult Spinal Deformity
Joseph Laratta, Jeffrey L. Gum, Avery L. Buchholz, Andrew Pugely, William Smith

8:14–8:16 am
One vs Two Attending Surgeons for Spine Deformity: A Systematic Review and Meta-analysis
Asad M. Lak, Abdullah M. Abunimer, Caroline Goedmakers, Rania Mekary, Linda Aglio, Melvin Makhni, Hasan A. Zaidi
8:16–8:18 am
Influence of Gender on Discharge Disposition After Spinal Fusion for Adult Spine Deformity Correction

8:18–8:20 am
Management of the Fractional Curve in Degenerative Scoliosis using Circumferentially Minimally Invasive Fusion
Corey T. Walker, Jakub Godzik, Jay D. Turner, Juan S. Uribe

8:20–8:22 am
Frailty Predicts Functional Outcome Following Adult Spinal Deformity Surgery
Jianning Shao, Arbaz Momin, Jonathan J. Rasoul, Jacob Enders, Edward C. Benzel, Michael P. Steinmetz

8:22–8:24 am
Preoperative Pelvic Tilt Informs Functional Outcomes After Adult Spinal Deformity Surgery in the Lumbar Spine
Jianning Shao, Arbaz Momin, Jonathan J. Rasoul, Jacob Enders, Edward C. Benzel, Michael P. Steinmetz

8:24–8:26 am
Circumferential Correction of Spinal Deformity and Instability Secondary to Bacterial Spondylodiscitis
Ziev Moses, Mazda K. Turel, Mena G. Kerobus, Samuel Meza, Ricardo B.V. Fontes

8:26–8:28 am
Intravenous Tranexamic Acid and Perioperative Blood Loss in Percutaneous Three-Level Lumbar Fusion: A Feasibility Study
Robert W. McCabe, Doris Tong, Lucas Garmo, Teck M. Soo

8:28–8:30 am
Patient Expectation on Outcomes of Adult Spinal Deformity Surgery
W. H. Andrew Ryu, Brian T. David, Ricardo B.V. Fontes, Richard G. Fessler

8:30–8:32 am
Complications, Radiographic, and Surgical Outcomes of Rigid Cervical Scoliosis and Combined Coronal Deformity Correction
Darryl Lau, Rushikesh S. Joshi, Alexander F. Haddad, Vedat Deviren, Christopher P. Ames

8:32–8:34 am
Risk Factors for Intensive Care Unit and Hospital Stay Following Osteotomies for Severe Cervicothoracic Deformity
Rushikesh S. Joshi, Darryl Lau, Alexander F. Haddad, Vedat Deviren, Christopher P. Ames
8:34–8:36 am
Neurologic Outcomes and Use of Neuromonitoring for Posterior Based Three Column Osteotomy for Cervicothoracic Deformity
Darryl Lau, Cecilia L. Dalle Ore, Alexander F. Haddad, Vedat Deviren, Christopher P. Ames

8:36–8:38 am
Influence of approach on Segmental Lordosis and Spinopelvic Correction with Lumbar Interbody Fusion: A Meta-Analysis and Systematic Review
Jennifer Mao, Jeffrey P. Mullin, Muhammad Waqas, Tim O’Connor, Asham Khan, Felix Chin, John Pollina

8:38–8:40 am
Multilevel Posterior Column Osteotomies (MPCO): Technique Evaluation for Lumbar Sagittal Realignment in Unfused Discs
Joseph A. Osorio, James Lin, Meghan Cerpa, Lawrence Lenke

8:40–8:42 am
Age is the Best Predictor for Length of Stay and Opioid Use Amongst Patients Undergoing Deformity Correction Surgery
Emmanuel Adeyemo, Umaru Barrie, Salah G. Aoun, Madelina Nguyen, Olatunde Badejo, Zachary Christian, Kristen M. Hall, Valery Peinado Reyes, David L. McDonagh, Carlos A. Bagley

8:42–8:44 am
Functional Status and Comorbidity Burden Are Predictors of Postoperative Complications in Adult Spinal Deformity Surgery
Jianning Shao, Arbaz Momin, Jonathan J. Rasouli, Jacob Enders, Edward C. Benzel, Michael P. Steinmetz

8:44–8:46 am
Bone Morphogenetic Protein Use in Adult Thoracolumbar Deformity Surgery: Impact on Reoperation Rate and Cancer Risk
Kunal Varshneya, Martin N. Stienen, Zachary A. Medress, Victor E. Staartjes, Atman Desai, Gordon Li, Corinna C. Zygourakis, Jon Park, John K. Ratliff, Anand Veeravagu

8:46–8:48 am
Efficacy and Safety of IV TXA in Reducing Blood Loss and Transfusions in Thoracolumbar Fusion
Alexandre B. Todeschini, Benjamin G. McGahan, Alberto Uribe, Marco Echavarria-Villalobos, Juan Fiorida-Diaz, Mahmoud Abdel-Rasoul, Asad Akhter, Liesl Close, Benjamin McGahan, Andrew Grossach, Stephanus Viljoen, Sergio Bergese

8:48–8:50 am
Utility of Topical Tranexamic Acid in Spine Deformity Surgery: A Systematic Review and Meta-analysis
Nida Fatima, John H. Shin
8:50–8:52 am
Novel Radiographic Vertebral Bone Quality Score Predicts Symptomatic Adjacent Segment Disease Following Lumbar Fusion
A. Karim Ahmed, Jeff Ehresman, Daniel Lubelski, Andrew Schilling, Zach Pennington, Ethan Cottrill, Julie McCracken, Majid Khan, Daniel M. Sciubba

8:52–8:54 am
Interim Analysis of a Prospective, Concurrently Controlled, Multi-Center FDA Study Results of Paraspinous Tension Band

8:54–8:56 am
Indications for Surgical Intervention from Adolescent to Adult Idiopathic Scoliosis: An International Survey of Experts

8:56–8:58 am
ACR vs PSO for Severe Sagittal Deformity: Clinical & Radiologic Results of a Hyperlordotic Expandable Lateral Interbody
Lara W. Massie, Hesham M. Zakaria, Mohamed Macki, Azam Basheer, Victor W. Chang, Frank LaMarca

8:58–9:00 am
Upright versus Supine Imaging is Superior to Flexion/Extension Xrays in Detection of Instability
Andrew Yew, Aleksey Ovchinnikov, Zoher Ghogawala

9:00–9:02 am
Regional Heterogeneity in Sacropelvic Bone Densitometry is Amplified after Teriparatide Treatment
Patrick Flanigan, Anthony L. Mikula, Soliman Oushy, Jeremy L. Fogelson, David W. Polly, Benjamin D. Elder

9:02–9:04 am
Machine Learning Model to Predict Osteoporotic Spine with Hounsfield Units on Lumbar Computed Tomography
Kyoung-Hyup Nam, Dong Hwan Kim, Byung Kwan Choi, In Ho Han

9:04–9:06 am
Predicting Determinants of Variation in Episode-of-care Bundled Payments for Adult Spinal Deformity Surgery
Zachary A. Medress, Anand Veeravagu, John K. Ratliff, Atman Desai, Corinna C. Zygourakis, Kunal Varshneya, Parastou Fatemi, Adrian Rodrigues, Stephen Skirboll, Jon Park, Martin N. Stienen
9:06–9:08 am
Age, BMI and Osteoporosis are More Predictive than Imaging for Adjacent Segment Re-Operation after Lumbar Fusion
Nii Ankrah, Andrew Yew

9:08–9:10 am
Preventing Proximal Junctional Failure in Open Thoracolumbar Fusion Using Multilevel Transvertebral Stabilization Screws
Ascher Kaufmann, Doris Tong, Guriqbal Bhullar, Matthew Bahoura, Chad F. Claus, Teck M. Soo

9:10–9:12 am
Anterior Lumbar Enhanced Recovery After Surgery (ERAS) for Adult Spinal Deformity: Case Series and Proposed Protocol
John F. Burke, Taemin Oh, Vivek Sudhakar, Darryl Lau, Charles Eichler, Aaron J. Clark MD, Christopher P. Ames

9:12–9:14 am
Feasibility of Machine Vision-based Spinal 3-Dimensional Navigation in the Sacrum and Pelvis
Dan T. Chen, Albert Yee, Victor X.D. Yang

9:14–9:16 am
Augmented Reality Precision and Accuracy for Percutaneous Pedicle Screw Insertion - A Multi Cadaveric Analysis
Camilo Molina, Frank M. Phillips, Matt Colman, Majid Khan, Emanuele Orru, Kornelis Poelstra, Larry T. Khoo

9:16–9:18 am
Prediction Calculator for Length of Stay and Nonroutine Discharge after Elective Spine Surgery
Daniel Lubelski, Jeff Ehresman, James Feghali, Joseph Tanesbaum, Ali Bydon, Nicholas Theodore, Timothy F. Witham, Daniel M. Sciubba

9:18–9:20 am
Radiologic and one-year clinical outcomes in ALIF and TLIF
Ziev Moses, Seok Yoon Oh, Brian T. David, Richard G. Fessler

9:20–9:22 am
Coronal Balance in Degenerative Scoliosis Treated with Circumferential Minimally Invasive Fusion
Corey T. Walker, Jakub Godzik, Jay D. Turner, Juan S. Uribe

9:22–9:24 am
The Effect of Concurrent Sagittal and Coronal Imbalance Following Three Column Osteotomies for Thoracolumbar Deformity
Darryl Lau, Alexander F. Haddad, Rushikesh S. Joshi, Vedat Deviren, Christopher P. Ames

9:24–9:26 am
Defining Complication and Neurologic Deficit Rates Following Posterior Based Osteotomies for Cervicothoracic Deformity
Darryl Lau, Vedat Deviren, Christopher P. Ames
9:26–9:28 am
A Prospective Analysis of Minimally Invasive Surgery for Adult Spinal Deformity: A Multi-center Study

9:28–9:30 am
Patient Satisfaction after Surgical Management of Adult Spinal Deformity: MIS vs. Open Techniques

Scientific Session 5
Belmont Ballroom 4 & 8
9:30–11:15 am
A Focus on Innovation to Improve Spine Care
Moderators: Daniel J. Hoh, Michael P. Steinmetz


Learning Objectives: Upon completion of this session, participants will be able to:
- Analyze the design, methodology, and content of basic science and clinical spine studies
- Describe the impact of innovative technologies on the field of spine surgery
- Describe how technological advances in spine surgery can positively impact patient care

9:30–9:35 am
Recognition of Kuntz Scholars and Introduction of J.A.N.E. and Mayfield Award Winners
Wilson Z. Ray

9:36–9:41 am
J.A.N.E. Award Presentation: A Novel Method to Classify Patients with Cervical Incomplete SCI based on Potential for Recovery: A Trajectory Analysis
Jetan H. Badhiwala, Jefferson R. Wilson, Michael G. Fehlings

The J.A.N.E. award honors the legacy of Dr. John Anthony Jane Sr., 1931–2015. Dr. Jane was a world-renowned neurosurgeon, scientist, and teacher. Exceptionally influential in neurosurgery, he held leadership positions in the ABNS and the Senior Society, and served as editor of the Journal of Neurosurgery for more than 20 years.
9:42–9:47 am
J.A.N.E. Award Discussant
Richard G. Fessler

9:48–9:53 am
Mayfield Clinical Science Award Presentation: Load Sharing Classification Score in Patients with TLICS 4 is Predictive of Surgical Intervention
Nima Alan, Joseph Donohue, Alp Ozpinar, Nitin Agarwal, Adam S. Kanter, David O. Okonkwo, David Hamilton

9:54–9:59 am
Mayfield Clinical Science Award Discussant
Nicholas Theodore

10:00–10:05 am
Introduction of the DSPN Historian
Nicholas Theodore

10:06–10:16 am
Combining Forces: Orthopedics and Neurosurgery in the Battle for the Pedicle Screw
Volker K. H. Sonntag

10:17–10:20 am
Introduction of the Peripheral Nerve Meritorious Award Recipient
Mari-Noelle Hebert-Blouin

10:21–10:33 am
Peripheral Nerve Meritorious Award Recipient Presentation
Robert J. Spinner

10:34–10:42 am
NFL Update
Nicholas Theodore

10:43–10:46 am
WFNS Introduction
Praveen V. Mummaneni

10:47–10:55 am
Changing Outcome Using Prognostic Factors for Cervical Trauma
Salman Y. Sharif

10:56–11:04 am
Anterior and Posterior Approach to Complex Cervical Diseases
Maurizio Fornari

11:05–11:13 am
Should we Correct Geriatric Deformities?
Mehmet Zileli

11:14–11:15 am
Discussion and Questions
Special Session
Belmont Ballroom 4 & 8
11:15 am–12:10 pm
Business of Neurosurgery

Moderators: Joseph S. Cheng, Kurt M. Eichholz
Speakers: Owoicho Adogwa, Mohamad Bydon, Kristopher T. Kimmell, Cheerag D. Upadhyaya, Anand Veeravagu

Learning Objectives: Upon completion of this session, participants will be able to:

- Demonstrate an understanding of the socioeconomic policies under consideration and the effect that those legislative efforts will have on the practice of spine surgery
- Discuss the recent activity of the Washington Committee with regards to spinal surgery
- Identify the changes in the E&M structure and the impact it has on a neurosurgery practice that focuses on spine

11:15–11:22 am
The Possibility of Medicare for All: The Effect on Spine Surgery
Cheerag D. Upadhyaya

11:23–11:30 am
Ambulatory Surgical Centers: Spine Surgeons Need Them Now More Than Ever
Kurt M. Eichholz

11:31–11:38 am
Washington Update
Mohamad Bydon

11:39–11:46 am
Is the Spine Bundle Our Inevitable Future?
Owoicho Adogwa

11:47–11:54 am
Malpractice in Neurosurgery: Understanding its Origins
Anand Veeravagu

11:55 am–12:02 pm
The Status of Legislation: Addressing the Preauthorization Conundrum
Kristopher T. Kimmell

12:03–12:10 pm
The Changes in E&M Coding Effecting Your Practice
Joseph S. Cheng
DSPN Business Meeting
Belmont Ballroom 4 & 8

12:10–12:30 pm
Moderators: Domagoj Coric, Luis M. Tumialán
Speakers: Zoher Ghogawala, Steven N. Kalkanis, Adam S. Kanter, Eric A. Potts, Christopher I. Shaffrey, Michael Y. Wang, Christopher E. Wolfla

12:10–12:12 pm
Chair’s Report
Zoher Ghogawala

12:13–12:15 pm
Treasurer’s Report
Eric A. Potts

12:16–12:18 pm
Secretary’s Report
Adam S. Kanter

12:19–12:21 pm
Nominating Committee Report
Michael Y. Wang

12:22–12:24 pm
CNS Board Report
Steven N. Kalkanis

12:25–12:27 pm
AANS Board Report
Christopher I. Shaffrey

12:28–12:30 pm
Future Sites Committee Report
Christopher E. Wolfla

12:30 pm
Meeting Adjourns

We’ll see you next year, March 11–14, 2021, at the iconic Fontainebleau Miami Beach!
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Find the latest spine and peripheral nerve technology in the Exhibit Hall. Take time to explore the hall and enjoy one-on-one discussions and hands-on demonstrations with our exhibitors. Learn about the devices and new technologies that can advance your practice.

Located on Level 4, in Belmont: 1-3 & 5-7.
This is immediately adjacent to the General Session in Belmont 4-8.
Exhibit Hours

Friday, March 6 9:00 am–4:30 pm
Saturday, March 7 9:00 am–1:15 pm
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Lunch symposium

Less invasive anterior and posterior procedural approaches

Featuring special guest
Jerome Bettis
NFL Hall of Fame and Super Bowl champion

Friday, March 6 from 12:00–1:00 p.m.

Faculty: Juan Uribe, M.D. and Adam Kanter, M.D.

Juan Uribe, M.D.
Barrow Neurological Institute, Chief, Spinal Disorders, Vice Chair, Neurosurgery

Adam Kanter, M.D.
University of Pittsburgh Medical Center, Director, Minimally Invasive Spine Program, Chief, Spine Services

Jerome Bettis
XLIF patient

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## Exhibitor List

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<th>Company Name</th>
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SEE YOU NEXT YEAR!
The 37th Annual Meeting of the Joint Section on Disorders of the Spine and Peripheral Nerves.

Miami Beach, Florida

Join us at the iconic Fontainebleau Miami Beach!

March 11–14, 2021

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General Information

Speaker Ready Room

The Speaker Ready Room is located in Yaletown Meeting Room 1.
The hours are:

Thursday, March 5 8:00 am–6:00 pm
Friday, March 6 6:00 am–7:00 pm
Saturday, March 7 6:00 am–6:00 pm
Sunday, March 8 6:00 am–12:30 pm

The Speaker Ready Room will be available Thursday, March 5 through Sunday, March 8. All speakers and abstract presenters should visit the Speaker Ready Room at least one hour prior to their presentations.

Exhibit Hall

Belmont Ballroom Salons 1–3, 5–7

Friday, March 6 9:00 am–4:30 pm
Saturday, March 7 9:00 am–1:15 pm

Registration

Belmont Commons

Thursday, March 5 11:00 am–5:30 pm
Friday, March 6 6:30 am–6:30 pm
Saturday, March 7 6:30 am–5:30 pm
Sunday, March 8 6:30 am–12:30 pm

No Smoking Policy

Smoking is not permitted at any official Section on Disorders of the Spine and Peripheral Nerve Annual Meeting event. Smoking is allowed at the Cosmopolitan of Las Vegas in designated areas only.

Attire

Professional attire is appropriate for the meeting and the Exhibit Hall. Professional/dressy attire is appropriate for evening social events.
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All drugs and medical devices used in the United States are administered in accordance with the Food and Drug Administration (FDA) regulations. These regulations vary depending on the risks associated with the drug or medical devices compared to products already on the market, and the scope of the clinical data available.

Some drugs and medical devices demonstrated or described within the print publications of the Section of Disorders of the Spine and Peripheral Nerves jointly sponsored by the CNS have FDA clearance for use for specific purposes or for use only in restricted research settings. The FDA has stated that it is the responsibility of the physician to determine the FDA status of each drug or device he or she wants to use in compliance with applicable laws.

Neither the content (written or oral) of any course, seminar or other presentation in the program, nor the use of a specific product in conjunction therewith, nor the exhibition of any materials by any parties coincident with the program, should be construed as indicating endorsement or approval of the views presented, the products used or the materials exhibited by the Section on Disorders of the Spine and Peripheral Nerves jointly sponsored by the CNS, or by its committees, commissions or affiliates.
Find the latest spine and peripheral nerve technology in the Exhibit Hall. Take time to explore the hall and enjoy one-on-one discussions and hands-on demonstrations with our exhibitors. Learn about the devices and new technologies that can advance your practice.

Exhibit Hall Features

- Discover state-of-the-art equipment, products, and services.
- Enjoy lunch in the exhibit hall or a corporate sponsored lunch. Corporate partners present the latest cutting-edge technology while providing lunch.
- Participate in What's New Sessions. Join the crowd during daily beverage breaks on Friday and Saturday, as speakers share the latest in cutting-edge research and technology.

Exhibit Hours

Friday, March 6  
9:00 am–4:30 pm
Saturday, March 7  
9:00 am–1:15 pm

What’s New and Beverage Break Schedule

<table>
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<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
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<tr>
<td>9:30–10:15 am</td>
<td>Belmont Ballroom Salons 1-3, 5-7</td>
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<tr>
<td>9:41–9:51 am</td>
<td>Clinical Applications of Trinity ELITE</td>
<td>James T. Ryaby</td>
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<td>9:53–10:03 am</td>
<td>Nano-Technology</td>
<td>Hyun Bae</td>
<td>DePuy Synthes</td>
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<tr>
<td>10:05–10:15 am</td>
<td>CD Horizon™ Astute™ PEEK Rod Spinal System: No Need to Stress</td>
<td>Russ P. Nockels</td>
<td>Medtronic</td>
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FRIDAY, MARCH 6
2:30–3:15 pm
Belmont Ballroom Salons 1-3, 5-7

2:35–2:45 pm
New MIS TLIF Innovations Using the Luna® XD for Xtra Dimensional Fusion
Presenter: Richard G. Fessler
Sponsored by:

2:47–2:57 pm
SABLE™, The Obvious Choice
Presenter: Christopher R. Tomaras
Sponsored by:

2:59–3:09 pm
Presenter: George Frey
Sponsored by:

SATURDAY, MARCH 7
9:30–10:15 am
Belmont Ballroom Salons 1-3, 5-7

9:35–9:45 am
MagnetOs Bone Graft: Eliminating Non-unions Surface-driven Modulation of the Immune System
Presenter: Charlie Campion, PhD
Sponsored by:

9:47–9:57 am
Tesla in the OR? The Benefits of Machine-Vision Image Guidance
Presenter: Jared D. Ament
Sponsored by:

9:59–10:09 am
Hardware Advances in Spinal Oncology
Presenter: Maziyar A. Kalani
Sponsored by:
<table>
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<tr>
<th>Date</th>
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<th>Session</th>
<th>Presenters</th>
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<tr>
<td>THURSDAY, MARCH 5</td>
<td>12:00–1:00 pm</td>
<td><strong>Improving ERAS Protocols, Incorporating New Technologies, Improving Outcomes</strong></td>
<td>Praveen V. Mummaneni</td>
<td>Mont Royal Ballroom 1</td>
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<td><strong>Sponsored by:</strong> PACIRA NETWORKS, Mobi-DISCourse – A Technology Discussion on Arthroplasty From Imaging to Bionic Arms</td>
<td>Sponsored by: Mobi-DISCourse – A Technology Discussion on Arthroplasty From Imaging to Bionic Arms</td>
<td>Mont Royal Ballroom 2</td>
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<tr>
<td>FRIDAY, MARCH 6</td>
<td>12:00–1:00 pm</td>
<td><strong>The Evolution of Robotic Guided Surgery</strong></td>
<td>Virgilio Matheus</td>
<td>Mont Royal Ballroom 1</td>
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<td><strong>Sponsored by:</strong> NuVasive, Less Invasive Anterior and Posterior Procedural Approaches featuring special guest Jerome Bettis, XLIF patient</td>
<td>Sponsored by: Less Invasive Anterior and Posterior Procedural Approaches featuring special guest Jerome Bettis, XLIF patient</td>
<td>Nolita Ballroom 3</td>
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<td><strong>Presenters:</strong> Adam S. Kanter, Juan S. Uribe</td>
<td><strong>Debate: Awake TLIF vs Single Position for the Treatment of Degenerative Pathologies in a Less Invasive Manner</strong></td>
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<td><strong>Sponsored by:</strong> NuVasive, DePuy Synthes</td>
<td><strong>Presenters:</strong> Praveen V. Mummaneni, Michael S. Virk</td>
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<td><strong>Presenters:</strong> Robert K. Eastlack, David W. Polly Jr.</td>
<td><strong>Novel SI Joint Fusion Applications for Adult Spinal Deformity</strong></td>
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<td><strong>Sponsored by:</strong> Medtronic</td>
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<tr>
<td>SATURDAY, MARCH 7</td>
<td>12:15–1:15 pm</td>
<td><strong>Mazor X Stealth™ Edition:</strong> Transforming Spine Surgery through Navigated Robotic Guidance</td>
<td>Richard V. Chua</td>
<td>Mont Royal Ballroom 1</td>
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<td><strong>Presenters:</strong> Hyun Bae</td>
<td><strong>Presenters:</strong> Christopher P. Ames</td>
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<td><strong>Sponsored by:</strong> Stryker</td>
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<td></td>
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<td><strong>Intraoperative Imaging and Enabling Technologies: Using Technology to Help Improve Patient Outcomes</strong></td>
<td>Sponsored by: Stryker</td>
<td>Nolita Ballroom 2</td>
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### Networking Events

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<th>Event Name</th>
<th>Location</th>
<th>Date</th>
<th>Time</th>
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<tbody>
<tr>
<td>Opening Reception</td>
<td>Chelsea Pool</td>
<td>Thursday, March 5</td>
<td>6:30–8:30 pm</td>
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<tr>
<td>The Cosmopolitan of Las Vegas</td>
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Attend an unforgettable Opening Reception with dazzling Cirque-style entertainment, classic rock and roll music, and more, as we bring the best of Las Vegas entertainment straight to you.

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<th>Event Name</th>
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<tr>
<td>Reception with WINS</td>
<td>Gracia Ballroom 3</td>
<td>Saturday, March 7</td>
<td>5:30–6:30 pm</td>
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Join your colleagues from WINS and Pain for an hour of complimentary food, drink, and networking.

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<th>Event Name</th>
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<tr>
<td>Young Neurosurgeons’ Reception and Dinner</td>
<td>Gracia Ballroom 4</td>
<td>Saturday, March 7</td>
<td>6:00–8:00 pm</td>
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All residents, fellows, and young neurosurgeons are invited to enjoy a delicious dinner with Neurosurgery Honored Guest, Daniel K. Resnick. RSVP is required, to RSVP please email meetings@cns.org or stop by the registration desk before 12:00 pm on Friday, March 6, 2020.
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