THE 37TH ANNUAL MEETING OF THE AANS/CNS SECTION ON DISORDERS OF THE SPINE AND PERIPHERAL NERVES

SPINE SUMMIT 2021
COURAGE, RESILIENCE, AND EXCELLENCE:
SETTING THE PATH
#Spine2021

San Diego, California

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WELCOME TO SPINE SUMMIT 2021

On behalf of the Joint Section on Disorders of the Spine and Peripheral Nerves Executive Committee, welcome! We are so excited to see everyone in person again. This year’s meeting promises to be innovative and thought-provoking as we explore “Courage, Resilience, and Excellence: Setting the Path”.

This year we are proud to honor several honored guests. They will be sharing their knowledge during award presentations, happy hour debates, and at the Cahill Controversies. We are also pleased to have special speaker Richard H. Carmona, M.D., M.P.H., F.A.C.S., 17th Surgeon General of the United States, who will deliver an inspiring speech on “Leading Through Crisis.”

We look forward to seeing all of you at the opening reception on Wednesday night at the Hilton San Diego Bayfront and know there will be many remarkable stories to be shared.

Thank you for taking time out of your busy schedules to join us at Spine Summit 2021. We wish you an inspiring and enjoyable meeting.

Sincerely,

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Chairman’s Biography

Michael P. Steinmetz

Joint Section on Disorders of the Spine and Peripheral Nerves Chair

Michael P. Steinmetz, MD, is endowed as the William and Amanda Madar Chairman of the Department of Neurosurgery at Cleveland Clinic. He is Professor and Chairman of Neurological Surgery at Cleveland Clinic Lerner College of Medicine of Case Western Reserve University. His areas of expertise and clinical and research interests include complex spine surgery, minimally invasive surgery, spine trauma, and spinal cord injury.

He is widely published in the neurosurgical spine care arena; currently working as co-editor of Benzel’s Spine Surgery, 5th Edition (in press). His editorial responsibilities encompass several high-impact publications including: The Spine Journal, Journal of Neurosurgery Spine, World Neurosurgery, and Operative Neurosurgery. He serves as a reviewer for several additional journals, and has contributed more than 185 peer reviewed articles and 85 chapters to the body of surgical spine care literature, with several more in progress.

Dr. Steinmetz is actively involved in the various professional societies of neurosurgery and spine surgery. He is currently the Chairman of the Council of Neurosurgical State Societies and the Past-Chairman of the CNS/American Association of Neurological Surgeons (AANS) Joint Section on Diseases of the Spine & Peripheral Nerves. He was appointed Ex Officio of the AANS Executive Committee and a member of the Annual Meeting Committee. He is a member of the Minimally Invasive, CME, Governance, Advocacy, and the PAC committees for the North American Spine Society. He is the current program committee co-chair for NASS and the Lumbar Spine Research Society.
THANK YOU
for your support of
SPINE SUMMIT 2021

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AMBASSADOR
General Information

Speaker Ready Room

The Speaker Ready Room is located in Sapphire Greenroom. The hours are:

**Wednesday, July 28**  
8:00 am–6:00 pm

**Thursday, July 29**  
6:00 am–7:00 pm

**Friday, July 30**  
6:00 am–5:00 pm

**Saturday, July 31**  
6:00 am–12:30 pm

All speakers and abstract presenters should visit the speaker ready room at least two hours prior to their presentations.

Exhibit Hall

**Sapphire A-C, E-G, I-K, M-O**

**Thursday, July 29**  
9:00 am–4:30 pm

**Friday, July 30**  
9:00 am–1:15 pm

Registration

**Sapphire Foyer**

**Wednesday, July 28**  
11:00 am–5:30 pm

**Thursday, July 29**  
6:30 am–6:30 pm

**Friday, July 30**  
6:30 am–4:30 pm

**Saturday, July 31**  
6:30 am–12:30 pm

No Smoking Policy

Smoking is not permitted at any official Section on Disorders of the Spine and Peripheral Nerves Spine Summit 2021 event. The Hilton San Diego Bayfront is a non-smoking hotel. Smoking is allowed in designated outdoor areas only.

Attire

Professional attire is appropriate for the meeting and for the Exhibit Hall. Professional/Dressy attire is appropriate for the evening social events.
**WEDNESDAY**
**JULY 28, 2021**

11:00 am–5:30 pm  
Registration

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

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

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

Special Course 3  
NEW! Innovations in Peripheral Nerve Surgery

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

3:00–5:00 pm  
Seminar for APRN and PAs

6:30–8:00 pm  
Opening Reception

8:00–10:00 pm  
Dinner Seminar  
Spine Summit Honored Guest  

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**THURSDAY**
**JULY 29, 2021**

6:30 am–6:30 pm  
Registration

6:30–7:30 am  
Complimentary 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  
Resilience: 2020 Lessons Learned

9:00 am–4:30 pm  
Exhibit Hall Open

9:30–10:15 am  
Scientific Session 2  
Courage: From Learner to Learned (What My Mentors Taught Me That Has Shaped My Career and How that Translates to How I Educate My Trainees)

12:00–1:00 pm  
• Non-CME Sponsored 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 Sessions 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 Abstract Breakout Session

4:30–6:30 pm  
Crossfire: Finesse or Brute Force  
(Happy Hour Debates with Beer and Wine)
FRIDAY
JULY 30, 2021

6:30 am–4:30 pm  
Registration

6:30–7:30 am  
Complimentary Breakfast

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

8:00–9:30 am  
Scientific Session 4  
Excellence: Empowering Our Discipline

9:00 am–1:15 pm  
Exhibit Hall Open

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

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

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

1:30–4:30 pm  
Special Course 5  
NEW! Practical Matters: What every APP/Surgeon Team Needs to Know

1:30–3:30 pm  
Special Course 6  
NEW! Pediatric Spinal Pathology for the Adult Spine Surgeon

1:30–4:30 pm  
Special Course 7  
Treatment and Complication Avoidance in the Management of Spinal Tumors

Special Course 8  
Spine Summit Grand Rounds: Difficult Cases- The Decision-Making Dilemma

Special Course 9  
NEW! Starting Your Career: Practical Tips for Success

5:30–7:30 pm  
Young Neurosurgeons’ Reception and Dinner

6:00–7:00 pm  
WINS Reception

SATURDAY
JULY 31, 2021

6:30 am–12:30 pm  
Registration

6:30–7:30 am  
Complimentary 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 Abstract Breakout Session
  • General Spine Surgery 2/Tumor/Opioids Abstract Breakout Session
  • General Spine Surgery 3/Peripheral Nerve/Basic Science Abstract Breakout Session
  • Spinal Deformity Abstract Breakout Session

9:30–11:10 am  
Scientific Session 5  
Setting the Path: A View to the Future

11:15 am–12:10 pm  
Special Session: Business of Neurosurgery in collaboration with CSNS

12:10–12:30 pm  
DSPN Business Meeting

12:30 pm  
Meeting Adjourns
CME Credit 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 the 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.

*A maximum of 19.50 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 Wednesday Special Course. Attendees will earn an additional 2 AMA PRA Category 1 Credits™ for attending the Wednesday evening Dinner Seminar. Attendees will receive a maximum of 2.75 AMA PRA Category 1 Credits™ for an eligible Friday afternoon Special Course. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Nursing Credit
The American Board of Neuroscience Nursing (ABNN) accepts attendance at educational activities approved for CME credit for CNRN or SCRN recertification. The educational activity must be specific to neuroscience or stroke and a course agenda may be required for any sessions that do not explicitly indicate neuroscience content. One CME credit hour equals one(1) CE hour.

For more information regarding recertification requirements, please contact the ABNN directly at 847-375-4733. Check the following websites for additional requirements:

Physician’s Assistant Credit
The American Academy of Physicians Assistants (AAPA) and The National Commission on Certification of Physician Assistant (NCCPA) accepts attendance at educational activities from an ACCME accredited provider. One CME credit hour equals one(1) AAPA Category 1 CME credit. Education credits can be submitted by logging into the online submission system for both organizations.
For more information regarding recertification requirements, please contact the organizations directly:

National Commission on Certification of Physician Assistants
678-417-8100
www.nccpa.net

American Academy of Physician Assistants
703-836-2272
cme@aapa.org

Disclosures

The Accreditation Council for Continuing Medical Education Standards for Integrity and Independence requires that anyone in a position to control the content of the educational activity has disclosed all financial relationships with any ineligible company. The ACCME defines an “ineligible company” as those whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or 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.
Honored Guest
Neurosurgery

Gregory R. Trost
University of Wisconsin

Gregory R. Trost, MD, is a Professor and Vice Chairman in the Department of Neurological Surgery at the University of Wisconsin-Madison, where he has practiced for 25 years. He also holds a Professorship in the Department of Orthopedics and Rehabilitation Medicine. Dr. Trost is a Co-Director of the Spinal Surgery Program, as well as the Spinal Surgery Fellowship Director. His practice consists primarily of spinal surgery, but also performs brachial plexus and peripheral nerve surgery.

Dr. Trost received his MD from the University of Wisconsin-Madison School of Medicine in 1988. He completed his Neurological Surgery residency at the same institution in 1995. A Complex Spinal Surgery Fellowship was completed the following year under the tutelage of Dr. Iain Kalfas, MD. He then returned to the University of Wisconsin as the first dedicated spine surgeon in 1996 and has not practiced at any other institution.

Dr. Trost has held several leadership positions in his local institution and organized neurological surgery, in addition to numerous committee memberships. Notably these include the AANS Board of Directors, University of Wisconsin Medical Foundation Board, and Chair of Admissions for the University of Wisconsin School of Medicine and Public Health.

Education has always been a priority for Dr. Trost. He currently serves as a Course Director for the Cleveland Spine Review, which he has done for over 20 years. This week-long course is currently the longest running course in organized spinal surgery, dating back to the early 90’s when Dr. Edward Benzel initiated the course. This annual meeting has a significant international attendance and has led to the opportunity to teach internationally. Courses have taken place in Turkey, Colombia, Chile, Greece, Bahrain, Dubai, Egypt (5 times), and Pakistan (7 times).

He and his wife, Beth Trost, MD, have been married for 40 years as of June 20, 2021. They have three adult children and a grandson, Riot Harbor Trost. He lives up to his name. When not in Madison, the Trosts can be found at their second home in Key West, enjoying an active lifestyle of kayaking, fishing, and social life.

Dr. Trost also enjoys a variety of building projects. He has completed a tandem kayak made of wood strips and is currently constructing a wood burning brick oven. Hopefully this will be completed prior to this meeting.
Honored Guest
Orthopedic Surgery

Sigurd Berven
University of California, San Francisco

Sigurd Berven, MD, is the chief of the Spine Service at UC San Francisco. He holds a joint appointment in Orthopaedic Surgery and Neurosurgery and leads the UCSF Spine Surgical Home Program. Dr. Berven studied Human Biology and Economics at Stanford University, and studied Philosophy, Politics and Economics (PPE) as a graduate student at Oxford University. He then studied medicine at Harvard Medical School, followed by residency in the Harvard Combined Orthopaedic Program.

His post-graduate surgical training included a chief residency at the Boston Children’s Hospital and Spine Fellowship at UC San Francisco where he has been a faculty member since August 2000. Dr. Berven is the Professor in Residence at UC San Francisco and serves as the Chief of the Spine Service and Director of the Spine Surgical Home Program and the Interdisciplinary Spine Service. His clinical interests include complex spinal deformity in the adult and pediatric patient, and his research interests include studies on the value of interventions including non-operative management, operative strategies, and new technologies.

He serves on the Board of Directors of the Scoliosis Research Society, the Evaluation Committee of the American Academy of Orthopaedic Surgery, the executive committee of the US Bone and Joint Decade Initiative, and has been Chairman of the Value Council of the North American Spine Society. Dr. Berven has been a leader in developing an evidence-based approach to disorders of the spine, and is the co-founder of the UCSF Clinical Outcomes Research Program. His research has been funded by the NIH, NIAMS, NSF, NASA, CDMI, NASS, SRS, OREF, and AO Spine.

Sig and Alexandra Berven met in Oxford as graduate students, and as national team rowers, representing the US and Britain respectively. They have 3 sons. Alistair Berven graduated from Princeton University last year and is a graduate student of Environmental Science at Oxford. Christopher Berven is a rising Junior at Berkeley where he is the captain of the Cal Boxing Team. Ben Berven is a rising senior at the Marin Academy. Sig enjoys travel, sports, and good company.
Eric L. Zager, MD, was born and raised in Livingston, NJ, and graduated as valedictorian at Livingston High School, where he was co-captain of his undefeated State Championship soccer team. He received 1st Team All-State honors and the Fred Coggin Award as the Scholar-Soccer Player in the state in 1973.

He received the John Harvard Scholarship for 4 years and attended Harvard College in Cambridge, MA, where he played varsity soccer and garnered All-Ivy League honors his senior year. Dr. Zager graduated magna cum laude in Biochemistry from Harvard College and received his MD degree at Stanford University. He completed internship in general surgery at Columbia University in New York, followed by his neurosurgical residency at the Massachusetts General Hospital in Boston.

He won the Galbraith Award in Cerebrovascular Surgery in 1988 and the Young Clinician Investigator Award from the American Association of Neurological Surgeons in 1991. He received a Clinical Fellowship Award from the Congress of Neurological Surgeons to pursue fellowship training in peripheral nerve surgery at the University of Toronto and at Louisiana State University in New Orleans. He has been on the faculty at Penn since 1989, focuses his academic interests on peripheral nerve and cerebrovascular disorders, and has been the President of the Pennsylvania Neurosurgical Society and the Philadelphia Neurological Society.

Additionally, he has been a Visiting Professor at many universities in the US and abroad and delivered the David Kline Inaugural Lecture in the Department of Neurosurgery at the University of California at San Francisco. He was elected to the Academy of Master Clinicians of the Perelman School of Medicine at the University of Pennsylvania and currently holds the Endowed Chair: Neurosurgical Professorship in Academic Excellence. Dr. Zager lives with his wife and 3 children in Philadelphia.
Neurosurgery Meritorious Awardee

Nicholas Theodore
Johns Hopkins University
School of Medicine

Nicholas Theodore, MD, is the Donlin M. Long Professor and Professor of Neurosurgery, Orthopaedic Surgery, and Biomedical Engineering at Johns Hopkins University School of Medicine. He is the Director of the Neurological Spine Program and Co-Director of the Carnegie Center for Surgical Innovation. He graduated from Cornell University and was the recipient of a Cornell Tradition Academic Fellowship. He graduated medical school with honors at Georgetown University and was inducted into AOA.

After interning at Bethesda Naval Hospital, Dr. Theodore was Senior General Medical Officer with the United States Marine Corps in Okinawa, Japan. He completed his neurosurgical residency and a fellowship in spinal surgery under the direction of Drs. Robert Spetzler and Volker Sonntag, respectively, at the Barrow Neurological Institute. He spent time on the clinical service at the NIH working with Dr. Edward Oldfield and went on to serve as Chief of the Division of Neurosurgery at Naval Medical Center San Diego, overseeing the largest neurosurgery complement in the Navy.

His areas of interest include brain and spinal cord injury, minimally invasive surgery, robotics, and personalized medicine. He has authored over 250 scientific publications and has been the recipient of many research awards, including the Tasker, Mayfield, and NASS Awards. He has received several grants awarded by the National Institutes of Health, National Science Foundation, and a major award from the Department of Defense.

In 2010, with Neil Crawford, PhD, he founded Excelsius Surgical, a robotics company which was sold to Globus Medical in 2013. The technology associated with this venture lead to the first real-time image-guided surgical robot for spine surgery and was the most successful launch of a surgical robot in medical device history. In 2018, he was appointed Chairman of the National Football League’s Head Neck and Spine Committee. In 2020, Dr. Theodore was awarded a five-year $13.48 million grant from the Defense Advanced Research Projects Agency as a principal investigator in the Bridging the Gap+ program to develop cutting-edge implantable sensors and devices for the diagnosis and management of acute spinal cord injury. He has been happily married to his wife Effie for 27 years and has raised two sons, both of whom rowed heavyweight varsity crew in college. Costa graduated from Cornell University in 2020 and John is a sophomore at Columbia University.
Friday, July 30
8:36–9:25 am

Leading Through Crisis

Richard H. Carmona, M.D., M.P.H., FACS
17th Surgeon General of the United States
Chief of Health Innovations, Canyon Ranch
Distinguished Professor, University of Arizona

Born to a poor immigrant family in New York City, Richard Carmona experienced homelessness, hunger, and health disparities during his youth. The experiences greatly sensitized him to the relationships among culture, health, education and economic status, and ultimately shaped his future.

After dropping out of high school, Dr. Carmona enlisted in the U.S. Army in 1967 where he received a GED. By the time he left active duty, he was a Special Forces, combat-decorated Vietnam veteran. He then pursued a college degree and entered medical school at the University of California – San Francisco where he won the prestigious Gold Cane award as the top graduate.

Dr. Carmona became a surgeon with a subspecialty in trauma, burns, and critical care. He was recruited to Tucson to establish the first trauma system in southern Arizona, which he did successfully. Later, while working full time as a hospital and health system CEO, he earned a master’s degree in public health policy and administration at the University of Arizona.

Dr. Carmona has served for more than 34 years with the Pima County Sheriff’s Department in Tucson, including as deputy sheriff, detective, SWAT team leader and department surgeon. He is one of the most highly decorated police officers in Arizona, and his numerous awards include the National Top Cop Award, the National SWAT Officer of the Year, and the National Tactical EMS Award. Dr. Carmona is a nationally recognized SWAT expert and has published extensively on SWAT training and tactics, forensics, and tactical emergency medical support. Dr. Carmona has also served as a medical director of police and fire departments, and he is a fully qualified peace officer with expertise in special operations and emergency preparedness, including weapons of mass destruction.

In 2006 Vice Admiral Carmona successfully completed the statutory four-year term as Surgeon General and was named vice chairman of Canyon Ranch. He also served as CEO of the company’s health division and president of the Canyon Ranch Institute. Dr. Carmona continues his Canyon Ranch leadership role as the Chief of Health Innovations. He also serves on several public corporate boards and works with private equity and venture capital firms to identify emerging science and technology to translate to market for economic and public benefit.
Networking Events

Opening Reception  Promenade Plaza
Wednesday, July 28  6:30–8:00 pm
Take in spectacular views with the San Diego Bay as the backdrop. Enjoy a lavish array of food and beverages and listen to live entertainment as you network with old friends and new colleagues at the Opening Reception. Each medical attendee and spouse/guest registered for the meeting will receive one complimentary ticket. Resort casual attire is recommended.

Young Neurosurgeons’ Reception & Dinner  Sapphire Terrace
Friday, July 30  5:30–7:30 pm
All residents, fellows and young neurosurgeons are invited to enjoy a delicious dinner with the 2021 Spine Summit Honored guests. RSVP required, Please email meetings@cns.org no later than Wednesday, July 28, to attend.

Reception with WINS  Sapphire 400
Friday, July 30  6:00–7:00 pm
Join your colleagues from WINS for an hour of Networking.

Thank you to Medtronic and Depuy Synthes for their support of this reception.
Congratulations to the 2021 Award Recipients!

**Wyatt L. Ramey**  
J.A.N.E. Award

**Nitin Agarwal**  
Branch Award

**Ken M. Porche**  
Mayfield Clinical Science Award

**Daniel Lubelski**  
Kline Peripheral Nerve Top Abstract

**Brandon Sherrod**  
Kline Peripheral Nerve Research Award

Charles Kuntz IV Scholars

- Khaled Alok
- Safwan Alomari
- John F. Burke
- James Caruso
- Chad F. Claus
- Islam Fayed
- Daryl Fields
- Yaroslav J. Gelfand
- Dayton Grogan
- Nikita Lakomkin
- Seokchun Lim
- Anthony L. Mikula
- Ali Moghaddamjou
- Whitney Muhlestein
- Daniel Myers
- Zach Pennington
- Brandon Sherrod
- Tolga Susral
- Timothy Y. Wang
- Yagiz U. Yolcu
THANK YOU

The following companies have provided an educational grant in support of Spine Summit 2021

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NuVasive
WEDNESDAY | July 28, 2021

11:00 am–5:30 pm
Sapphire Foyer
Registration

12:00–1:00 pm
Pre-meeting Non-CME Sponsored Lunch Symposia
See page 95 for detailed information and locations.

Special Course 1
Cobalt 501
1:30–5:30 pm
$200
Novel and Emerging Technologies in Spine Surgery
In collaboration with SMISS

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:
— 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-assisted Spinal Deformity Surgery
John H. Shin

1:46–1:55 pm
Navigation-assisted Lateral Surgery
Mark E. Oppenlander

1:56–2:05 pm
Pitfalls and Complication Avoidance with Navigation
J. Patrick Johnson
2:06–2:15 pm
Robot-assisted Interbody Fusion
Paul Park

2:16–2:25 pm
Cost Effectiveness of Navigation/Robotics
Dean Chou

2:26–2:35 pm
Radiation Reduction Technologies
Juan S. Uribe

2:36–2:49 pm
Questions and Discussion

2:50–3:19 pm
Hands-on Workshop (Navigation, AR, Robots)

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?
Jay D. Turner

4:01–4:10 pm
Cellular Allograft — The Next BMP?
Khoi D. Than

4:11–4:20 pm
Novel Screw Technologies (One-step MIS Pedicle Screw, Fenestrated Screws, Etc.)
Michael Y. Wang

4:21–4:30 pm
Exosscopes and Virtual Reality: Moving Beyond Traditional Loupes and Microscopes
Daniel M. Sciubba

4:31–4:40 pm
Donald J. Blaskiewicz

4:41–4:50 pm
Questions and Discussion

4:51–5:30 pm
Hands-on Workshop (Robotics)

Educational Grant provided by: ATEC Spine, DePuy Synthes, Globus Medical, Medtronic, NuVasive
Spinal Deformity: Applying Current Deformity Concepts to Your Practice, a Case Based Approach

**Course Directors:** Shay Bess, Kai-Ming G. Fu

**Speakers:** Sigurd Berven, Donald J. Blaskiewicz, Dean Chou, Serena Hu, Praveen V. Mummaneni, Gregory M. Mundis, Peter G. Passias

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

**Learning Objectives:**
- 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

**MEETING AGENDA**

**WEDNESDAY**

1:30–1:35 pm
Welcome and Explanation of Course Format
Shay Bess, Kai-Ming G. Fu

1:36–2:00 pm
Applying Deformity Principles to Patients with Degenerative Cervical Disease
Gregory M. Mundis

2:01–2:25 pm
Indications for MIS Versus Open Deformity Surgery: MISDEF2 Algorithm
Dean Chou

2:26–2:50 pm
Multi-rod Solutions for Deformity: When to Consider?
Sigurd Berven

2:51–3:15 pm
Sacro-pelvic Considerations in Deformity Surgery
Serena Hu

3:16–3:30 pm
Break

3:31–3:55 pm
Using Navigation in Spinal Deformity
Peter G. Passias

3:56–4:20 pm
Minimally Invasive Approach Selection in Adult Deformity (Anterior, Lateral, and Posterior)
Praveen V. Mummaneni

4:21–4:45 pm
Complication Avoidance an Optimizing Long Term Outcomes in MIS Adult Deformity Surgery
Gregory M. Mundis

4:46–5:10 pm
Complication Management in Open Adult Deformity Surgery
Shay Bess
5:11–5:30 pm
Discussion and Participant Cases
Moderator: Donald J. Blaskiewicz

Educational Grant provided by: Medtronic

Special Course 3
Cobalt 500

1:30–5:30 pm
NEW! Innovations in Peripheral Nerve Surgery

Course Directors: Holly Gilmer, Line G. Jacques
Speakers: Simon Archibald, Justin M. Brown, Allan D. Levi, Mark A. Mahan, Wilson Z. Ray, Konstantin V. Slavin, Ian Valerio

Course Description: This new offering from the DSPN will highlight the newest and latest techniques in peripheral nerve surgery, from early diagnosis through optimal operative management.

Learning Objectives:
— Describe the results of early clinical trials for nerve transfer following SCI
— Demonstrate understanding of novel diagnostic modalities to assist in surgical decision making for PN surgery
— Discuss options for neuromodulation in PN disease

1:30–1:39 pm
Introduction
Holly Gilmer, Line G. Jacques

1:40–2:00 pm
Nerve Transfers for Spinal Cord Injury: A Clinical Trial
Wilson Z. Ray

2:01–2:21 pm
Quantitative Electrodiagnostic Studies to Improve Nerve Transfers
Justin M. Brown

2:22–2:42 pm
Cell Based Therapies for Nerve Regeneration
Allan D. Levi

2:43–3:03 pm
Perfusion Based Imaging of Nerves
Mark A. Mahan

3:04–3:14 pm
Questions and Discussion

3:15–3:35 pm
Target Muscle Reinnervation and Machine Interface
Ian Valerio

3:36–3:56 pm
Next Generation Conduits for Nerve Repair (Non-CME)
Simon Archibald

3:57–4:17 pm
Novel Neuromodulation for Peripheral Nerve
Konstantin V. Slavin
Special Course 4  
Sapphire 410  
1:30–5:30 pm  
$200  
Introduction to Spinal Coding: From Decompression to Deformity  

Course Directors: Mark E. Oppenlander, John K. Ratliff  
Speakers: Owoicho Adogwa, Joseph S. Cheng, Kurt M. Eichholz, Kristopher T. Kimmell, 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:  
— 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  
Mark E. Oppenlander  

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  
Joseph S. Cheng

3:31–3:45 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

5:01–5:30 pm  
Questions and Conclusion

Seminar for APRN and PAs  
Sapphire 402

3:00–5:00 pm  
Complimentary for Registered Nurses & PAs

Course Directors: Sara M. McEvoy, Eric A. Potts  
Speakers: Robert Evans, Erin Harrison, Angela M. Jolivette, Sara M. McEvoy, Emma Schulte, Andrea L. Strayer, Eric Truumees

Course Description: Neurosurgery Advanced 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:  
— 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
3:00–3:12 pm
Overview of MRI Imaging Basics in the Cervical, Thoracic and Lumbar Spine
Eric A. Potts

3:13–3:25 pm
Management of Medical Comorbidities (DM, Anticoagulation, Nutrition)
Sara M. McEvoy

3:26–3:38 pm
Advanced Perioperative Management: Support Staff, Patient Education
Emma Schulte

3:39–3:51 pm
Post-operative Pain Management
Erin Harrison

3:52–4:04 pm
Essential Surgical Spine Anatomy for Advanced Providers: How to be the Ideal Surgical Assistant
Robert Evans

4:05–4:17 pm
Pre-operative Optimization for Postoperative Success
Andrea L. Strayer

4:18–4:30 pm
Pre-operative Optimization for Postoperative Success
Angela M. Jolivette

4:31–4:43 pm
Triaging Spinal Cord Injuries and Injuries to the Vertebral Column
Eric Truumees

4:44–5:00 pm
Questions and Discussion
### Opening Reception

6:30–8:00 pm  
**Promenade Plaza**  
**Hilton San Diego Bayfront**

Take in spectacular ocean views and watch the sunset while enjoying a lavish array of food and beverages as you network with friends and colleagues at the Opening Reception. Get your groove on with live music that spans today’s hits, Motown, 70s dance, and classic rock with the Kicks Band. Each medical attendee and spouse/guest registered for the meeting will receive one complimentary ticket. Please note this event is held outdoors. Resort casual attire is recommended.

### Dinner Seminar

8:00–10:00 pm  
**Elevation Room**  
$200  
(includes three-course dinner and beverages)

**Spine Summit Honored Guest Dinner Symposium: The Future of Spine Surgery: Predictions About Technology, Healthcare and the Evolution of Tomorrow’s Spine Surgeon**

**Moderator:** Michael P. Steinmetz  
**Speakers:** Sigurd Berven, Thomas E. Mroz, Nicholas Theodore, Gregory R. Trost

**Seminar Description:** An opportunity to interact with the 2021 Spine Summit Honored Guests, Gregory Trost, Sig Berven, as well as Meritorious Award Recipient Nick Theodore to learn their perspectives on the future of spine surgery. The DSPN Chair and his partner, Drs. Mike Steinmetz and Thomas Mroz, will also present a perspective of the future of spine surgery.

**Learning Objectives:**
- Identify the various trajectories that technology may lead the future of spinal surgery
- Identify 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

**Educational Grant provided by:** Medtronic
THURSDAY | JULY 29, 2021

6:30 am – 6:30 pm  
Registration

6:30 – 7:30 am  
Complimentary Breakfast

Challenging Cases 1 | Sapphire DHLP
7:00–7:45 am
Oral Board-style Challenging Cases: Cervical
Moderators: Yi Lu, Laura A. Snyder

Opening Remarks | Sapphire DHLP
7:45–8:00 am
7:45–7:54 am  
Welcome  
Erica F. Bisson
7:55–8:00 am  
Introduction  
Michael P. Steinmetz

Scientific Session 1 | Sapphire DHLP
8:00–9:30 am
Resilience: 2020 Lessons Learned
Moderators: Scott A. Meyer, Robert G. Whitmore
Speakers: Zoher Ghogawala, Daniel J. Hoh, Thomas E. Mroz, Praveen V. Mummaneni, Daniel M. Sciubba
Learning Objectives:
— Describe the impact of the global pandemic on spine surgery
— Demonstrate understanding of optimizing patients to improve and the role of artificial intelligence
— Analyze the latest techniques for biologics and optimal treatment for CSM

8:00–8:10 am
The Impact of COVID-19 on Spine Surgery: Our Patients and Our Trainees
Praveen V. Mummaneni

8:11–8:16 am
Discussion

8:17–8:27 am
Preoperative Optimization for Spine Surgery (Prehab)
Daniel J. Hoh

8:28–8:33 am
Discussion

8:34–8:44 am
Lesson from CSM-S: Is Laminoplasty Superior?
Zoher Ghogawala
8:45–8:50 am
Discussion

8:51–9:01 am
The Integration of Machine Learning into Practice Algorithms
Daniel M. Sciubba

9:02–9:07 am
Discussion

9:08–9:18 am
Bone Science: Osteointegration, Fusion Biologics, Surface Science/Nanotechnology
Thomas E. Mroz

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

9:30 am–4:30 pm
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 94 for detailed information and schedule.

Scientific Session 2
Sapphire DHLP

10:15 am–12:00 pm
Courage: From Learner to Learned (What My Mentors Taught Me That Has Shaped My Career and How that Translates to How I Educate My Trainees)

Moderators: Erica F. Bisson, Luis M. Tumialán

Learning Objectives:
— Identify how spine surgery has been shaped through dedicated mentorship
— Recognize the benefit of a team-based (orthopedics and neurosurgery) approach to the complex spine patient
— Identify the role of PN surgery and how it has transformed over the last decade

10:15–10:38 am
Neurosurgery Honored Guest Presentation
Gregory R. Trost
Introduction by Daniel K. Resnick

10:39–11:03 am
Orthopedics Honored Guest Presentation
Sigurd Berven
Introduction by Praveen V. Mummaneni
11:04–11:28 am
Peripheral Nerve Honored Guest Presentation
Eric L. Zager
Introduction by Zarina S. Ali

11:29 am–12:00 pm
DSPN Chair’s Address
Michael P. Steinmetz
Introduction by Edward C. Benzel

12:00–1:00 pm
Lunch with Exhibitors or Attend a Non-CME Sponsored Lunch
See page 96 for detailed information and schedule.

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

Moderators: Erica F. Bisson, Regis W. Haid
Speakers: Paul C. McCormick, Paul Park, Christopher I. Shaffrey, Jian Shen, Juan S. Uribe, Jean-Paul Wolinsky

Learning Objectives:
— Identify a variety of surgical techniques for the management of the degenerating spine
— Identify 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
Endoscopic Spine Surgery
Jian Shen

1:09 - 1:14 pm
Discussion

1:15–1:23 pm
Single Position Lateral Surgery
Juan S. Uribe

1:24 - 1:29 pm
Discussion

1:30–1:38 pm
Intramedullary Tumor (Ependymoma or Astrocytoma), Nuances with Technique
Paul C. McCormick

1:39 - 1:44 pm
Discussion
1:45–1:53 pm  
**Correction of Chin on Chest Deformity: Nuances of Restoring Alignment (How Much is Enough)**  
Paul Park

1:54 - 1:59 pm  
**Discussion**

2:00–2:08 pm  
**Posterior-only En Bloc Spondylectomy in the T Spine**  
Jean-Paul Wolinsky

2:09 - 2:14 pm  
**Discussion**

2:15–2:23 pm  
**PKJ Prevention – Tethering, Vertebroplasty**  
Christopher I. Shaffrey

2:24–2:30 pm  
**Discussion and Summary of Session**

2:30–3:15 pm  
**Beverage Break and What’s New Session in the Exhibit Hall.**  
See page 95 for detailed information and schedule.

**Peripheral Nerve Session Cobalt 501**

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

**Course Directors:** Line G. Jacques, Robert J. Spinner  

**Course Description:** This course will cover the 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:**  
— 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

2:30–2:37 pm  
**Localization of Peripheral Nerve Lesions**  
Robert J. Spinner
2:38–2:45 pm
Injury Types and Predicting Outcomes
Allan J. Belzberg

2:46–2:53 pm
Innovations for Nerve Regeneration
Rajiv Midha

2:54–3:01 pm
Principle of Nerve Repair: Techniques of Cooptations and Grafting
Allan D. Levi

3:02–3:09 pm
Principle of Nerve Repair: Techniques of Nerve Transfer
Wilson Z. Ray

3:10–3:39 pm
Case Based Discussion: Nerve Trauma
Discussants: Justin M. Brown, Amgad S. Hanna, Elias B. Rizk

3:40–3:47 pm
Diagnosis and Treatment: UE Entrapment Syndromes
Eric L. Zager

3:48–3:53 pm
Diagnosis and Treatment: LE Entrapment Syndromes
Mark A. Mahan

3:54–3:59 pm
Principles of Management: Peripheral Nerve Tumors
Line G. Jacques

4:00–4:30 pm
Panel Discussion: Entrapments and Tumors
Moderators: Allan J. Belzberg, Holly Gilmer, Rajiv Midha, Christopher J. Winfree
Discussants: Andrew S. Jack, Thomas J. Wilson

Educational Grant provided by: Axogen
3:15–4:25 pm
Oral Abstract Presentations

Learning Objectives:
— Analyze the findings of novel neurosurgical studies, critique the design and methodology of these studies
— List important areas for further knowledge development and research
— Discuss ongoing innovative clinical and basic science studies, and how they may impact current practice

Kuntz Scholar Oral Abstract Presentations
Concurrent Session 1

Moderators: Kai-Ming G. Fu, Karthik Madhavan

3:15–3:20 pm
100 Kline Top Peripheral Nerve Award: Dorsal Root Entry Zone Lesioning for Chronic Neuropathic Pain Secondary to Brachial Plexus Avulsion
Daniel Lubelski, Zach Pennington, Arinze Ochuba; Allan J. Belzberg

3:20–3:25 pm
Kline Peripheral Nerve Top Abstract
Discussant: Mark A. Mahan

3:25–3:30 pm
101 Characterization of Intervertebral Disc Inflammation Following Discectomy for Treatment of Lumbar Disc Herniation
Daniel Myers, Isaac Swink, Brett Phillips, Chen Xu, Yesica Garcia-Fiueroa; Boyle C. Cheng, Nick Giannoukakis, Alexander Kwong-Tak Yu

3:30–3:35 pm
Discussant: Daniel J. Hoh

3:35–3:40 pm
102 Surgical Approaches to Tumors of the Occipito-cervical, Subaxial Cervical, and Cervicothoracic Spine
Zach Pennington, Erick M. Westbroek, Sheng-fu Larry Lo, Daniel Sciubba

3:40–3:45 pm
Discussant: Ziya L. Gokaslan

3:45–3:50 pm
103 Differences between Anterior and Posterior Approaches for Treatment of Cervical Spondylotic Myelopathy
3:50–3:55 pm  
**Discussant:** Domagoj Coric

3:55–4:00 pm  
**104 Involvement of mTOR Pathway Modulates Autophagy and Immune Response in Recovery from Spinal Cord Injury**  
Tolga Sursal, Ingrid Vargova, Lucia Machova Urdzikova, Kristyna Karova, Chirag D. Gandhi, Pavla Jendelova, Meena Jhanwar-Uniyal

4:00–4:05 pm  
**Discussant:** Shekar N. Kurpad

4:05–4:10 pm  
**105 Abaloparatide Increases Bone Mineral Density in Potential Spine Surgery Candidates with Osteoporosis**  

4:10–4:15 pm  
**Discussant:** Gregory R. Trost

4:15–4:20 pm  
**106 Non-surgical Management of Shoulder Subluxation after Nerve Reconstruction for Neonatal Brachial Plexus Palsy**  
Whitney Muhlestein, Sean McKale, Kate Chang, Lynda Jan-San Yang, Brandon Smith

4:20–4:25 pm  
**Discussant:** Holly Gilmer

### Kuntz Scholar Oral Abstract Presentations  
**Concurrent Session 2**

**Moderators:** Maziyar A. Kalani, John H. Shin

3:15–3:20 pm  
**107 Lower Hounsfield Units at the Upper Instrumented Vertebrae are Associated with Proximal Junctional Kyphosis and Failure**  

3:20–3:25 pm  
**Discussant:** Sigurd Berven

3:25–3:30 pm  
**108 Spontaneous Recovery in Patients with an ASIA A Spinal Cord Injury: Analysis of Multicentre Data in 943 Cases**  
Ali Moghaddamjou, Jefferson R. Wilson, Michael G. Fehlings

3:30–3:35 pm  
**Discussant:** John H. Chi
3:35–3:40 pm
109 Use of the Relative Citation Ratio as a Measure of Academic Neurological Spine Surgeon Productivity
Dayton Grogan, Vamsi Reddy, Arjun Gupta, Yue-Fang Chang, Daryl Fields, Nitin Agarwal

Discussant: Langston T. Holly

3:40–3:45 pm
110 Decisional Regret Among Older Adults Undergoing Corrective Surgery for Adult Spinal Deformity
Owoicho Adogwa, James Caruso, Cody M. Eldridge, Ravinderjit Singh, Sai Chilakapati, Pulvasha Demne, Sonja Stutzman, Salah G. Aoun, Aanand Naik, Carlos A. Bagley, Una Makris

Discussant: Langston T. Holly

3:45–3:50 pm
111 Risk Factors for Not Reaching MCID at 90 days and 1 year after Elective Lumbar Spine Surgery

Discussant: Gregory M. Mundis

3:50–3:55 pm
112 Effect of Morbid Obesity on Complications, Readmission, and PROs after MIS TLIF: An Inverse Propensity Score Analysis
Chad F. Claus, Michael H. Lawless, Evan J. Lytle, Doris Tong, Matthew Bahoura, Lucas Garmo, Joseph Gabriil, Peter L. Bono, Prashant S. Kelkar; Boyd F. Richards, Daniel A. Carr, Clifford M. Houseman, Tuck-Mun Soo

Discussant: Jay D. Turner

3:55–4:00 pm
113 Injury Volume Extracted from MRI Predicts Neurologic Outcome in Acute SCI: A Prospective TRACK-SCI Pilot Study

Discussant: Andrew T. Dailey
Kuntz Scholar Oral Abstract Presentations
Concurrent Session 3

Moderators: Hoon Choi, Jeremy Steinberger

3:15–3:20 pm
114 Comparison of C5 Palsy Incidence in Laminectomy and Fusion Versus Laminoplasty
Yaroslav J. Gelfand, Yagmur Muftuoglu, Anwesha Dubey, Ien Li, Michelle Hong, Daniel C. Lu, Langston T. Holly

3:20–3:25 pm
Discussant: Zoher Ghogawala

3:25–3:30 pm
115 Outcomes of Anterior Cervical Discectomy and Fusion Correlate with the Specialty of the Surgeon Performing the Procedure
Safwan Alomari, Brendan F. Judy, Jon Weingart, Sheng Fu, Larry Lo, Daniel M. Sciubba, Nicholas Theodore, Timothy F. Witham, Ali Bydon

3:30–3:35 pm
Discussant: Eric A. Potts

3:35–3:40 pm
116 Single Position Lateral Lumbar Fusion with Robot-assisted Pedicle Screws: Analysis and Comparison to Prone Screws
Islam Fayed, Alexander X. Tai, Matthew Triano, Anousheh Sayah, Jean-Marc Voyadzis, Faheem A. Sandhu

3:40–3:45 pm
Discussant: Peter G. Passias

3:45–3:50 pm
117 The Effects of Connexin Inhibitors on the Outcomes of a Porcine Spinal Cord Injury Model
Khaled Alok, Ibrahim Oweis, Wassim Baassiri, Charbel Moussalem, Mohamad Nabih El Houshiemy, Shadi Bsat, Safwan Alomari

3:50–3:55 pm
Discussant: Oren N. Gottfried

3:55–4:00 pm
118 Surgical Timing of TLICS 4 Fractures Impacts Long-term Pain Outcomes
Daryl Fields, Stephanie Casillo, Xiaoran Zhang, Nima Alan, Nitin Agarwal, Peter C. Gerszten, Adam S. Kanter, David Hamilton, David O. Okonkwo

4:00–4:05 pm
Discussant: Anthony M. DiGiorgio
MEETING AGENDA

WEDNESDAY

4:05–4:10 pm
119 Rate of Pseudarthrosis Following Anterior Cervical Discectomy and Fusion using Allograft Cellular Bone Matrix
Timothy Y. Wang, Stephen M. Bergin, Christine Park, Shashank Rajkumar, C. Rory Goodwin, Isaac O. Karikari, Muhammad M. Abd-El-Barr, Christopher I. Shaffrey, Chester Yarbrough, Khoi D. Than

4:10–4:15 pm
Discussant: Robert F. Heary

4:15–4:20 pm
120 Carbon Ion Radiotherapy for Sacral Chordomas: An Institutional/National Comparison of Outcomes with Surgery and RT
Yagiz U. Yolcu, Jad Zreik, Waseem Wahood, Atiq Bhatti, Mohamad Bydon, Matthew Houdek, Peter Rose, Anita Mahajan, Ivy Petersen, Michael Haddock, Safia Ahmed, Nadia Laack, Krishan Jethwa, Elizabeth Jeans, Reiko Imai, Shigeru Yamada, Robert L. Foote

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

THURSDAY

Minimally Invasive/Motion Preservation Abstract Breakout Session
3:15–4:25 pm
Moderators: Kenneth M. Crandall, Anthony C. Lau

3:15–3:17 pm
200 Lordotic vs. non-Lordotic Static Cage in MIS Transformafional Lumbar Fusion: A Longitudinal Comparative Cohort Study
Michael H. Lawless, Chad F. Claus, Doris Tong, Noah J. Jordan, Amarpal Dosanjh, Connor Hanson, Clifford M. Houseman, Daniel A Carr

3:17–3:19 pm
201 Higher Paraspinal Muscle Density Effect on Outcomes after ACDF
Zachariah Pinter, Scott Wagner, Ashley Xiong, Brett Freedman, Benjamin D. Elder, Ahmad Nasser

3:19–3:21 pm
202 Robotic-Assisted Trajectory into Kambin’s Triangle during Percutaneous Transformafional Lumbar Interbody Fusion (percLIF)
3:21–3:23 pm
203 Functional Ability Classification based on Kinesiophobia and Demoralization Scores in Degenerative Spine Patients
Ram Haddas, Cezar Sandu, Varun Sambariyya, Domingo Molina, Isador H. Lieberman, Andrew Block

3:23–3:25 pm
204 TLIF using a Novel Minimally Invasive Expandable Interbody Cage: PROs and Radiographic Parameters
Richard G. Fessler, Josha Woodward, Christopher D. Witiw, John Paul G. Kolcun, Mena G. Kerolus, Brian T. David, R. David Fessler

3:25–3:27 pm
205 A New Bibliometric Index: The Top 100 Most Disruptive Publications in Neurosurgery Journals
Owoicho Adogwa, Rachyl Shanker, Sai Chilakapati, Palwasha Deme, Syed I. Khalid , Elizabeth Khusid, James Caruso, Michael DeCuypere, Sandi Lam, Adan Becerra

3:27–3:29 pm
206 Intraoperative Monitoring in Lateral Lumbar Interbody Fusion is Not Associated with Improved Patient Outcomes
Jianning Shao, Arbaz Momin, Jonathan J. Rasouli, Jacob Enders, Derrick Obiri-Yeboah, Edward C. Benzsel, Michael P. Steinmetz

3:29–3:31 pm
207 Utility of the 5-item Modified Frailty Index for Predicting Adverse Outcomes Following Elective ACDF
Jad Zreik, Mohammed A. Alvi, Yagiz U. Yolcu, Abdul K. Ghaith, Brett Freedman, Mohamad Bydon

3:31–3:33 pm
208 Safety and Accuracy of Robot-Assisted Placement of Pedicle Screws Compared to Conventional Free-Hand Techniques
Nida Fatima, John H. Shin

3:33–3:35 pm
209 How to Perform, and Bill for, a Spine Specific Neurologic Strength Exam Using Telehealth in the COVID-19 Era

3:35–3:37 pm
210 Transforaminal Lumbar Interbody Fusion with a Novel Minimally Invasive Expandable Interbody Cage
Josha Woodward, Hani Malone, Christopher D. Witiw, Lacin Koro, John Paul G. Kolcun, Shahjehan Ahmad, Brian T. David, Richard D. Fessler, Richard G. Fessler
3:37–3:39 pm
211 Anterior Lumbar Interbody Fusion: Single Institutional Review of Complications
Armin Mortazavi, Ehsan Dowlati, William Mualem, Hefzibha Alexander, Juliana Rotter, Jean-Marc Voyadzis

3:39–3:41 pm
212 The Minimally Invasive Interbody Selection Algorithm for Spinal Deformity

3:41–3:43 pm
213 Patterns and Impact of EHR-defined Depression Phenotypes in Spine Surgery
Mayur Sharma, Maxwell Boakye, Shawn W. Adams, Thomas Chandler, Dengzhi Wang, Beatrice Ugiliweneza, Doniel Drazin

3:43–3:45 pm
214 Comparison of Complications and 90 Day Readmissions Between Open and MIS Surgery for Adult Spine Deformity
Juan S. Uribe, Shashank V. Gandhi, Paul Park, Christopher I. Shaffrey, Robert Eastlack, Dean Chou, Richard D. Fessler, Gregory M. Mundis, Shay Bess, Adam S. Kanter, David O. Okonkwo

3:45–3:47 pm
215 Long-Term Analysis of Adjacent Level Pathology in Minimally Invasive Transforaminal Lumbar Interbody Fusion
Mick J. Perez-Cruet, Lee Ong Chien, Wissam M. Elfallal, Eric Mong, Aaron Raupp, Esam Elkhaitib

3:47–3:49 pm
216 Surgical Treatment of Sacroiliac Joint Pain: Patient-reported Outcomes Through 2-year Follow-up
Louis H. Rappaport, Alex Mohit, Kim Hetsper, Torrey J. Shirk

3:49–3:51 pm
217 Saphenous SSEP Monitoring of Femoral Nerve Health During Prone Transpsoas (PTP) Lateral Lumbar Interbody Fusion (LLIF)
Antoine Tohmeh, Cheri Somers, Kelli Howell

3:51–3:53 pm
218 The Impact of Erector Spinae Plane Block on Postoperative Opioid Use in Minimally Invasive Lateral Lumbar Spine Fusions
Clifford Crutcher, Hans Zhang, Hari Mitra, Brian Nevitt, Jeffrey Gadsden, Muhammad M. Abd-El-Barr, Peter M. Grossi
3:53–3:55 pm
219 Ambulation within 8 Hours of Elective Cervical And Lumbar Spine Surgeries are Associated With Improved Outcome
Seokchun Lim, Michael Bazydlo, Sameah A. Haider, Mohamed Macki, Travis M. Hamilton, Richard Easton, Ilyas Aleem, Michelangelo Perez-Cruet, Jason M. Schwalb, Muwaffak Abdulhak, Victor W. Chang

3:55–3:57 pm
220 Comparison of Single-Position Robot-Assisted Surgery Versus Conventional Minimally Invasive Surgery Following LLIF
Themistocles Protopsaltis, Robert Brady, Jeffrey J. Larson, Richard F. Frisch, Kade Huntsman, Todd Lansford, Chris Maulucci, Gerald Haywood, Jonathan Harris, Jorge Gonzalez, Brandon Bucklen

3:57–3:59 pm
221 Management of Single-level Thoracic Disc Herniation Via a Modified Transfacet Approach: A Review of 86 Patients
Samir Kashyap, E.A. Friis, Andrew Webb, Paul M. Arnold

3:59–4:01 pm
222 Global Coronal Malalignment after MIS ASD Surgery: Multicenter Assessment of 141 Patients with Min 1-Yr Follow-up

4:01–4:03 pm
223 Segmental Lordosis Gain: PTP vs. LLIF
Luiz Pimenta, Rodrigo A. Amaral, Gabriel Pokorny, Rafael Moriguchi, Penando Melo Filho

4:03–4:05 pm
224 An Analysis of Perioperative Complications of LLIF in Patients with a History of Colonic Inflammatory Disease
Edward M. Barksdale, Mina Huerta, Karrington Seats, Arbaz Momin, Nicholas M. Rabah, Vikram Chakravarthy, Michael P. Steinmetz, Thomas E. Mroz

4:05–4:07 pm
225 Early Assessment of Cost-effectiveness in the FDA Pivotal Study of the TOPS Motion Preserving Device
Jared Ament, Bari Thaci, Amir A. Vokshoor, Kee Kim, J. Patrick Johnson

4:07–4:09 pm
226 Minimally Invasive Multiple-Rod Constructs with Robotics Planning in Adult Spinal Deformity Surgery: A Case Series
Vrajesh Shah, Martin H. Pham, Luis Daniel Diaz-Aguilar, Ronald A. Lehman
4:09–4:11 pm
227 OLIF vs LLIF: A Comparative Analysis of Postoperative Complications and Quality of Life
Jianning Shao, Arbaz Momin, Jonathan J. Rasouli, Jacob Enders, Derrick Okiri-Yesooh, Edward C. Benzel, Michael P. Steinmetz

4:11–4:13 pm
228 Progression to Spinal Instability Requiring Fusion Following Lumbar Decompression Surgery
Jacob Enders, Nicholas Bank, Ryan McNassor, Precious Oyem, Michael Ryan, Nicholas M. Rabah, Michael P. Steinmetz, Thomas E. Mroz

4:13–4:15 pm
Tim O’Connor, Mary O’Hehir, Lauren Levy, Isador H. Lieberman, Brandon Mariotti, Jennifer Mao, John Pollina, Jeffrey P. Mullin

4:15–4:17 pm
230 Prone Transpsoas Fusion (PTP) for Treatment of Adjacent Segment Disease: A Multicenter Case Series

4:17–4:19 pm
231 Comparison of Early "Prone Lateral" Experience vs "PTP" Proceduralization: Learnings, Efficiencies, and Peri-op Outcomes
Gene Massey, Antoine Tohmeh, Tyler Smith, Muhammad M. Abd-El-Barr, Isaac Moss, David G. Schwartz, Samuel Joseph

4:19–4:21 pm
232 SpineTrak: The First Randomized Control Trial Using the Apple Watch to Objectively Track Spine Surgical Patients
Christopher Leung, Parastou Fatemi, Ketan Yerneni, Atman Desai, Christy Tompkins-Lane, Corinna C. Zygourakis

4:21–4:23 pm
233 Awake Spine Surgery Reduces Length of Stay and Enhances Recovery in Transforaminal Lumbar Interbody Fusion
Jared Heinze, Holley Spears, Kyle Brena, Ernest E. Braxton

4:23–4:25 pm
234 Navigated Robotic Assistance Improves Pedicle Screw Accuracy in Minimally Invasive Surgery of the Thoracolumbar Spine
Arnold B. Vardaman, David Wallace, Neil Crawford, Jessica Riggleman, Samantha Greeley, Charles Ledonio, Grant Jamgochian, Torrey J. Shirk, Brandon Bucklen
4:30–6:30 pm

Sapphire DHLP

Crossfire: Finesse or Brute Force
Happy Hour Debates with Beer and Wine

Moderators: Darrel S. Brodke, Gerald E. Rodts

Neurosurgery Speakers: Edward C. Benzel, Robert F. Heary, Praveen V. Mummaneni, Daniel M. Sciubba

Orthopedic Speakers: Sigurd Berven, Matthew Goodwin, Jason Savage, Jeffrey Wang

Summary Speakers: Wellington Hsu, Ilya Laufer, Catherine Miller-Simington, Alpesh Patel

Learning Objectives:
— Analyze the impact of novel interbody technology
— Recognize optimal protocols for treatment of spine tumor patients
— Discuss treatment algorithms for cervical spine disease

4:30 – 4:59 pm

Topic 1: Interbody Surface Technology Materials

4:30–4:38 pm
PRO: Better Fusion with New Devices
Sigurd Berven

4:39–4:47 pm
CON: Just Another Expensive Cage
Praveen V. Mummaneni

4:48–4:53 pm
Summary of Points
Wellington Hsu

4:54–4:56 pm
Questions from the Audience

4:57–4:59 pm
Audience Vote

5:00–5:29 pm

Topic 2: ERAS for Spine Tumor Surgery

5:00–5:08 pm
PRO: Patients Don’t Have Much Time to Live, Get Them Out of the Hospital ASAP. They are Perfect ERAS Candidates
Daniel M. Sciubba

5:09–5:17 pm
CON: These People Are Sick and Not Well. ERAS is Absolutely Ridiculous
Matthew Goodwin
5:18–5:23 pm
Summary of Points
Ilya Laufer

5:24–5:26 pm
Questions from the Audience

5:27–5:29 pm
Audience Vote

5:30 – 5:59 pm
Topic 3: Single Level Arthroplasty is Suitable for Patients with CSM

5:30–5:38 pm
PRO: Arthroplasty is Suitable
Jeffrey Wang

5:39–5:47 pm
CON: Single Level CSM is Best Treated with ACDF
Robert F. Heary

5:48–5:53 pm
Summary of Points
Alpesh Patel

5:54–5:56 pm
Questions from the Audience

5:57–5:59 pm
Audience Vote

6:00–6:30 pm
Topic 4: Cervical Lami/Fusion - Ok to Stop at C7?

6:00–6:08 pm
PRO: Sufficient to Stop at C7
Edward C. Benzel

6:09–6:17 pm
CON: Should Fuse Across CT Junction
Jason Savage

6:18–6:23 pm
Summary of Points
Catherine Miller-Simington

6:24–6:26 pm
Questions from the Audience

6:27–6:30 pm
Audience Vote and Session Conclusion
FRIDAY | JULY 30, 2021

6:30 am – 4:30 pm  
Sapphire Foyer  
Registration

6:30 – 7:30 am  
Sapphire Foyer  
Complimentary Breakfast

Challenging Cases 1  
Sapphire DHLP

7:00–8:00 am  
Oral Board-style Challenging Cases: Lumbar Cases  
Moderators: Jay D. Turner, Anand Veeravagu

Scientific Session 4  
Sapphire DHLP

8:00–9:30 am  
Excellence: Empowering Our Discipline  
Moderators: Zoher Ghogawala, R. John Hurlbert  
Speakers: Richard H. Carmona, Adam S. Kanter, Michael P. Steinmetz, Luis M. Tumialán, Michael Y. Wang  
Learning Objectives:  
— Recognize the role of mentorship in career development  
— Identify how to define a career focus  
— Identify steps to becoming a subspecialty focused lead

8:00–8:07 am  
Lessons in Becoming an Innovator: A Tribute to Allan D. Levi  
Michael Y. Wang

8:08–8:15 am  
Lessons in Becoming a Global Expert: A Tribute to Christopher I. Shaffrey  
Adam S. Kanter

8:16–8:23 am  
Lessons in Becoming a Fierce Negotiator: A Tribute to Regis W. Haid  
Luis M. Tumialán

8:24–8:31 am  
Lessons in Becoming an Educator: A Tribute to Edward C. Benzel  
Michael P. Steinmetz

8:32–8:35 am  
Introduction of Guest Speaker: Richard H. Carmona  
Luis M. Tumialán

8:36–9:25 am  
Guest Speaker Presentation: Leading Through Crisis  
Richard H. Carmona

9:26–9:30 am  
Session Summary
9:00 am–1:30 pm
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 95 for detailed information and schedule.

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

Moderators: Mohamad Bydon, Domagoj Coric

Learning Objectives:
— Discuss the risks/benefits of options in lateral spine surgery
— Recognize options in nerve transfer surgery for SCI
— Analyze optimal treatment for primary tumor resection

10:15–10:44 am
Topic 1: Single Position Lateral Surgery

10:15–10:22 am
PRO: It’s Beyond Efficient
Juan S. Uribe

10:23–10:30 am
CON: No Alignment Correction and Risk of Misplaced Hardware
Gregory M. Mundis

10:31–10:36 am
Summary of Points
Adam S. Kanter

10:37–10:41 am
Questions From the Audience

10:42–10:44 am
Audience Vote

10:45–11:14 am
Topic 2: C5 Palsy: Watchful Waiting or Early Nerve Transfer

10:45–10:52 am
PRO: Early Nerve Transfer Results in Improved Function
Justin M. Brown
10:53–11:00 am
CON: Most Get Better With Time, Why Subject the Patient to a Morbid Surgery
James S. Harrop

11:01–11:06 am
Summary of Points
Line G. Jacques

11:07–11:11 am
Questions From the Audience

11:12–11:14 am
Audience Vote

11:15–11:44 am
Topic 3: Osteoporosis and ASD, Optimize Bone and Operate versus Not Surgical Candidates

11:15–11:22 am
PRO: Optimize with Medical Management
Kristen E. Jones

11:23–11:30 am
CON: Complication Too High, Don’t Do Surgery
Christopher M. Bonfield

11:31–11:36 am
Summary of Points
D. Kojo Hamilton

11:37–11:41 am
Questions from the Audience

11:42–11:44 am
Audience Vote

11:45 am–12:15 pm
Topic 4: En Bloc Resection versus Separation Surgery for Chordoma

11:45–11:52 am
PRO: En Bloc Resection Provides Better Outcomes
Ziya L. Gokaslan

11:53 am–12:00 pm
CON: Separation Surgery is the Preferred Method
Mark H. Bilsky

12:01–12:06 pm
Summary of Points
Laurence D. Rhines

12:07–12:11 pm
Questions From the Audience

12:12–12:15 pm
Audience Vote and Session Conclusion
MEETING AGENDA

12:15–1:15 pm
Lunch with Exhibitors or Attend a Non-CME Sponsored Lunch
See page 96 for detailed information and schedule.

Special Course 5  Cobalt 520
1:30–4:30 pm $150
NEW! Practical Matters: What Every APP/Surgeon Team Needs to Know
Complimentary for Registered Nurses & PAs

Course Directors: Nicole M. LeFevre, Corinna C. Zygourakis
Faculty: Karl C. Bruckman, Eric A. Potts, Nicholas Theodore, Anand Veeravagu, Minda Zhu
Course Description: This new course will teach the must-have knowledge and skills to ensure success in the operating room for every Advanced Practice Provider.
Learning Objectives:
— Identify basic anatomy and screw placement from the occiput to the ilium
— Discuss procedure-specific patient positioning
— Demonstrate operative techniques including: suturing, drilling, and placing screws

1:30–1:34 pm
Introduction
Nicole M. LeFevre, Corinna C. Zygourakis

1:35–1:49 pm
Spine Surgery Anatomy
Corinna C. Zygourakis

1:50–2:04 pm
Basics of Screw Placement
Nicholas Theodore

2:05–2:14 pm
Pearls of Patient Positioning
Minda Zhu

2:15–2:29 pm
Suturing Tips and Tricks
Karl C. Bruckman

2:30–3:29 pm
Hands-on Rotations
Eric A. Potts, Nicholas Theodore, Anand Veeravagu, Corinna C. Zygourakis

3:30–4:30 pm
Course Social Hour (Non-CME)
Special Course 6

**Sapphire 400**

**1:30–3:30 pm**

**NEW! Pediatric Spinal Pathology for the Adult Spine Surgeon**

**Course Directors:** Christopher M. Bonfield, Vijay Ravindra

**Speakers:** Douglas L. Brockmeyer, David D. Gonda, Mari L. Groves, Christina M. Sayama, Andrew C. Vivas

**Course Description:** From trauma to deformity: what every spine surgeon should know about treating pediatric patients will be covered in this new course for DSPN 2021.

**Learning Objectives:**
- Recognize different surgical options for stabilizing the craniocervical junction
- Discuss diagnostic evaluation and treatment options for craniocervical instability
- Identify the basics of pediatric deformity and when to intervene surgically

**1:30–1:34 pm**

**Introduction**
Christopher M. Bonfield, Vijay Ravindra

**1:35–1:49 pm**

**Chiari - When to Fuse**
Mari L. Groves

**1:50–2:04 pm**

**Fusion Techniques for the Craniocervical Junction**
Vijay Ravindra

**2:05–2:19 pm**

**AOD: Diagnosis and Treatment Options**
David D. Gonda

**2:20–2:34 pm**

**C1-2 Instability: When We See It and What Do We Do**
Douglas L. Brockmeyer

**2:35–2:49 pm**

**Basics of Pediatric Deformity Correction**
Christina M. Sayama

**2:50–3:04 pm**

**What the Adult Neurosurgeon Needs to Know About Pediatric Conditions: Tethering, Split Cord Malformations, Myelomeningocele**
Christopher M. Bonfield

**3:05–3:19 pm**

**High Grade Spondylolisthesis: When to Operate and What Options for Constructs**
Andrew C. Vivas

**3:20–3:30 pm**

**Questions and Conclusion**
Special Course 7

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30–5:30 pm</td>
<td>Treatment and Complication Avoidance in the Management of Spinal Tumors</td>
<td>John E. O'Toole, John H. Shin</td>
</tr>
<tr>
<td></td>
<td>Course Directors: John E. O'Toole, John H. Shin</td>
<td>Cobalt 502</td>
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<tr>
<td></td>
<td>Course Description: This seminar will review and highlight the multi-disciplinary management of spinal tumors for the practicing surgeon. Practical tips for managing common tumors and clinical scenarios with an emphasis on complications avoidance and surgical planning will be emphasized. Participants are encouraged to prepare and present cases for discussion.</td>
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<td>Learning Objectives:</td>
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<td></td>
<td>— Analyze various surgical treatment approaches to address spine tumor pathologies</td>
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<td></td>
<td>— Identify applications of new technologies in spine tumor surgery</td>
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<td></td>
<td>— Discuss complications avoidance strategies in tumor surgery</td>
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<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30–1:33 pm</td>
<td>Introduction</td>
<td>John E. O'Toole, John H. Shin</td>
</tr>
<tr>
<td>1:34–1:45 pm</td>
<td>Management of Vertebral Column Tumor Metastasis</td>
<td>Ilya Laufer</td>
</tr>
<tr>
<td>1:46–1:57 pm</td>
<td>Tips for Treating Epidural Cord Compression (When You're Not at an AMC)</td>
<td>Nicolas Dea</td>
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<tr>
<td>1:58–2:09 pm</td>
<td>When Do Metastatic Spine Tumor Patients Require Stabilization</td>
<td>Hesham M. Soliman</td>
</tr>
<tr>
<td>2:22–2:33 pm</td>
<td>Complications and How I Deal With Them</td>
<td>C. Rory Goodwin</td>
</tr>
<tr>
<td>2:34–2:45 pm</td>
<td>Management of Primary Bone Tumors of the Mobile Spine</td>
<td>Dean Chou</td>
</tr>
</tbody>
</table>
2:46–2:57 pm
Surgical Considerations for Cervical Chordoma
Daniel M. Sciubba

2:58–3:09 pm
Quality of Life and Patient Satisfaction After En Bloc Resection
Matthew Goodwin

3:10–3:24 pm
Break

3:25–3:36 pm
High Sacral Tumors: Single versus Staged Approaches
Ziya L. Gokaslan

3:37–3:48 pm
Mid to Low Sacral Tumors: When is Reconstruction Needed
Ehud Mendel

3:49–4:00 pm
Management of Benign Bone Tumors in the Spine
Michael A. Galgano

4:01–4:12 pm
Technical Nuances of Intradural Cervical Tumor Surgery
Mark H. Bilsky

4:13–4:30 pm
Participant Case Discussions
Ilya Laufer

Educational Grant provided by: Medtronic

Special Course 8
Cobalt 500

1:30–4:30 pm
Spine Summit Grand Rounds: Difficult Cases- The Decision-Making Dilemma

Course Directors: Ali A. Baaj, Langston T. Holly
Discussants: Victor W. Chang, Khoi D. Than
Speakers: Sigurd Berven, James S. Harrop, Gregory M. Mundis, Laurence D. Rhines

Course Description: Spine Summit Grand Rounds is a 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:
— 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**  
Ali A. Banj, Langston T. Holly

1:36–1:56 pm  
**The Difficult Anterior Cervical Case**  
James S. Harrop

1:57–2:17 pm  
**The Difficult Thoracic Case**  
Gregory M. Mundis

2:18–2:38 pm  
**The Difficult Lumbar Case**  
Sigurd Berven

2:39–2:59 pm  
**The Difficult Tumor Case**  
Laurence D. Rhines

3:00–4:19 pm  
**Submitted Cases Review and Discussion**  
Victor W. Chang, Khoi D. Than

4:20–4:30 pm  
**Questions and Conclusion**

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**Special Course 9  Sapphire 410**

1:30–4:30 pm  
**NEW! Starting Your Career: Practical Tips for Success**  
$150

**Course Directors:** Owoicho Adogwa, Brenton H. Pennicooke  
**Speakers:** Edward C. Benzel, Domagoj Coric, Daniel C. Lu, David O. Okonkwo, Wilson Z. Ray, Daniel K. Resnick, Laura A. Snyder, Walavan Sivakumar, Marjorie C. Wang

**Course Description:** This course addresses neurosurgery and neuroscience research across the continuum of scientific inquiry: clinical research, translational research, comparative effectiveness research, and bench/basic science research. In this comprehensive course, you will hear from scientific leaders in neurosurgery/neuroscience research, about surgeon- and institutional-level factors that enhance your success as an early career investigator. The course will be beneficial to neurosurgery residents and junior faculty interested in pursuing careers as surgeon-scientists/researcher.

**Learning Objectives:**
- Execute contract negotiation and your first job as a surgeon-researcher: key components that lead to increased likelihood of early career success
- Demonstrate knowledge of the different types of research methodologies and keys to success in each
- Identify the progression from hypothesis generation to a fundable project

1:30–1:39 pm  
**Introduction**  
Owoicho Adogwa, Brenton H. Pennicooke
MEETING AGENDA

1:40–1:54 pm
Negotiating Your First Job: Components of Surgeon Scientist Contract
Daniel C. Lu

1:55–2:09 pm
Basic Science versus Translational Clinical versus Health Services/Population Science
David O. Okonkwo

2:10–2:24 pm
From Ideas to Fund-able Projects
Wilson Z. Ray

2:25–2:39 pm
Thinking Ahead- Structuring Your First 5 Years for Success
Daniel K. Resnick

2:40–2:54 pm
Publishing in a High Impact Journal
Edward C. Benzel

2:55–3:14 pm
Break

3:15–4:30 pm
Survival Guide for Your First Year in Practice: ABNS, Running Clinic, Scheduling Surgery, Life Balance
Moderator: Marjorie C. Wang
Discussants: Domagoj Coric, Walavan Sivakumar, Laura A. Snyder

3:50–7:30 pm
Young Neurosurgeons’ Reception and Dinner
Sapphire Terrace

All residents, fellows, and young neurosurgeons are invited to enjoy a delicious dinner with 2021 Spine Summit Honored Guests: Sigurd Berven, Nicholas Theodore, Gregory R. Trost, and Eric L. Zager.

RSVP is required. To RSVP, please email meetings@cns.org or stop by the registration desk by 12:00pm on Wednesday.

6:00–7:00 pm
Reception with WINS
Sapphire 400

Join your colleagues from WINS for an hour of networking.
SATURDAY | JULY 31, 2021

6:30 am – 12:30 pm  Sapphire Foyer
Registration

6:30 – 7:30 am  Sapphire Foyer
Complimentary Breakfast

Challenging Cases 3  Sapphire DHLP
7:00 – 7:30 am
Oral Board Style Challenging Cases: Peripheral Nerve
Moderators: Line G. Jacques, Robert J. Spinner

Educational Grant provided by: Axogen

Abstract Breakout Sessions
7:30 – 9:30 am

Learning Objectives:
- Analyze the findings of novel neurosurgical studies, critique the design and methodology of these studies
- List important areas for further knowledge development and research
- Discuss ongoing innovative clinical and basic science studies, and how they may impact current practice

General Spine Surgery 1/Trauma/Spinal Cord Injury  Cobalt 500
7:30 – 9:30 am
Moderators: Anthony M. DiGiorgio, Eve C. Tsai

7:30 – 7:32 am
300 Preop Symptom Duration and PROs after ACDF in Non-myelopathic Patients: Michigan Spine Surgery Improvement Collaborative
Michael H. Lawless, Chad F. Claus, Doris Tong, Connor Hanson, Lucas Garino, Chenxi Li, Clifford M. Houseman, Peter L. Bono, Boyd F. Richards, Prashant S. Kelkar, Muwaffak Abdulhak, Paul Jin-Young Park, Teck M. Soo

7:32 – 7:34 am
301 Impact of Spinal Cord Injury on Intestinal Microbiome: A Yucatan Mini Pig Study
Mayur Sharma, Richa Singhal, Jay Ethridge, Caitlin Moorman, Manicka Vadhanam, Leslie Sherwood, Steven Davison, Shirish Barve, Maxwell Boakye

7:34 – 7:36 am
302 Effect of Improvement in mJOA Scores on Patient Satisfaction after Surgery for CSM: An Analysis of the QOD
<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Presenters</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>7:36–7:38 am</td>
<td>303 Alignment and Junctional Failure in Posterior Cervical Fusion: A Multicenter Comparison of Two Surgical Approaches</td>
<td>Zachariah Pinter, Brian A. Karamian, Jad Bou Monsef, Jennifer Mao, Ashley Xiong, Rachel L. Honig, Bradford L. Currier, Ahmad Nassr, Brett Freedman, Mohamad Bydon, Benjamin D. Elder, David Kaye, Chris Keplter, Gregory Schroeder, Alex Vaccaro, Scott Wagner, Arjun Sebastian</td>
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<tr>
<td>7:38–7:40 am</td>
<td>304 The Use Of Vancomycin Powder To Prevent Surgical Site Infections In Lumbar Spine Surgery: An Institutional Experience</td>
<td>Ahmed Albayar, Rachel Blue, Rachel Welch, Jang W. Yoon, Ali Ozturk, William C. Welch</td>
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<tr>
<td>7:40–7:42 am</td>
<td>305 Radiographic Comparison of Lordotic and Hyperlordotic Implants in L5-S1 Anterior Lumbar Interbody Fusion</td>
<td>Samuel H. Farber, Jake Godzik, James Zhou, Corey T. Walker, Kaveh Khajavi, Jay D. Turner, Juan S. Uribe</td>
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<tr>
<td>7:44–7:46 am</td>
<td>307 Predictors of Long-term Outcomes and Survival Following 3-Column Injuries in Patients with Ankylosing Spinal Disorders</td>
<td>Nikita Lakomkin, Anthony L. Mikula, Elizabeth Wellings, Zachariah Pinter, Mohammed A. Abi, Jeffery St. Jor, Benjamin D. Elder</td>
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<tr>
<td>7:48–7:50 am</td>
<td>309 Intra-operative Hypotension Diminishes Functional Recovery in Patients Following Acute Traumatic Spinal Cord Injury</td>
<td>Maclean Cook, Kristopher Patterson, Jason Barber, Vikas O’Reilly-Shah, Arman Dogal, Christine Fong, Hannah Weaver, Rajiv Saigal</td>
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<tr>
<td>7:50–7:52 am</td>
<td>310 Percutaneous Lumbar Interbody Fusion is Associated with Reduced Opioid Use When Compared with minimally Invasive TLIF</td>
<td>Clifford Crutcher, Hari Mitra, Hans Zhang, Peter M. Grossi, Muhammad M. Abd-El-Barr</td>
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</tbody>
</table>
7:52–7:54 am
311 Comparison of Adjustable Lordotic Expandable & Static Lateral Interbody Spacers on Endplate Loading, Lordosis Correction
Ripul R. Panchal, Dhara Amin, May Alall, Jonathan Harris, Brandon Bucklen

7:54–7:56 am
312 Predicting Adverse Events Following Anterior Cervical Discectomy and Fusion: ACDF Scoring System
Nida Fatima, John H. Shin

7:56–7:58 am
313 Fixation Strength of Modified Iliac Screw Trajectory Compared to Traditional Iliac and S2 Alar-Iliac Trajectories
Alexander von Glinski, Clifford A. Pierre, Jonathan Mahoney, Jonathan Harris, May Alall, Brandon Bucklen, Rod J. Oskouian, Jens Chapman

7:58–8:00 am
314 Parkinson’s Disease, Dysphagia and Cervical Spine Surgery
Mauricio J. Avila, Travis M. Dumont

8:00–8:02 am
315 Does Discharge Destination Increase Risks of Readmissions and Complication after Lumbar Spine Surgery?
Christine Park, Chad Cook, Alessandra Garcia, Oren N. Gottfried

8:02–8:04 am
316 Effects of Patient Transfer on Total Cost of Posterior Cervical Decompression and Fusion Surgery

8:04–8:06 am
317 RCT Trial Comparing PEEK and Allograft Spacers in Patients Undergoing Transforaminal Lumbar Interbody Fusion Surgeries
Alan T. Villavicencio, Ewell L. Nelson, Sharad Rajpal, Kara D. Beasley, Sigita Burneikiene

8:06–8:08 am
318 Postoperative SVA >4 cm Has No Impact on Neck Pain after C2-T2 Fusion for Myelopathy: Results from a Multi-center Study

8:08–8:10 am
319 Outcomes for 139 Patients Seen in Person for the First Time on the Day of Surgery Compared to Historical Controls
Alex C. M. Green, Beau McGinley, Gerald E. Rodts, Daniel Refai, Matthew F. Gary
8:10–8:12 am
320 Single Assessment Numeric Evaluation (SANE) Can Reliably Predict Quality of Life for Patients Undergoing ACDF

8:12–8:14 am
321 Impact of Obesity on Posterior Cervical Fusion for Cervical Myelopathy
Eli Perez, Royce Woodroffe, Brian Park, Logan Helland, Patrick W. Hitchon

8:14–8:16 am
322 In-situ VBR Cage Assembly for 360 Degree Repair of Severe Traumatic L5 Burst Fractures: 3 Case Reports
Shahriar Daneshfar, Joey Grochmal, Jason A. Felton

8:16–8:18 am
323 Analysis of Complication and Failure to Rescue Rates in Spinal Cord Injury Patients from a National Database (TQIP)

8:18–8:20 am
324 Comparison of Intra-operative Positioning Techniques on Cervical Sagittal Parameters after Posterior Cervical Fusion
Asad Akhter, Andrew J. Grossbach, Ryan Eaton, Nathaniel Toop, Stephanus Viljoen

8:20–8:22 am
325 Paraspinal Muscle Density Effect on Outcomes After Posterior Cervical Fusion
Zachariah Pinter, Adan Omar, Harold Salmons, Sarah Townsley, Bradford L. Currier, Brett Freedman, Ahmad Nassr, Benjamin D. Elder, Scott Wagner, Arjun Sebastian

8:22–8:24 am
326 Effects of Military Personal Protective Equipment on Spinal Column Loads from Underbody Blast Loading
Jamie Baisden, Sagar Umale, Hoon Choi, Narayan Yoganandan

8:24–8:26 am
327 Short Segment Pedicle Fixation of Traumatic Low Lumbar Fractures (L3-L5): Report of 30 Cases
Christina Moawad, Paul M. Arnold

8:26–8:28 am
328 Randomized Study Examining Return to Work after Surgery for Cervical Spondylotic Myelopathy
8:28–8:30 am
329 Subsidence and Loss of Lordosis With Stand-Alone Cages for Multilevel Anterior Cervical Fusions
Shashank V. Gandhi, Daniel Toscano, Peter Hollis, Ahmad Latefi

8:30–8:32 am
330 Allograft Subsidence has Minimal Effect on Cervical Alignment following ACDF
Zachariah Pinter, Anthony L. Mikula, Ashley Xiong, Arjun Sebastian, Brett Freedman, Bradford L. Currier, Benjamin D. Elder, Mohamad Bydon, David Kaye, Chris Kepler, Ahmad Nasse, Scott Wagner

8:32–8:34 am
331 Is There Value to Flexion-Extension Radiographs for Degenerative Spondylolisthesis?
Aidin Kashigar, Joseph Laratta, Leah Carreon, Erica F. Bisson, Zoher Ghogawala, Andrew Y. Yew, Tino Mkorombindo, Praveen V. Mummaneni, Steven D. Glassman

8:34–8:36 am
332 Impact of Timing of Surgical Decompression for Acute Spinal Cord Injury: A Pooled Analysis of Individual Patient Data

8:36–8:38 am
333 Does Rod Attachment Induce Significant Strain in Lumbosacral Fixation?
Anna Sawa, Piyarat Wongsawatwong, Bernardo De Andrada, Jakub Godzik, Juan S. Uribe, Jay D. Turner, Brian Kelly

8:38–8:40 am
334 Correlation Between the Motor Component of the ISNCSCI with the Bedside Neurosurgical Examination: A TRACK-SCI Study

8:40–8:42 am
335 Addition of Fusion to Decompression Improves Patient-Reported Outcomes for Grade I Degenerative Lumbar Spondylolisthesis
8:42–8:44 am
336 Isolated Traumatic Occipital Condyle Fractures: Is External Cervical Orthosis Even Necessary?
Enyinna L. Nwachuku, Confidence Njoku-Austin, Austin Anthony, Kevin Patel, David Hamilton, Adam S. Kanter, Peter Gerszten, David O. Okonkwo

8:44–8:46 am
337 Biomechanical Effect of Facet Joint Violation on Adjacent Segment Motion and Disc Strain Following Lumbar Fusion

8:46–8:48 am
338 Navigated Robot Assistance in the Placement of 726 Pedicle Screw: A Quantitative Accuracy Assessment
Carlo A. Benech, Rosa Perez, Franco Benech, Torrey J. Shirk, Brandon Bucklen

8:48–8:50 am
339 Frailty Predicts Complications Better Than Age after Surgery for Cervical Myelopathy: A NSQIP Database Study
Jamie R. F. Wilson, Jetan H. Badhiwala, Jeffereon R. Wilson, Albert Yee, Michael G. Fehlings

8:50–8:52 am
340 The Role of Instrumentation in the Surgical Treatment of Spondyloiscitis and Spinal Epidural Abscess
Jonathan J. Lee, Saeed S. Sadrameli, Surej Sulhan, Virendra R. Desai, Sean M. Barber

8:52–8:54 am
341 6-month Outcomes for Patients Undergoing Posterior vs Circumferential Surgical Approach for Isthmic Spondylolisthesis
Paul M. Arnold, Steven C. Ludwig, Alexander R. Vaccaro, Darrel S. Brodke, Justin S. Smith, Jens Chapman, James S. Harrop, Thomas E. Mroz, Michael G. Fehlings, Daniel M. Scibbba, Branko Kopjar, Sarah Woodrow, Zach Ray

8:54–8:56 am
342 Do Safety-net Hospitals Provide Equitable Care after Decompressive Surgery for Acute Cauda Equina Syndrome?
Archis R. Bhandarkar, Mohammed A. Alvi, James Naessens, Mohmad Bydon

8:56–8:58 am
343 Early Decompression and Short Transport Time after Traumatic Spinal Cord Injury are Associated with Improved Outcomes
Robert Sterner, Nathaniel Brooks

8:58–9:00 am
344 Postoperative Quality of Life in Young, Early and Late Elderly Patients with Cervical Myelopathy
Davide M. Croci, Brandon Sherrod, Erica F. Bisson
9:00–9:02 am
345 External Validation of a Predictive Model of Postoperative Complications and Correlation with Patient Reported Outcomes
Parastou Fatemi, Yi Zhang, Summer Han, Natasha Purington, Corinna C. Zygorakis, Anand Veeravagu, Atman Desai, Jon Park, John K. Ratliff

9:02–9:04 am
346 Patient Risk Factors and Hospital Drivers for Exorbitant Cost after Elective ACDF for CSM
Andrew B. Koo, Aladine A. Elsamadicy, Margot Sarkozy, Mani Sandhu, Astrid Hengartner, Christopher S. Hong, Daniel M. Sciuabba, Luis Kolb, Maxwell S.H. Laurans

9:04–9:06 am
347 Relation of Prehospital Hemodynamic Status and SpO2 to Neurologic Recovery After Acute Traumatic Spinal Cord Injury
Kristopher Patterson, Maclean Cook, Jason Barber, Vikas O’Reilly-Shah, Arman Dagel, Christine Fong, Hannah Weaver, Rajiv Saigal

9:06–9:08 am
348 FDA IDE Study of Decompression and Paraspinous Tension Band for Degenerative Spondylolisthesis: 24-Month Outcomes

9:08–9:10 am
349 Surgical Decompression for Cervical Spondylotic Myelopathy in Patients with Associated Hypertension

9:10–9:12 am
350 Assessing the Efficacy of the mJOA in Myelopathic Patients: A Cervical QOD Study

9:12–9:14 am
351 Predicting Patient Outcomes After Far Lateral Lumbar Discectomy
Eric Winter, Donald Detchou, Gregory Glauser, Krista Strouz, Scott D. McClintock, Paul J. Marcotte, Neil Malhotra
9:14–9:16 am
352 The Effect Of Patient Position On Psoas Morphology And In Lumbar Lordosis
Luiz Pimenta, Rodrigo A. Amaral, Gabriel Pokorny, Murilo T. Daher, Raphael Pratalsi, Carlos Fernando P. S. Herrero

9:16–9:18 am
353 Validation of a Novel Classification System for Thoracic Disc Herniations and Application to Surgical Approach

9:18–9:20 am
354 Establishing Fluid Biomarker Gradients based on Severity of Spinal Cord Injury
Nitin Agarwal, Megan Rode, Tavis Taylor, Sowvik Roy, Pallavi Muluk, Aparna Krishnamoorthy, Hannah Easow, Gabrielle Stout, Yue-Fang Chang, David Hamilton, Partha Thirumala

9:20–9:22 am
355 Single-Position Prone Lateral Interbody Fusion Improves Segmental Lordosis in Single-level Lumbar Spondylolisthesis
Corey T. Walker, Samuel H. Farber, Shashank V. Gandhi, Jakub Godzik, Jay D. Turner, Juan S. Uribe

9:22–9:24 am
356 Modified-Frailty Index and Outcomes Following Posterior Lumbar Decompression and Fusion for Spondylolisthesis

9:24–9:26 am
357 Fractures of the Axis: A Single-Institutional Experience with 425 Patients
Nathan A. Shlobin, Michael Cloney, Benjamin Hopkins, Vineeth Thirunavu, Akash Mitra, Nikil Prasad, Hooman Azad, Nader S. Dahdaleh

9:26–9:28 am
358 Machine Learning Algorithm for Predicting Discharge Disposition following Surgery for Spinal Stenosis
Nida Fatima, John H. Shin

9:28–9:30 am
359 Predictors of Dysphagia after Anterior Surgery for Degenerative Cervical Myelopathy
Harsh Wadhwa, Jigyasa Sharma, Kunal Varshneya, Karuna Dewan, Martin N. Stienen, Anand Veeravagu
General Spine Surgery 2/Tumor/Opioids Abstract Breakout Session

Cobalt 502
7:30 – 9:30 am
Moderators: Victor W. Chang, Benjamin D. Elder

7:30–7:32 am
400 Neighborhood Income as a Predictor of Outcomes and Opioid Use After Spine Surgery in the United States

7:32–7:34 am
401 Assessment of Efficacy of Teriparatide (PTH 1-34) following Lumbar Fusion Surgery in Patients with Osteoporosis
Nida Fatima, Elie Massaad, Muhamed Hadzipasic, Ganesh Shankar, John H. Shin

7:34–7:36 am
402 The role of Intraoperative Hypotension during Spinal Fusion Contributing to Acute Kidney Injury
Rachel Blue, Michael Spadola, Ben Gu, Alexis Gutierrez, Mitchell Weinstein, Dmitriy Petrov

7:36–7:38 am
403 Use of Teriparatide Prior to Lumbar Fusion Surgery lowers the Rate of Complications for Patients with Osteoporosis
Yagiz U. Yoleu, Jad Zreik, Mohammed A. Alvi, Nathan Wanderman, Bayard Carlson, Ahmad Nassr, Jeremy L. Fogelson, Benjamin D. Elder, Brett Freedman, Mohamad Bydon

7:38–7:40 am
404 Racial is an Independent Predictor for Non-Routine Discharges after Spine Surgery for Intradural Spinal Tumors
Aladine A. Elsamadicy, Andrew B. Koo, Wyatt David, Benjamin Reeves, Isaac G. Freedman, Zach Pennington, Jeff Ehresman, Maxwell S.H. Laurans, Luis Kolb, Daniel M. Scrubba

7:40–7:42 am
405 Is the Use of rh-BMP associated with Increased Incidence of Cancer?
Nida Fatima, John H. Shin, Jun Seok Bae, Peter Loughenbury, Rory Murphy, Amit Jain, Zorica Buser, Hans-Joerg Meisel, K. Daniel Riew, AO Spine Knowledge Forum Degenerative Spine

7:42–7:44 am
406 Automated CT Imaging Biomarkers for Prediction of Outcomes in Spine Surgery for Cancer Metastasis
7:44–7:46 am
407 Predicting Opioid Use During Hospitalization After Lumbar Fusion: A Contemporary Single Surgeon Series
Victor M. Lu, Gregory D. Brusko, Peter Borowsky, Michael Y. Wang

7:46–7:48 am
408 10-Year Surgical Trends for Patients with Spinal Metastases
Jose Orenday, Maria José Cavagnaro, Mauricio J. Avila, Haroon Kisana, Isabel M. Strouse, Jacob Howshar, Aaron Dowell, Naushaba Khan, Chung-Yon Lin, Robert Ravninsky, Ali A. Baaj

7:48–7:50 am
409 Predictors of Nonelective Surgery for Spinal Metastases: A Nationally-Representative Retrospective Cohort Study
Hammad A. Khan, Nicholas M. Rabah, Vikram Chakravarthy, Raghav Tripathi, Ajit A. Krishnaney

7:50–7:52 am
410 Non-Elective Admission Status is Associated with Higher Cost of Care and Longer Length of Stay in Spinal Deformity

7:52–7:54 am
411 Robotic Pedicle Screw Placement Accuracy in Spine Surgery Based on Neuromonitoring Thresholds
Charles Kanaly, Danielle Backes, Christine Richardson, Brandon Bucklen

7:54–7:56 am
412 The Effect of Progressive Intraoperative Blood Loss on Viscoelastic Coagulation Parameters in Major Spine Surgery
Colin Lamb, Sean N. Neifert, William Shuman, Daniel Katz, John M. Caridi

7:56–7:58 am
413 Diagnostic Yield, Accuracy & Complications of CT-guided Biopsy for Spinal Lesions – A Systematic Review & Meta-Analysis
Giorgos Michalopoulos, Yagiz U. Yolcu, Abdul Karim Ghaiith, Mohammed A. Alvi, Carrie Carr, Mohamad Bydon

7:58–8:00 am
414 Frailty Status But Not Age Predicts Surgical Outcomes in Spinal Tumors: An NSQIP 2015-19 Analysis of 4662 Patients
Syed F. Kazim, Christian A. Bowers, Chad D. Cole, Rohini Mckee, Meic H. Schmidt

8:00–8:02 am
415 Understanding the Natural History of Postoperative Pain and Opioid Use Following Spine Surgery via a SMS Application
8:02–8:04 am
416 6-year Follow-up of i-FACTOR® Peptide Enhanced Bone Graft vs Autograft in Single-level ACDF in a FDA IDE Study
Paul M. Arnold, Alexander R. Vaccaro, Rick Sasso, Benoît Goulet, Michael G. Fehlings, Robert F. Heary, Michael Janssen, Branko Kopjar

8:04–8:06 am
417 Clinical Accuracy and Initial Experience with Augmented Reality-Assisted Pedicle Screw Placement: The First 205 Screws
Ann Liu, Yike Jin, Ethan Cottrill, Majid Khan, Erick M. Westbroek, Jeffrey S. Ehresman, Zach Pennington, Sheng-fu L. Lo, Daniel Sciubba, Camilo A. Molina, Timothy F. Witham

8:06–8:08 am
418 Incidence and Risk Factors of Prolonged Opioid Use Following Lumbar Spine Surgery: A Cohort Study
Anshit Goyal, Stephanie Payne, Lindsey Sangaralingham, Molly Jeffery, James Naessens, Halena Gazelka, Elizabeth B. Habermann, Robert J. Spinner, Mohamad Bydon

8:08–8:10 am
419 Pre-Operative Subcutaneous Ketamine and Associated Opioid Tapering in Patients Undergoing Spinal Fusion Surgery
R Ganko, Le Chi Chiu, Jason Yang, Tillman Boesel, Sushama Deshpande, Mario D’Souza, Thanan Elalingam, Matthew Tait

8:10–8:12 am
420 Classifying Patients Operated For Spondylolisthesis: A Machine-Learning Analysis Of Clinical Presentation Phenotypes

8:12–8:14 am
421 Clinical Reliability of Genomic Data Obtained from Spinal Metastatic Tumor Samples
Ori Barzilai, Axel Martin, Anne Reiner, Ilya Laufer, Adam Schmitt, Mark H. Bilsky

8:14–8:16 am
422 Lumbar Far Lateral Disc Herniation: Single Center Outcomes of Modified Technique
Arsalaan Salehani, Nicholas J. Erickson, Matthew S. Parr, Travis Aitcheley, James H. Mooney, Sasha Howell, Nicholas M. Laskay, Danielle Koch, Daniel K. Harmon, Mamerhi O. Okor

8:16–8:18 am
423 Safety and Efficacy of Low-Dose rhBMP-2 Use for Anterior Cervical Fusion
Stephen K. Mendenhall, Eric A. Potts, Jean-Pierre Mobasser
MEETING AGENDA

8:18–8:20 am
424 Post-MACRA Trends in Lumbar MRI Utilization for Low Back Pain Patients Across 1,373 Reporting Hospitals
Ansh Desai, Tarun Jella, Alexander Acuña, Christina H. Wright, James Wright

8:20–8:22 am
425 Relationship Between Physician Industry Payments and Cost of ACDF in Medicare Beneficiaries
Matthew Sklar, Christopher Leung, Harsh Wadhwa, Corinna C. Zygourakis

8:22–8:24 am
426 Molecular Biomarkers & Survival in Breast Cancer Patients with Spine Metastases: A Systematic Review & Meta-analysis
Archis R. Bhandarkar, Mohammed A. Alvi, Shyam Kurian, Waseem Wahood, Larry Prokop, Minetta Liu, Mohammad Bydon

8:24–8:26 am
427 Single-dose Versus Hypofractionated Focused Radiation in a Newly Developed Radiation-induced VCF Model
Alexander Perdomo-Pantoja, Christina Holmes, Ioan A. Lina, Jason Liauw, Varun Pawanansarajah, Brian C. Goh, Chukwuebuka C. Achebe, Ethan Cottrill, Warren Grayson, Kristin Redmond, Soojung C. Hur, Timothy F. Witham

8:26–8:28 am
428 A Web-Based Calculator for Clinical Outcome Prediction in Sacral Tumor Surgery
James Feghali, Zach Pennington, Bethany Hung, Andrew Hersh, Andrew Schilling, Jeffrey S. Ehresman, Siddhartha Srivastava, Ethan Cottrill, Daniel Lubelski, Sheng-fu L. Lo, Daniel M. Sciubba

8:28–8:30 am
429 Association between Vitamin D Deficiency and Surgical Site Infection Following Elective Lumbar Fusions

8:30–8:32 am
430 Surgical Site Infections Following Spine Surgery: The Effect of Seasonality
William Shuman, Adam Y. Li, Jonathan S. Gal, Sean N. Neisert, Theodore Hannah, Nicholas Dreher, Alex J. Schupper, John M. Caridi, Tanvir Choudhri

8:32–8:34 am
431 Validation of Machine Learning-based Frailty Indices to Predict Adverse Events after Surgery for Spinal Metastases
Elie Massaad, Natalie Williams, Ali Kiapour, Muhamed Hadzipasic, Ganesh Shankar, John H. Shin

8:34–8:36 am
432 A Web-based Calculator for Wound Complications After Metastatic Spine Tumor Surgery
Andrew Hersh, James Feghali, Bethany Hung, Zach Pennington, Andrew Schilling, Albert Antar, Jaimin Patel, Jeffrey S. Ehresman, Daniel Lubelski, C. Rory Goodwin, Daniel M. Sciubba
8:36–8:38 am
433 A Biomechanical Investigation of Lumbar Interbody Fusion Techniques
Jamie Baisden, Sagar Umale, Hoon Choi, Narayan Yoganandan

8:38–8:40 am
434 Transforaminal versus Lateral Lumbar Interbody Fusion: Analysis of the Michigan Spine Surgery Improvement Collaborative
Michael J. Strong, Timothy J. Yee, Siri Sahib S. Khalsa, Yamaan S. Saadah, Osama Kashlan, Jacob R. Joseph, Nicholas J. Szerlip, Paul Park, Mark E. Oppenlander

8:40–8:42 am
435 Results of a Multi-center Randomized Clinical Trial Comparing Surgical Strategy for Cervical Myelopathy

8:42–8:44 am
436 Thoracolumbar Interfascial Plane Block Reduces Postoperative Opioid Consumption Compared to Traditional Field Block
Gregory D. Brusko, Victor M. Lu, Peter Borowsky, Michael Y. Wang

8:44–8:46 am
437 Exploring the Relationship Between Smoking Cessation Therapy and Lumbar Fusion Outcomes: A Matched Analysis
Owoicho Adogwa, Syed I. Khalid, Sair Chilakapati, Palvasha Deme, Rachal Shanker, Ravi S. Nunna, Samantha Maasavani, Brittanay Hunter, Nicholas Duff, Jennifer Smith, James Curuso, Tabinda Ali, Ravinderjitt Singh, Cody M. Eldridge

8:46–8:48 am
438 Race and Survival Rate of Spinal Astrocytoma Patients: A 20-year Observational Study Using the SEER Database
Kyle McGrath, Chris Karas

8:48–8:50 am
439 Robotic Prone Trans Psoas (RPTP): Harnessing Robotic Assistance for Prone, Circumferential Access to the Lumbar Spine
David R. Santiago-Dieppa, Arvin R. Wali, Lauren Stone, Martin H. Pham, William R. Taylor, Andrew D. Nguyen

8:50–8:52 am
440 Factors Associated with Adjacent Level Progression Following Surgery-Radiosurgery for Metastatic Spinal Cord Compression
Vikram Chakravarty, Hammad A. Khan, Shaarada R. Srivatsa, Todd Emch, Ajit A. Krishnaney

8:52–8:54 am
441 Is it Better to Stop at C2 or C3/4 in Elective Posterior Cervical Decompression and Fusion?
Steven G. Roth, Inamullah Khan, Silky Chotai, Byron Stephens, Amir Abtahi, Clinton J. Devin, Scott L. Zuckerman
8:54–8:56 am
442 Radiographic and Clinical Outcomes Related to Interbody Cage Morphology in Transforaminal Lumbar Interbody Fusions
Nathaniel Toop, Dominic Maggio, James Oosten, Kyle Deister, Ty Gilkey, Francis Farhadi, Andrew J. Grossbach, Stephanus Viljoen

8:56–8:58 am
443 Differences in Discharge Disposition on Patient Reported Outcomes and 30-Day Readmission/Reoperation Rates
Christine Park, Chad Cook, Oren N. Gottfried

8:58–9:00 am
444 Impact of Race & Socio-Economic Status in Clinical & Patient Reported Outcomes after Surgery for Cervical Myelopathy

9:00–9:02 am
445 Dysphonia Following Stand-alone ACDF: Incidence, Severity and Resolution
Akhil Chandra, Avani Vaishnav, Hikari Urakawa, Jung K. Mok, Derek Colaizzo, Marcel Dupont, Evan Sheha, Catherine Himo Gang, Sheeraz Qureshi

9:02–9:04 am
446 Surgeon Specialty Effect on Early Outcomes of Elective Anterior/Lateral Lumbar Interbody Fusions
Safwan Alomari, Jose L. Porras, Sheng Fu L. Lo, Daniel M. Sciubba, Nicholas Theodore, Timothy F. Witham, Ali Bydon

9:04–9:06 am
447 A Self-Controlled Study of Fusion and Subsidence in TLIF with PEEK-Ti Versus 3D-Ti Cages
Ali Chaiblavi, Sonic Oun, Marcela Pacheco-Zhang, Sara T. Mikoci, Frank Vizesi

9:06–9:08 am
448 Insurance Status as a Mediator of Clinical Presentation and Neurologic Outcomes for Patients with Metastatic Disease
Tara E. Dalton, Meghan Price, Jessica Goodwin, Rafael De la Garza Ramos, Cesar Baeta, Edwin McGray, Reza Yassari, Isaac O. Karikari, Muhammad M. Abol-El-Barr, Andrea Goodwin, C. Rory Goodwin

9:08–9:10 am
449 Impact of Cage Type (PEEK vs. Titanium) on Subsidence and Patient Outcomes after TLIF: N2QOD Single-institution Study
Robert Kim, Forrest Hamrick, Andrew T. Dailey, Erica F. Bisson, Mark A. Mahan, Marcus D. Mazur
9:10–9:12 am
450 Impact of Lidocaine/Bupivacaine Use on Opioid Consumption Following Spinal Surgery: A Systematic Review and Meta-Analysis
Shyam Kurian, Sung Huang, Laurent Tsai, Yoel Y. Yoleu, Shao-Wen Hung, Giorgos Michalopoulos, Mohammed A. Alvi, Tsai-Sheng Fu, Mohamad Bydon

9:12–9:14 am
Nida Fatima, John H. Shin

9:14–9:16 am
452 Long-Term Upright Radiographic Outcomes after Intradural Tumor Resection via Lamincetomy and Laminoplasty
Clinton D. Morgan, Evan Richman, Jay D. Turner

9:16–9:18 am
453 Finite Element Analysis and Spinal Metastatic Disease
Jamie Baisden, Sagar Umale, Vaibhav Porwal, Prashant Khandelwal, Hoon Choi, Narayan Yoganandan

9:18–9:20 am
454 Factors Associated with Recurrence of Low-Grade Spinal Ependymomas: A Systematic Review and Meta-analysis
Waseem Wahood, Yoel Y. Yoleu, Panagiotis Kerezoudis, Giorgos Michalopoulos, Mohamad Bydon

9:20–9:22 am
455 Postoperative Urinary Retention after Elective Spine Surgery: Systematic Review and Meta-analysis
Brij S. Karmur, Jonathan Cunningham, Peter Lewkonia, Steven Casha, Michael M.H. Yang

9:22–9:24 am
456 Patient-Reported Outcomes After Treatment of Tumor-Related Spinal Instability Using Fenestrated Pedicle Screws
Elie Massaad, Ali Kiotour, Muhamed Hadzipasic, Ganesh Shankar, John H. Shin

9:24–9:26 am
457 Racial Disparities in Perioperative Morbidity following Spine Oncological Surgery
Rafael De la Garza Ramos, Jong Hyun Choi, Ishan Naidu, Joshua Benton, Yaroslav J. Gelfand, Murray Echt, David J. Altschul, Vijay Yanamadala, Reza Yassari

9:26–9:28 am
458 Preoperative Treatment of Osteoporosis and Health Care Utilization in Patients Undergoing Thoraco-Lumbar Spine Fusions
Mayur Sharma, Kevin John, Nicholas Diets, Nikhil Jain, Wang Dengshi, Beatrice Ugliuweneza, Daniel Drazin, Maxwell Bonkay

9:28–9:30 am
459 Exploring the Effects of Rod Instrumentation Order on Strain in Posterior Thoracolumbar Fixation Constructs
Kyle McGrath, Callan Gillespie, Jeremy Loss, Robb Colbrunn, Swetha J. Sundar, Michael P. Steinmetz
MEETING AGENDA

General Spine Surgery 3/
Peripheral Nerve/
Basic Science Abstract
Breakout Session
7:30 – 9:30 am
Moderators: Allan J. Belzberg, Kristen E. Jones

7:30–7:32 am
500 Does Added Compression Alter Intervertebral Disc Surface Strain During Multi-directional Loading?

7:32–7:34 am
501 Ramifications of Post-Operative Dysphagia on Healthcare Resource Utilization following Elective ACDF for CSM
Aladine A. Elsamadicy, Andrew B. Koo, Wyatt David, Isaac G. Freedman, Benjamin Reeves, Jeff Ehresman, Zack Pennington, Maxwell S.H. Laurans, Luis Kolb, Daniel M. Sciubba

7:34–7:36 am
502 Seasonal Effects on Postoperative Complications Following Spinal Surgery
Phil Henson, William Shuman, Adam Y. Li, Muhammad Ali, Alex J. Schuppler, Jonathan S. Gal, Jeremy Steinberger, Tanvir Choudhri

7:36–7:38 am
503 Using QOD to Identify Indicators of Postoperative Dissatisfaction in Surgical Treatment of Spondylolysis

7:38–7:40 am
504 Cervical Spine Steroid Injections for Delay of Surgery for Cervical Spondylotic Myelopathy
Mustfa Manzur, Andre Samuel, Avani Vaishnav, Sarvishth Iyer, Steven Meanahy, Todd Albert, Catherine Himo Gang, Sheeraz Qureshi

7:40–7:42 am
505 Nerve Transfers after Cervical Spine Surgery: Multi-Institutional Case Series and Review of the Literature
Daniel Lubelski, Zach Pennington, Srujan Kopparapu, Daniel M. Sciubba, Allan T. Bishop, Alexander Y. Shin, Robert J. Spinner, Allan J. Belzberg

7:42–7:44 am
506 Titanium Plasma Spray Enhances Ability of PEEK to Promote Gene Expression Related to Bone Formation
Sheeraz Qureshi, Roland Beard, Margaret Van Horn, Brandon Bucklen

7:44–7:46 am
507 Radiographic and clinical outcomes with the single position prone lateral transposas approach
Samuel H. Farber, Komal Naeem, Malika Bhargava, Randall W. Porter

7:46–7:48 am
508 Congenitally-fused Cervical Spine Associated with Adjacent Level Degeneration in the Absence of Cervical Spine Surgery
Gabriel Friedmann, Ben L. Grannan, Robert Koffie, Aniket N. Zinzawadia, Ziv Williams, Jean-Valery Coumans
7:48–7:50 am
509 Does Screw Length Impact 1-Year Fixation in 3-Level Anterior Cervical Discectomy and Fusion?
Alysha Jamieson, Noah M. L. Nichols, Dean Chou, Praveen V. Mummaneni, Lee A. Tan

7:50–7:52 am
510 Natural History of Extracranial Schwannomas: A Single Institutional Series
Daniel Lubelski, Zach Pennington, Arinze Ochuba, Tej D. Azad, Jaishri Blakeley, Allan J. Belzberg

7:52–7:54 am
511 ACDF with a Porous PEEK Cage vs. Fibular Allograft: Clinical/Radiographic Outcomes at 1-Year Postoperatively
Lacin Kavo, Josh Woodward, Dominick Richards, Zakariak Siyaji, John Paul George Kolcun, David Fessler, Richard G. Fessler

7:54–7:56 am
512 Posterior Cervical Decompression and Fusion Terminating at C7
Susanna Kwok, Anant Naik, Chengmin Zhang, Qiang Zhou, Paul M. Arnold

7:56–7:58 am
513 A Rough 3D-Printed Surface Enhances Stem Cell Proliferation and Osteoblast Differentiation
Sheeraz Qureshi, Margaret Van Horn, Roland Beard, Brandon Bucklen

7:58–8:00 am
514 Machine Learning Approach to Differentiation of Peripheral Neurofibromas and Schwannomas: A Multi-Center Study
Michael Zhang, Elizabeth Tong, Samuel Wong, Forrest Hamrick, Maryam Mohammadsadegh, Vaishnavi Rao, Courtney Pendleton, Brandon Smith, Nicholas F. Hug, Sandip Biswal, Jayne Seekins, Sandy Napel, Robert J. Spinner, Mark A. Mahan, Kristen Yeom, Thomas J. Wilson

8:00–8:02 am
515 Risk Factors for Allograft Subsidence following ACDF
Zachariah Pinter, Anthony L. Mikula, Matthew Shirley, Ashley Xiong, Brett Freedman, Bradford L. Currier, Benjamin D. Elder, Mohamad Bydon, David Kaye, Chris Kepler, Scott Wagner, Ahmad Nassr, Arjun Sebastian

8:02–8:04 am
516 Differences in Human, Pig, and Rat Spinal Cord Stem Cells in Response to Inflammatory and Regenerative Factors In Vitro
Ahmad Galuta, Abdul Mounem Yassin-Kassab, Diana C. Ghinda, Ryan Sandarage, Jason Kwan, Suzan Chen, Angela Auriat, Eve C. Tsai

8:04–8:06 am
517 A Retrospective Study of Patient Complaints in the Post-operative Period Following Spinal Surgery
Andrew Ronald, Vineeth Saada, Nicholas M. Rabah, Michael P. Steinmetz
8:06–8:08 am
518 Surgical Autonomy Program (SAP) for Evaluation of Resident Performance in Spine Surgery
Kelly R. Murphy, Alexander Suarez, Andrew B. Cutler, Elayna Kirsch, Lefko Charalambous, Nandan P. Lad, Katherine McDaniel, Michael M. Haglund

8:08–8:10 am
519 Midpoint of C7 Lateral Mass Serves as an Accurate Reference Point for Placement of T1 Pedicle Screws
Michael Panagos, Charles A. Sansur, Kevin Kim, Ashish Sharma, Timothy Chryssikos, Kenneth M. Crandall

8:10–8:12 am
520 3 and 12-month Change in Patient Reported Outcomes & MCID by Myelopathy Severity Following Cervical Decompression

8:12–8:14 am
521 Diagnosis Related Group as a Predictor of Length of Stay, Disposition in Patients Undergoing ACDF
Ansh Desai, Jeff Butke, Uma V. Mahajan, Collin Labak, Eric Herring, Berje H. Shammasian, Rohit Mauria, Manish K. Kasliwal

8:14–8:16 am
522 3-D Patient-specific Monitored Guidewire Placement-guides: A Safe(r) Technique
Raul B. Santos, Carlos M. Ribeiro, Antonio M. Baptista

8:16–8:18 am
523 Demographic Risk Factors and Use of Annular Closure to Avoid Disability with Reoperations Following Lumbar Discectomy
R. Todd Allen, Michael J. Musacchio, Claudius Thomé, Adisa Kursumovic, Peter D. Klassen

8:18–8:20 am
524 Lymphoceles Following Anterior Lumbar Interbody Fusion: A Review of 1322 Patients
Justin K. Scheer, Alexander F. Haddad, Andrew Kai-Hong Chan, Charles Eichler, Bobby Tay, Shane Burch, Dean Chou, Christopher P. Ames, Praveen V. Mummaneni

8:20–8:22 am
525 Variations in the Microorganisms, Biomarkers, and Management of Wound Infections After Posterior Spinal Fusion
Michael Cloney, Benjamin Hopkins, Nathan A. Shlobin, Max Kelsten, Nader S. Dahdaleh
8:22–8:24 am
526 Age as a Risk Factor for Complications Following ACDF: Michigan Spine Surgery Improvement Collaborative (MSSIC)
Chad F. Claus, Michael H. Lawless, Doris Tong, Robert W. McCabe, Connor Hanson, Lucas Garmo, Chenxi Li, Paul Park, Mawaffak Abdulhak, Teck M. Soo

8:24–8:26 am
527 Longitudinal Analysis of Peripheral Nerve Surgery Training: Comparing Neurosurgery to Plastic and Orthopedic Surgery
Paulomi Gohel, Mike White, Daryl Fields, Nitin Agarwal, Nima Alan

8:26–8:28 am
528 Older Spondylolisthesis Patients Undergoing Decompressions See Less Satisfaction Post Surgery
Geoffrey R. O’Malley, Jr., Ricky Greff, Sudheesha Perera, Dimple Gandhi, Scott A. Meyer, John J. Knightly

8:28–8:30 am
529 Identifying Treatment Patterns in Patients with Bertolotti Syndrome: An Elusive Cause of Chronic Low Back Pain
Kyle McGrath, Nicholas M. Rabah, Michael P. Steinmetz

8:30–8:32 am
530 Clinical Outcome of Surgical Site Infection After Spinal Fusion

8:32–8:34 am
531 Preoperative Cross-sectional Area of Psoas Muscle Impacts Postoperative Functional Outcomes of Posterior Lumbar Surgery
Hikari Urakawa, Kosuke Sato, Avani Vaishnav, Sohrab Virk, Yoshikatsu Katsurasu, Eyan Sheha, Takashi Kaito, Catherine Himo Gang, Sheeraz Qureshi

8:34–8:36 am
532 C5 Nerve Sheath Tumors are Significantly Associated with New Postoperative Weakness
Anthony L. Mikula, Brandon Smith, Nikita Lakomkin, Matthew Doan, Megan M. Jack, Mohamad Bydon, Robert J. Spinner

8:36–8:38 am
533 Awareness of Complex Regional Pain Syndrome Among Medical Professionals
Tariq Al-Saadi, Yahya Al-Kindi, Mundher Abudraz, Abdullah Al Balushi

8:38–8:40 am
534 Relationship Between Restraint System Use & Brachial Plexus Injuries in Motor Vehicle Accidents: A Case-Control Study
Anshit Goyal, Sung Huang Laurent Tsai, Megan C. Kasuba, Courtney Pendleton, Kristen Scheitler, Elizabeth B. Habermann, Mohamad Bydon, Robert J. Spinner
8:40–8:42 am
535 CT Hounsfield Units as a Predictor of Reoperation and Graft Subsidence Following Lateral Lumbar Interbody Fusion
Daipayan Guha, Harry Mushlin, Nallammai Muthiah, Lena Vodovozt, Nitin Agarwal, D. Kojo Hamilton, David O. Okonkwo, Adam S. Kanter

8:42–8:44 am
536 Reliability of Neuromonitoring in the Detection of Postoperative C5 Palsy after Posterior Cervical Surgery
Clinton D. Morgan, Robert Koffie, Juan S. Uribe

8:44–8:46 am
537 Does Posterior Ligamentous Complex Disruption Following Lumbar Fixation Affect the Upper Adjacent Level?

8:46–8:48 am
538 CSRS-CSDI: A PROM Quantifying the Effect of Post-Arthrodesis Cervical Stiffness on Patient Quality of Life
Andrew S. Jack, Erik Hayman, Clifford A. Pierre, Christopher D. Witiu, Rod J. Oskouian, Jens Chapman, Robert A. Hart

8:48–8:50 am
539 Differences in Clinical and Operative Characteristics, and PROs Between Patients with Myelopathy and Myeloradiculopathy

8:50–8:52 am
540 Biomimetic Laser-etched Titanium Promotes Gene Expression of Early Bone Markers
Sheeraz Qureshi, Roland Beard, Margaret Van Horn, Brandon Bucklen

8:52–8:54 am
541 Degenerated Intervertebral Disc Reconstruction Using Hydrogel Scaffold Nucleus Pulposus Stem Cell Impregnated Matrix
Mick J. Perez-Cruet, Rasul Chaudhry, Christina McKee, Lee Ong Chiang

8:54–8:56 am
542 Fatty Infiltration in Cervical Flexors and Extensors in Degenerative Cervical Myelopathy
Monica Pulival, Kenneth Weber, Andrew Smith, James Elliott, Fauziyya Muhammad, Nader S. Dahdaleh, Jerzy Bodurka, Zachary Smith

8:56–8:58 am
543 In Vitro Assessment of Adjustable Lordotic Expandable Lateral Interbody Spacers on Endplate Loading, Lordosis Correction
Ripul R. Panchal, Dhara Amin, May Allall, Jonathan Harris, Brandon Bucklen
8:58–9:00 am
544 Cervical Paraspinal Muscle Fatty Degeneration does not relate to Muscle Cross Sectional Area
Zachariah Pinter, Scott Wagner, Ashley Xiong, Bradford L. Currier, Brett Freedman, Chris Kepler, Benjamin D. Elder, Mohamad Bydon, Ahmad Nassr, Arjun Sebastian

9:00–9:02 am
545 Comparison of Reoperation Rate Following TLIF Using 3D-printed Porous Titanium Interbody Cages or PEEK Cages
Isaac Lapite, Nicole Keller, Robert Winkelman, Ryan McNassor, Todd Emch, Aijit A. Krishnaney, Jason Savage, Michael P. Steinmetz

9:02–9:04 am
546 Magnetization Transfer Imaging and Atlas Based Mapping of the Spinal Cord in Degenerative Cervical Myelopathy
Monica Paliwal, Kenneth Weber, Faiziaa Muhammad, Grace Haynes, Benjamin Hopkins, Nader S. Dahdaleh, Todd B. Parrish, Jerzy Bodurka, Yasin Dhaher, Zachary A. Smith

9:04–9:06 am
547 Should SSEP and MEP Monitoring be Routinely Used in Posterior Cervical Operations?
Robert Koffie, Clinton D. Morgan, Courtney Hemphill, Juan S. Uribe

9:06–9:08 am
548 Frailty is a Better Predictor of Negative Outcomes After Posterior Spinal Fusion Than Age
Michael Cloney, Benjamin Hopkins, Nathan A. Shlobin, Nader S. Dahdaleh

9:08–9:10 am
549 3D-Printed Porous Biomimetic Titanium Promotes Osteogenic Gene Expression in Murine Mesenchymal Stem Cells
Sheeraz Qureshi, Roland Beard, Margaret Van Horn, Brandon Bucklen

9:10–9:12 am
550 Correlations Between Disc Dimensions and Principal Surface Strains Across the L4-5 Intact IVD during in vitro Loading
Anna Savas, Piyanat Wangyasawatwong, Bernardo De Andrada, Jakub Godzik, Jay D. Turner, Brian Kelly

9:12–9:14 am
551 Assessing the Performance of SANE Score in Predicting Long-Term Outcomes after Surgery for Low Grade Spondylolisthesis
Scott C. Wagner, Mohammed A. Alvi, Abdul K. Ghaith, Arjun Sebastian, Andrew Kai-Hong Chan, Praeven V. Mummaneni, Erica F. Bisson, Mohamad Bydon

9:14–9:16 am
552 The Psychological Burden of Disease Among Patients Undergoing Cervical Spine Surgery
Peter G. Passias, Sara Naessig, Waleed Ahmad, Katherine Pierce, Nicholas Kummer, Lara Passfall, Oscar Krol, Brooke O’Connell, Constance Maglaras, Bassel G. Diebo
9:16–9:18 am
553 Biomimetic 3D-printed Titanium Interbody Spacers Demonstrate Osseointegration in an Ovine Lumbar Interbody Fusion Model
Frank La Marca, Roland Beard, Margaret Van Horn, Wenhai Wang, Bryan W. Cunningham, Ken Mullinix, May Allall, Brandon Bucklen

9:18–9:20 am
554 The Role of Plasma Derived Purified Exosome Product (PEP) for Improved Locomotor Recovery in Spinal Cord injured Rats
Chiduziem Onyedimma, F.M. Moinuddin, Yagiz U. Yolcu, Mohamad Bydon

9:20–9:22 am
555 Use of Incisional Negative Pressure Wound Therapy in Complex Spinal Surgery
Daniel Myers, Rocco M. Dabecco, Chen Xu, Rebecca Schorr, Alexander Kwong-Tak Yu

9:22–9:24 am
556 Association Between Social Determinants of Health and Postoperative Outcomes in Single-Level Lumbar Fusions
Owoicho Adogwa, Syed I. Khalid, Sai Chilukapati, Palvashia Deme, Samantha Maasarani, Ravi S. Nunna, Rachyl Shanker, James Caruso, Alecia Cherney, Jennifer Smith, Anne-Isabelle Rene

9:24–9:26 am
557 A Novel Fusion Classification System for the Advent of Bioactive Interbody Implants
Robert Eastlack, Hani Malone, Martin Collier, Hazem Elsebaie, Gregory M. Mundis, Bahar Shahidi, Behrooz A. Akbarnia

9:26–9:28 am
558 Radiographic Outcomes of Anterior-alone Reconstruction with Expandable Cages After Corpectomy for Cervical Spondylosis
Robert North, Michael J. Strong, Brandon W. Smith, Yamaan S. Saadeh, Jacob R. Joseph, Osama Kashlan, Nicholas J. Szerlip, Mark E. Oppenlander, Paul Park

9:28–9:30 am
559 Rheumatoid Arthritis in Spine Surgery: A Systematic Review and Meta-Analysis
Benjamin Streufert, Chiduziem Onyedimma, Abdul K. Ghaitth, Yagiz U. Yolcu, Ahmad Nassr, Benjamin D. Elder, Arjun Sebastian, Bradford L. Currier, Mohamad Bydon

Spinal Deformity
Abstract Breakout Session
7:30 – 9:30 am
Moderators: Lara W. Massie, Marcus D. Mazur
7:30–7:32 am
600 Which Coronal Measurements & How Much Coronal Malalignment Most Accurately Predict 2-year PROs After ASD Surgery?
Scott L. Zuckerman, Christopher Lai, Daniel Shen, Meghan Cerpa, Mena G. Kerolus, Ian A. Buchanan, Alex Ha, Eric Leung, Nathan Lee, Lawrence Lenke
7:32–7:34 am
601 Establishing a Threshold of Impairment to Define Coronal Malalignment in Adult Spinal Deformity Patients
Scott L. Zuckerman, Christopher Lai, Daniel Shen, Meghan Cerpa, Mena G. Kerolus, Ian A. Buchanan, Alex Ha, Zeeshan Sardar, Ronald A. Lehman, Lawrence Lenke

7:34–7:36 am
602 What is the Lowest Achievable Rate of Complications Following Corrective Surgery for Adult Spinal Deformity?
Lara Passfall, Nicholas Kammer, Oscar Kol, Sara Naessig, Bhaven Kapadia, Shudeen Vira, Renaud Lafage, Virginie Lafage, Peter G. Passias

7:36–7:38 am
603 Evaluation Quality of Life Following Adult Spinal Deformity Surgery in Three Domains: Physical, Mental, and Functional
Jianning Shao, Arbaz Momin, Jonathan J. Rasonali, Amy S. Nowacki, Jacob Enders, Precious Oyem, Emily Abramczyk, Carlos Muñoz, Edward C. Benzel, Michael P. Steinmetz

7:38–7:40 am
604 Do Adult Spinal Deformity Patients Undergoing Surgery Continue to Improve After 1-year Postoperative?
Scott L. Zuckerman, Christopher Lai, Daniel Shen, Meghan Cerpa, Mena G. Kerolus, Ian A. Buchanan, Alex Ha, Lawrence Lenke

7:40–7:42 am
605 PEEK vs Titanium Implants in Single Level Lateral Lumbar Interbody Fusion: Does it Matter for Outcomes?
Robert Koffie, Ifije Ohiorhenuan, Courtney Hemphill, Juan S. Uribe

7:42–7:44 am
606 Biomechanics of Spinal Deformity Correction Constructs: Implications for Proximal Junction Kyphosis Risk Assessment
Robert Koffie, Bernardo De Andrade, Jennifer Lehrman, Jakub Godzik, Anna Sawa, Shashank V. Gandhi, Brian Kelly, Juan S. Uribe, Jay D. Turner

7:44–7:46 am
607 Posterior Polyethylene Tethers Reduce Occurrence of Proximal Junctional Kyphosis after Multilevel Spinal Instrumentation
Emily Rabinovich, Harrison Snyder, Jesse McClure, Thomas Buell, Justin S. Smith, Christopher I. Shaffrey, Avery Buchholz

7:46–7:48 am
608 Clinical Utility of Intraoperative Spinal Curvature Assessment with Multi-slot Extended View Imaging on the O-arm System
Amanda Sacino, Sutipat Pairojboriboon, Xiaoxuan Zhang, Ali Uneri, Michael Ketcha, Yixuan Huang, Pengwei Wu, Craig Jones, Patrick Helm, Jeffrey Sieversden, Sheng Fu L. Lo

7:48–7:50 am
609 Biomechanical Effects of Proximally Extending Long Segment Constructs with PEEK Rods: A Cadaveric Study
Bernardo De Andrade, Piyanat Wangsawatwong, Jennifer Lehman, Anna Sawa, Jakub Godzik, Samuel H. Farber, Brian Kelly, Juan S. Uribe
7:50–7:52 am
610 Surgical Realignment of Adult Degenerative Scoliosis Improves Short Term Gait
Ram Haddas, Cezar Sandu, Addison Wood, Varun Sambhariya, Isador H. Lieberman

7:52–7:54 am
611 The Influence of Frailty on PJF – Is Optimal Realignment Superseded by Physiologic Age?
Oscar Krol, Lara Passfall, Nicholas Kummer, Waleed Ahmad, Sam Naessig, Bassel G. Diebo, Shaleen Vira, Virginie Lafage, Peter G. Passias

7:54–7:56 am
612 Compensatory Mechanisms in Adult Degenerative Thoracolumbar Spinal Deformity – Radiographic Patterns, Their Reversibility after Corrective Surgery and the Influence of Pelvic Morphology
Nicholas Dietz, Basil Gruter, Edin Nevzati, Mazda Farshad, Samuel K. Cho, Peter Hollis, Alexander Spiessberger

7:56–7:58 am
613 Changes in Coronal Alignment in Obeid Type 1 and Type 2 Adult Scoliosis after Lateral Interbody Fusion
Gregory A. Kuzmik, Sigurd Berven, Alexa Semoneche, Alvin Chan, Justin Lee, Shane Burch, Vedat Deviren, Praveen V. Mummaneni, Dean Chou

7:58–8:00 am
614 Assessing Coronal Alignment from Odontoid to Sacrum: A Normative Volunteer Study of the Odontoid-CSVL Distance
Scott L. Zuckerman, Zeeshan Sardar, Meghan Cerpa, Jean-Charles Le Hucq, Stephane Bourret, Katsuhiro Hasegawa, Hee-Kil Wong, Gabriel Liu, Huee Weng Dennis Hey, Michael Kelly, Hend Riahi, Lawrence Lenke

8:00–8:02 am
615 Housfield units vs DEXA t-score as a predictor for post-operative PJK
Dominic Maggio, Nathaniel Toepf, Andrew James Grossbach, Stephanus Viljoen, Francis Farhadi

8:02–8:04 am
616 The Impact of Osteoporosis on Adult Deformity Surgery Outcomes in Medicare Patients
Kunal Varshneya, Rayyan Jokhai, Parastou Fatemi, Zachary A. Medress, Martin N. Stuenen, Allen L. Ho, John K. Rutliﬀ, Anand Veeravagu

8:04–8:06 am
617 Tension Parameters of Junctional Tethers in Proximal Junction Kyphosis
Mary O’Hehir, Tim O’Connor, Brandon Mariotti, Munish C. Gupta, Sigurd Berven, John Pollina, David W. Polly, Jeffrey P. Mullin

8:06–8:08 am
618 Multi-Level Stabilization Screws Preventing Kyphosis in Adult Spinal Deformity Surgery: A Comparative Cohort Study
Ascher Kaufmann, Chad F. Claus, Doris Tong, Robert W. McCabe, Connor Hanson, Clifford M. Houseman, Daniel A. Carr, Teck M. Soo
8:08–8:10 am
619 Biomechanical Investigation of an L5 Pedicle Subtraction Osteotomy for Sagittal Malalignment: An In-vitro Study
Burhan Janjua, Gerald Hayward, Jonathan Harris, May Allall, Brandon Bucklen

8:10–8:12 am
620 Comparison of Sagittal Vertical Axis Correction after L4 versus L3 Pedicle Subtraction Osteotomies
Joshua Rivera, Praveen V. Munnameni, Jeremy Guinn, Hao-Hua Wu, Minghao Wang, Ping G. Duan, Zhe Xu, Justin Lee, Burooj Mahmod, Parishkirta Srivastava, Rafael Guizar III, Xiao Tan, Jeremy Huang, Vivian Le, Shane Burch, Berven, Dean Chou

8:12–8:14 am
621 Symptomatic Proximal Junction Failure Following Deformity Surgery in Patients Undergoing Active Smoking Cessation
Jared M. Robichaux, Kevin D. Morrow, Adam Podet, John C. Stock

8:14–8:16 am
622 Intraoperative use of O-Arm in Deformity Surgery, Outcome on Screw Accuracy and Radiation Exposure
Davide M. Croci, Sarah E. Nguyen, Seth Streitmatter, Brandon Sherrod, Iyas Eli, Michael T. Bounajem, Jeremy Hardy, Kyril Cole, Austin Gamblin, Marcus D. Mazur, Andrew T. Dailey

8:16–8:18 am
Scott L. Zuckerman, Zeeshan Sardar, Meghan Cerpa, Jean-Charles Le Huec, Stephane Bourret, Kazuhiro Hasagawa, Hee-Kit Wang, Gabriel Liu, Hwee Weng Dennis Hey, Hend Riahi, Michael Kelly, Lawrence Lenke

8:18–8:20 am
624 A Comparison Between Same-Day Vs Staged Anterior/Posterior Spinal Fusions For Adult Spine Deformity Correction.

8:20–8:22 am
625 Understanding Proximal Junctional Kyphosis: New Way of Evaluating Adjacent Segment Strain and Vulnerability to Failure
Jakub Godzik, Jennifer Lehrman, Bernardo De Andrade, Pyanat Wangsawatwong, Anna Sava, Brian Kelly, Jay D. Turner

8:22–8:24 am
626 Utilization Trends, Cost, and Payments for Adult Spinal Deformity Surgery Using the MarketScan and Medicare Databases
Harsh Wadhwa, Christopher P. Ames, Corinna C. Zygourakis

8:24–8:26 am
627 Postop Coronal Malalignment After Adult Spinal Deformity Surgery: Incidence, Risk Factors, and Impact on 2-year Outcomes
Scott L. Zuckerman, Christopher Lai, Daniel Shen, Meghan Cerpa, Ian A. Buchanan, Mena G. Kerolus, Alex Ha, Eric Leung, Nathan Lee, Zeeshan Sardar, Ronald A. Lehman, Lawrence Lenke
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<thead>
<tr>
<th>Time</th>
<th>Presentation Title</th>
<th>Authors</th>
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<tr>
<td>8:26–8:28 am</td>
<td>628 Preop Coronal Malalignment Often Leads to More Extensive Surgery Than Sagittal Malalignment in Adult Spinal Deformity</td>
<td>Scott L. Zuckerman, Christopher Lai, Meghan Cerpa, Ian A. Buchanan, Mena G. Kerolus, Alex Ha, Nathan Lee, Eric Leung, Lawrence Lenke</td>
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<td>8:32–8:34 am</td>
<td>631 Back to OR: Predicting Return to the Operating Room following Surgery for Adult Spinal Deformity</td>
<td>Nida Fatima, John H. Shin</td>
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<td>8:34–8:36 am</td>
<td>632 Trends in 2 Year Outcomes of a Prospective Consecutively Enrolled Single-Center Adult Cervical Deformity Series</td>
<td>Lara Passfall, Nicholas Kummer, Oscar Krol, Bassel G. Diebo, Shaleen Vira, Peter G. Passias</td>
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<td>8:38–8:40 am</td>
<td>634 The Clinical Impact of Failing to Achieve Ideal Proportional Realignment in Adult Spinal Deformity Patients</td>
<td>Peter G. Passias, Lara Passfall, Oscar Krol, Nicholas Kummer, Waleed Ahmad, Sara Naessig, Bhaven Kapadia, Bassel G. Diebo, Virginie Lafage</td>
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<td>8:42–8:44 am</td>
<td>636 Peak Force of the Posterior Ligamentous Complex in Patients with Adult Spinal Deformity Requiring Revision Surgery</td>
<td>Bahar Shahidi, Brad Anderson, Tina Iannaccone, Courtney Moltzen, Robert Eastlack, Gregory M. Mundis</td>
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8:44–8:46 am  
637 The Effect of Undercorrection on Distal Junctional Kyphosis in ACD Patients  
Oscar Krol, Peter G. Passias, Lara Passfall, Nicholas Kummer, Shaleen Vira, Bassel G. Diebo

8:46–8:48 am  
638 Use of Osteotomy Techniques in Cervical Deformity Procedures: Are Approaches and Practices Changing Over the Years?  
Peter G. Passias, Oscar Krol, Nicholas Kummer, Lara Passfall, Shaleen Vira, Bassel G. Diebo

8:48–8:50 am  
639 Comparison of Complications, Outcomes, and Cost in Frail vs Non-Frail ASD Surgery Patients  
Oscar Krol, Peter G. Passias, Nicholas Kummer, Lara Passfall, Waleed Ahmad, Shaleen Vira, Jordan Lebovic

8:50–8:52 am  
640 Transforaminal Thoracic Interbody Fusion (TTIF) for Treatment of Thoracic Proximal Junctional Kyphosis  
Bryan Ladd, Christophe T. Martin, Jonathan N. Sembrano, David W. Polly, Kristen E. Jones

8:52–8:54 am  
641 Impact of Preoperative Cross-sectional Area of Psoas Muscle on Outcomes of Adult Spinal Deformity Surgery  
Hikari Urakawa, Kosuke Sato, Jonathan Elysee, Renaud Lafage, Avani Vaishnav, Yucheng Yao, Han Jo Kim, Frank Schwab, Virginie Lafage, Sheeraz Qureshi

8:54–8:56 am  
642 Biomechanics of a Laterally Placed SI Joint Device Supplemental to S2AI Fixation in Adult Spinal Deformity Construct  
Bernardo De Andrada, Piyanat Wangsawatwong, Jennifer Lehrman, Anna Sava, Derek Lindsey, Scott Verby, Jakub Godzik, Juan S. Uribe, Brian Kelly

8:56–8:58 am  
643 Achievement of Robust Optimal Alignment and Functional Status in Adult Spinal Deformity Surgery: 3-Year Outcome Analysis  
Lara Passfall, Nicholas Kummer, Oscar Krol, Sara Naessig, Waleed Ahmad, Katherine Pierce, Bhavven Kapadia, Shaleen Vira, Bassel G. Diebo, Peter G. Passias

8:58–9:00 am  
644 The Effects of Global Alignment and Proportionality Scores on Post-Operative Outcomes Following ASD Correction  
Oscar Krol, Lara Passfall, Nicholas Kummer, Shaleen Vira, Peter G. Passias
9:00–9:02 am
645 Experience with Novel Posterior Tether Applicator to Prevent Proximal Junctional Kyphosis after Long-segment Fusion

9:02–9:04 am
646 Identifying T1Slope and C2Slope Thresholds for Optimal Functional and Clinical Outcomes in Cervical Deformity Correction
Lara Passfall, Nicholas Kummer, Oscar Krol, Bhaveen Kapadia, Renaud Lafage, Bassel G. Diebo, Virginie Lafage, Peter G. Passias

9:04–9:06 am
647 Should our Corrective Re-Alignments be Tailored to Different Frailty States?
Peter G. Passias, Oscar Krol, Lara Passfall, Nicholas Kummer, Shaleen Vira, Bassel G. Diebo

9:06–9:08 am
648 Factors Predicting Complications in Surgically Treated Patients with Cervical Deformity
Asad M. Lak, Noah Nawabi, John Kilgallon, Elie Massaad, Hasan A. Zaidi, John H. Shin

9:08–9:10 am
649 Failure to Achieve Pelvic Balance Following Hip Replacement Surgery May Be a Risk Factor for Degenerative Scoliosis
Asad M. Lak, Francesca Siddi, Fidelia Ida, Hasan A. Zaidi, Timothy R. Smith, Yi Lu

9:10–9:12 am
650 Operative Levels and Patient Frailty Inform Hospital Course Following Adult Spinal Deformity Surgery
Jianning Shao, Arbaz Momin, Jonathan J. Rasoul, Amy S. Newacki, Jacob Enders, Precious Oyen, Emily Abramczyk, Carlos Munoz, Edward C. Benzel, Michael P. Steinmetz

9:12–9:14 am
651 Bone Morphogenetic Protein Use in Adult Thoracolumbar Deformity Surgery: Impact on Reoperation Rate and Cancer Risk
Kunal Varshneya, Martin N. Stienen, Zachary A. Medress, Atman Desai, John K. Ratliff, Anand Veeravagu

9:14–9:16 am
652 Are We Improving at 3-Column Osteotomy in Terms of Achieving Optimal Realignment and Minimizing Complications in ASD?
9:16–9:18 am
653 Delineation of Alignment Goals in Cervical Deformity Correction Associated with Optimal Clinical and Functional Outcomes
Lara Passfall, Oscar Krol, Nicholas Kummer, Waleed Ahmad, Sara Naessig, Katherine Pierce, Renaud Lafage, Virginie Lafage, Peter G. Passias

9:18–9:20 am
654 Role of Pelvic Obliquity & Leg Length Discrepancy in Adult Spinal Deformity Patients with Coronal Malalignment
Scott L. Zuckerman, Christopher Lai, Daniel Shen, Meghan Cerpa, Mena G. Kerolus, Ian A. Buchanan, Alex Hu, Eric Leung, Nathan Lee, Lawrence Lenke

9:20–9:22 am
655 Improvements in Outcomes and Cost after Adult Spinal Deformity (ASD) Corrective Surgery between 2008 and 2019

9:22–9:24 am
656 Anterior Lumbar Interbody Fusion Stability in Lengthening Posterior Instrumentation Constructs: A Biomechanical Study
Kyle McGrath, Eric Schmidt, Jeremy Loss, Michael P. Steinmetz

9:24–9:26 am
657 Can We Reliably Predict Autocorrection of Concurrent Cervical Malalignment Following Thoracolumbar Deformity Surgery?
Peter G. Passias, Lara Passfall, Oscar Krol, Nicholas Kummer, Bassel G. Diebo, Virginie Lafage

9:26–9:28 am
658 Normalization of Pelvic Tilt Following Adult Spinal Deformity Correction: Analysis of Prevalence, Timing, and Predictors
Peter G. Passias, Lara Passfall, Oscar Krol, Nicholas Kummer, Waleed Ahmad, Renaud Lafage, Virginie Lafage

9:28–9:30 am
659 Evaluation of Sagittal Spino-pelvic Balance in Spinal Cord Stimulator Patients
Royce Woodroffe, Eli Perez, Brian Park, Scott Seaman, Matthew A. Howard, Saul Wilson
Scientific Session 5  Sapphire DHLP
9:30–11:15 am  Setting the Path: A View to the Future

Moderators: Langston T. Holly, Wilson Z. Ray
Speakers: Charles L. Branch, Steven D. Glassman, Michael W. Groff, John J. Knightly, Tyler R. Koski, Camilo A. Molina, Daniel K. Resnick, Michael P. Steinmetz, Nicholas Theodore

Learning Objectives:
- Discuss the implications of practice change through healthcare crises
- Identify the importance of a patient-centric approach to spine care
- Describe the changing landscape of neurosurgical education

9:30–9:40 am  Recognition of Kuntz Scholars and Introduction of J.A.N.E., Mayfield, and new this year NREF/HYM Branch Fund Award Winner
Wilson Z. Ray

Wyatt L. Ramey, Angelica Alvarez Reyes, R. John Hurlbert, Jens Chapman, Travis M. Dumont

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.

9:47–9:52 am  J.A.N.E. Award Discussant
R. John Hurlbert

Ken M. Porche, Ronny Samra, Meghan M. Brennan, Sasha Vaziri, Daniel J. Hoh, Basma Mohamed

9:59–10:04 am  Mayfield Clinical Science Award Discussant
Daniel M. Sciubba

10:05–10:07 am  Introduction to Future Directions in Spine Surgery
John J. Knightly

10:08–10:16 am  How to do Better the Next Time: Ahead of the Curve (COVID)
Daniel K. Resnick
10:17–10:25 am  
Eye on the Ball: What Really Matters for ASD Patients (Coronal Alignment, Sag Alignment, Restoration of Balance/Gaze)  
Tyler R. Koski

10:26–10:34 am  
Virtual Reality and Augmented Reality in Spine: Where Are We Going  
Camilo A. Molina

10:35–10:37 am  
Recognition of Neurosurgery Meritorious Award  
Michael P. Steinmetz

10:38–10:52 am  
Meritorious Award Presentation - Half a Decade of the Robot: Has it Changed Our Practice or Are We Waiting for Something  
Nicholas Theodore

10:53–11:01 am  
Developing Competencies in Novel Techniques: The Learning Curve  
Charles L. Branch

11:02–11:10 am  
ASR and the Impact of the Registry on the Future of Spine  
Steven D. Glassman

11:11–11:15 am  
Discussion and Session Conclusion  
Michael W. Groff

11:15 am–12:10 pm  
Special Session Sapphire DHLP  
Business of Neurosurgery in Collaboration with CSNS

Moderators: Joseph S. Cheng, Jeremy T. Phelps  
Speakers: Owoicho Adogwa, Kurt M. Eichholz, Luis M. Tumialán, Cheerag D. Upadhyaya

Learning Objectives:  
- Identify the changes in coding and reimbursement that impacts a neurosurgery spine practice  
- Identify documentation requirements to facilitate authorization of imaging and surgeries  
- Discuss the variables used by hospital systems to identify the financial impact of a spinal neurosurgeon  
- Demonstrate an understanding of the variables associated with contracts for a successful neurosurgery position

11:15–11:16 am  
Introduction  
Joseph S. Cheng, Jeremy T. Phelps

11:17–11:24 am  
Coding Updates 2021 for Spine  
Luis M. Tumialán
### MEETING AGENDA

#### DSPN Business Meeting

**12:10–12:30 pm**  
**Moderators:** Erica F. Bisson, Luis M. Tumialán  
**Speakers:** Zoher Ghogawala, Regis W. Haid, Brian L. Hoh, Eric A. Potts, Michael P. Steinmetz, Luis M. Tumialán, Christopher E. Wofla

**12:10–12:12 pm**  
**Chair’s Report**  
Michael P. Steinmetz

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

**12:16–12:18 pm**  
**Secretary’s Report**  
Luis M. Tumialán

**12:19–12:21 pm**  
**Nominating Committee Report**  
Zoher Ghogawala

**12:22–12:24 pm**  
**CNS Board Report**  
Brian L. Hoh

**12:25–12:27 pm**  
**AANS Board Report**  
Regis W. Haid

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

**12:30 pm**  
Meeting Adjourns
THANK YOU
for your support of
SPINE SUMMIT 2021

PARTNER

THANK YOU
The following companies
have provided
in-kind equipment

ATEC Spine
Augmedics
DePuy Synthes
Globus Medical
Medtronic
NuVasive
Exhibit Hall

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 Sapphire A-C, E-G, I-K, M-O. This is immediately adjacent to the General Scientific Sessions in Sapphire D, H, L, and P.

Level 4, Sapphire Ballroom

Elevator Banks from Guest Rooms and from Level 5 Special Courses
Exhibit Hours

**Thursday, July 29**
9:00 am – 4:30 pm

**Friday, July 30**
9:00 am – 1:15 pm

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**PRESENTATION THEATER & LOUNGE**

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**GENERAL SCIENTIFIC SESSIONS**

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**SAPPHIRE WEST FOYER**

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**SAPPHIRE TERRACE**
with View of Bay

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**Exhibit Hours**

**Thursday, July 29**
9:00 am – 4:30 pm

**Friday, July 30**
9:00 am – 1:15 pm
Complimentary Wi-Fi is available to all attendees throughout the Hilton San Diego Bayfront meeting space.

NETWORK NAME: Hilton Honors Meeting
PASSWORD: Waterfront
THANK YOU for your support of SPINE SUMMIT 2021
SEE YOU NEXT YEAR!

THE 38TH ANNUAL MEETING OF THE AANS/CNS SECTION ON DISORDERS OF THE SPINE AND PERIPHERAL NERVES

SPINE SUMMIT 2022
FEBRUARY 23–26, 2022
LAS VEGAS, NEVADA

TRANSFORMATIVE TECHNOLOGIES
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Exhibit Products & Services

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Exhibit Hall Features

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

What’s New Sessions and Beverage Break Schedule

THURSDAY, JULY 29

9:30–10:15 am
Sapphire Ballroom Salons A-C, E-G, I-K, M-O

9:31–9:51 am
PTP - The Evolution of the Lateral Approach
Presenters: Luiz Pimenta, William Taylor
Sponsored by:

9:52–10:02 am
How Artificial Intelligence is Shaping the Future of Lumbar Degenerative Cases
Presenter: Peter Passias
Sponsored by:

10:03–10:13 am
Surface Technology and Immune Modulation
Presenter: Alpesh Patel
Sponsored by:

THURSDAY, JULY 29
BEVERAGE BREAK
2:30–3:15 pm
Sapphire Ballroom Salons A-C, E-G, I-K, M-O

2:35–2:45 pm
7D Surgical FLASH Navigation
Presenter: Beau Standish
Sponsored by:

2:47–2:57 pm
Latest Advances in Carbon Fiber Reconstruction for Spine Tumors: Cases and Q&A
Presenters: Maz Kalani, John H. Shin
Sponsored by:
2:59–3:09 pm
New Delivery Technology for a MIS TLIF
Presenter: Frank LaMarca
Sponsored by:

FRIDAY, JULY 30
9:30–10:15 am
Sapphire Ballroom Salons A-C, E-G, I-K, M-O

9:35–9:45 am
Utilizing an Open Matrix 3D Printed Architecture to Treat Anterior Cervical Pathologies
Presenter: Ryan Kretzer
Sponsored by:

9:47–9:57 am
Prone Lateral Lumbar Interbody Fusion: Advancements with ExcelsiusGPS® Robotic Navigation
Presenter: Virgilio Matheus
Sponsored by:

9:59–10:09 am
Advances in MIS Posterior Cervical Fusion
Presenter: Mokbel Chedid
Sponsored by:

Industry Sponsored Lunch Symposia Schedule

WEDNESDAY, JULY 28
12:00–1:00 pm
Presenters: Michael Y. Wang, Jeffrey Gadsden, Mohamad Bydon
Location: Sapphire 410
Sponsored by:

THURSDAY, JULY 29
12:00–1:00 pm
Presenters: Puya Alikhani, Jang Yoon, Michael Y. Wang
Location: Cobalt 500
Sponsored by:

The Impact of Robotic Navigation in Spine Surgery
Presenter: Bowen Jiang
Location: Cobalt 502
Sponsored by:
ALIF and XALIF: Discussion on Patient Specific Care and Advanced Material Science
Presenter: Jonathan Schoeff
Location: Sapphire 400

Complex Cervical Spine Surgery: What Every Young Surgeon Needs to Know
Presenters: Jason Savage, Corinna Zygourakis
Location: Cobalt 501

FRIDAY, JULY 30
12:15–1:15 pm

Elevate your Cervical Procedures utilizing SYMPHONY™ OCT System: Case Based Discussion
Presenters: Joseph Osorio, Christopher Ames
Location: Cobalt 500

Robotic Navigation Assisted Single Position Surgery 2 Ways
Presenter: Virgilio Matheus
Location: Cobalt 502

The TLIF of Tomorrow: Enabled by the Latest MIS Technologies & Tools
Presenters: Charles Branch, Christopher Holland, Lee Tan
Location: Cobalt 501
Disclaimer

The material presented at Spine Summit 2021 has been made available by the Section on Disorders of the Spine and Peripheral Nerves and the CNS for educational purposes only. These materials are not intended to represent the only, nor necessarily the best method or procedure appropriate for the medical situations discussed, but rather are intended to present an approach, view, statement or opinion of the faculty, which may be helpful to others who face similar situations.

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.

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