WHY SETTLE FOR “ISH” WHEN YOU CAN HAVE “ONLY”? 

TITAN SPINE INTRODUCES \texttt{nanoLOCK} SURFACE TECHNOLOGY.

THE ONLY CLEARED NANOTECHNOLOGY FOR THE SPINE. 
THE ONLY SURFACE WITH ACCESS TO THE NEW NANOTEXTURED ICD-10 CODE. 
THE ONLY SURFACE TO WIN THE WHITECLOUD AWARD FOR BEST BASIC SCIENCE. 
THE ONLY SURFACE BACKED BY MORE THAN 10 YEARS OF BIOMATERIAL KNOW HOW. 

#StandWithTheFuture AT BOOTH 1645.
Most Comprehensive portfolio of FDA-cleared 3D-printed titanium spinal implants
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Predictable, precise, efficient.
A Surgical Assurance platform for spine and brain surgery.

implants placed with Mazor Robotics technology

120,000

17,000+
Mazor Robotics procedures

NASS 2016 • Booth #931
AlignWithExperience.com
WELCOME TO NASS 2016!

We are thrilled to have so many spine professionals from multiple specialties registered for this year’s meeting in Boston, home to 2016 NASS President Christopher M. Bono, MD.

All of us are excited to experience this dynamic meeting featuring challenging educational programs, an outstanding technical exhibition, the chance to network and build relationships with celebrated spine professionals, and gain insight from renowned guest speakers.

You will hear the most current scientific research during the Best Papers and abstract presentations, and can view the ePosters throughout the meeting. Poster Grand Rounds enable you to meet with and ask questions of ePoster authors.

Some of this year’s symposia include: Own the Bone™: Establishing a Fragility Fracture Service and Preventing the Next Vertebral Fracture; Professional Coaching and Enhanced Self-care to Counteract Stress, Burnout and Frustration; and Low Back Pain Secondary to Degenerative Disc Disease: Interdisciplinary Perspectives on the Value of Treatment.

There are Interdisciplinary Spine Forums as well as Section Specialty Track sessions and the Global Spine Forum, all of which conclude with a reception.

Additionally, there is a ticketed didactic course, Optimizing Value and Outcomes in Spine Care: The Key Role of Psychologically-Informed Practice as well as a Resident and Fellow Hands-on Training Course on Friday and Saturday if you are interested in more educational offerings.

And the Technical Exhibition has it all. The latest products and services offered as well as Surgical Innovation Labs where you can hear didactic lectures and see product demonstrations in addition to gaining hands-on experience with the latest spine systems. Also, this year exhibiting company MD and PhD consultants will present their latest research during afternoon New Technology Presentations.

Don’t miss Dr. Michio Kaku, renowned futurist, theoretical physicist, international authority in Einstein’s unified field theory, and predictor of business and economic trends on Thursday after the presidential address. Kaku will enlighten us with a glimpse into our future. Attend the Healthcare Outlook 2017 featuring Bob Woodward, legendary Pulitzer Prize-winning journalist/author and associate editor of The Washington Post.

Thank you for attending! Enjoy the meeting and all that Boston has to offer.

Christopher M. Bono, MD
President

Alan S. Hilibrand, MD
Scott Kreiner, MD
2016 Program Co-chairs
What do you do for your patients with SI joint pain?

Learn about the latest developments in diagnosis and the use of the iFuse Implant System®

SI joint treatment using the patented triangular design of the iFuse Implant™ has produced unparalleled clinical results. iFuse is the only SI joint fusion system with clinical studies demonstrating that treatment improved pain, patient function, and quality of life.1,2

SI-BONE presents: Thursday, Oct. 27th
Sacroiliac Joint Diagnosis Best Practices and the iFuse Implant System Surgical Technique for SI Joint Fusion.

Featuring Joseph Fortin, DO, Fort Wayne, IN
Location: Blue Lab at The Learning Center,
Times: 2-3 pm and 3-4 pm
Please RSVP at the booth or email RSVP@si-bone.com

Randomized Trial of Sacroiliac Joint Fusion vs. Non-Surgical Management: 2 Year Outcomes
Presenting Author: Peter Whang, MD
Session: Innovative Technologies Presentations, Room 208
SI-BONE Presentation Time: 2:50 pm

Visit si-bone.com to learn more.

LEARNING OBJECTIVES
Upon completion of this meeting, participants should gain strategies to:
- Promote discussion of new scientific developments and best practices in spine care;
- Demonstrate the application of current techniques, procedures and research;
- Practice evidence- and value-based medicine relative to spine care.

EVALUATION AND EDUCATIONAL CERTIFICATES
After the meeting, evaluations will be submitted electronically and CME certificates will be printed directly from our website. Visit spine.org/CME to claim education credit and to print CME certificates. Contact education@spine.org with questions.

CONTINUING MEDICAL EDUCATION (CME) CREDIT
The North American Spine Society is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians and takes responsibility for the content, quality and scientific integrity of this CME activity.

The North American Spine Society designates this live activity for a maximum of 27 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

The American Medical Association has determined that physicians not licensed in the U.S. to participate in this CME activity are eligible for AMA PRA Category 1 Credits™.

Additional credit may be obtained by attending the additional courses, including: Hands-on course: Minimally Invasive Spine Surgery; Optimizing Value and Outcomes in Spine Care: The Key Role of Psychologically-Informed Practice; and the Fundamentals of Spine Surgery and Interventional Pain Management Resident/Fellow Hands-on Training Course.

MOBILE EVENT GUIDE
Maximize your conference experience by using our interactive mobile event app. From developing your itinerary and connecting with colleagues to locating exhibitors, the app is your comprehensive tool for navigating the meeting. Simply type www.spine.org/mobile into your phone’s browser, search “NASS 2016” in your app store or scan the QR code.
Discover the full range of Orthofix® spine solutions at the NASS annual meeting. See how our innovative products and allografts directly improve the quality of patients lives.
CONTINUING EDUCATION (CE) CREDIT FOR ALLIED HEALTH PROFESSIONALS

NASS is proud to offer continuing education units (CEUs) to accommodate nonphysician attendees’ certification requirements. The following indicates the status of CEU accreditation for nonphysician attendees. Requirements vary for other allied health and advanced practice providers; please contact your licensing organization for their requirements.

Sessions that are accredited for Allied Health Continuing Education are marked with an icon in the program schedule. Look for \( \text{AH} \) to make sure you are attending sessions that maximize your accredited educational experience.

- **Chiropractors:** NASS has received approval from the Southern California University of Health Sciences to offer continuing education credits to Chiropractors from select states.

- **Physical Therapists:** The American Physical Therapy Association of Massachusetts Continuing Education Committee has approved this meeting according to the Criteria for Approval of Continuing Education offerings established by the Massachusetts Physical Therapy Association. Information provided should be used within scope of practice.

- **Physician Assistants:** The American Academy of Physician Assistants (AAPA) accepts Category 1 credit from AOACME, prescribed credit from the American Academy of Family Physicians (AAFP) and AMA PRA Category 1 CME Credit™ for the Physician’s Recognition Award from organizations, such as NASS, accredited by the ACCME.

- **Nurse Practitioners:** The American Association of Nurse Practitioners (AANP) accepts AMA PRA Category 1 Credit™ from organizations accredited by the ACCME.

- **Nurses:** This educational activity is jointly provided by AXIS Medical Education and the North American Spine Society. This activity is planned and implemented by AXIS Medical Education and the North American Spine Society. AXIS Medical Education is accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC) to provide continuing education for the healthcare team.

Credit Designation for Nursing: AXIS Medical Education designates this continuing nursing education activity for 24 contact hours.

Learners are advised that accredited status does not imply endorsement by the provider or ANCC of any commercial products displayed in conjunction with an activity.

AXIS Contact Information: For information about the accreditation of this program please contact AXIS at 954-281-7524 or info@axismeded.org.

ANNUAL MEETING 2016 SESSIONS ONDEMAND—CME CREDIT AVAILABLE!

The North American Spine Society designates this enduring material for a maximum of 33 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Order the 2016 Annual Meeting session recordings and get 24/7 access to more than 500 scientific presentations, including electronic posters, scientific sessions, symposia, breakout sessions, abstracts, featured lectures and more. These web-based, fully synchronized audio, video and slide presentations are available anywhere with Internet access. Topics covered include biomechanics, motion preservation, spinal deformity, diagnostics and imaging, injections and interventions, and much more. CME credit is available for watching symposia and the Interdisciplinary Spine Forum. Purchase through the online shop at www.spine.org.

DISCLAIMER

The material presented at the 31st Annual Meeting is made available by the North American Spine Society for educational purposes only. The material is not intended to represent the only, nor necessarily the best, method or procedure appropriate for the medical situations discussed; rather, it is intended to present an approach, view, statement or opinion of the faculty which may be helpful to others who face similar situations.

NASS disclaims any and all liability for injury or other damages to any individual attending the meeting and for all claims which may arise out of the use of the techniques demonstrated therein by such individuals, whether these claims shall be asserted by physicians or any other person.

This Final Program contains confirmed program content, faculty and presenters as of September 21, 2016. Any further changes from the published Final Program will be announced at the beginning of each session.
ReBOSSIS®
Biosynthetic Scaffold with Handling Characteristics of Cotton

- Moldable & highly absorbent
- Maintains integrity during placement
- Elastic properties enhance bone-to-graft interface
- Withstands dissolution & displacement associated with irrigation

VISIT THE ORTHOREBIRTH BOOTH FOR A HANDS-ON DEMONSTRATION
BOOTH #551

www.rebossis.com
If you are looking for an alternative to sitting in lecture halls, the Technical Exhibition offers you a variety of experiences to continue your professional development. Food, a place to meet, surgical training, interactive learning, or a new job: the Technical Exhibition features something for everyone.

With more than 300 exhibitors, you can find the newest products in spine. The best way to search for exactly what you are looking for is the mobile app. Don’t wander; search by product category or type in a keyword. Our exhibitors would love to put their products into your hands, and NASS is the only place where all of the spine market is gathered for you.

**Technical Exhibition hours:**
- Wednesday, October 26: 9:00 a.m.–5:00 p.m.
- Thursday, October 27: 9:00 a.m.–5:00 p.m.
- Friday, October 28: 9:00 a.m.–1:30 p.m.

**DINING OPTIONS**

**Complimentary Box Lunches**
Connect with past colleagues or make new connections over lunch. For registered medical attendees, complimentary box lunches are available in the Technical Exhibition from 12:00–1:00 p.m. Wednesday, Thursday and Friday.

**NASS Bistro**
**BOOTH #272**
The NASS Bistro is a great food option that saves time, allows attendees and exhibitors to purchase a hot lunch, and provides the largest variety and best value for lunch at the convention center. Please note: A box lunch is included in the attendee registration fee for Wednesday, Thursday and Friday. The NASS Bistro is an added lunch option at the Annual Meeting.

- Wednesday, October 26: 11:00 a.m.–2:30 p.m.
- Thursday, October 27: 11:00 a.m.–2:30 p.m.
- Friday, October 28: 11:00 a.m.–1:30 p.m.

Visit [http://www.bistrotickets.com/nass](http://www.bistrotickets.com/nass) or the NASS Bistro booth located in the Level 1 West Lobby to purchase tickets.

**Concessions**
Concessions are available near Registration in the Lobby, Level 1 West, North Lobby, SW Level 1 and the 400 aisle of the Technical Exhibition.

**NETWORKING BREAKS**
Grab a beverage and have a conversation during the Networking Breaks. Located in the Technical Exhibition (except where noted), the breaks are scheduled:

- Wednesday, October 26: 10:00–10:30 a.m.; 3:05–3:35 p.m.
- Thursday, October 27: 9:30–10:00 a.m.; 3:10–3:40 p.m.
- Friday, October 28: 10:00–10:30 a.m.; 2:45–3:15 p.m.*
- Saturday, October 29: 10:00–10:30 a.m.*

*Located at the top of escalators, Level 2 West

**LUNCH AND LEARN AT THE SOLUTION SHOWCASE THEATER**
**BOOTH #573**
Lunch and Learn in the Solution Showcase Theater. Grab your lunch and take it next door to the Solution Showcase Theater where the latest research from Industry will be presented. Two presentations each day will take place from 12:00–1:00 p.m. These presentations are always well attended so be sure to get there early to listen to presentations from Richard Wolf, Zimmer Biomet, Misonix, Invibio Biomaterial Solutions, Medicrea USA and DJO Global. Check the mobile app for an updated schedule.

**NASS CAREER FAIR**
**BOOTH #1851**
Stop by the NASS Career Fair to speak with employers face-to-face about opportunities in their organizations. This is a free service to NASS members and meeting attendees. At the event, you will complete a brief profile and upload your CV, and participating companies can reach out to you to set up interviews. Companies interested in signing up onsite can stop by the Career Fair. Visit the member services area in the main lobby for more information.
THE LEARNING PLACE

BOOTH #1900

The Learning Place features areas for experiential and independent learning.

ePosters
View hundreds of ePosters; ePosters also are provided in the meeting’s mobile app and with the OnDemand meeting recordings, if purchased.

Poster Grand Rounds
During the morning and afternoon networking breaks, attendees will have the opportunity to meet with and ask questions of selected ePoster authors.

Internet Station
Visit the Internet Station to keep in touch with your home or office while at the Annual Meeting. Several computers with internet access are available.

Surgical Innovation Labs
Want to get really hands on? The Surgical Innovation Labs offer you the opportunity to see the newest products in situ. Cadaveric demonstrations will take place from 8:00 a.m.–4:00 p.m. Wednesday and Thursday and until 10:00 a.m. Friday. Surgical workshops are offered by companies on Wednesday and Thursday evenings allowing you to scrub in and try out the latest innovations for yourself. Located in The Learning Place, the expanded Surgical Innovation Labs offer you experiential learning to complement your professional goals. Check the mobile app for an updated schedule.

Thank you to Philips Healthcare and Protech Medical for their lab support.

Practical Theater Presentations and NASS Research Information
Connect with specific topics of interest to you and your practice.

The focus of this year’s Practical Theater presentations will be MACRA 101-CMS Quality Payment Programs: MIPS and APMS. The presentations will be held at the following times:

› Wednesday, October 26, 2016, 10:00–10:30 a.m.
  Presenter: Rick Hoover, CMS Health Insurance Specialist/Rural Health Coordinator, Boston Regional Office

› Thursday, October 27, 2016, 9:30–10:00 a.m.
  Presenter: NASS Performance Measurement Committee

› Thursday, October 27, 2016, 3:10–3:40 p.m.
  Presenter: Rick Hoover, CMS Health Insurance Specialist/Rural Health Coordinator, Boston Regional Office

› Friday, October 28, 2016, 10:00–10:30 a.m.
  Presenter: NASS Performance Measurement Committee

This year’s Practical Theater also will house NASS Research information. The NASS Research Council and its committees are dedicated to advancing the science and care of spine on behalf of the NASS membership and spine field. Stop by to see what’s new from these volunteers working on your behalf and pick up information about:

› NASS’ registry efforts
› New clinical guidelines
› Appropriate use criteria and mobile app
› Patient safety alerts
› 2017 Research Funding Application
› Clinical tools and more!

Exercise Booth: Movement is the Medicine
Developed by the Exercise Committee, this updated interactive booth showcases patient education tools for your practice. Information about exercises and short videos are available at the Exercise Booth. Interact with colleagues, Exercise Committee members and physical therapists, and learn from ongoing live demonstrations for a chance to win a Fitbit!
Meeting Information

TUESDAY, OCTOBER 25

WELCOME RECEPTION
6:00–7:30 p.m. WESTIN BOSTON WATERFRONT, SAUCIETY

Ready to meet a few new faces at this year’s meeting? Or just reconnect with your colleagues? The Welcome Reception is the perfect opportunity to do so! This great networking event takes place after the courses conclude so you have time to grab a bite, have a drink and chat before heading off to dinner. Please note that your meeting badge is required for entry.

WEDNESDAY, OCTOBER 26

LEADERSHIP DEVELOPMENT AND TRAINING GUEST SPEAKERS: MARY CRANE AND DAVID DYE
ROOM 206A

Mary Crane
9:00–11:00 a.m.

For more than ten years, Mary Crane has delivered high energy, high impact programs to leading universities, Fortune 500 companies and AMLaw 100 law firms. Her fundamental message has remained the same: While an individual’s IQ and GPA helps open doors, critically important people skills ultimately land the job, close the deal and help build teams that transform organizations. Her seminars provide participants with the skills they need to put their best, most effective selves forward. Crane is the creator of the 100 Things You Need To Know book series. Premised on the belief that no one professional needs to know everything, Crane maintains that professionals who know the 100 most important things about a particular subject area possess the critical information they need to succeed. Topics covered include: “Starting Work” (May 2013); “Networking” (December 2013); “Business Etiquette” (2014); “Getting Along with Others” (2014); and “Managing Projects & Time” (2015).

Crane is a graduate of the University of Missouri-Columbia and George Washington University Law School. She is also a graduate of the Culinary Institute of America, where she studied tortes after studying torts. She has worked for entities as diverse as the American Petroleum Institute and the American Heart Association. Get this: she’s also a former White House assistant chef. Crane has been featured on 60 Minutes. She is a regular contributor to Let’s Talk Live, a Washington, D.C. news-talk program. She has been quoted extensively in a variety of print and electronic media, including The New York Times, The Wall Street Journal, Forbes.com, Fortune.com and CNN.com.

David M. Dye
1:30–3:30 p.m.

David M. Dye is an internationally recognized professional speaker, trainer and facilitator. He works with leaders, managers, and supervisors who want to lead their team to the top. David works with leaders to increase their influence, solve common leadership frustrations, and improve their productivity through people-centered leadership.

Originally an urban educator teaching leadership, history and public speaking, he served as an elected city councilman and as chief operating officer for Colorado UpLift where he trained leaders and helped build organizations in Denver, New York, Orlando, Phoenix and Portland. David has worked with thousands of leaders across industries and serves on the Board of Directors for the Colorado chapter of the National Speakers Association.

Known for his optimism, for making difficult concepts understandable, and for moving leaders to immediate, practical action, David’s workshops, presentations and seminars help leaders increase their influence, solve common leadership frustrations, and improve productivity through practical leadership inspiration.
DEMAND EVIDENCE. NOT TALK.

Talk is cheap — let’s see the data. Fact is, no other bone growth agent has the published clinical evidence that Infuse has. That’s why surgeons and hospitals have trusted Infuse in their patients since 2002.

Cellular Bone Matrices (CBMs) can’t say that. As the authors of a recent Spine Journal article conclude, the efficacy of CBMs in spinal fusion surgery remains highly inconclusive, and, ultimately, CBMs don’t have the clinical data to support their use.

You demand proven, predictable bone growth options for your patients. Only one name can say that it’s Trusted, Proven, and Predictable for over 14 years.

Infuse Bone Graft

VISIT US AT BOOTH 1015

Let data drive the decisions that influence outcomes.

Learn more at BMP2.com.

BRIEF SUMMARY OF INDICATIONS, CONTRAINDICATIONS, AND WARNINGS FOR:

INFUSE® Bone Graft/LT-CAGE®
Lumbar Tapered Fusion Device
INFUSE® Bone Graft/INTER FIX™
Threaded Fusion Device
INFUSE® Bone Graft/INTER FIX™ RP
Threaded Fusion Device
INFUSE® Bone Graft/PERIMETER®
Interbody Fusion Device
INFUSE® Bone Graft/CLYDESDALE®
Spinal System

The INFUSE® Bone Graft/Medtronic Interbody Fusion Device is indicated for spinal fusion procedures in skeletally mature patients with degenerative disc disease (DDD) at one level from L2-5, who may also have up to Grade I spondylolisthesis or Grade 1 retroolisthesis at the involved level.

The following interbody devices and surgical approaches may be used with INFUSE® Bone Graft:

• The LT-CAGE® Lumbar Tapered Fusion Device, implanted via an anterior open or an anterior laparoscopic approach at a single level.
• The INTER FIX™ or INTER FIX™ RP Threaded Fusion Device, implanted via an anterior open approach at a single level.
• The PERIMETER® Interbody Fusion Device implanted via a retroperitoneal anterior lumbar interbody fusion (ALIF) at a single level from L2-S1 or an oblique lateral interbody fusion (OLIF) approach at a single level from L5-S1.
• The CLYDESDALE® Spinal System, implanted via an OLIF approach at a single level from L2-L5.

The INFUSE® Bone Graft/Medtronic Interbody Fusion Device consists of two components containing three parts—a spinal fusion cage, a recombinant human bone morphogenetic protein, and a carrier/scaffold for the bone morphogenetic protein and resulting bone.

These components must be used as a system for the prescribed indication described above. The bone morphogenetic protein solution component must not be used without the carrier/scaffold component or with a carrier/scaffold component different from the one described in this document. The INFUSE® Bone Graft component must not be used without the Medtronic Interbody Fusion Device component.

NOTE: The INTER FIX™ Threaded Fusion Device and the INTER FIX™ RP Threaded Fusion Device may be used together to treat a spinal level. The LT-CAGE® Lumbar Tapered Fusion Device, the PERIMETER® Interbody Fusion Device, and the CLYDESDALE® Spinal System implants are not to be used in conjunction with either the INTER FIX™ or INTER FIX™ RP implants to treat a spinal level.

The INFUSE® Bone Graft/Medtronic Interbody Fusion Device is contraindicated for patients with a known hypersensitivity to recombinant human Bone Morphogenetic Protein-2, bovine Type I collagen, or to other components of the formulation and should not be used in the vicinity of a resected or extant tumor, in patients with any active malignancy, or patients undergoing treatment for a malignancy: in patients who are skeletally immature: in patients who are pregnant for one year following treatment with this device.

Published Clinical Evidence1 vs. Cost2

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2 Cellular bone matrices: viable stem cell-containing bone graft substitutes.


CAUTION: Federal (USA) law restricts this device to sale by or on the order of a physician with appropriate training or experience.
HEALTHCARE OUTLOOK 2017
GUEST SPEAKER: BOB WOODWARD
10:35 a.m.–12:00 p.m. ROOM 210ABC
Bob Woodward is an associate editor of The Washington Post, where he has worked since 1971. He has shared in two Pulitzer Prizes, first in 1973 for the coverage of the Watergate scandal with Carl Bernstein, and second in 2002 as the lead reporter for coverage of the 9/11 terrorist attacks. He has authored or coauthored 18 books, all of which have been national non-fiction best sellers. Twelve of those have been #1 national best sellers, spanning the years from 1974 to 2010. Bob Schieffer of CBS News has said, "Woodward has established himself as the best reporter of our time. He may be the best reporter of all time." In 2014, Robert Gates, former director of the CIA and Secretary of Defense, said that he wished he'd recruited Woodward into the CIA, saying of Woodward, "He has an extraordinary ability to get otherwise responsible adults to spill [their] guts to him... his ability to get people to talk about stuff they shouldn't be talking about is just extraordinary and may be unique." Gene Roberts, the former managing editor of The New York Times, has called the Woodward-Bernstein Watergate coverage, "maybe the single greatest reporting effort of all time." In listing the all-time 100 best non-fiction books, TIME magazine has called All the President’s Men, by Bernstein and Woodward, “Perhaps the most influential piece of journalism in history.”

RESIDENT, FELLOW AND PROGRAM DIRECTORS’ MEETING
12:00–1:00 p.m. ROOM 206A
The Spine Fellowship Match continues to be a success with more than 60 participating programs representing 119 fellowship positions. An update of this year’s match results and efforts underway to create an alternative to the ACGME for accreditation of spine fellowship programs will be discussed. This is an open discussion and lunch is provided.

SPINEPAC LUNCHEON FEATURING BOB WOODWARD
(Open to 2016 SpinePAC Donors)
12:00–1:00 p.m. TOP OF ESCALATORS, LEVEL 2 WEST
The Legendary Pulitzer Prize-winning journalist/author and associate editor of The Washington Post will be on site signing copies of his latest book, The Last of the President’s Men, during this complimentary luncheon for current members of SpinePAC. Additional donations will be accepted for signed books.

SPINECONNECT RECEPTION
5:15–6:15 p.m. ROOM 206A
This event, held immediately following the Case-based Discussion: Top Cases from SpineConnect session, provides attendees who have participated in the SpineConnect site, or those interested in learning more about this resource, the opportunity to meet face-to-face and network with others who have shared their expertise on the site.

In just two years, SpineConnect has become an essential resource for NASS members with:

- 571 cases and discussions posted
- 6,877 spine care specialists logged in
- 2,034 replies from experts in the field


Program Alert!
Be sure to attend the Case-based Discussions: Top Cases from SpineConnect session on Wednesday from 3:40–5:10 p.m. in Room 206A.

The session is directly followed by a SpineConnect reception... open to all attendees!
Without bleeding bone, there’s no true SI joint arthrodesis.

And without a true arthrodesis, your SI joint fusion patients aren’t getting the best opportunity for lasting relief. That’s the power of the Simmetry® System, the minimally invasive surgical procedure that uses proven orthopedic principles, including joint decortication and bone graft delivery, to achieve arthrodesis. *The Simmetry System. True SI Joint Arthrodesis.*

At NASS 2016: Newly Released 12-month Fusion & Clinical Results

Visit Booth #1241
THURSDAY, OCTOBER 27

PRESIDENTIAL GUEST SPEAKER:
MICHIO KAKU, PhD
11:00 a.m.–12:00 p.m. | ROOM 210ABC

Dr. Michio Kaku is one of the most widely recognized figures in science in the world today. He has more than 2.5 million fans on Facebook, and his latest book, The Future of the Mind, hit #1 on The New York Times and Amazon best sellers lists.

He is an internationally recognized authority in two areas. The first is Einstein’s unified field theory, which Dr. Kaku is attempting to complete. The other is to predict trends affecting business, commerce, and finance based on the latest research in science. He is the author of three New York Times best sellers, including Physics of the Impossible and Physics of the Future. He has also hosted numerous documentaries on the Discovery Channel, the Science Channel, and also BBC-TV.

Dr. Kaku holds the Henry Semat Chair in Theoretical Physics at the City University of New York. He graduated from Harvard University in 1968 (summa cum laude and 1st in his Physics class). He received his PhD in Physics from the University of California at Berkeley in 1972, and has been a professor at CUNY for almost 30 years. He has taught at Harvard and Princeton as well. His goal is to complete Einstein’s dream of a “theory of everything,” to derive an equation, perhaps no more than one inch long, which will summarize all the physical laws of the universe. He is the co-founder of string theory, a major branch of string theory, which is the leading candidate today for the theory of everything. His PhD level textbooks are required reading at many of the world’s leading physics laboratories.

He is the author of several international best-sellers and has interviewed 300 of the world’s top scientists, many of them Nobel Laureates and directors of the largest scientific laboratories, about their vision for the next 20 to 100 years in computers, robotics, biotechnology, space travel, etc. These are the scientists who are inventing the future in their laboratories.

Many of his books have been made into TV series. Physics of the Impossible was made into a 24 episode Discovery/Science Channel TV series called Sci Fi Science, and Physics of the Future was the basis of a four hour TV series for the Discovery/Science Channel called Futurescape.

His web page, www.mkaku.org, registered more than 110 million page hits in just the past four years. Dr. Kaku also does considerable public speaking on international radio and TV.

He was featured in the full-length, 90 minute feature film, Me and Isaac Newton, which was nominated for an Emmy in 2001. He was profiled in Tech-TV’s Big Thinkers series and is a regular commentator on that cable network. He has spoken on more than 500 radio stations around the country.

He also hosts his own national weekly radio program which airs in 130 cities in the US and also the KU national satellite band and internet, called Science Fantastic. It is the largest nationally syndicated science radio show on commercial radio in the United States, and perhaps the world.

THE SPINE JOURNAL OUTSTANDING PAPER AWARDS PRESENTATIONS
1:05–2:05 p.m. | ROOM 210ABC
Honor your colleagues as The Spine Journal presents this year’s Outstanding Paper Awards.

MEMBERS’ BUSINESS MEETING
3:10–3:40 p.m. | ROOM 206A
Find out the latest news, events and information, and meet the Board of Directors.

RESIDENT, FELLOW AND PROGRAM DIRECTORS’ RECEPTION
5:00–6:00 p.m. | TOP OF ESCALATORS, LEVEL 2 WEST
NASS is proud to announce the 14th Annual Resident, Fellow and Program Directors’ Reception at the 31st Annual Meeting. The reception provides an opportunity for residents, fellows and potential fellows to mingle with each other and the program directors, and provides a casual setting to enjoy cocktails and hors d’oeuvres with colleagues.

JOINT SECTIONS OF NASS RECEPTION
5:00–6:00 p.m. | TOP OF ESCALATORS, LEVEL 2 WEST
This reception provides an opportunity to network with section members and those interested in becoming involved in sections. Come enjoy and learn how NASS is supporting these specific sections of its membership:
- Allied Health
- Biologics and Basic Research
- Minimally Invasive Procedures
- Radiology
- Rehabilitation, Interventional and Medical Spine (RIMS)
- Robotics and Navigation
- Spine Motion Technology
FRIDAY, OCTOBER 28

GLOBAL SPINE FORUM: ADVANCING SPINE CARE WORLDWIDE
7:30 a.m.–4:45 p.m. | ROOM 206A

NASS RECOGNITION AWARDS PRESENTATION
10:30–10:40 a.m. | ROOM 210ABC
The Recognition Awards are presented to outstanding society members.

2016 Leon Wiltse Award: Keith H. Bridwell, MD
2016 Henry Farfan Award: Makarand V. Risbud, PhD
2016 David Selby Award: James B. Reynolds, MD
2016 Spine Advocacy Award: Charles A. Mick, MD
See biographies of award winners on the following page.

RESEARCH GRANT AND FELLOWSHIP AWARDS PRESENTATIONS
10:40 a.m.–12:00 p.m. | ROOM 210ABC
Honor your colleagues as NASS presents this year’s research grants and traveling fellowships to those proposing advancements in spine care and research. Grant recipients from 2013 and 2014 also present their research findings.

VALUE ABSTRACT AWARDS PRESENTATIONS
3:20–3:50 p.m. | Room 210ABC
Value Abstract Awards foster and recognize efforts to define value in spine care.

RESIDENT AND FELLOW RESEARCH AWARDS PRESENTATIONS
3:20–3:50 p.m. | ROOM 209
Resident and Fellow Research Awards recognize young researchers’ and clinicians’ work in spine care.

INTERNATIONAL RECEPTION
4:45–5:45 p.m. | TOP OF ESCALATORS, LEVEL 2 WEST
Network with colleagues after the sessions have concluded. This reception is open to all attendees.

2016 NASS Career Fair
The Career Fair is being held at the NASS 2016 Annual Meeting.
Boston Convention & Exhibition Center
October 26-27, 2016
9:00 a.m. to 5:00 p.m.

Take advantage of this FREE opportunity
The Career Fair provides an opportunity for participants and top employers to discuss career opportunities.
There’s still time to register! Go to booth #1851 at the Career Fair registration area on the Exhibit Floor.

JOB SEEKERS
• Meet directly with employers with open positions in the field of spine care.
• Network with others and make contacts for your career future.
• Find the job that’s right for you!
• Job search all year round on the NASS Career Center

Visit http://careers.spine.org to get started!
Keith Bridwell, MD has been a prolific researcher on spinal deformity with over 300 peer-reviewed publications, 40 invited publications and 77 book chapters. His research has advanced spinal deformity surgery for the past 30 years and has culminated in a National Institute of Health ROI grant evaluating operative and non-operative treatment of adult spinal deformity. Dr. Bridwell has been a champion for adult and pediatric patients with scoliosis and has advocated for his patients through numerous local and national leadership roles. Dr. Bridwell has dedicated his entire career to the advancement of spinal deformity surgery. This is clearly reflected in the volume of academic work he has contributed, for which he has been honored with many awards and of which perhaps the most notable would be the recently completed NIH-funded clinical trial of adult scoliosis patients who were randomized to either non-operative treatment or surgery. His attention to detail and individualized care have resulted in many changed lives. As the Leon Wiltse Award seeks to recognize excellence in leadership and clinical research in spine care, we can’t think of another individual who deserves this award more than Dr. Keith Bridwell.

Nominated by Samuel K. Cho, MD and Lukas P. Zebala, MD

Dr. Jim Reynolds has been an effective and important behind the scenes committee member for a number of years. He quietly has just done his job each year, never looking for any recognition, simply serving the society and doing it well. He has been involved in committees since 2003 starting with the Patient Safety Committee. He has been chair of the Practice Management Committee as well as Audit committee of NASS. NASS might not be in the strong financial position it is in today if it were not for committee members like Jim Reynolds who devote their time to provide invaluable guidance on critical financial matters. In addition, he has a perspective that truly represents the desires and concerns of the “rank and file” members. I have known him personally for many years and he is one of the members I seek out when I want to get input on an idea or board position. He always gives sound advice and counsel. He is truly a great representative of the general membership.

Nominated by Eric J. Muehlbauer, MJ, CAE

Dr. Makarand V. Risbud is a tenured Professor of Orthopedic Surgery and Professor and Director of Cell and Developmental Biology PhD Program at the Thomas Jefferson University in Philadelphia. Dr. Risbud’s research has been solely focused on understanding the underlying physiology and pathophysiology of intervertebral disc degeneration and alleviation of discogenic pain. His group has extensively investigated the importance of local micro environmental factors in regulating disc cell function. His pioneering work has discovered that a number of proteins including HIF-1alpha and TonEBP respond to the unique environment that characterizes the nucleus pulposus. More recently Dr. Risbud has been investigating mechanisms by which inflammatory cytokines promote disc degeneration. He actively collaborates with leading spine surgeons and clinicians with an ultimate goal to devise more comprehensive theory encompassing feed forward events triggering inflammatory events that promote disc degeneration and pain. His lab offers a rich environment for research training and has trained several physician scientists and graduate students. His work has been continuously funded by grants from the NIH/NIAMS. He has published more than 120 peer reviewed articles and in 2014 has co-edited the first book devoted to biology of the Intervertebral Disc. Dr. Risbud is a founding member of the Philadelphia Spine Research Society and is chair and convener of biennial International Philadelphia Spine Symposium held since 2011.

Nominated by James D. Kang, MD, Irving Shapiro, PhD, Alexander R. Vaccaro, MD, PhD and Jill Urban, PhD

Charles A. (Charlie) Mick, MD has been one of NASS’ most passionate and thoughtful advocates on all levels of the organization, working through various committees at NASS to promote quality patient spine care. Dr. Mick has primarily lent his expertise to NASS by serving on the AMA CPT and RUC committee and has worked tirelessly on Capitol Hill and with federal agencies to expand NASS’ brand. Dr. Mick served on the Advocacy Council for six years (2005–2011) and was a founding member of the Spine Advocates program where he served three years (2006–2009) before becoming NASS President in 2013. Dr. Mick’s greatest attribute is his willingness to volunteer his time to NASS whenever he is called upon, no matter the issue.

Nominated by the NASS Advocacy Council
A Vaccine Research Study for Adults Undergoing Elective Spinal Surgery

- Reducing surgical infections may contribute to the overall reduction in healthcare infections worldwide.
- A global research study is evaluating the safety and efficacy of an investigational *Staphylococcus aureus* 4-antigen vaccine (SA4Ag) when administered to adults undergoing an elective open posterior spinal fusion procedure with multilevel instrumentation.
- The study objective is to assess the safety and efficacy of this vaccine in reducing postoperative *Staphylococcus aureus* infections.

Potential participants for this study must be:
- 18 to 85 years of age,
- scheduled to undergo an elective open posterior spinal fusion procedure with multilevel instrumentation 10 to 60 days after study vaccination, and
- available for the entire duration of the study (approximately 6 to 8 months), and willing and able to comply with study procedures.

Visit our website: strivestudy.com
REGISTRATION

LOBBY—LEVEL 1 WEST

Hours:
Tuesday, October 25 6:30 a.m.–4:30 p.m.
Wednesday, October 26 6:30 a.m.–5:00 p.m.
Thursday, October 27 6:30 a.m.–5:00 p.m.
Friday, October 28 7:00 a.m.–5:00 p.m.
Saturday, October 29 7:00 a.m.–12:00 p.m.

INTERNATIONAL CERTIFICATE PRINTING

LOBBY—LEVEL 1 WEST

Visit the certificate printing station to print your certificate of meeting attendance.

COAT AND LUGGAGE CHECK

ROOM 101

The Coat and Luggage Check is available for your convenience. The cost is $3 per item. *Please Note: All items must be picked-up by closing. NASS and the convention center are not responsible for items left at the close of the day.

Hours:
Wednesday, October 26 7:00 a.m.–5:15 p.m.
Thursday, October 27 7:00 a.m.–6:15 p.m.
Friday, October 28 7:00 a.m.–6:00 p.m.
Saturday, October 29 7:00 a.m.–12:30 p.m.

PHOTOGRAPHY ORDERS

Looking for photos from the Annual Meeting? View and order photos of the general sessions, symposia, Technical Exhibition, special events and more at spine.smugmug.com.

BOSTON INFORMATION COUNTER

LOBBY—LEVEL 1 WEST

Staff at the Information Desk will be able to supply attendees with information on the city and beyond: tourist attractions, places of interest, shopping, dining, tips for tourists, etc. Restaurant reservation services also are available.

HOUSING BUREAU

LOBBY—LEVEL 1 WEST

onPeak is the official NASS Housing Agency and will have representatives available to answer questions about your hotel, help you with any hotel issues, and help to book your housing for the 2017 Annual Meeting in Orlando.

NEW! INTERNATIONAL HOUSING BUREAU

LOBBY—LEVEL 1 WEST

Learn about all-inclusive group housing services for the 2017 NASS Annual Meeting. The international plan includes room, breakfast, porterage, taxes and gratuity with the lowest official rates and offering early booking and preferred hotels guaranteed once booked. Multilingual meeting and convention managers will be dedicated to your groups from online to onsite.

WINE AND DINE FOR SPINE

Help fund spine research by booking restaurant reservations through NASS’s partnership with OpenTable. Each reservation made through the NASS website (www.spine.org/opentable) earns 40 cents for the Annual Research Fund (ARF).

ADVOCACY AND SPINEPAC

OUTSIDE ROOM 210ABC

Health care reform. Skyrocketing professional liability costs. Plunging Medicare reimbursement. Ever-increasing administrative burdens. Together, these forces imperil patient access to quality specialty care. To remedy these issues, the National Association of Spine Specialists—the 501(c)(6) trade organization which serves as NASS’ advocacy arm—unites physicians and patients in the fight for sound health care policy. The Association advocates in the legislative and regulatory arenas for public policies that protect members’ ability to practice medicine and give patients access to the specialists and technologies they require for the treatment of spine disorders. Stop by the SpinePAC Booth to learn about issues shaping the health policy debate and how to make a difference in the public policy process. SpinePAC is the fund through which the Association supports federal candidates who champion public policies benefiting spine care providers and their patients. Members can make their contributions to SpinePAC by visiting the Advocacy booth located directly outside of the main symposium hall, Room 210 ABC.
Relieving Vertebrogenic Chronic Low Back Pain

Introducing the INTRACEPТ® System. The new minimally invasive therapy targeting CLBP through ablation of the Basivertebral Nerve.*

The INTRACEPТ® System has demonstrated clinical effectiveness to relieve chronic low back pain associated with degenerative vertebrae or vertebral endplates.

Learn about our clinical trial results at the Innovative Technology Presentation and at Booth 1365

www.relievant.com

*The INTRACEPТ System is indicated for the relief of chronic low back pain (L 3-5) of at least six months duration that has not responded to at least six months of conservative care, and accompanied by either Type 1 or Type 2 Modic changes. The INTRACEPТ Procedure, as with any surgical procedure, has risks that should be discussed with your medical professional.
Visit the NASS Resource Center across from Registration in the main lobby.

**Hours:**  
- Wednesday, October 26: 6:30 a.m.–5:00 p.m.  
- Thursday, October 27: 6:30 a.m.–5:00 p.m.  
- Friday, October 28: 7:00 a.m.–5:00 p.m.

**Member Services**
All meeting attendees are encouraged to visit Member Services to take advantage of meeting-only membership offers. Pay your 2017 dues, join NASS or purchase logo merchandise at the booth to be entered into a drawing for a FREE 2017 NASS Annual Meeting registration. Attendees can also renew or join through the following links before the meeting ends to be entered into the drawing:
- **Renew**: www.spine.org/renew  
- **Join**: www.spine.org/jointoday

**Publications**
- **SpineLine**: Comment on SpineLine content, click through a short reader survey, and offer suggestions for upcoming articles. Help yourself to complimentary copies of the recent issue and see demos of digital and mobile SpineLine.
- **The Spine Journal**: The Spine Journal (TSJ) welcomes authors, readers and reviewers. Visit the Publications booth for the latest information on submitting manuscripts, our impact factor and efficient review processes. Also find information about becoming a reviewer and pick up a copy of TSJ’s latest issue.
- **Patient Education**: Review available patient education materials and suggest ideas for new brochure topics, as well as web articles, series or videos that would benefit spine patients. Members with current disclosure can also sign up to author pieces for the website and blog.

**Member Services is giving away a FREE registration** to the 2017 NASS Annual Meeting in Orlando, FL!

To enter, simply stop by the membership booth to renew your 2017 dues, join NASS or purchase a NASS logo item.

Winner will be announced after the meeting.

*Valid for general session registration only at the 2017 AM in Orlando, FL only. This is non-transferable.*
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- **Cannulated screw** allows for guided screw placement
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Exhibit #808

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SPEAKER INFORMATION CENTER

LOBBY—LEVEL 1 WEST

There is no Speaker Ready Room at this meeting. Podium and ePoster presenters are not permitted to upload or amend their presentations at any time onsite. Exceptions include The Spine Journal Outstanding Paper Awards and Research Grant Award presentations.

Course faculty, symposia presenters and Collaborative Care/Focused Discussion speakers may upload or amend presentations by visiting the Speaker Information Center in the Level 3 Lobby, near the registration area. Speakers are not permitted to use their own laptops for their presentations. No exceptions will be made.

**Hours:**
- Monday, October 24: 12:00–5:00 p.m.
- Tuesday–Friday, October 25-28: 6:30 a.m.–5:00 p.m.
- Saturday, October 29: 7:00–11:00 a.m.

PRESS ROOM

ROOM 104B

The on-site Press Room includes a media-only work area with free online access, charging stations and printer access. Snacks and coffee for credentialed journalists are served.

Only conference staff, credentialed media and presenter interviewees are allowed access to the press room. Members of the media, advertising staff and exhibitors may not host meetings in the press room.

**Hours:**
- Wednesday, October 26: 7:00 a.m.–5:00 p.m.
- Thursday, October 27: 7:00 a.m.–5:00 p.m.
- Friday, October 28: 7:00 a.m.–5:00 p.m.
- Saturday, October 29: 7:00 a.m.–11:00 a.m.
STRENGTH THROUGH CONNECTIONS.

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Captiva Spine’s TirboLOX™ (Titanium Reinforced Bone) Cervical Cage is created using advanced 3D printing technologies to form a dual porosity, and a micro-surface roughness, that is conducive to direct bony ongrowth and ingrowth. Along with dual porosity, TirboLOX incorporates an open architecture to accommodate accurate post-op imaging and graft visibility.

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*TirboLOX™ is not currently cleared by the FDA for distribution in the United States.
ACTIVITIES

Freedom Trail  thefreedomtrail.org
A must while in Boston is to follow the 2.5-mile redbrick trail from Boston Common to Bunker Hill. The trek will take between 1 to 3 hours. You can power walk through the historical sites or go on a tour with a guide in Revolutionary garb. Make time for a stop at America’s oldest bar, the Bell in Hand Tavern.

Faneuil Hall Marketplace  faneuilhallmarketplace.com
Located in the heart of downtown Boston, and along the Freedom Trail, is Faneuil Hall Marketplace. The original Faneuil Hall dates back to 1742 and the festival marketplace now encompasses the North Market, Quincy Market and South Market buildings. Grab a bite beneath the Quincy Market canopies, pick up unique finds and watch the street performers.

Fenway Park  mlb.mlb.com/bos/ballpark
Baseball or not, there’s nothing quite like a visit to Fenway Park, one of America’s most beloved baseball stadiums since it opened in 1912. View the “Green Monster” up close during one of the 50-minute tours offered daily.

Cambridge  cambridgeusa.org
Cross the Charles River to nearby Cambridge where Harvard and the Massachusetts Institute of Technology (MIT) are located. There is a mix of stunning architecture, an incredible range of restaurants and shopping that attracts students, locals and visitors. Stroll through the historic Harvard Yard, and walk along Tory Row to view the colonial mansions including the Longfellow House (105 Brattle Street), home of 19th-century poet Henry Wadsworth Longfellow and former headquarters for General George Washington during the Siege of Boston.

Cheers  cheersboston.com
For fans of the television show, stop in for one at the bar shown in the opening credits of this ’90s sitcom. Afterward, walk up Beacon Street to the State House and across the street is the Public Garden. Then make your way to Newbury Street for some shopping at some of Boston’s most upscale boutiques.

MUSEUMS

Boston Tea Party Museum  bostonteapartyship.com
Located in the middle of the Fort Point Channel, the museum is a stone’s throw from where the Boston Tea Party actually occurred. Hop aboard a faithful recreation of a colonial-era ship—and throw tea crates overboard in defiance of King George III’s “taxation without representation” policy. Also get a first-hand look at Robinson Tea Chest, one of only two known tea chests still in existence from those monumental days in December 1773.

African Meeting House  afroammuseum.org
See where the abolitionist movement found a voice. In the historic Beacon Hill neighborhood, see the oldest African-American church edifice still standing in the US and where the New England Anti-slavery Society was founded and later, Frederick Douglass delivered an anti-slavery speech. View the museum’s many artifacts such as an 1848 bill of sale for an enslaved boy named Tom to works by African-American women sculptors.

Museum of Fine Arts, Boston  mfa.org
The MFA’s collection of more than 450,000 artifacts and paintings spans nearly every major period and region—from ancient to contemporary, from the Americas, Europe, Asia and Africa. See museum’s highlights, such as Renoir’s Dance at Bougival, van Gogh’s Portrait of the Postman and Winslow Homer’s The Fog Warning as well as seven new contemporary art collections.

Isabella Stewart Gardner Museum  gardnermuseum.org
Art and food abound at this museum. After checking out the museum’s mainstays—from Vermeer’s The Concert to Rembrandt’s The Storm on the Sea of the Galilee—enjoy classic American fare along with more eclectic choices by chef-owner Peter Crowley.

The Sports Museum  sportsmuseum.org
Sports and Boston go hand in hand. So swing by Boston’s Sports Museum, located in TD Garden. Delve into the history of the Boston area’s top sports teams and events with exhibits on the Boston Bruins, New England Patriots, the Boston Marathon and the Boston Red Sox. Great addition is a visit to Fenway Park.

Museum of Science  mos.org
Take your pick from among 500 interactive exhibits at Boston’s Museum of Science. Enjoy a variety of simulator experiences, from an orbital journey around the International Space Station to a ride on history’s greatest flying machines—including the supersonic fighter aircraft F-5 Tiger. Also get a first-hand look at cosmic collisions, fractal patterns that burst before your eyes, and a close-up view of Mars in the Charles Hayden Planetarium.
RELENTLESSLY PURSUITING CONNECTIONS TO TRANSFORM THE PROCESS OF CARE

BrightMatter™ Drive and Vision allow a high level of visualization of tissue, which is critical when working with bone and soft tissue around nerves in the spine.

COME SEE FOR YOURSELF AT BOOTH 1366
RESTAURANTS

Alden & Harlow  aldenharlow.com
Thoughtfully sourced, American food in a subterranean, modern and comfortable space. From vegetable-forward fare to a rich, smoky burger, Chef Michael Scelfo prepares bold and flavor-forward food. The cocktail list rivals the dinner menu in creativity and ambition.
40 Brattle St., Cambridge, 617-864-2100

Asta  astaboston.com
This Back Bay spot offers three-, five-, or eight-course menus. Share courses like Brussels sprouts tossed in nutty Marmite butter from the $75 five-course menu and beef ravioli with charred leeks from the $50 three-course version.
47 Massachusetts Ave., Boston, 617-585-9575

Audubon Circle  audubonboston.com
Located near Fenway Park, this cozy neighborhood restaurant/bar offers food that is simple but inspired. Audubon Circle has won several awards from Boston Magazine, including “Best Bar Menu” and “Best Neighborhood Restaurant.”
838 Beacon St., Boston, 617-421-1910

B&G Oysters  bandgoysters.com
Barbara Lynch, a James Beard Award winning chef, pioneered the idea of presenting local, fresh bivalves and seafood in a hip, bar-centered environment in the South End back in 2003.
550 Tremont St., Boston, 617-423-0550

Banyan Bar + Refuge  banyanboston.com
The menu is a compilation of Chinese, Japanese, Thai and even eastern Russian elements. Try a lobster roll with honey-miso butter, Korean fried chicken with a dried-lime chimichurri or a massive New York strip shareable DIY platter served with scallion pancakes.
553 Tremont St., Boston, 617-556-4211

Bergamot  bergamotrestaurant.com
The restaurant offers a three course menu of progressive American cuisine for $46 every night. And when you just need a drink, its one of the city’s most undersung bars.
118 Beacon St., Somerville, 617-576-7700

Bistro du Midi  bistrodumidi.com
This Provençal bistro has doting service, world-class wines, a plush but unfussy dining room with prime Public Garden frontage.
272 Boylston St., Boston, 617-426-7878

Bondir  bondircambridge.com
This cozy farm-to-table restaurant in Cambridge serves pastoral and marine bounty of New England and offers a finely curated selection of American and European wines and beers. Vegetables are picked the same day, fish hours out of the ocean and pasture-raised meats will change daily.
279A Broadway, Cambridge, 617-661-0009

Brewer’s Fork  brewersfork.com
Here you can pair a barrel-aged blonde pinto with crisp maple-glazed pork belly or mussels bathed in a beer-and-tasso-ham broth from a wood-burning oven. Or sip on a tulip glass brimming with Berliner Weisse, with a pillowy, char-blonedered pizza.
7 Moulton St., Charlestown, 617-337-5703

Coppa  coppaboston.com
The classic pizzas are smoky and rich the house pastas are remarkably creative and the vegetable dishes are some of the town’s finest.
253 Shawmut Ave., Boston, 617-391-0902

Craigie on Main  craigieonmain.com
Some of the most game-changing eats around with new innovations continuing to emerge from this kitchen with the menu staples remaining as good as ever. Try the crispy Brussels sprouts cooked in duck fat until nutty, browned; octopus charred on a plancha with an earthy black-garlic vinaigrette; and fish-sauce coated pigs’ tails and roasted pig’s head with Peking pancakes.
853 Main St., Cambridge, 617-497-5511

Eastern Standard  easternstandardboston.com
With a menu boasting everything from cheese and charcuterie to seared salmon and burgers, this classy, cool and casual American brasserie is located in Kenmore Square’s Commonwealth Hotel.
528 Commonwealth Avenue, Boston, 617-532-9100

Erbaluce  erbaluce-boston.com
With its dim lighting, convenient Bay Village locale, and carbonara pasta, Erbaluce has been a destination for Italian dining since 2008. Try the weekly-friendly bar menu.
69 Church St., Boston, 617-426-6969

Grill 23 & Bar  grill23.com
This steakhouse offers perfectly seared slabs of beef and for the non-steak crowd there’s Jonah crab cakes, lobster chowder, and pot roast with sweet pea ebelskivers.
161 Berkeley St., Boston, 617-542-2255

Grotto  grottorestaurant.com
This small and inconspicuous Beacon Hill restaurant serves contemporary Italian fare served in a casual, dimly-lit setting. Grotto has a nightly three course, prix-fixe menu for $40.
37 Bowdoin Street, Boston, 617-227-3434

Hojoko  hojokoboston.com
James Beard Award Winning Chef Tim Cushman opened this rock & roll Japanese tavern in The Verb Hotel. The menu includes robata-grilled yakitori, creative maki rolls, a selection of over 20 sake cups, grilled yakitori, creative maki rolls, a selection of over 20 sake cups, Japanese-inspired craft cocktails and multiple frozen drink machines.
1271 Boylston St., Boston, 617-670-0507

Island Creek Oyster Bar  islandcreekoysterbar.com
This oyster bar is a local favorite serving Island Creek oysters, grown locally in Duxbury, MA. There’s also the lobster-roe noodles with shreds of braised short rib in the dining room. Soak up the energy of the lounge, where you’ll have a front-row seat to both the shucking action and the craft cocktail production.
500 Commonwealth Ave., Boston, 617-532-5300
**Kirkland Tap & Trotter**  kirklandtapandtrotter.com
For the more-casual follow-up to Craigie on Main, chef Tony Maws employs a deluxe custom wood-fired grill to churn out smoky plates of grilled chicken, succulent pork ribs in an ancho chili glaze, and one epic kimchi-Russian-dressing-slated cheeseburger. 425 Washington St., Somerville, 617-259-6585

**La Brasa**  labrasasomerville.com
La Brasa’s greatest strength is its piquant flavors of the chef’s Mexican homeland. Selections like beets with crunchy quinoa and a sauce made from maple syrup and chile de árbol; pork loin dressed with ancho chimichurri and a spicy au jus; and chicken wing with 12-ingredient Oaxacan mole.
124 Broadway, Somerville, 617-764-1412

**L’Espalier**  lespalier.com
In the heart of Back Bay, L’Espalier offers sophisticated and modern New England-French cuisine. A dedicated cheese specialist and a tea sommelier are just some of the rare extravagances.
774 Boylston St., Boston, 617-262-3023

**Lone Star Taco Bar**  lonestar-boston.com
Sample what’s been called some of the city’s best Tex-Mex food. It requires a trip to the neighborhood of Allston, downtown Boston’s younger, trendier sibling. Fill your tacos with everything from homemade chorizo to braised tofu, and wash it all down with a 20-oz. “mug-arita” or a michelada.
479 Cambridge St., Boston, 617-782-8226

**Menton**  mentonboston.com
This fine dining restaurant by Chef Barbara Lynch has received numerous accolades, including the Best Newcomer, Best French and Best Service distinctions in the Zagat Boston Restaurant Guide, and is Boston’s only Relais & Châteaux and Forbes Travel Guide Five-Star property.
354 Congress St., Boston, 617-737-0099

**Mistral**  mistralbistro.com
This French Mediterranean-inspired dining option offers an ever-changing seasonal menu. High ceilings and warm lighting reflect the sophistication of this establishment.
223 Columbus Avenue, Boston, 617-867-9300

**Moooo...**  mooorestaurant.com
Attached to XV Beacon Hotel, this steakhouse offers a warm modern décor providing a relaxed, sophisticated atmosphere. You’ll be instantly won over the second the waiter brings out the cast-iron pan full of warm bread. Enjoy one of many steak options or a seafood selection.
15 Beacon Street, Boston, (617) 670-2515

**Myers & Chang**  myersandchang.com
This South End eatery offers Asian-inspired small plates like kalbi-style short ribs with apple kimchi, or twice-cooked lamb belly stir-fried with hot mustard and Chinese long beans.
1145 Washington St., Boston, 617-542-5200

**Neptune Oyster**  neptuneoyster.com
This restaurant has such good oysters they even put them on their sandwiches. They also serve excellent seafood of all kinds.
63 Salem St., Boston, 617-742-3474

**No. 9 Park**  no9park.com
Another offering from James Beard Award winner Barbara Lynch, No. 9 Park is situated in a historic townhouse on Beacon Hill. The elegant setting composed of antique-style chandeliers and original wood floors is the perfect backdrop for the Italian- and French-inspired menu. If you cannot get a reservation, try to sit at the bar and have dinner there.
9 Park Street Boston, 617-742-9991

**Oleana**  oleanarestaurant.com
This Middle Eastern-Mediterranean restaurant serves up inventive dishes like chickpea crêpe with smoked cinnamon aioli, or lamb steak with Turkish spices and fava bean moussaka. Save room for the homemade ice creams such as cocoa-rose with a date-rose truffle or salted butter with a pumpkin-brown butter crêpe.
134 Hampshire St., Cambridge, 617-661-0505

**O Ya**  o-ya.restaurant
At this opulent restaurant there’s three-pound lobsters, Osetra caviar, and bottles of champagne flowing. The quality of fish is exceptional and correlates with the prices.
One Charles St. S., Boston, 617-421-1200

**Ostra**  ostraboston.com
Located in a 100-year-old fire station in the Leather District, Ostra offers contemporary Japanese dining in an intimate setting. There’s a Chef’s tasting menu and an extensive a la carte menu of imaginative nigiri, sashimi, vegetable, wagyu beef, kurobuta pork and chicken dishes.
9 East St., Boston, 617-654-9900

**Puritan & Company**  puritan.cambridge.com
This farmhouse-chic Inman Square restaurant, with vintage furniture as décor, is a modern interpretation of traditional New England cookery. Plates like lamb belly glazed with old-school Moxie, pan-seared local catch, elegant bowls of clam chowder as well as a petite oyster-and-charcuterie bar.
1166 Cambridge St., Cambridge, 617-615-6195

**Ristorante Fiore**  www.riantorantefiore.com
Fiore is located in the Italian North End and has the perfect combination of great food, friendly wait staff and endearing atmosphere. The place is nothing fancy, but if you are craving an authentic Italian meal with some of the best red sauce around, this is the place.
250 Hanover Street, Boston, 617-371-1176

**Row 34**  row34.com
This very popular seafood destination has great fish plus an extensive beer list with local brews like Trillium, and unusual sours from Italy and Belgium.
383 Congress St., Boston, 617-553-5900
Select Oyster Bar  selectboston.com
In this tiny space the wait times can be long, however the chef’s offerings like ceviche, and tartares—paper-thin slices of halibut garnished with pickled pumpkin and hamachi laced with a snappy dressing of ginger and Warren pear—as well as entrées such as thick Gloucester swordfish steak stippled with rose harissa and cucumber raita are worth the wait.
50 Gloucester St., Boston, 617-239-8064

Shepard  shepardcooks.com
French cuisine combined with New England spirit reflects the earthy fare and primal cuts of meat cooked over an open hearth here. Offerings include the fra diavolo tossed with smoky red sauce and hunks of lobster, 90-day dry aged ribeye steak, and rabbit agnolotti with garlic mustard roots and greens.
One Shepard St., Cambridge, 617-714-5295

Shojo  shojoboston.com
This Chinatown establishment offers inspired Asian plates like five-spice-butter-fried chicken with puffy Hong Kong-style waffles; wu-tang tiger style ribs with Thai basil and shallots; and crispy fish & chips taco with tartar, slaw and potato sticks.
9A Tyler St., Boston, 617-423-7888

Sonsie  sonsieboston.com
Located on Newbury Street, this restaurant is crowded almost every night for dinner or drinks. With its American fare menu, choices can range from gourmet brick-oven pizza to steak. The bar has a great selection of wine and signature cocktails.
327 Newbury Street, Boston, 617-351-2500

Spoke  spokewinebar.com
While wine bars typically emphasize the drinks first, food second, this Davis Square venue serves up both on an equal playing field. Food-friendly apéritifs set the stage for creative small plates, which marry elegance with appealing rusticity.
89 Holland St., Somerville, 617-718-9463

Sportello  sportelloboston.com
Located on Boston’s waterfront, Sportello is a modern diner-inspired Italian trattoria offering fresh, handmade pastas, creamy polentas, beautifully composed salads, and inventive, balanced entrees. All the seasonal dishes are made with fresh ingredients.
348 Congress St., Boston, 617-737-1234

SRV  www.srvboston.com
Located in the South End, SRV features comforting yet upscale Venice-inspired small plates. Specializing in pasta made from house-milled flour and made to order risotto, SRV has a neighborhood feel with an exclusively Italian wine list and cocktails.
569 Columbus Ave., Boston, 617-536-9500

Strip-T’s  stripts.com
This Watertown hangout offers Moxie-slicked chicken wings, fried-cauliflower-stuffed sub, and romaine salad crowned with oxtail and a poached egg. And there’s he magnificent burger packed with chuck skirt-steak, and beef-cheek patty and a smear of smoked miso.
93 School St., Watertown, 617-923-4330

Sweet Cheeks  sweetcheeksq.com
The fall-apart ribs, crackly-skinned sausages, and mammoth slabs of brisket are sourced from the highest-quality purveyors. Meat aside, Sweet Cheeks is also the rare barbecue spot that welcomes vegetarian diners, with sublime biscuits and one of the finest salads in town.
1381 Boylston St., Boston, 617-266-1300

Sycamore  sycamorennewton.com
This neighborhood favorite offers sweet-potato muhammara with pillowy grilled pita, and suckling-pig confit with bright fennel purée and blood-orange marmalade as well as duck, lamb and pig boards that people rave about. It’s also home to very satisfying vegetarian entrées.
755 Beacon St., Newton Centre, 617-244-4445

Toro  toro-restaurant.com
This electric South End tapas spot continues to push the boundaries of the Spanish small plate. Menu mainstays like the aioli-slatedrained corn and griddled shrimp in a buttery, chili-scented garlic sauce as well as dishes like Thai curried mussels, broccoli with pistachio muhammara that stray from the Spanish theme make for a pleasurable dining experience.
1704 Washington St., Boston, 617-536-4300

Trade  trade-boston.com
Located on Atlantic Wharf in the Seaport District, Trade offers diners a menu of food from around the world made with fresh, local ingredients. This neighborhood restaurant with high-ceilings and exposed-brick is trendy but very casual and offers raw bar favorites, inspired small plates and entrees such as seared salmon with quinoa tabouleh, chickpea and eggplant yogurt; red-cooked duck with scallion pancakes, shitate mushrooms and orange; braised lamb osso buco with cauliflower tahini, pistachio gremolata.
540 Atlantic Ave., Boston, 617-451-1234

T.W. Food  twfoodrestaurant.com
This cozy Cambridge bistro offers forward-thinking dishes like orecchiette with baby octopus and hazelnut–black garlic gremolata; and johnnycakes with bacon, ricotta and beets. And for dessert there’s the “glamorous” sundae, topped with bitter-chocolate ganache and chocolate-oat crumble. The food is served in a Parisian-style boîte with exposed-brick walls, French-wine-country maps, and attentive servers.
377 Walden St., Cambridge, 617-864-4745

Uni  unisashimibar.com
This semi-pricey sushi spot is known for its artistic renditions of raw fish but there’s so much more. Dinner offerings feature sansho-pepper-dusted karaage fried chicken, petite nubs of rock-shrimp tempura, and octopus dumplings. The late-night weekend menu has its own identity, highlighted by steaming bowls of ramen.
370 Commonwealth Ave., Boston, 617-536-7200
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www.spinendos.com
Complimentary shuttle service is provided between Boston Convention and Exhibition Center and the hotels listed below.

### Shuttle Routes

<table>
<thead>
<tr>
<th>Hotel</th>
<th>Route</th>
<th>Shuttle Boarding Location at Hotel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aloft Seaport</td>
<td>N/A</td>
<td>Walk to the Boston Convention and Exhibition Center</td>
</tr>
<tr>
<td>Boston Marriott Copley Place</td>
<td>1</td>
<td>Copley Square – Curbside on Huntington Avenue</td>
</tr>
<tr>
<td>Boston Park Plaza Hotel &amp; Towers, The</td>
<td>2</td>
<td>Columbus Avenue Entrance</td>
</tr>
<tr>
<td>Courtyard Boston Downtown Tremont</td>
<td>2</td>
<td>Front Entrance on Tremont Street</td>
</tr>
<tr>
<td>DoubleTree by Hilton Hotel Boston - Downtown</td>
<td>2</td>
<td>Walks to Courtyard Boston Tremont</td>
</tr>
<tr>
<td>Element Seaport</td>
<td>N/A</td>
<td>Walk to the Boston Convention and Exhibition Center</td>
</tr>
<tr>
<td>Fairmont Copley Plaza Boston</td>
<td>1</td>
<td>Walk to Boston Marriott - Copley Square – Curbside on Huntington Avenue</td>
</tr>
<tr>
<td>Hilton Boston Downtown/Faneuil Hall</td>
<td>3</td>
<td>Broad Street Entrance</td>
</tr>
<tr>
<td>Hyatt Regency Boston</td>
<td>3</td>
<td>Curbside on Avenue de Lafayette</td>
</tr>
<tr>
<td>Omni Parker House</td>
<td>3</td>
<td>Corner of Tremont &amp; School Streets</td>
</tr>
<tr>
<td>Renaissance Boston Waterfront</td>
<td>N/A</td>
<td>Walk to the Boston Convention and Exhibition Center</td>
</tr>
<tr>
<td>Seaport Hotel, The</td>
<td>N/A</td>
<td>Walk to the Boston Convention and Exhibition Center</td>
</tr>
<tr>
<td>Sheraton Boston Hotel</td>
<td>1</td>
<td>Walk to Boston Marriott - Copley Square – Curbside on Huntington Avenue</td>
</tr>
<tr>
<td>Westin Boston Waterfront</td>
<td>N/A</td>
<td>Walk to the Boston Convention and Exhibition Center</td>
</tr>
<tr>
<td>Westin Copley Place</td>
<td>1</td>
<td>Walk to Boston Marriott - Copley Square – Curbside on Huntington Avenue</td>
</tr>
</tbody>
</table>

### Shuttle Schedule

**Tuesday, October 25**
- Shuttle Service: 6:00 a.m. - 5:30 p.m. Every 30 minutes
- 5:30 p.m. - 8:00 p.m. Every 10-15 minutes Welcome Reception Shuttle

**Wednesday, October 26**
- Shuttle Service: 6:00 a.m. - 2:00 p.m. Every 10-15 minutes
- 2:00 p.m. - 4:00 p.m. Every 30 minutes *
- 4:00 p.m. - 6:00 p.m. Every 10-15 minutes

**Thursday, October 27**
- Shuttle Service: 6:00 a.m. - 10:30 a.m. Every 10-15 minutes
- 10:30 a.m. - 1:30 p.m. Every 30 minutes *
- 1:30 p.m. - 6:00 p.m. Every 10-15 minutes

**Friday, October 28**
- Shuttle Service: 6:00 a.m. - 10:30 a.m. Every 10-15 minutes
- 10:30 a.m. - 1:30 p.m. Every 30 minutes *
- 1:30 p.m. - 6:00 p.m. Every 10-15 minutes

**Saturday, October 29**
- Shuttle Service: 7:00 a.m. - 12:30 p.m. Every 30 minutes *

*Departs Boston Convention and Exhibition Center on the hour & half-hour.
Schedule may vary due to traffic & weather conditions.
Last bus leaves from hotel 60 minutes prior to end time with no return service.

Please check the signage in your hotel lobby, upon your arrival in Boston, for the most current information.
Note: This is a preliminary shuttle schedule and is subject to change.

For Shuttle Information & Special Assistance:
(310) 466-4699
Please call at least 60 minutes prior to pick-up.

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Production Transport
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Explore Our Expanded Portfolio
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## Official Hotels & Rates:

<table>
<thead>
<tr>
<th></th>
<th>Hotel Name</th>
<th>Address</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Boston Convention &amp; Exhibition Center (BCEC)</td>
<td></td>
<td>$260</td>
</tr>
<tr>
<td>2</td>
<td>Aloft Boston Seaport</td>
<td>401-403 D Street</td>
<td>$303</td>
</tr>
<tr>
<td>3</td>
<td>Boston Marriott Copley Place</td>
<td>110 Huntington Avenue</td>
<td>$303</td>
</tr>
<tr>
<td>4</td>
<td>Courtyard Boston Tremont Hotel</td>
<td>275 Tremont Street</td>
<td>$262</td>
</tr>
<tr>
<td>5</td>
<td>Doubletree Hotel Downtown Boston</td>
<td>821 Washington Street</td>
<td>$269</td>
</tr>
<tr>
<td>6</td>
<td>Element Boston Seaport</td>
<td>391-395 D Street</td>
<td>$270</td>
</tr>
<tr>
<td>7</td>
<td>Fairmont Copley Plaza Boston</td>
<td>138 St James Avenue</td>
<td>$340</td>
</tr>
<tr>
<td>8</td>
<td>Hilton Boston Downtown/ Faneuil Hall</td>
<td>89 Broad Street</td>
<td>$285</td>
</tr>
<tr>
<td>9</td>
<td>Hyatt Regency Boston</td>
<td>One Avenue de Lafayette</td>
<td>$291</td>
</tr>
<tr>
<td>10</td>
<td>Omni Parker House</td>
<td>60 School Street</td>
<td>$259</td>
</tr>
<tr>
<td>11</td>
<td>Park Plaza Hotel &amp; Towers</td>
<td>50 Park Plaza at Arlington Street</td>
<td>$299</td>
</tr>
<tr>
<td>12</td>
<td>Renaissance Boston Waterfront</td>
<td>606 Congress Street</td>
<td>$314</td>
</tr>
<tr>
<td>13</td>
<td>Seaport Hotel</td>
<td>One Seaport Lane</td>
<td>$315</td>
</tr>
<tr>
<td>14</td>
<td>Sheraton Boston Hotel</td>
<td>39 Dalton Street</td>
<td>$265</td>
</tr>
<tr>
<td>15</td>
<td>Westin Boston Waterfront (HQ)</td>
<td>425 Summer Street</td>
<td>$275</td>
</tr>
<tr>
<td>16</td>
<td>Westin Copley Place</td>
<td>10 Huntington Avenue</td>
<td>$309</td>
</tr>
</tbody>
</table>
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STOP Neck Pain
Booth #1002
### Monday, October 24

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:30 a.m.–4:00 p.m.</td>
<td><strong>Ticketed Session:</strong> Coding Update 2016: Essentials and Controversies of Spine Care Coding Room 206A</td>
</tr>
<tr>
<td>8:00 a.m.–5:00 p.m.</td>
<td><strong>Exhibitor Registration</strong> Lobby—Level 1 West</td>
</tr>
</tbody>
</table>

### Tuesday, October 25

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:30 a.m.–4:30 p.m.</td>
<td><strong>Attendee Registration</strong> Lobby—Level 1 West</td>
</tr>
<tr>
<td>7:30 a.m.–4:00 p.m.</td>
<td><strong>Ticketed Session:</strong> Coding Update 2016 (Continued) Room 206A</td>
</tr>
<tr>
<td>7:30 a.m.–4:30 p.m.</td>
<td><strong>Ticketed Hands-on Course:</strong> Minimally Invasive Spine Surgery Room 205C</td>
</tr>
<tr>
<td>8:00 a.m.–6:00 p.m.</td>
<td><strong>Exhibitor Registration</strong> Lobby—Level 1 West</td>
</tr>
<tr>
<td>6:00–7:30 p.m.</td>
<td><strong>Welcome Reception</strong> Westin Boston Waterfront</td>
</tr>
</tbody>
</table>

### Wednesday, October 26

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:30–8:00 a.m.</td>
<td><strong>Continental Breakfast</strong> Outside General Session (Room 210ABC)</td>
</tr>
<tr>
<td>6:30 a.m.–5:00 p.m.</td>
<td><strong>Attendee Registration</strong> Lobby—Level 1 West</td>
</tr>
<tr>
<td>7:00 a.m.–5:00 p.m.</td>
<td><strong>Exhibitor Registration</strong> Lobby—Level 1 West</td>
</tr>
<tr>
<td>7:25–7:30 a.m.</td>
<td><strong>Welcome Remarks</strong> Room 210ABC</td>
</tr>
<tr>
<td>7:30–7:35 a.m.</td>
<td><strong>NASS Working for You:</strong> Spine Registry Update Room 210ABC</td>
</tr>
<tr>
<td>7:30–7:35 a.m.</td>
<td><strong>Interdisciplinary Symposium:</strong> Own the Bone™: Establishing a Frailty Fracture Service and Preventing the Next Vertebral Fracture Room 210ABC</td>
</tr>
<tr>
<td>7:35–9:00 a.m.</td>
<td><strong>Innovative Technology Presentations</strong> (Non-CME Session) Room 209</td>
</tr>
<tr>
<td>8:00–9:00 a.m.</td>
<td><strong>Surgical Innovation Lab Demos</strong> The Learning Place Technical Exhibition, Booth #1900</td>
</tr>
<tr>
<td>8:00–10:00 a.m.</td>
<td><strong>Symposia:</strong> NASS Working for You: Coverage Update Room 210ABC</td>
</tr>
</tbody>
</table>

### Additional Information

- **AH**: Accredited for Allied Health Continuing Education
- ****: Requires separate registration fee

- **Best Papers**: Cervical Myelopathy Room 210ABC
- **Leadership Development and Training**: Communication and Self-awareness Room 206A
- **Interdisciplinary Spine Forum**: Early Return to Work Room 205C
- **Technical Exhibition**: Technical Exhibition
- **NASS Career Fair**: Technical Exhibition, Booth #1851
- **ePosters**: The Learning Place Technical Exhibition, Booth #1900
- **Networking Break**: Beverage Service Technical Exhibition
- **Exercise Video Demonstrations**: The Learning Place Technical Exhibition, Booth #1900
- **Practical Theater**: MACRA 101-CMS Quality Payment Programs: MIPS and APMs The Learning Place Technical Exhibition, Booth #1900
- **Poster Grand Rounds**: The Learning Place Technical Exhibition, Booth #1900
- **Symposia:**
  - Healthcare Outlook 2017: The Elections, Delivery System Reform and MACRA Implementation AH Room 210ABC
  - Section on Biologics and Basic Research: ACDF vs. TDR: Adjacent Segment Disease and Clinical Outcomes AH Room 209
  - Assessment and Management of Oncologic Lesions of the Spine: A Multidisciplinary Approach AH Room 208
- **Abstract Presentations:**
  - Injections and Biologics Room 205A
  - Complications Room 205B
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
</table>
| 11:00 a.m.–1:00 p.m. | Surgical Innovation Lab Demos  
The Learning Place  
Technical Exhibition, Booth #1900 |
| 11:00 a.m.–2:30 p.m. | NASS Bistro  
Technical Exhibition, Booth #272 |
| 12:00–1:00 p.m.   | Complimentary Box Lunch  
*Medical Attendees Only*  
Technical Exhibition, Booth #773 |
|                   | SpinePAC Luncheon  
*Open to 2016 SpinePAC Donors*  
Top of Escalators, Level 2 West |
|                   | Resident, Fellow and Program Directors’ Meeting  
Room 206A |
|                   | Solution Showcase  
Technical Exhibition, Booth #573  
- 12:00: Richard Wolf  
- 12:30: Zimmer Biomet |
| 1:00–2:00 p.m.    | Abstract Presentations:  
- Thoracolumbar Surgery  
  Room 210ABC  
- Psychosocial  
  Room 209  
- Cervical Surgery  
  Room 208  
- Biomechanics  
  Room 205A  
- Infection  
  Room 205B |
| 1:00–3:05 p.m.    | Interdisciplinary Spine Forum:  
Room 205C |
| 1:30–3:30 p.m.    | Leadership Development and Training:  
Creativity and Development  
Room 206A |
| 2:00–4:00 p.m.    | Surgical Innovation Lab Demos  
The Learning Place  
Technical Exhibition, Booth #1900 |
| 2:05–3:05 p.m.    | Abstract Presentations:  
- Cervical Myelopathy  
  Room 210ABC  
- Adult Spinal Deformity  
  Room 209  
- Thoracolumbar Surgery  
  Room 208  
- Complications  
  Room 205A  
- Diagnostics and Imaging  
  Room 205B |
| 3:05–3:35 p.m.    | Networking Break  
Beverage Service  
Technical Exhibition |
|                   | Exercise Video Demonstrations  
The Learning Place  
Technical Exhibition, Booth #1900 |
|                   | Poster Grand Rounds  
The Learning Place  
Technical Exhibition, Booth #1900 |
| 3:35–3:40 p.m.    | NASS Working for You:  
Coding Update  
Room 210ABC |
| 3:40–5:10 p.m.    | Symposia:  
- Value-based Healthcare: Impact on Caring for Spine Patients  
  Room 210ABC  
- Complex Spinal Infections: Comprehensive Evaluation and Management  
  Room 209  
- Management of the Elderly Spine Patient  
  Room 208  
Abstract Presentations:  
- Anterior Cervical  
  Room 205A  
- Spinal Trauma  
  Room 205B  
Interdisciplinary Spine Forum:  
Room 205C  
Case-based Discussion:  
Top Cases from SpineConnect  
Room 206A |
| 5:10–6:10 p.m.    | Innovative Technology Presentations  
(Non-CME Session)  
Room 210ABC |
| 5:15–6:15 p.m.    | SpineConnect Reception  
Room 206A |
### Thursday, October 27

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</table>
| 6:30–8:00 a.m.  | Continental Breakfast  
Outside General Session (Room 210ABC)                              |
| 6:30 a.m.–5:00 p.m. | Attendee Registration  
Lobby—Level 1 West                                                     |
| 6:50–6:55 a.m.  | Announcements  
Room 210ABC                                                           |
| 6:55–7:00 a.m.  | **NASS Working for You:**  
Town Hall USA Update  
Room 210ABC                                                           |
| 7:00–8:30 a.m.  | Interdisciplinary Symposium:  
Professional Coaching and Enhanced Self-care to Counteract Stress, Burnout and Frustration  
Room 210ABC                                                           |
| 7:20–9:30 a.m.  | Interdisciplinary Spine Forum:  
Gender Specificity: It’s Time to Abandon “One Size Fits All” in Spine Care  
Room 205C                                                            |
| 8:00–10:00 a.m. | Surgical Innovation Lab Demos  
The Learning Place  
Technical Exhibition, Booth #1900                                    |
| 8:00 a.m.–5:00 p.m. | Exhibitor Registration  
Lobby—Level 1 West                                                     |
| 8:00 a.m.–5:00 p.m. | ePosters  
The Learning Place  
Technical Exhibition, Booth #1900                                     |
| 8:30–9:30 a.m.  | Best Papers:  
Biologics and Interventional Care  
Room 210ABC                                                           |
| 9:00 a.m.–5:00 p.m. | Technical Exhibition  
Technical Exhibition                                                     |
| 9:00 a.m.–5:00 p.m. | NASS Career Fair  
Technical Exhibition, Booth #1851                                      |
| 9:30–10:00 a.m. | Networking Break  
Beverage Service  
Technical Exhibition                                                     |
| 9:30–10:00 a.m. | Exercise Video Demonstrations  
The Learning Place  
Technical Exhibition, Booth #1900                                       |
| 10:00–10:15 a.m. | **Patient-Centered Outcomes Research Institute Update:**  
Joe Selby, MD, MPH, Executive Director, PCORI  
Room 210ABC                                                           |
| 10:15–11:00 a.m. | Introduction and Presidential Address:  
F. Todd Wetzel, MD and Christopher M. Bono, MD  
Room 210ABC                                                           |
| 11:00 a.m.–12:00 p.m. | Introduction and Presidential Guest Speaker:  
Christopher M. Bono, MD and Michio Kaku, PhD  
Room 210ABC                                                           |
| 11:00 a.m.–1:00 p.m. | Surgical Innovation Lab Demos  
The Learning Place  
Technical Exhibition, Booth #1900                                       |
| 11:00 a.m.–2:30 p.m. | **NASS Bistro:**  
Technical Exhibition, Booth #272                                         |
| 12:00–1:00 p.m.  | Complimentary Box Lunch  
Medical Attendees Only  
Technical Exhibition, Booth #773                                         |
| 1:00–1:05 p.m.   | **NASS Working for You:**  
Appropriate Use Criteria Update  
Room 210ABC                                                            |
| 1:05–2:05 p.m.   | The Spine Journal Outstanding Paper Awards Presentations  
Room 210ABC                                                           |
|                  | **Symposia:**  
- Think Before You Tweet #socialmedia #ethics #professionalism  
Room 209                                                             |
|                  | - Decreasing Radiation Exposure During Spine Surgery and Interventional Procedures  
Room 208                                                             |
|                  | **Abstract Presentations:**  
- Lumbosacral/Pelvic  
Room 205A                                                             |
|                  | - Deformity (AIS)  
Room 205B                                                             |
|                  | - Cervical Complications  
Room 205C                                                             |

**AH:** Accredited for Allied Health Continuing Education
### Meeting-at-a-Glance

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00–4:00 p.m.</td>
<td><strong>Surgical Innovation Lab Demos</strong>&lt;br&gt;The Learning Place&lt;br&gt;Technical Exhibition, Booth #1900</td>
</tr>
<tr>
<td>2:10–3:10 p.m.</td>
<td><strong>Section Specialty Track:</strong>&lt;br&gt;• Section on Rehabilitation, Interventional and Medical Spine (RIMS): Posterior Pelvic/Sacroiliac Joint Pain&lt;br&gt;Room 210ABC&lt;br&gt;• Section on Minimally Invasive Procedures Abstract Presentations&lt;br&gt;Room 209&lt;br&gt;• Section on Biologics and Basic Research: Implications of Modifiable Patient Factors on Bone Biology and Fusion&lt;br&gt;Room 205A&lt;br&gt;• Section on Robotics and Navigation&lt;br&gt;Room 205B&lt;br&gt;• Section on Spine Motion Technology Abstract Presentations&lt;br&gt;Room 205C&lt;br&gt;<strong>Innovative Technology Presentations</strong>&lt;br&gt;(Non-CME Session)&lt;br&gt;Room 208</td>
</tr>
<tr>
<td>3:10–3:40 p.m.</td>
<td><strong>Networking Break</strong> Beverage Service&lt;br&gt;Technical Exhibition&lt;br&gt;<strong>Exercise Video Demonstrations</strong>&lt;br&gt;The Learning Place&lt;br&gt;Technical Exhibition, Booth #1900&lt;br&gt;<strong>Members’ Business Meeting</strong>&lt;br&gt;Room 206A&lt;br&gt;<strong>Practical Theater:</strong>&lt;br&gt;MACRA 101-CMS Quality Payment Programs: MIPS and APMs&lt;br&gt;The Learning Place&lt;br&gt;Technical Exhibition, Booth #1900&lt;br&gt;<strong>Poster Grand Rounds</strong>&lt;br&gt;The Learning Place&lt;br&gt;Technical Exhibition, Booth #1900</td>
</tr>
<tr>
<td>3:40–5:10 p.m.</td>
<td><strong>Section Specialty Track:</strong>&lt;br&gt;• Section on Rehabilitation, Interventional and Medical Spine (RIMS): Metabolic Disease and Spine Outcomes&lt;br&gt;Room 210ABC&lt;br&gt;• Section on Minimally Invasive Procedures: Minimally Invasive Spine Procedures from A to Z&lt;br&gt;Room 209&lt;br&gt;• Section on Radiology: Spinal Imaging Pearls for Staying Out of Trouble and Detecting Problems When They Occur&lt;br&gt;Room 208&lt;br&gt;• Section on Biologics and Basic Research Abstract Presentations&lt;br&gt;Room 205A&lt;br&gt;• Section on Robotics and Navigation&lt;br&gt;Room 205B&lt;br&gt;• Section on Spine Motion Technology: Debating Options for Treating Painful Lumbar Disc Degeneration and Lumbar Stenosis&lt;br&gt;Room 205C</td>
</tr>
<tr>
<td>4:00–5:00 p.m.</td>
<td><strong>Committee Orientation Program</strong>&lt;br&gt;Room 206A</td>
</tr>
<tr>
<td>5:00–6:00 p.m.</td>
<td><strong>Resident, Fellow and Program Directors’ Reception</strong>&lt;br&gt;Top of Escalators, Level 2 West&lt;br&gt;<strong>Joint Sections of NASS Reception</strong>&lt;br&gt;Top of Escalators, Level 2 West</td>
</tr>
<tr>
<td>5:00–8:00 p.m.</td>
<td><strong>Surgical Innovation Lab Workshops</strong>&lt;br&gt;The Learning Place&lt;br&gt;Technical Exhibition, Booth #1900</td>
</tr>
</tbody>
</table>
**Friday, October 28**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
</table>
| 6:30–8:00 a.m. | **Continental Breakfast**  
Outside General Session (Room 210ABC)                                    |
| 7:00 a.m.–5:00 p.m. | **Attendee Registration**  
Lobby—Level 1 West                                                     |
| 7:20–7:25 a.m. | **Announcements**  
Room 210ABC                                                             |
| 7:25–7:30 a.m. | **NASS Working for You:** Advocacy Update  
Room 210ABC                                                            |
| 7:30–8:15 a.m. | **Global Spine Forum:** AOSpine: Current Concepts in the Treatment of Complex Cervical Spine Disorders  
Room 206A                                                             |
| 7:30–8:55 a.m. | **Interdisciplinary Symposium:** Low Back Pain Secondary to Degenerative Disc Disease: Interdisciplinary Perspectives on the Value of Treatment (AH)  
Room 210ABC                                                           |
| 7:30–10:00 a.m. | **Young Spine Surgeons Forum**  
Room 205B                                                               |
| 7:30 a.m.–4:00 p.m. | **Ticketed Session:** Optimizing Value and Outcomes in Spine Care: The Key Role of Psychologically-Informed Practice  
Room 211                                                              |
| 8:00–9:00 a.m. | **Interdisciplinary Spine Forum:** Section on Allied Health Abstract Presentations  
Room 205C                                                             |
| 8:00–10:00 a.m. | **Surgical Innovation Lab Demos**  
The Learning Place Technical Exhibition, Booth #1900                  |
| 8:00 a.m.–1:00 p.m. | **Exhibitor Registration**  
Lobby—Level 1 West                                                      |
| 8:15–8:45 a.m. | **Global Spine Forum:** Italian and European Society of Neuroradiology  
Room 206A                                                             |
| 8:45–9:30 a.m. | **Global Spine Forum:** Chinese Orthopaedic Association  
Room 206A                                                           |
| 8:55–9:00 a.m. | **NASS Working for You:** Payor Policy Review Committee Update  
Room 210ABC                                                            |
| 9:00–10:00 a.m. | **Best Papers:**  
Disc Replacement and Socioeconomics  
Room 210ABC                                                             |
| 9:00 a.m.–12:00 p.m. | **Interdisciplinary Spine Forum:** Shoulder-Neck Syndromes: Evaluation and Treatment of Patients with Concurrent Neck Pain and Upper Quarter Pathology (AH)  
Room 205C                                                             |
| 9:00 a.m.–1:30 p.m. | **Technical Exhibition**  
Technical Exhibition                                                      |
| 10:00–10:30 a.m. | **Networking Break**  
Beverage Service Technical Exhibition                                    |
| 10:00–12:00 p.m. | **Exercise Video Demonstrations**  
The Learning Place Technical Exhibition, Booth #1900                  |
| 10:00–1:30 p.m. | **Practical Theater:**  
MACRA 101-CMS Quality Payment Programs: MIPS and APMs  
The Learning Place Technical Exhibition, Booth #1900                  |
| 10:30 a.m.–12:00 p.m. | **Poster Grand Rounds**  
The Learning Place Technical Exhibition, Booth #1900                  |
| 10:30 a.m.–12:00 p.m. | **NASS Recognition Awards Presentation** (10:30–10:40)  
NASS Research Grant and Fellowship Awards Presentations (10:40–12:00)  
Room 210ABC                                                            |
| 10:30 a.m.–12:00 p.m. | **Abstract Presentations:**  
Spine Surgery in the Elderly Population  
Room 209                                                               |
| 10:30 a.m.–12:00 p.m. | Low Back Pain and Imaging Modalities  
Room 208                                                               |
| 10:30 a.m.–12:00 p.m. | Cervical andThoracolumbar Deformity  
Room 205A                                                               |
| 10:30 a.m.–12:00 p.m. | Spinal Tumors  
Room 205B                                                               |
| 10:30 a.m.–12:00 p.m. | **Global Spine Forum Symposium:** Challenges in Spine Care: Life as a Spine Surgeon  
Room 206A                                                               |

*AH*: Accredited for Allied Health Continuing Education  
*: Requires separate registration fee
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>10:30 a.m.–6:00 p.m.</td>
<td><strong>Ticketed Hands-on Course:</strong> Fundamentals of Spine Surgery and Interventional Pain Management Resident/Fellow Training Course The Learning Place, Orange Theater Technical Exhibition, Booth #1900</td>
</tr>
<tr>
<td>11:00 a.m.–1:30 p.m.</td>
<td><strong>NASS Bistro</strong> Technical Exhibition, Booth #272</td>
</tr>
<tr>
<td>12:00–1:00 p.m.</td>
<td><strong>Complimentary Box Lunch</strong> Medical Attendees Only Technical Exhibition, Booth #773</td>
</tr>
<tr>
<td>1:00–1:45 p.m.</td>
<td><strong>Global Spine Forum:</strong> Chinese Association of Orthopedic Surgeons Room 206A</td>
</tr>
<tr>
<td>1:00–2:45 p.m.</td>
<td><strong>Interdisciplinary Spine Forum:</strong> Whiplash-associated Disorders (WAD): A Biopsychosocial Perspective on Its Assessment and Management: Part 1 Room 205C</td>
</tr>
<tr>
<td>1:10–1:15 p.m.</td>
<td><strong>NASS Working for You:</strong> Leaders of Congressional Healthcare Committees Room 210ABC</td>
</tr>
</tbody>
</table>
| 1:15–2:45 p.m. | **Symposia:**  
  - Intradiscal Biologic Therapy Room 210ABC  
  - Managing the Delivery of Spine Care: What Can Healthcare Learn from the Business Community Room 209  
  - Allografts for Spinal Fusion: Rethinking Dogma Room 208  
  **Abstract Presentations:**  
  - Deformity Complications Room 205A |
| 1:45–2:30 p.m. | **Global Spine Forum:** ArabSpine/Dubai International Spine Room 206A |
| 2:30–3:15 p.m. | **Global Spine Forum:** Brazilian Spine Society Room 206A |
| 2:45–3:15 p.m. | **Networking Break** Beverage Service Top of Escalators, Level 2 West |
| 3:15–3:20 p.m. | **NASS Working for You:** Spine Safety Update Room 210ABC |
| 3:15–4:00 p.m. | **Global Spine Forum:** Indonesian Spine Society Room 206A |
| 3:15–4:45 p.m. | **Interdisciplinary Spine Forum:** Whiplash-associated Disorders (WAD): A Biopsychosocial Perspective on Its Assessment and Management: Part 2 Room 205C |
| 3:20–3:50 p.m. | **Value Abstract Awards Presentations** Room 210ABC  
  **Resident and Fellow Research Awards Presentations** Room 209 |
| 3:50–4:50 p.m. | **Abstract Presentations:**  
  - Anterior Cervical and Complications Room 210ABC  
  - Epidemiology Room 209  
  - Socioeconomics and Surgical Decision Making Room 208  
  - Deformity/Sagittal Alignment Room 205A  
  - Biomechanics Room 205B |
| 4:00–4:45 p.m. | **Global Spine Forum:** Saudi Spine Society Room 206A |
| 4:45–5:45 p.m. | **International Reception** Top of Escalators, Level 2 West |
### Saturday, October 29

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
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<tbody>
<tr>
<td>7:00–9:00 a.m.</td>
<td><strong>Continental Breakfast</strong></td>
<td>Top of Escalators, Level 2 West</td>
</tr>
<tr>
<td>7:00 a.m.–12:00 p.m.</td>
<td><strong>Attendee Registration</strong></td>
<td>Lobby—Level 1 West</td>
</tr>
<tr>
<td>7:25–7:30 a.m.</td>
<td><strong>Announcements</strong></td>
<td>Room 205A</td>
</tr>
<tr>
<td>7:30–9:00 a.m.</td>
<td><strong>Symposium:</strong> Spinal Cord Stimulation and Function</td>
<td>Room 205A</td>
</tr>
<tr>
<td>7:30 a.m.–1:00 p.m.</td>
<td><strong>Ticketed Session: [AH]</strong> Optimizing Value and Outcomes in Spine Care: The Key Role of Psychologically-Informed Practice (Continued)</td>
<td>Room 211</td>
</tr>
<tr>
<td>7:30 a.m–2:00 p.m.</td>
<td><strong>Ticketed Hands-on Course:</strong> [AH] Fundamentals of Spine Surgery and Interventional Pain Management Resident/Fellow Training Course (Continued) The Learning Place, Orange Theater Technical Exhibition, Booth #1900</td>
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<tr>
<td>9:00–10:00 a.m.</td>
<td><strong>Abstract Presentations:</strong></td>
<td></td>
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<tr>
<td></td>
<td>• Lumbar Stenosis</td>
<td>Room 205A</td>
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<tr>
<td></td>
<td>• Deformity Outcomes</td>
<td>Room 205B</td>
</tr>
<tr>
<td></td>
<td>• Biomechanics/Mechanical Testing</td>
<td>Room 205C</td>
</tr>
<tr>
<td>10:00–10:30 a.m.</td>
<td><strong>Networking Break</strong></td>
<td>Beverage Service</td>
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<tr>
<td></td>
<td><strong>Meeting Adjourns</strong></td>
<td>Top of Escalators, Level 2 West</td>
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<tr>
<td>10:30 a.m.–12:00 p.m.</td>
<td><strong>Symposia:</strong></td>
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<td></td>
<td>• Improving Outcomes and Reducing Complications for the Surgical Treatment of Degenerative Lumbar Scoliosis [AH]</td>
<td>Room 205A</td>
</tr>
<tr>
<td></td>
<td>• Management of High Risk and Cancer Patients: Fast-track Recovery ERAS and Beyond [AH]</td>
<td>Room 205B</td>
</tr>
<tr>
<td></td>
<td>• Changing Behavior through Physical Therapy: Improving Patient Outcomes [AH]</td>
<td>Room 205C</td>
</tr>
</tbody>
</table>

[AH]: Accredited for Allied Health Continuing Education
- : Requires separate registration fee
7:30 a.m.–4:00 p.m.
**Ticketed Session:**
**Coding Update 2016: Essentials and Controversies of Spine Care Coding**
Room 206A
Chair: Donna M. Lahey, RNFA

This timely and highly interactive course is led by expert physician faculty who provide comprehensive coding information you can immediately use to maximize reimbursement. Coding Update covers the latest information on ICD-10, E&M coding, and CPT4 coding of surgical, medical and radiologic procedures.

Participants will leave this course with tips on how to navigate through the authorization and denial process, utilize Medicare NCCI edits, and properly document to receive reimbursement.

Additionally, participants will have the opportunity to meet one-on-one with physician faculty who lead NASS’ CPT, RUC and reimbursement efforts; participate in “real op notes” hands-on coding sessions and be part of an interactive panel discussion with leading experts in the spine coding industry.

**Upon completion of this course, participants should gain strategies to:**
- Become familiar with coding updates for 2016 including new CPT codes, modifiers, NCCI edits, and OIG work plan changes;
- Correlate correct coding with practice reimbursement ensuring that every procedure is reimbursed at its highest allowable level;
- Recognize the relationship between proper diagnostic (ICD-10) and procedural coding (CPT4) and how to link them to avoid denials;
- Learn the elements required for complete and accurate documentation for E&M coding, and medical and surgical procedure notes;
- Take advantage of government incentive programs and avoid penalties (EHR, value-based payment modifier);
- Understand the accurate use of modifiers and their impact on reimbursement;
- Define coding issues which negatively impact reimbursement and trigger audits;
- Effectively and accurately code interventional injection procedures and neurologic testing;
- Utilize payer reimbursement policies and guidelines to avoid claim denials and obtain proper authorization;
- Effectively incorporate teachings of this course into their practice.

NASS designates this live activity for a maximum of 12.5 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

The American Medical Association has determined that physicians not licensed in the US to participate in this CME activity are eligible for AMA PRA Category 1 Credits™.

This program meets AAPC guidelines for 12.5 CEUs (6.5 Day 1; 6 Day 2). Can be applied to Core A and CANPC, CASCC, CEMC, COSC specialties for continuing education units.

8:00 a.m.–5:00 p.m.
**Exhibitor Registration**
Lobby—Level 1 West
6:30 a.m.—4:30 p.m.
Attendee Registration
Lobby—Level 1 West

7:30 a.m.—4:00 p.m.
Ticketed Session:
Coding Update 2016: Essentials and Controversies of Spine Care Coding (Continued)
Room 206A

7:30 a.m.—4:30 p.m.
Ticketed Hands-on Course:
Minimally Invasive Spine Surgery
Room 205C
Chairs: Michael Y. Wang, MD, FACS; Sheeraz A. Qureshi, MD, MBA

This course will provide a targeted focus on current minimally invasive techniques to the spine, including posterior, lateral, OLIF, navigation, robotic and endoscopy techniques. A short didactic lecture section will be followed by a comprehensive program that will afford attendees an opportunity for guided practice in the hands-on cadaver bioskills lab. Space will be limited to maximize hands-on time for the participants.

Upon completion of this course, participants should gain strategies to:
› Recognize the theories behind MIS spine techniques;
› Describe the benefits of each approach to the spine through minimally invasive techniques;
› Integrate Navigation/Robotics into a minimally invasive practice setting;
› Avoid complications through anatomic considerations;
› Recognize the common complications of each approach to the spine using minimally invasive techniques;
› Apply the principles and techniques acquired directly into their patient care of simple and complex spinal disorders.

The North American Spine Society designates this live activity for a maximum of 7.5 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.
Wednesday, October 26

6:30–8:00 a.m.
Continental Breakfast
Outside General Session (Room 210ABC)

6:30 a.m.–5:00 p.m.
Attendee Registration
Lobby—Level 1 West

7:00 a.m.–5:00 p.m.
Exhibitor Registration
Lobby—Level 1 West

7:25–7:30 a.m.
Welcome Remarks
Room 210ABC

7:30–7:35 a.m.
NASS Working for You: Spine Registry Update
Room 210ABC
Moderator: Daniel K. Resnick, MD, MS

7:35–9:00 a.m.
Interdisciplinary Symposium: Own the Bone®: Establishing a Fracture Liaison Service and Preventing the Next Vertebral Fracture
Room 210ABC
Moderator: Paul A. Anderson, MD

Fragility fractures have a major impact, not only on the patient, but on their families and on society as a whole. Fractures due to osteoporosis or low bone mass are responsible for more than 432,000 hospital admissions, nearly 2.5 million physician office visits, and about 180,000 nursing home admissions annually. Spine fractures result in some 150,000 hospital admissions each year, and the actual incidence of vertebral fractures is likely much greater given the large number that go undetected. In 2001, the annual US medical cost for vertebral fracture management was estimated at $13.8 billion; since then, that figure is likely to have increased with a growing elderly population.

This symposium introduces the spine community to fracture liaison service models of care which help implement a systems-based approach to the identification, evaluation and bone health treatment of patients with fragility fractures. Fragility fracture programs have shown significant improvement in patients receiving appropriate testing and bone health treatment, and have been shown to reduce subsequent osteoporotic-related fractures. The American Orthopedic Association offers a quality improvement program, Own the Bone®, to encourage orthopedic surgeons to become involved in the management and initiation of care coordination for patients who have fragility fractures. The program includes education to patients and practitioners, and the dissemination of best practices employed, such as active co-management of the patient’s osteoporosis with other specialties and primary care physicians.

Spine practitioners in their practices today are likely to confront both greater numbers of fragility fracture patients and greater expectations that they will diagnose and treat the underlying basis of these fragility fractures. This symposium introduces strategies to provide the necessary leadership to establish fracture liaison services, operate these programs, and effectively initiate care coordination to diminish their patients’ risk of fracture recurrence.

Upon completion of this session, participants should gain strategies to:

- Recognize the value to patients of fracture liaison services;
- Motivate spine practitioners to diagnosis and begin medical management of patients with metabolic bone disease;
- Analyze multidisciplinary implementation considerations for fragility fracture service or fracture liaison service model of care for secondary fracture prevention;
- Review successful strategies for establishing and running their fragility fracture services.

Agenda

- Introduction
  Paul A. Anderson, MD
- Own the Bone®: The American Orthopedic Association’s Initiative to Improve Bone Health
  Kyle J. Jeray, MD
- The Treatment Gap: Why We Need Secondary Fracture Prevention
  Christopher M. Bono, MD
Starting a Fragility Fracture Program: Getting Administrators on Board
Paul A. Anderson, MD

How Our Hospital Did It
Kyle J. Jeray, MD

Starting a Fragility Fracture Practice: What to Test and When to Get Help
Joseph M. Lane, MD

Discussion, Questions and Answers
All Faculty

FDA Device/Drug Status:
Joseph M. Lane, MD: Bisphosphonates; PTH (1-34): Approved for this indication.

8:00–9:00 a.m.
Innovative Technology Presentations
Non-CME Session
Room 209
Moderator: Edward J. Dohring, MD

8:00–8:05 a.m.
Orthofix, Inc.: Evaluation of a Novel PEEK Titanium Composite (PTC) Interbody Cage in an Ovine Lumbar Interbody Fusion
Erik I. Waldorff, PhD³; Christian M. Puttlitz, PhD²; Howard B. Seim III, DVM³; Jeremiah T. Easley, DVM³; James T. Ryaby, PhD¹; Kirk McGilvray, PhD⁴¹Orthofix, Lewisville, TX, US; ²Colorado State University, Fort Collins, CO, US; ³Preclinical Surgical Research Laboratory, Colorado State University, Fort Collins, CO, US; ⁴Colorado State University OBRL, Fort Collins, CO, US
FDA Device/Drug Status: FORZA® PEEK Titanium Composite (PTC™) Spacer System (Approved for this indication)

8:05–8:10 a.m.
LinkSPINE: Bilateral Lumbar Fixation Following Microsurgical Decompression from a Unilateral Approach
John (Sean) P. Malloy IV, DO, PT, ATC²; Christopher D. Chaput, MD³; Faheem Sandhu¹; Nestor Rodriguez-Martinez, MD⁴; Neil Crawford, PhD⁵; Anna G. Newcomb, MS⁶¹East Coast Orthopaedics, PA, Pompano Beach, FL, US; ²Scott & White Hospital, Temple, TX, US; ³Washington, DC, US; ⁴Phoenix, AZ, US; ⁵Globus Medical, Phoenix, AZ, US; ⁶BNI Spinal Biomechanics Lab, Phoenix, AZ, US
FDA Device/Drug Status: FacetLINK HEMI Device (Approved for this indication)

8:10–8:15 a.m.
Diffusion, Inc.: Evaluating the In Vivo Osseoconductive and Osseointegrative Properties of a Novel PEEK-Zeolite Biomaterial in a Critical Sized Rabbit Femoral Defect Model
Sriram Sankar, MSc¹; Joseph J. Crudden, MD²; Paul E. Kraemer, MD³¹Diffusion Technologies Inc., Georgetown, TX, US; ²Austin, TX, US; ³Indiana Spine Group, Carmel, IN, US
FDA Device/Drug Status: PEEK-Zeolite (ZFuze™) (Investigational/Not approved), PEEK-Silver Zeolite (CleanFuze™) (Investigational/Not approved)

8:15–8:20 a.m.
Benvenue Medical Inc.: Multiexpandable Cage for Minimally Invasive Posterior Lumbar Interbody Fusion
Jeffrey D. Cooe, MD¹; Donald Kucharzyk, DO²; Kornelis A. Poelstra, MD, PhD³; Joshua M. Ammerman, MD⁴; James F. Zucherman, MD⁵; Debby Holmes Higgin, MS, MPH⁶; Sandeep Kunwar, MD⁷¹Silicon Valley Spine Institute, Campbell, CA, US; ²Orthopaedic, Pediatric & Spine Institute, Crown Point, IN, US; ³The Spine Institute on the Emerald Coast, Destin, FL, US; ⁴Washington Neurosurgical Associates, Washington, District of Columbia, US; ⁵St. Mary’s Spine Center, San Francisco, CA, US; ⁶Benvenue Medical, Santa Clara, CA, US; ⁷Fremont, CA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

8:20–8:30 a.m.
Discussion

8:30–8:35 a.m.
Globus Medical: In Vitro Analysis of Stability and Potential Risks Associated with an Experimental Anterior Interbody Device with Anchors: A Biomechanical and Microtomography Study
Aaron Danison, DO¹; Jonathan Harris²; Mir Hussain³; Thomas Frimpong, DO, DO⁴; Wenhai Wang, PhD⁵; Brandon Bucklen, PhD⁶¹Carilion Clinic, Roanoke, VA, US; ²Globus Medical Inc., Audubon, PA, US; ³Bassett Medical Center, Cooperstown, NY, US
FDA Device/Drug Status: LDR ROI-A (Approved for this indication), Independence MIS (Investigational/Not approved)
8:40–8:45 a.m.
**Tyber Medical, LLC: Reduced Bacterial Growth on Titanium Screws with Nanophase TiO2 Surface Treatment**

Thomas J. Webster, PhD1; Ira L. Fedder, MD2; Garima Bhardwaj3

1Northeastern University, Boston, MA, US; 2Orthopaedic Associates, Baltimore, MD, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

8:45–8:50 a.m.
**Paradigm Spine, LLC: Can Interlaminar Stabilization Provide Durable, Clinically Effective Treatment after Decompression?**

Celeste Abjornson, PhD1; Frank P. Cammisa, MD

Hospital for Special Surgery, New York, NY, US

**FDA Device/Drug Status:** Coffex (Approved for this indication)

8:50–9:00 a.m.
**Discussion**

8:00–10:00 a.m.
**Surgical Innovation Lab Demonstrations**

The Learning Place, Technical Exhibition, Booth #1900

- **Alphatec Spine Complex Solutions Workshop**
  - Blue Lab
- **Introduction to Mazor Robotics’ Newest Surgical Assurance Platform for Spine Surgery, the Mazor X Yellow Lab**

9:00–10:00 a.m.
**Best Papers: Cervical Myelopathy**

Room 210ABC

**Moderator:** Alan S. Hilibrand, MD

9:00–9:06 a.m.
**1. Guidelines for the Management of Patients with Degenerative Cervical Myelopathy**

Lindsay Tetreault, PhD1; Bizhan Aarabi, MD, FACS, FRCSC; Paul M. Arnold, MD2; Darrel S. Brodkin, MD3; Anthony Burns, MD, MSc4; Simon Carette, MD5; Robert Chen, MD6; Kazuhiro Chiba, MD, PhD7; Joseph R. Dettori, MPH, PhD8; Julie C. Furlan, MD, PhD, MBA9; James S. Harrop, MD10; Langston T. Holly, MD11; Sukhvinder Kalsi-Ryan, PT, MS, PhD12; Mark Kotter, MD, PhD13; Brian K. Kwon, MD, PhD, FRCSC14; Allan Martin, MD15; James Middleton, MBBS, PhD16; James Milligan, MD17; Hiroaki Nakashima, MD18; Narihito Nagoshi, MD, PhD19; John M. Rheem, MD20; K. Daniel Riew, MD21; Mohammed F. Shamji, MD, PhD, FRCSC22; Anoushka Singh, PhD23; Andrea C. Skelly, PhD, MPH24; Jeffrey C. Wang, MD25; Sumeet Sodhi, MD, MPH26; Jeffrey Wilson, MD, PhD27; Albert J. Yee, MD, FRCSC28; Michael G. Fehlings, MD, PhD, FRCSC29

1University of Toronto, Oakville, ON, Canada; 2University of Maryland Medical Center, Department of Neurosurgery, Baltimore, MD, US;

3University of Kansas Medical Center/Department of Neurosurgery, Kansas City, KS, US; 4University Orthopaedic Center, Salt Lake City, UT, US; 5University Health Network - Toronto Rehabilitation Institute, Toronto, ON, Canada; 6Thomas Jefferson University Hospital, The Rothman Institute, Philadelphia, PA, US; 7University of Maryland, Baltimore, MD, US; 8University of Toronto, Toronto, ON, Canada; 9Division of Orthopaedic Surgery, Department of Medicine, Nagoya University, Nagoya, Japan; 10Department of Orthothopaedic Surgery, National Defense Medical College, Tokyo, Japan; 11Department of Orthopaedic Surgery, University of British Columbia, Vancouver, BC, Canada; 12University of British Columbia, Vancouver, BC, Canada; 13Departments of Orthopaedic Surgery and Rehabilitation Medicine, Boston University School of Medicine, Boston, MA, US; 14University of Washington, Seattle, WA, US; 15Rothman Institute, Philadelphia, PA, US; 16UCLA Neurosurgery, Santa Monica, CA, US; 17University of Cambridge, Cambridge, UK; 18Rothman Institute, Philadelphia, PA, US; 19The Spine Hospital/Columbia Doctors/ New York-Presbyterian/The Allen Hospital, New York, NY, US; 20University of Toronto, Toronto, ON, Canada; 21Spectrum Research, Inc., Tacoma, WA, US; 22USC Spine Center, Los Angeles, CA, US; 23Sunnybrook Health Sciences Centre, Toronto, ON, Canada

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

9:06–9:12 a.m.
**2. Outcomes of Treatment for Cervical Myelopathy**

Kristen Nicholson, PhD1; Paul W. Millhouse, MD, MBA2; Emily Pflug, BS3; Barrett Woods, MD4; Christopher K. Kepler, MD, MBA5; Mark F. Kurd, MD6; D. Greg Anderson, MD7; Jeffrey A. Rihn, MD8; Alan S. Hilibrand, MD9; Alexander R. Vaccaro, MD, PhD10; Gregory D. Schroeder, MD11; Kris E. Radcliff, MD12

1Philadelphia, PA, US; 2Rothman Institute, Philadelphia, PA, US; 3Sidney Kimmel Medical College at Thomas Jefferson University, Philadelphia, PA, US; 4Rothman Institute, Bryn Mawr, PA, US; 5Penn Presbyterian Medical Center, Philadelphia, PA, US; 6Thomas Jefferson University Hospital, Egg Harbor Township, NJ, US; 7Rothman Institute, Philadelphia, PA, US; 8Rothman Institute, Thomas Jefferson University, Philadelphia, PA, US; 9University of Minnesota, Twin Cities, Minneapolis, MN, US; 10University of Kansas Medical Center/Department of Neurosurgery, Kansas City, KS, US; 11University of Sydney, Sydney, NSW, Australia; 12University of Cambridge, Cambridge, UK; 13University of California, San Francisco, CA, US; 14University of Utah, Salt Lake City, UT, US; 15The University of Sydney (John Walsh Centre for Rehabilitation Research, Kolling Institute of Medical Research), Sydney, NSW, Australia; 16The Centre for Family Medicine, Kitchener, ON, Canada; 17Nagoya University Graduate School of Medicine, Department of Orthopedic Surgery, Nagoya, Japan; 18Emory University, Atlanta, GA, US; 19The Spine Hospital/Columbia Doctors/New York-Presbyterian/The Allen Hospital, New York, NY, US; 20Department of Orthopaedic Surgery, National Defense Medical College, Tokyo, Japan; 21Department of Orthopaedic Surgery, National Defense Medical College, Tokyo, Japan; 22Department of Orthopaedic Surgery, National Defense Medical College, Tokyo, Japan

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

9:12–9:18 a.m.
**3. Does Sagittal Balance Influence the Surgical Outcomes of Patients with Cervical Myelopathy?**

Paul W. Millhouse, MD, MBA1; Kristen Nicholson, PhD2; Emily Pflug, BS3; Barrett Woods, MD4; Gregory D. Schroeder, MD5; Christie E. Stawicki6; D. Greg Anderson, MD7; Alan S. Hilibrand, MD8; Christopher K. Kepler, MD, MBA9; Mark F. Kurd, MD10; Jeffrey A. Rihn, MD11; Alexander R. Vaccaro, MD, PhD12; Kris E. Radcliff, MD13


**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.
Wednesday, October 26

9:18–9:24 a.m.
4. Is it Necessary to Extend a Multilevel Posterior Cervical Decompression and Fusion to the Upper Thoracic Spine?

Gregory D. Schroeder, MD; Christopher K. Kepler, MD, MBA; Mark F. Kurd, MD; Paul W. Millhouse, MD, MBA; Priyanka Kumar, BA; Loren Mead; Kristen Nicholson, PhD; Christie E. Stawicki; Andrew Helbert; Daniella Fasciano; Kris E. Radcliff, MD; Jeffrey A. Rihn, MD; D. Greg Anderson, MD; Alan S. Hilibrand, MD; Alexander R. Vaccaro, MD, PhD


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

9:24–9:30 a.m.
5. Empty PEEK Cages in ACDF: Does Partial Titanium Coating Improve the Radiographic Fusion?

Michael Hanna, PhD; Andreas Kotsias, MD; Olaf Suess, MD, PhD

1Mercury Spine Healthcare Consulting, New York, NY, US; 2Queen Elizabeth Central Hospital, Blantyre, Malawi; 3DRK Kliniken Berlin I Westend, Berlin, Germany

FDA Device/Drug Status: “Shell” cervical cages (was AMT, then Medtronic, now not available) (Approved for this indication)

9:30–9:36 a.m.
6. The Effect of Smoking on Spinal Cord Healing Following Surgical Treatment for Cervical Myelopathy

David Kusin, MD; Nicholas U. Ahn, MD

1University of Nebraska Medical Center, Omaha, NE, US; 2University Hospital of Cleveland/Department of Orthopedic Surgery, Cleveland, OH, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

9:36–9:42 a.m.
7. Tobacco Smoking and Outcomes of Decompressive Surgery in Patients with Symptomatic Degenerative Cervical Myelopathy

Paul M. Arnold, MD; Branko Kopjar, MD, PhD; Lindsay Tetreault, PhD; Hiroaki Nakashima, MD; Michael G. Fehlings, MD, PhD, FRCSC

1University of Kansas Medical Center/Department of Neurosurgery, Kansas City, KS, US; 2University of Washington, Seattle, WA, US; 3University of Toronto, Oakville, ON, Canada; 4Nagoya University Graduate School of Medicine, Department of Orthopedic Surgery, Nagoya, Japan; 5Toronto Western Hospital, Toronto, ON, Canada

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

9:42–10:00 a.m.
Discussion

9:00–11:00 a.m.
Leadership Development and Training: Communication and Self-awareness

Room 206A
Moderator: Mitchel Harris, MD, FACS

The Leadership Development Program provides an opportunity for individuals to enhance their leadership skills within the ever changing healthcare environment and expand the pool of well-qualified candidates ready for advancement. Whether you’re looking to build your own skills, those of a committee or even an entire organization, look to the NASS Leadership Development Program to gain knowledge and expertise from highly qualified faculty. The Leadership Development Program helps develop leaders who lead with a vision of a better future.

For more than ten years, Mary Crane has delivered high energy, high impact programs to leading universities, Fortune 500 companies and AMLaw 100 law firms. Her fundamental message has remained the same: While an individual’s IQ and GPA helps open doors, critically important people skills ultimately land the job, close the deal and help build teams that transform organizations. Her seminars provide participants with the skills they need to put their best, most effective selves forward. Crane is the creator of the 100 Things You Need To Know book series. Premised on the belief that no one professional needs to know everything, Crane maintains that professionals who know the 100 most important things about a particular subject area possess the critical information they need to succeed. Topics covered include: “Starting Work” (May 2013); “Networking” (December 2013); “Business Etiquette” (2014); “Getting Along with Others” (2014); and “Managing Projects & Time” (2015).

Crane is a graduate of the University of Missouri-Columbia and George Washington University Law School. She is also a graduate of the Culinary Institute of America, where she studied tortes after studying torts. She has worked for entities as diverse as the American Petroleum Institute and the American Heart Association. Get this: she’s also a former White House assistant chef. Crane has been featured on 60 Minutes. She is a regular contributor to Let’s Talk Live, a Washington, D.C. news-talk program. She has been quoted extensively in a variety of print and electronic media, including The New York Times, The Wall Street Journal, Forbes.com, Fortune.com, and CNN.com.

Upon completion of this session, participants should gain strategies to:
• Acquire skills to become a stronger leader who can build a shared vision, improve teamwork and increase productivity within the organization;
• Develop a personal action to create a greater impact in the organization.
Interdisciplinary Spine Forum: Early Return to Work
Room 205C
Moderator: Marco Campello, PhD, PT

Work disability from spine-related injuries poses a major burden to society in the form of suffering and cost associated with treatment and work-loss time. There is evidence that early coordinated efforts to return injured workers back to the workplace or maintain them at work during an episode of spine pain is successful. This approach is a collaboration among different stakeholders including workplace management and supervisor staff, occupational healthcare providers, claims adjusters, case coordinators, treating team members, and patients. This session is intended to provide the perspective of various stakeholders and to propose a model for coordinated care.

Upon completion of this session, participants should gain strategies to:

- Understand the scope of the problem;
- Understand the role of different stakeholders in managing patients;
- Learn strategies to manage patients with work disabling back pain.

Agenda

- Scope of the Problem: The Burden of Spine-related Work Disability
  Margareta Nordin, Dr.Med.Sci.
- Patient Conundrum: Navigating the Workers Comp Maze
  Sherri Weiser, PhD
- Presenteeism
  Marco Campello, PT, PhD
- Your Words Are Part of the Treatment and Can Help Patients Keep Their Jobs
  Jennifer Christian, MD, MPH
- Discussion
- Early Rehabilitation: It Takes a Village (RTW Models)
  Pierre Côté, DC, PhD
- Assessing Work Ability: What is the Evidence?
  Douglas Gross, PhD
- Employer Perspective: What Can Supervisors and Upper Management Do to Reduce Disability?
  William Shaw, PhD
- How Do We Pull It All Together?
  Faculty Panel, Moderator: Margareta Nordin, Dr.Med.Sci.
10:00–10:30 a.m.

Poster Grand Rounds
The Learning Place, Green Theater
Technical Exhibition, Booth #1900

10:00–10:15 a.m.
P8. Multi-Level Histopathological Analysis of an Ovine Cervical Spine Intervertebral Disc Degeneration Model
Christopher J. Colloca, DC, PhD
International Spine Research Foundation, Chandler, AZ, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:15–10:30 a.m.
P25. Impact of Irrigation and Debridement on Interbody Fusion Rate Following Index Lumbar Spine Surgery
Timothy Y. Wang1; Oren N. Gottfried, MD2
1Duke University Medical Center, Durham, NC, US; 2Duke University, Durham, NC, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:00–10:30 a.m.

Poster Grand Rounds
The Learning Place, Blue Theater
Technical Exhibition, Booth #1900

10:00–10:15 a.m.
P53. Psoas Size Predicts Perioperative Morbidity after Lumbar Spine Surgery
Hesham Zakaria, MD1; Azam Basheer, MD2; Brent Griffith, MD3; Victor Chang, MD3
1Henry Ford Hospital, Detroit, MI, US; 2Henry Ford Health System, Detroit, MI, US; 3Henry Ford West Bloomfield Hospital, West Bloomfield, MI, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:15–10:30 a.m.
P51. Psoas Size Predicts Survival in Patients with Lung Cancer Metastasis to the Spine
Hesham Zakaria, MD1; Azam Basheer, MD2; David Boyce-Fappiano, BS3; Erinna Elbe, BS3; Ian Lee, MD1; Brent Griffith, MD2; Farzan Siddiqui, MD, PhD2; Victor Chang, MD4
1Henry Ford Hospital, Detroit, MI, US; 2Henry Ford Health System, Detroit, MI, US; 3Detroit, MI, US; 4Henry Ford West Bloomfield Hospital, West Bloomfield, MI, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:30–10:35 a.m.

NASS Working for You: Coverage Update
Room 210ABC
Moderator: John A. Glaser, MD
Recent controversies surrounding the Affordable Care Act (ACA), such as the announcement by one of the nation’s top insurance companies that it would no longer offer plans on the government-run state health insurance exchanges and the collapse of more than half of the federally funded insurance cooperatives, suggest that we may be witnessing the beginning of the unraveling of the ACA. Can we afford to let the current healthcare system crash or do viable alternatives that better support the needs of patients and providers exist? Moreover, what will be the fate of the ACA under a new Administration and Congress and will the two branches work together to fix or repeal the law? This symposium will examine how well spine specialists have fared under the ACA and shed light on alternative proposals currently being offered by the 2016 presidential candidates and members of Congress. Other key healthcare trends in 2017 will also be analyzed in the context of the new Congress and how this will impact NASS’ advocacy agenda moving forward. Finally, new Medicare payment reform efforts, such as the Medicare Access and CHIP Reauthorization Act (MACRA), seek to emphasize a more value and performance-based system through a variety of new payment models. These new payment structures will present many new challenges to spine care providers and the delivery of care. This session will focus on how the Centers for Medicare and Medicaid Services (CMS) is planning to implement the new Merit-Based Incentive Payment System (MIPS) and examine the role NASS is playing in the evolution of Alternative Payment Models (APMs) and bundled payments in spine care.

Upon completion of this session, participants should gain strategies to:

- Gain an in-depth understanding of NASS’ current federal legislative priorities and emerging trends in healthcare policy in Washington, DC;
- Discover recent trends in Medicare payment policies and how NASS has worked/is working with Congress and the Administration to promote appropriate payment and delivery reforms on behalf of the spine care professionals and patients.

Agenda

- Election 2016: What Are the Candidates Saying About Health Care and How Will This Effect Spine Care and Patients in the Years to Come?
  John G. Finkenberg, MD
- How are the politics of healthcare currently playing out in this year’s election, and what will be the major points of debate in the years to come?
- What are the major health care proposals being offered by the presidential candidates, and how they will affect spine care in the next Administration?
- Congressional Outlook on Healthcare Legislation and the Affordable Care Act in 2017
  David A. Wong, MD, MSc, FRCS
  - How will the outcomes of the 2016 elections affect the Congressional agenda in 2017?
  - Will a new Congress seize the opportunity to repeal and replace the ACA or push for modifications to improve its infrastructure?
  - How will this affect NASS’ ability to advocate on behalf of its core issues?
- Delivery System Reform, Medicare Payment Reform and MACRA Implementation
  Gregory J. Przybylski, MD
  - What are the hallmarks of the MACRA program?
  - What is NASS doing to promote fairness and flexibility in the establishment of these new payment models?
  - How CMS will implement the Merit-Based Incentive Payment System (MIPS) and incorporate new Alternative Payment Models (APMs) and bundled payments for spine care into future payment structures
- Questions and Answers
  Panel

This session will address topics including: adjacent segment disease (biology or biomechanics), single-level anterior cervical discectomy and fusion vs. total disc replacement (TDR) (critical review of the literature), and two-level disease (TDR and hybrid procedures). This interactive session allows time for open discussion and debate.

Upon completion of this session, participants should gain strategies to:

- Discuss the biology and biomechanics of adjacent segment disease;
- Review the current evidence regarding single level ACDF vs. TDR;
- Review the current evidence regarding 2-level TDR and “hybrid” procedures;
- Compare the clinical and radiographic outcomes of ACDF vs. TDR.
Agenda

- Introduction
  Jason W. Savage, MD and W. Mark Erwin, DC, PhD

- Adjacent Segment Disease: Biology or Biomechanics?
  James D. Kang, MD and Howard S. An, MD

- Single-level ACDF versus TDR: A Critical Review of the Literature
  Paul A. Anderson, MD

- Two-level Disease: TDR and Hybrid Procedures
  Jack E. Zigler, MD

- Debate and Discussion

FDA Device/Drug Status:

Paul A. Anderson, MD: Total disc replacements (Approved for this indication).
Jack E. Zigler, MD: Mobi-C CX ADR 2-Level (Approved for this indication); Prestige LP 2-Level (Approved for this indication); Prodisc-C 2-Level (Not approved for this indication); Hybrid Constructs (Not approved for this indication).

10:35 a.m.–12:00 p.m.
Room 208
Moderators: Ron Alkalay, PhD; Marco Ferrone, MD

This session will review the diagnosis, work-up and contemporary management of spinal column tumors. Upon completion of the program, participants will better understand the relevant anatomy and the important differences between metastasis and primary spinal column tumors, and how those differences impact appropriate management. Faculty also will address the important public health implications of this increasingly common problem.

Upon completion of this session, participants should gain strategies to:

- Understand the relevant anatomy and the important differences between metastasis and primary spinal column tumors and how those differences impact appropriate management.

Agenda

- Management of the New Lesion: When is a Work-up Needed?
  Marco L. Ferrone, MD

- Radiologic Predictions of Fracture Risk in Spinal Metastatic Disease
  David H. Hackney, MD

- Biomechanical Implications and Inference of Fracture Risk
  Ron N. Alkalay, PhD

- Spinal Radiation and its Role in Surgical Patients: Indications, Efficacy, Outcomes
  Lauren M. Hertan, MD

- Separation Surgery in the Treatment of Metastatic Spine Tumors: Why Less is More
  Mark H. Bilsky, MD

- Vertebral Augmentation: Minimally Invasive Anterior Load Sharing
  Michael W. Groff, MD

- Surgical Management of Metastatic Spine Lesions
  Mitchel Harris, MD, FACS

- Discussion

10:35 a.m.–12:00 p.m.
Abstract Presentations: Injections and Biologics
Room 205A
Moderator: Bradly S. Goodman, MD

10:35–10:41 a.m.
Levent O. Ulusoy, MD1; Selhan Karadereler, MD1; Ayhan Mutlu, MD1; Meric Enercan, MD1; Sinan Kahraman, MD1; Tunay Sanli, MA1; Mustafa Sirvanci, MD1; Azmi Hamzaoglu, MD1
1Istanbul Spine Center, Istanbul, Turkey

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:41–10:47 a.m.
Sung Hoon Kim; Sang-Heon Lee, MD, PhD2; Yongji Jeong, MD, PhD2; Park Hyeunjun, MD2; Nack Hwan Kim
2Korea University School of Medicine, Seoul, Democratic People’s Republic of Korea

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
10:47–10:53 a.m.  
10. Incidence of Serious Adverse Events Associated with Readmissions after Vertebral Augmentation Using an Expandable Implant: Follow-Up Analysis of KAST  
Douglas P. Beall, MD1; John Hornberger, MD, MS, FACP2; Jeffrey D. Coe, MD3; Qianyi Li, MS4; Mark McIlhuff, MBA, MS4; Daniel Bloch, PhD; Debby Holmes Higgin, MS, MPH5; Sean Tutton, MD6  
FDA Device/Drug Status: Kiva System, Benvenue Medical, Santa Clara, CA: Approved for this indication.

10:53–10:59 a.m.  
11. Peptide Amphiphile Nanoslurry as an Improved BMP-2 Carrier for Spinal Arthrodesis  
Joseph A. Weiner, BS1; Ralph W. Cook IV, BS1; Danielle S. Chun, BA1; Mark McClendon, PhD2; Sungsoo S. Lee, PhD2; Ryan Freshman, BS3; Michael S. Schallmo, BS4; Jonghwa Yun5; Chawon Yun, PhD5; Samuel I. Stupp, PhD5; Erin L. Hsu, PhD5; Wellington K. Hsu, MD5  
1Northwestern University, Chicago, IL, US; 2Department of Orthopaedic Surgery, Chicago, IL, US; 3Feinberg School of Medicine, Department of Orthopedic Surgery, Chicago, IL, US; 4Northwestern University Feinberg School of Medicine, Chicago, IL, US; 5Simpson Querrey Institute, Chicago, IL, US  

10:59–11:05 a.m.  
12. Sciatic Nerve Exposure to Non-Compressive Nucleus Puplosus Elicits and Acute Inflammatory Neuritis Mediated by Neurotrophin Expression  
Mohammed F. Shamji, MD, PhD, FRCSC  
University of Toronto, Toronto, ON, Canada  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:05–11:17 a.m.  
13. Effect of Oxy133, an Osteogenic Oxysterol, and rhBMP2 on New Bone Formation in Rat Posterolateral Fusion Model  
Zorica Buser, PhD5; Susan J. Drapeau, PhD5; Frank Stappenbeck, PhD5; Renata C. Pereira, PhD5; Farhad Parhami, PhD5; Jeffrey C. Wang, MD5  
5Hoffman Medical Research Center, Keck School of Medicine, USC, Los Angeles, CA, US; 2Vericel Corporation, Cambridge, MA, US; 3CA, US; 4UCLA, Los Angeles, CA, US; 5USC Spine Center, Los Angeles, CA, US  
FDA Device/Drug Status: rhBMP2 (Approved for this indication), Oxy133 (Not approved for this indication)

11:17–11:23 a.m.  
14. Effects of Combined Ovariectomy with Dexamethasone on Rat Lumbar Vertebrae  
Jiang Xiaobing, PhD  
1st Affiliated Hospital of Guangzhou University of Chinese Medicine, Guang Zhou City, China  
FDA Device/Drug Status: Dexamethasone (Approved for this indication)

11:23–11:29 a.m.  
15. Reduced Rate of Proximal Junctional Fractures Above Long Instrumented Constructs Utilizing a Tapered Dose of Vertebral Cement: A Biomechanical Study  
Joseph M. Zavatsky, MD1; David C. Briski, MD2  
1Spine & Scoliosis Specialists, Tampa, FL, US; 2Ochsner Medical Center, Jefferson, LA, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:35–11:41 a.m.  
16. Downstream Mechanisms Underlying the Deleterious Effects of Aryl Hydrocarbon Receptor Activation on Osteogenic Differentiation  
Michael S. Schallmo, BS1; Chawon Yun, PhD2; Danielle S. Chun, BA3; Joseph A. Weiner, BS3; Ralph W. Cook IV, BS4; Ryan Freshman, BS5; Jonghwa Yun6; Wellington K. Hsu, MD6; Erin L. Hsu, PhD6  
1Northwestern University Feinberg School of Medicine, Chicago, IL, US; 2Northwestern University, Chicago, IL, US; 3Department of Orthopaedic Surgery, Chicago, IL, US; 4Feinberg School of Medicine, Department of Orthopedic Surgery, Chicago, IL, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:41–11:47 a.m.  
17. Variance of Spinal Osteoporosis Induced by Dexamethasone and Methylprednisolone and its Associated Mechanism  
Jiang Xiaobing, PhD  
1st Affiliated Hospital of Guangzhou University of Chinese Medicine, Guang Zhou City, China  
FDA Device/Drug Status: dexamethasone (Approved for this indication), methylprednisolone (Approved for this indication)
10:35 a.m.–12:00 p.m.

**Abstract Presentations:**

**Complications**

**Room 205B**

**Moderator:** Alan S. Hilibrand, MD

**10:35–10:41 a.m.**

**18. Thromboembolic Disease in Adult Spinal Deformity Surgery: Incidence and Risk Factors in 737 Patients**

Han Jo Kim, MD1; Bassel G. Diebo, MD2; Sravisht Iyer, MD3; Michael P. Kelly, MD4; Daniel M. Sciubba, MD4; Frank J. Schwab, MD4; Virginie Lafage, PhD5; Gregory M. Mundis Jr., MD5; Christopher I. Shaffrey, MD5; Justin S. Smith, MD, PhD5; Robert A. Hart, MD5; Douglas C. Burton, MD5; Shay Bess, MD5; Christopher P. Ames, MD6; Eric O. Klineberg, MD6; International Spine Study Group7

1Hospital for Special Surgery, New York, NY, US; 2Washington University, Saint Louis, MO, US; 3John Hopkins University/School of Medicine, Baltimore, MD, US; 4Scripps Clinic Medical Group, Department of Orthopedics, La Jolla, CA, US; 5University of Virginia, Charlottesville, VA, US; 6UVA Health System, Charlottesville, VA, US; 7Oregon Health & Science University, Portland, OR, US; 8University of Kansas Medical Center, Kansas City, KS, US; 9Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 10Hospital for Specialty Care, Taunton, MA, US; 11Southwest Scoliosis Institute, Plano, TX, US; 12Baltimore, MD, US; 13University of Virginia, Charlottesville, VA, US; 14UVA Health System, Charlottesville, VA, US; 15Brighton, CO, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

**10:41–10:47 a.m.**

**19. The Effect of Ketorolac on Spinal Fusion: What is the Evidence?**

Jesse Li, BS1; Remi M. Ajiboye, MD, MPH2; Akshay Sharma, BA2; Adedayo O. Ashana, MD3; Tara Reza, BS3; Sina Pourtaheri, MD4

1UCLA Medical Center, Department of Orthopaedic Surgery, Los Angeles, CA, US; 2Case Western Reserve University School of Medicine, Cleveland, OH, US; 3University of Southern California, Los Angeles, CA, US

**FDA Device/Drug Status:** Ketorolac (brand name Toradol) approved for this indication.

**10:47–10:53 a.m.**

**20. Effect of Complications within 90-Days on Cost-Utility Following Lumbar Decompression with and without Fusion for Degenerative Spine Disease**

Silky Chotai, MD4; Ahilan Sivaganesan, MD4; Scott L. Parker, MD5; John A. Sielatycki, MD6; Joseph Wick, BA7; David Stanko, MS1; Matthew J. McGirt, MD8; Clinton J. Devlin, MD9

1Vanderbilt University Medical Center, Nashville, TN, US; 2Vanderbilt University, Nashville, TN, US; 3Vanderbilt University School of Medicine, Nashville, TN, US; 4Vanderbilt University School of Medicine, Nashville, TN, US; 5Carolina Neurosurgery & Spine Associates, Charlotte, NC, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

**10:53–10:59 a.m.**

**21. Obesity is Associated with Increased Major Complications Following Adult Spinal Deformity (ASD) Surgery Including Implant Failure, Wound Problems and Return to Surgery: A Propensity Score Matched Analysis**

Ryan T. Cassilly, MD1; Shay Bess, MD1; Breton Line, BS2; Alexandre Sorocceanu, MD, MPH3; Virginie Lafage, PhD4; Eric O. Klineberg, MD5; Christopher P. Ames, MD6; Douglas C. Burton, MD6; Munish C. Gupta, MD6; Gregory M. Mundis Jr., MD6; Robert A. Hart, MD7; Richard A. Hostin Jr., MD8; Khaled M. Kebaish, MD9; Han Jo Kim, MD4; Oheneba Boachie-Adjei, MD5; Frank J. Schwab, MD5; Christopher I. Shaffrey, MD5; Justin S. Smith, MD, PhD6; International Spine Study Group7

1Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 2Washington University School of Medicine, Saint Louis, MO, US; 3AO Foundation, Dübendorf, Switzerland; 4John Hopkins University/School of Medicine, Baltimore, MD, US; 5University of California, San Francisco, San Francisco, CA, US; 6Medical University of South Carolina, Charleston, SC, US; 7Oregon Health & Science University, Portland, OR, US; 8University of California, San Francisco, San Francisco, CA, US; 9Scripps Clinic Medical Group, Department of Orthopedics, La Jolla, CA, US; 10Oregon Health & Science University, Portland, OR, US; 11Southwest Scoliosis Institute, Plano, TX, US; 12Baltimore, MD, US; 13University of Virginia, Charlottesville, VA, US; 14UVA Health System, Charlottesville, VA, US; 15Brighton, CO, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.
23. Proximal Junctional Kyphosis (PJK) Can Be Predicted Following Adult Spinal Deformity (ASD) Surgery: Models Based on Regional Alignment Changes within the Fusion Area

Barthelemy Liabaud, MD1; Renaud Lafage, MSc1; Robert A. Hart, MD2; Frank J. Schwab, MD3; Justin S. Smith, MD4; Han Jo Kim, MD5; Richard A. Hostin Jr, MD6; Peter G. Passias, MD1; Christopher P. Ames, MD1; Gregory M. Mundis Jr, MD1; Douglas C. Burton, MD1; Shay Bess, MD7; Eric O. Klineberg, MD1; Virginie Lafage, PhD1; International Spine Study Group8

1Hospital for Special Surgery, New York, NY, US; 2Oregon Health & Science University, Portland, OR, US; 3UVA Health System, Charlottesville, VA, US; 4Southwest Scoliosis Institute, Plano, TX, US; 5NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 6University of California, San Francisco, San Francisco, CA, US; 7Scripps Clinic Medical Group, Department of Orthopedics, La Jolla, CA, US; 8University of Kansas Medical Center, Kansas City, KS, US; 9Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 10UC Davis School of Medicine, Sacramento, CA, US; 11UC Davis School of Medicine, Sacramento, CA, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

24. Occult Infection in Patients Who Have Undergone Spinal Surgery with Instrumentation

TuCKER C. Callanan, BS1; Darren R. Lebl, MD1; Frank P. Cammisa, MD1; Brendan Walker, BS1; Andrew A. Sama, MD1; Federico P. Girardi, MD1; Samuel Miller, BS1; Celeste Abjornson, PhD1

1Hospital for Special Surgery, New York, NY, US; 2The Warren Alpert Medical School, Providence, RI, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

25. Ultralow Dose Radiation 3D Intraoperative Imaging: How Low Can We Go? An O-Arm®, CT Scan, Cadaveric Study

Vishal Sarwahi, MD1; Andrew Lee, MD1; Terry D. Amaral, MD1; Stephen Vendolowski, BS1; Rachel Gecelter, BS1; Beverly Thornhill, MD1; Dan Wang1


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

26. Does the Timing of Preoperative Epidural Steroid Injection Affect Infection Risk after ACDF or Posterior Cervical Fusion?

Jourdan M. Cancienne, MD1; Brian C. Werner, MD2; Varun Puvanesarajah, BS3; Anuj Singla, MD4; Francis H. Shen, MD2; Hamid Hassanzadeh, MD2; Adam L. Shimer, MD2

1University of Virginia, Charlottesville, VA, US; 2University of Virginia, Department of Orthopaedic Surgery, Charlottesville, VA, US; 3Johns Hopkins Medicine, Baltimore, MD, US; 4University of Virginia, School of Medicine, Charlottesville, VA, US; 5Charlottesville, VA, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
12:30 p.m.: Zimmer Biomet
Turning the Tide in Coverage for Cervical Disc Arthroplasty
Presented by Dr. Robert Jackson

1:00–2:00 p.m.
Abstract Presentations:
Thoracolumbar Surgery
Room 210ABC
Moderator: Thomas E. Mroz, MD

1:00–1:06 p.m.
28. Cost-Effectiveness of Circumferential Fusion for Lumbar Spondylolisthesis: Comparison of Transforaminal Lumbar Interbody Fusion versus Antero-Posterior Fusion
Jeffrey L. Gum, MD; Steven D. Glassman, MD; Charles H. Crawford III, MD; Mladen Djurashovic, MD; R. Kirk Owens II, MD; John R. Dimar II, MD; Katlyn McGraw, BA; Leah Y. Carreon, MD, MSc
Norton Leatherman Spine Center, Louisville, KY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:06–1:12 p.m.
29. Two-Year Patient-Reported Outcomes, Costs, and Healthcare Resource Utilization for TLIF versus PLF for Single Level Degenerative Spondylolisthesis
Elliott Kim, MD; Silky Chotai, MD; David Stonko, MS; Joseph Wick, BA; John A. Sielatycki, MD; Clinton J. Devin, MD
1Vanderbilt Orthopaedic Institute, Nashville, TN, US; 2Vanderbilt University Medical Center, Nashville, TN, US; 3Vanderbilt University School of Medicine, Nashville, TN, US; 4Nashville, TN, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:12–1:18 p.m.
30. Reoperation Rates Following Single-Level Lumbar Discectomy
Patrick Heindel, BS; Alexander Tuchman, MD; Patrick C. Hsieh, MD, MS; Martin H. Pham, MD; Anthony D’Oro, BA; Neil N. Patel, MD; Andre Jakoi, MD; Raymond J. Hah, MD; John C. Liu, MD; Zorica Buser, PhD; Jeffrey C. Wang, MD
1Keck School of Medicine of USC, Los Angeles, CA, US; 2Los Angeles, CA, US; 3University of Southern California, Los Angeles, CA, US; 4South Pasadena, CA, US; 5University of Southern California, Department of Orthopaedic Surgery, Los Angeles, CA, US; 6Hoffman Medical Research Center, Keck School of Medicine, USC, Los Angeles, CA, US; 7USC Spine Center, Los Angeles, CA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:18–1:24 p.m.
31. Determining the Drivers of Cost for Elective Laminectomy and Fusion for Lumbar Degenerative Disease
Silky Chotai, MD; Ahilan Sivaganesan, MD; Scott L. Parker, MD; John A. Sielatycki, MD; Matthew J. McGirt, MD; Clinton J. Devin, MD
1Vanderbilt University Medical Center, Nashville, TN, US; 2Vanderbilt University, Nashville, TN, US; 3Carolina Neurosurgery & Spine Associates, Charlotte, NC, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:24–1:30 p.m.
32. Association of Timing of Surgery and Clinical Outcomes in Patients Undergoing Transforaminal Lumbar Interbody Fusion
Alan T. Villavicencio, MD; Ewell L. Nelson, MD; Sigita Burneikiene, MD; Sharad Rajpal, MD
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:30–1:36 p.m.
33. National Trends for Primary and Revision Posterior Lumbar Fusions Throughout the United States
Comron Saiifi, MD; Alex Ha, MD; Ronald A. Lehman Jr, MD; Lawrence G. Lenke, MD
FDA Device/Drug Status: Posterior instrumentation including pedicle screws (Approved for this indication)

1:36–1:42 p.m.
34. Surgery for Refractory Coccygodynia: Operative versus Nonoperative Treatment
Kirkham B. Wood, MD; Gregor Larne, MD, PhD; Tyler Herzog, BS; Kevin L. Ju, MD; Lisa C. Beyer, PA-C; Christine Park, BS
1Stanford University School of Medicine, Redwood City, CA, US; 2Innlandet Hospital Trust, Lillehammer, Oppland, Norway; 3Johns Hopkins School of Medicine, Baltimore, MD, US; 4Emory University School of Medicine, Atlanta, GA, US; 5Massachusetts General Hospital, Boston, MA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:42–2:00 p.m.
Discussion
Wednesday, October 26

1:00–2:00 p.m.

Abstract Presentations:
Psychosocial
Room 209
Moderator: William D. Long, MD

1:00–1:06 p.m.
35. Spine Surgeon Selection Criteria: Factors Influencing Patient Choice
Blaine Manning, BS1; Junyoung Ahn2; Daniel D. Bohl, MD, MPH3; Philip Louie, MD4; Dustin H. Massel, BS5; Benjamin Mayo, BA6; Fady Y. Hijji, BS7; Ankur S. Narain, BA8; Kern Singh, MD2
1Chicago, IL, US; 2Rush University Medical Center, Chicago, IL, US; 3Midwest Orthopaedics at Rush, Chicago, IL, US; 4Department of Orthopaedic Surgery Rush University Medical Center, Chicago, IL, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:06–1:12 p.m.
36. Patient Satisfaction is Not Associated with Pain Medication Consumption in Postoperative Spine Surgery Patients in the Inpatient Setting
Miranda Bice, MD1; Dane Barton; Brandon D. Lawrence, MD2; Darrel S. Brodke, MD3; W. Ryan Spiker, MD4
1University of Utah, Salt Lake City, UT, US; 2University Orthopaedic Center, Salt Lake City, UT, US; 3University of Utah Orthopaedics, Salt Lake City, UT, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:12–1:18 p.m.
37. Effect of a Comprehensive Presurgical Education Program on the Anxiety Levels of Patients with Spinal Disorders: A Prospective Study
Xiaobang Hu, PhD1; Andrew R. Block, PhD2; Sara Brice3; S. Samuel Bederman, MD, PhD, FRSCSC4; Isador H. Lieberman, MD, FRSCSC, MBA5
1Scoliosis and Spine Tumor Center, Texas Back Institute, Texas Health Presbyterian Hospital Plano, Plano, TX, US; 2Texas Back Institute, Plano, TX, US; 3Restore Orthopedics and Spine Center, Orange, CA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:18–1:24 p.m.
38. Association Between Baseline Affective Disorders and 30-Day Readmission Rates in Patients Undergoing Elective Spine Surgery
Owoicho Adogwa, MD, MPH1; Aladine A. Elsamadicy, BS2; Victoria D. Vuong, MSC, BS3; Ankit Mehta, MD4; Raul A. Vasquez-Castellanos, MD5; Joseph S. Cheng, MD, MS6; Isaac O. Karikari, MD7; Carlos A. Bagley, MD8
1Rush University Medical Center, Chicago, IL, US; 2Duke School of Medicine, Durham, NC, US; 3Chicago, IL, US; 4University of Illinois at Chicago, Chicago, IL, US; 5Vanderbilt University - Neurosurgery, Nashville, TN, US; 6Yale University, New Haven, CT, US; 7Duke University Medical Center, Durham, NC, US; 8University of Texas Southwestern Medical Center, Dallas, TX, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:24–1:30 p.m.
39. Pretreatment of Anxiety Prior to Cervical Spine Surgery Improves Clinical Outcomes: A Prospective Single Institutional Experience
Owoicho Adogwa, MD, MPH1; Aladine A. Elsamadicy, BS2; Victoria D. Vuong, MSC, BS3; Ankit Mehta, MD4; Raul A. Vasquez-Castellanos, MD5; Joseph S. Cheng, MD, MS6; Isaac O. Karikari, MD7; Carlos A. Bagley, MD8
1Rush University Medical Center, Chicago, IL, US; 2Duke School of Medicine, Durham, NC, US; 3Chicago, IL, US; 4University of Illinois at Chicago, Chicago, IL, US; 5Vanderbilt University - Neurosurgery, Nashville, TN, US; 6Yale University, New Haven, CT, US; 7Duke University Medical Center, Durham, NC, US; 8University of Texas Southwestern Medical Center, Dallas, TX, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:30–1:36 p.m.
40. Impact of Depression on Health Related Quality of Life Outcomes in Surgically Treated Adult Spinal Deformity Patients: A ScoliRisk-1 Sub-Analysis
Amit Jain1; Lawrence G. Lenke, MD2; Leah Y. Carreon, MD, MSc3; Christopher P. Ames, MD4; Michael G. Feihlings, MD, PhD, FRSCSC5; Benny Dahl, MD, PhD6; Yukihiro Matsuyama, MD, PhD7; Yong Qiu, MD8; Christopher I. Shaffrey, MD9; Hossein Mehdian, FRCS10; Frank J. Schwab, MD11; Ferran Pellise, MD, PhD12; Kenneth M. Cheung, MD, FRCS13; Floreana Naef, MD14; Khaled M. Kebaish, MD15
1Portland, OR, US; 2Washington University School of Medicine, Saint Louis, MO, US; 3Norton Leatherman Spine Center, Louisville, KY, US; 4University of California, San Francisco, San Francisco, CA, US; 5University of Toronto Western Hospital, Toronto, ON, Canada; 6University of Tokyo, Tokyo, Japan; 7National University of Singapore, Singapore; 8Hospital for Special Surgery, New York, NY, US; 9Barcelona, Spain; 10Queen Mary Hospital, Hong Kong, Hong Kong; 11Johns Hopkins University, Baltimore, MD, US; 12Kuala Lumpur, Malaysia; 13University of Virginia, Charlottesville, VA, US; 14QMC University Hospital, Nottingham, Nottinghamshire, United Kingdom; 15Hospital For Special Surgery, New York, NY, US; 16Barcelona, Spain; 17Queen Mary Hospital, Hong Kong, Hong Kong; 18Johns Hopkins University, Baltimore, MD, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:36–2:00 p.m.
Discussion

124–1:30 p.m.
39. Pretreatment of Anxiety Prior to Cervical Spine Surgery Improves Clinical Outcomes: A Prospective Single Institutional Experience
Owoicho Adogwa, MD, MPH1; Aladine A. Elsamadicy, BS2; Victoria D. Vuong, MSC, BS3; Ankit Mehta, MD4; Raul A. Vasquez-Castellanos, MD5; Joseph S. Cheng, MD, MS6; Isaac O. Karikari, MD7; Carlos A. Bagley, MD8
1Rush University Medical Center, Chicago, IL, US; 2Duke School of Medicine, Durham, NC, US; 3Chicago, IL, US; 4University of Illinois at Chicago, Chicago, IL, US; 5Vanderbilt University - Neurosurgery, Nashville, TN, US; 6Yale University, New Haven, CT, US; 7Duke University Medical Center, Durham, NC, US; 8University of Texas Southwestern Medical Center, Dallas, TX, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:30–1:36 p.m.
40. Impact of Depression on Health Related Quality of Life Outcomes in Surgically Treated Adult Spinal Deformity Patients: A ScoliRisk-1 Sub-Analysis
Amit Jain1; Lawrence G. Lenke, MD2; Leah Y. Carreon, MD, MSc3; Christopher P. Ames, MD4; Michael G. Feihlings, MD, PhD, FRSCSC5; Benny Dahl, MD, PhD6; Yukihiro Matsuyama, MD, PhD7; Yong Qiu, MD8; Christopher I. Shaffrey, MD9; Hossein Mehdian, FRCS10; Frank J. Schwab, MD11; Ferran Pellise, MD, PhD12; Kenneth M. Cheung, MD, FRCS13; Floreana Naef, MD14; Khaled M. Kebaish, MD15
1Portland, OR, US; 2Washington University School of Medicine, Saint Louis, MO, US; 3Norton Leatherman Spine Center, Louisville, KY, US; 4University of California, San Francisco, San Francisco, CA, US; 5University of Toronto Western Hospital, Toronto, ON, Canada; 6University of Tokyo, Tokyo, Japan; 7National University of Singapore, Singapore; 8Hospital for Special Surgery, New York, NY, US; 9Barcelona, Spain; 10Queen Mary Hospital, Hong Kong, Hong Kong; 11Johns Hopkins University, Baltimore, MD, US; 12Kuala Lumpur, Malaysia; 13University of Virginia, Charlottesville, VA, US; 14QMC University Hospital, Nottingham, Nottinghamshire, United Kingdom; 15Hospital For Special Surgery, New York, NY, US; 16Barcelona, Spain; 17Queen Mary Hospital, Hong Kong, Hong Kong; 18Johns Hopkins University, Baltimore, MD, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:36–2:00 p.m.
Discussion
1:00–1:06 p.m.

41. Effect of Surgical Setting (Tertiary versus Community Hospitals) on Hospital Reported Outcomes for Anterior Cervical Spine Procedures

Ehsan Jazini, MD; Neil R. Sardesai, MD, MS; Tristan B. Weir, BS; Kelley E. Banagan, MD; Eugene Y. Koh, MD, PhD; Daniel E. Gelb, MD; Steven C. Ludwig, MD

1University of Maryland Medical Center, Baltimore, MD, US; 2University of Maryland School of Medicine, Baltimore, MD, US; 3University of Maryland Department of Orthopaedics, Baltimore, MD, US; 4University of Maryland School of Medicine, Baltimore, MD, US; 5University of Maryland Medical System, Baltimore, MD, US; 6University of Maryland, Baltimore, MD, US; 7University of Maryland Orthopaedic Associates, Baltimore, MD, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:06–1:12 p.m.

42. Hypoalbuminemia as a Risk Factor following Anterior Cervical Discectomy and Fusion (ACDF)

Sulaiman Somani; Joung Heon Kim, BS; Jun Kim, MD; Dante M. Leven, DO, PT; Nathan J. Lee, BS; Parth Kothari, BS; John Di Capua, MHS, BS; Samuel K. Cho, MD

1Mount Sinai School of Medicine, New York, NY, US; 2Icahn School of Medicine at Mount Sinai, New York, NY, US; 3Mount Sinai Medical Center, New York, NY, US; 4Icahn School of Medicine at Mount Sinai, New York, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:12–1:18 p.m.

43. Duration of Anesthesia as a Risk Factor for Postoperative Complications in Patients Undergoing Anterior Cervical Discectomy and Fusion

Nathan J. Lee, BS; Parth Kothari, BS; Jeremy Steinberger, MD; Dante M. Leven, DO, PT; Branko Skovrlj, MD; Javier Guzman, MD; Samuel K. Cho, MD

1Mount Sinai School of Medicine, New York, NY, US; 2New York, NY, US; 3Mount Sinai School of Medicine Department of Neurosurgery, New York, NY, US; 4Icahn School of Medicine at Mount Sinai, New York, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:18–1:24 p.m.

44. Risk Factors and Clinical Outcomes of Dysphagia after Anterior Cervical Surgery in Patients with Degenerative Cervical Myelopathy: Results from the AOSpine International and North America Studies

Lindsay Tetreault, PhD; Narihito Nagoshi, MD, PhD; Hiroaki Nakashima, MD; Paul M. Arnold, MD; Giuseppe Barbagallo, MD, MD; Branko Kopjar, MD, PhD; Michael G. Fehlings, MD, PhD, FRSCC

1University of Toronto, Oakville, ON, Canada; 2Toronto Western Hospital, Toronto, ON, Canada; 3Nagoya University Graduate School of Medicine, Department of Orthopedic Surgery, Nagoya, Japan; 4University of Kansas Medical Center/Department of Neurosurgery, Kansas City, KS, US; 5A.O.V. Policlinico, Catania, Italy; 6University of Washington, Seattle, WA, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:24–1:30 p.m.

45. i-Factor™ Bone Graft versus Autograft in Anterior Cervical Discectomy and Fusion: Two-Year Follow-Up of the Randomized Single-Blinded Food and Drug Administration Investigational Device Exemption Study

Paul M. Arnold, MD; Rick C. Sasso, MD; Michael E. Janssen, DO; Michael G. Fehlings, MD, PhD, FRSCC; Robert F. Heary, MD; Alexander R. Vaccaro, MD, PhD; Branko Kopjar, MD, PhD

1University of Kansas Medical Center/Department of Neurosurgery, Kansas City, KS, US; 2Indiana Spine Group, Carmel, IN, US; 3Center for Spine and Orthopedics, Denver, CO, US; 4Toronto Western Hospital, Toronto, ON, Canada; 5Center for Neurological Surgery, Newark, NJ, US; 6Rothman Institute, Philadelphia, PA, US; 7University of Washington, Seattle, WA, US

FDA Device/Drug Status: i-Factor™ Peptide Enhanced Bone Graft (Cerapedics, Inc., Westminster, CO) (Approved for this indication)

1:30–1:36 p.m.

46. Analysis of Successful versus Failed Radiographic Outcomes Following Cervical Deformity Surgery

Themistocles S. Protopsaltis, MD; Subaraman Ramchandran, MBBS; D. Kojo Hamilton, MD; Daniel M. Sciubba, MD; Alexandra Sorocanu, MD, MPH; Amit Jain; Peter G. Passias, MD; Virginia Lafage, PhD; Renaud Lafage, MSC; Justin S. Smith, MD, PhD; Robert A. Hart, MD; Munish C. Gupta, MD; Douglas C. Burton, MD; Shay Bess, MD; Christopher I. Shaffrey, MD; Christopher P. Ames, MD; International Spine Study Group

1Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 2University of Pittsburgh School of Medicine, Pittsburgh, PA, US; 3John Hopkins University/School of Medicine, Baltimore, MD, US; 4University of Calgary, Calgary, Canada; 5Portland, OR, US; 6NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 7Hospital for Special Surgery, New York, NY, US; 8UVA Health System, Charlottesville, VA, US; 9Oregon Health & Science University, Portland, OR, US; 10Washington University School of Medicine, St. Louis, MO, US; 11University of Kansas Medical Center, Kansas City, KS, US; 12University of Virginia, Charlottesville, VA, US; 13University of California, San Francisco, San Francisco, CA, US; 14Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
1:36–1:42 p.m.
47. Anterior Cervical Discectomy and Fusion (ACDF) is a Better Surgical Approach in Elderly Patients with C3/4 Level Myelopathy

Hidetomi Terai, MD, PhD; Koji Tamai, MD; Akinobu Suzuki, MD, PhD; Hiromitsu Toyoda, MD, PhD; Masatoshi Hoshino, MD; Shinti Takahashi, MD; Kazunori Hayashi, MD; Hiroaki Nakamura, MD, PhD

1Osaka City University, Osaka, Japan; 2Department of Orthopedic Surgery, Osaka City University Graduate School of Medicine, Osaka, Japan; 3Osaka City University, Graduate School of Medicine, Osaka, Japan

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:42–2:00 p.m.
Discussion

1:00–2:00 p.m.
Abstract Presentations:
Biomechanics
Room 205A
Moderator: Reginald Q. Knight, MD, MS

1:00–1:06 p.m.
48. Relationship Between Material and Mechanical Properties of Osteophytes and Non-Osteophytic Cortical Bone: A Preliminary Study

Fred Xavier, MD, PhD; Subrata Saha, PhD

1Hospital for Special Surgery, New York, NY, US; 2SUNY Downstate Medical Center, Brooklyn, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:06–1:12 p.m.
49. Finite Element-Based Adjacent Level Analysis of Pre- and Post-Lumbar Fusion for Scoliosis in Comparison to Healthy

Ram Haddas, PhD, MSc, MEng; Ming Xu, MSc; Isador H. Lieberman, MD, FRCS, MBA; James Yang, PhD

1Texas Back Institute Physicians, PA, Plano, TX, US; 2Texas Tech University, Lubbock, TX, US; 3Scoliosis and Spine Tumor Center, Texas Back Institute, Texas Health Presbyterian Hospital Plano, Plano, TX, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:18–1:24 p.m.
51. A Comparison of Kinematics and Spatiotemporal Parameters during Gait when Using Walking Sticks versus a Walker in Adult Scoliosis Patients

Ram Haddas, PhD, MSc, MEng; Isador H. Lieberman, MD, FRCS, MBA

1Texas Back Institute Physicians, PA, Plano, TX, US; 2Scoliosis and Spine Tumor Center, Texas Back Institute, Texas Health Presbyterian Hospital Plano, Plano, TX, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:24–1:30 p.m.
52. An Updated Analysis of Gravity Line with Pelvic and Lower Limb Compensation: Now Where Do We Stand?

Virginie Lafage, PhD; Ibrahim Obeid; Renaud Lafage, MSc; Barthelemy Liabaud, MD; Jeffrey Varghese, BS; Hongda Bao, MD; Jonathan Elysee; Louis M. Day, BS; Dana Cruz, MD; Subaraman Ramchandran, MBBS; Shay Bess, MD; Themistocles S. Protopsaltis, MD; Peter G. Passias, MD; Aaron J. Buckland, MBBS, FRACS; Frank J. Schwab, MD

1Hospital for Special Surgery, New York, NY, US; 2France; 3Nanjing Drum Tower Hospital, Nanjing, China; 4Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 5Spine Research Institute, New York, NY, US; 6NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:30–1:36 p.m.
53. Comprehensive Biomechanical Analysis of Three Lumbopelvic Reconstruction Techniques Following Total Sacrectomy: An In Vitro Human Cadaveric Model

Bryan W. Cunningham, PhD; Mohamad Bydon, MD; Ashley A. Murgatroyd, BS; Kenneth Mullinix, BS; Ziya L. Gokaslan, MD, FACS; Paul C. McKnee, MD, MBA

1Department of Orthopaedic Surgery and Orthopaedic Spinal Research Institute, University of Maryland Medical Center, Baltimore, Maryland, US; 2Department of Neurosurgery, Mayo Clinic, Rochester, Minnesota, US; 3The Warren Alpert Medical School of Brown University, Department of Neurosurgery, Providence, RI, US

FDA Device/Drug Status: EXPEDIUM (Approved for this indication)
1:36–1:42 p.m.
54. The Uppermost Instrumented Vertebra Mechanical Loading Correlates with the Magnitude of Proximal Junctional Kyphosis in Adult Spinal Deformity Surgery
Jonathan Elysee1; Renaud Lafage, MSc1; Breton Line, BS2; Frank J. Schwab, MD2; Justin S. Smith, MD, PhD3; Ibrahim Obeid4; Robert A. Hart, MD4; Jeffrey L. Gum, MD5; Christopher P. Ames, MD2; Gregory M. Mundis Jr., MD4; Todd J. Albert, MD1; Shay Bess, MD4; Munish C. Gupta, MD5; Virginie Lafage, PhD4; International Spine Study Group11
1Hospital for Special Surgery, New York, NY, US; 2International Spine Study Group, Arvada, CO, US; 3UVA Health System, Charlottesville, VA, US; 4France; 5Oregon Health & Science University, Portland, OR, US; 6Norton Leatherman Spine Center, Louisville, KY, US; 7University of California, Irvine, CA, US; 8Scripps Clinic Medical Group, Department of Orthopedics, La Jolla, CA, US; 9Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 10Washington University School of Medicine, St. Louis, MO, US; 11Brighton, CO, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:42–2:00 p.m.
Discussion

1:00–2:00 p.m.
Abstract Presentations: Infection
Room 205B
Moderator: Joshua E. Heller, MD

1:00–1:06 p.m.
55. Does Intrawound Vancomycin Application During Spine Surgery Create Vancomycin Resistant Organism?
Silky Chotai, MD1; Patty Wright; Andrew Hale; Whitney Jones; Matthew J. McGirt, MD2; Joshua C. Patt, MD, MPH3; Clinton J. Devin, MD4
1Vanderbilt University Medical Center, Nashville, TN, US; 2Carolina Neurosurgery & Spine Associates, Charlotte, NC, US; 3Carolina Medical Center, Charlotte, NC
FDA Device/Drug Status: Not approved for this indication.

1:06–1:12 p.m.
56. Is Healing on MRI Mandatory for Discontinuing Anti-Tubercular Therapy in Tuberculosis of Spine?
Murugan Yuvaraja, MS, DNB1; Venkatesh Krishnan, DNB, MBBS2; Rohit Amritanand, MD1; Justin Arockiaraj, MD2; Kenny S. David, MBBS, MS, FACS1
1Christian Medical College, Vellore, Tamilnadu, India; 2Christian Medical College, Toronto, ON, Canada; 3Spinal Disorders Surgery Unit, Department of Orthopaedics, Vellore, Tamil Nadu, India
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:12–1:18 p.m.
57. Does the Addition of Tobramycin Decrease Infection Risk in Patients Undergoing Lumbar Spinal Instrumented Fusions?
Yu-Po Lee, MD1; Nitin N. Bhatia, MD2; P D. Kiester, MD3; Saifal-Deen B. Farhan, MD1
1UC Irvine Medical Center, Orange, CA, US; 2Department of Orthopaedic Surgery, UC Irvine Medical Center, Orange, CA, US; 3University of California, Irvine, CA, US
FDA Device/Drug Status: Tobramycin is approved for antibiotic use.

1:18–1:24 p.m.
58. Is Propionibacterium Acnes becoming the Most Common Bacteria of Postoperative Infection following Adolescent Idiopathic Scoliosis Surgery?
Dave Nelles, MD; Calvin Kuo, MD; Todd Lincoln; Ravi S. Bains, MD Kaiser Permanente, Oakland, CA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:24–1:30 p.m.
59. Incidence, Epidemiology, and Treatment Trends for Spinal Epidural Abscesses: A Single Institution 10 Year Retrospective Analysis
Antonino Bucca; Zachary Denham, BS1; James Darnley; Kari Stammen, ATC1; Ryan Rauck, MD2; Sohrob Virk, MD, MBA3; Safdar N. Khan, MD4
1Columbus, OH, US; 2The Ohio State University Wexner Medical Center, Columbus, OH, US; 3Hospital for Special Surgery, New York, NY, US; 4Ohio State University, Columbus, OH, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:30–1:36 p.m.
60. Antibiotic-Loaded Bone Graft for Infection Prevention and Bone Regeneration in Posterolateral Spinal Fusion
Stefanie M. Shiels, PhD1; Patrick Patterson, MS2; Brian Barnes, PhD3; Vivek Raut, PhD4; Joseph Wenke, PhD5
1US Army Institute of Surgical Research, JBSA-Fort Sam Houston, TX, US; 2Arteriocyte Inc., Hopkinton, MA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:36–1:42 p.m.
61. The Incident Trends, Epidemiology, Mortality and Economic Evaluation of Vertebral Osteomyelitis in the United States: A Nationwide Inpatient Database Study of 283,022 Cases from 1998 to 2010
Kimon Issa, MD1; Matthew R. Boylan2; Michael J. Faloon, MD3; Sina Pourtaheri, MD4; Qais Naziri, MD2; Nikhil K. Sahai, MD, MPH3; Carl Paulino, MD4; Arash Emami, MD1
1Baltimore, MD, US; 2SUNY Downstate Medical Center, Brooklyn, NY, US; 3University Spine Center, Wayne, NJ, US; 4UCLA Medical Center, Department of Orthopaedic Surgery, Los Angeles, CA, US; 5St. Joseph’s Regional Medical Center/Seton Hall University, Paterson, NJ, US; 6Brooklyn, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
The WHO Burden of Disease 2010 study listed spinal disorders as having a greater impact on global health than HIV/AIDS, malaria, lower respiratory infections, stroke, breast cancer, lung cancer, Alzheimer’s disease or diabetes. The WHO and World Bank have estimated that low back and neck pain afflict almost one billion people worldwide and are the major causes of disability in the world. The growth of disability related to spinal disorders is increasing much more rapidly in developing, low-income countries compared to developed, high-income countries. Currently no global approach has been developed and tested that is likely to reduce the health burden of spinal disorders. There has not been any attempt to develop an implementable comprehensive, cost-effective model of care that could be implemented by clinicians, community and government health agencies with different resource capacities.

The Global Spine Care Initiative (GSCI) was convened in 2014 to bring together an interdisciplinary, international team of clinicians and scientists with the goal of developing an evidence-informed model of care that would apply to all people or patients likely to present to or seek advice from a spine care clinician irrespective of their specialty. A requirement of this model of care is that it should be implementable in communities with different resource capacities.

Upon completion of this session, participants should gain strategies to:

- Be aware of the current understanding of the burden of spinal disorders on both an individual and community level;
- Consider the classification of spinal disorders based on differences in intervention priorities that includes all potential patients or people likely to seek care or advice from a spine care clinician irrespective of their specialty;
- Be able to differentiate the levels of evidence for assessment, non-invasive active, non-invasive passive, and invasive treatment interventions and understand which intervention should be considered or not considered for different patient presentations;
- Understand how to implement a sustainable, evidence-based, interdisciplinary model of care for spinal disorders in any community, hospital, government, or private health care system irrespective of the available resources.

**Agenda**

- **Introduction**
  John M. Mayer, PhD, DC, CCRP
- **The Global Spine Care Initiative**
  Scott Haldeman, MD, PhD, DC, FRACP(C), FAAN
- **Background: Global, Community and Individual Burden of Spinal Disorders: A Systematic Review and Analysis for the Global Spine Care Initiative**
  Eric Hurwitz, PhD, DC
- **Methodology, Participation and Ethical Consideration of the Global Spine Care Initiative**
  Claire Johnson, PhD, MSEd, DC
- **Assessment of People with Spinal Disorders: A Systematic Review and Analysis for the Global Spine Care Initiative**
  Margareta Nordin, Dr.Med.Sci.
- **Community-based Screening, Education and Prevention of Spinal Disorders: A Systematic Review and Analysis for the Global Spine Care Initiative**
  Roger Chou, MD, FACP
- **Active and Passive Noninvasive Management of Spinal Disorders: A Systematic Review and Analysis for the Global Spine Care Initiative**
  Pierre Côté, PhD, DC
- **Invasive and Complex Management of Spinal Disorders: A Systematic Review and Results of a Delphi Consensus for the Global Spine Care Initiative**
  Margareta Nordin, Dr.Med.Sci.
- **Panel Discussion: What Does the Evidence Tell Us About the Management of Spinal Disorders?**

**FDA Device/Drug Status:**

Roger Chou, MD, FACP: Duloxetine (Approved for this indication); Acetaminophen, NSAIDs, Opioids, Antiseizure medications, Skeletal muscle relaxants, Benzodiazepines, Corticosteroids (Not approved for this indication).
Leadership Development and Training: Creativity and Development
Room 206A
Moderator: Mitchel Harris, MD, FACS

The Leadership Development Program provides an opportunity for individuals to enhance their leadership skills within the ever changing health care environment and expand the pool of well-qualified candidates ready for advancement. Whether you’re looking to build your own skills, those of a committee or even an entire organization, look to the NASS Leadership Development Program to gain knowledge and expertise from highly qualified faculty. The Leadership Development Program helps develop leaders who lead with a vision of a better future.

David M. Dye is an internationally recognized professional speaker, trainer, and facilitator. He works with leaders, managers, and supervisors who want to lead their team to the top. David works with leaders to increase their influence, solve common leadership frustrations, and improve their productivity through people-centered leadership.

Originally an urban educator teaching leadership, history, and public speaking, he served as an elected city councilman and as chief operating officer for Colorado UpLift where he trained leaders and helped build organizations in Denver, New York, Orlando, Phoenix, and Portland. David has worked with thousands of leaders across industries and serves on the Board of Directors for the Colorado chapter of the National Speakers Association.

Known for his optimism, for making difficult concepts understandable, and for moving leaders to immediate, practical action, David’s workshops, presentations, and seminars help leaders increase their influence, solve common leadership frustrations, and improve productivity through practical leadership inspiration.

Upon completion of this session, participants should gain strategies to:

- Acquire skills to become a stronger leader who can build a shared vision, improve teamwork and increase productivity within the organization;
- Develop a personal action to create a greater impact in the organization.

Surgical Innovation Lab Demonstrations
The Learning Place, Technical Exhibition, Booth #1900

- Misonix
  Blue Lab

- Varilift® Expandable, Stand-Alone Interbody Fusion Devices—A Demonstration of Stand-Alone Stability
  Green Lab

- Benvenu: Luna® 3D, the MULTI-Expandable Interbody Implant
  Yellow Lab

Abstract Presentations: Cervical Myelopathy
Room 210ABC
Moderator: W. Ryan Spiker, MD

62. Clinical Outcomes Following Surgical Management of Coexistent Parkinson’s Disease and Cervical Spondylotic Myelopathy
Roy Xiao¹; Jacob Miller, BS¹; Akshay Sharma, BA²; Daniel Lubelski, MD³; Thomas E. Mroz, MD³; Edward C. Benzel, MD³; Ajit A. Krishnaney, MD³; Andre Machado, MD³
¹Cleveland Clinic Foundation, Cleveland, OH, US; ²Case Western Reserve University School of Medicine, Cleveland, OH, US; ³Johns Hopkins Hospital, Department of Neurosurgery, Baltimore, MD, US; ⁴Cleveland Clinic Foundation Departments of Orthopaedic and Neurological Surgery, Cleveland, OH, US; ⁵Cleveland Clinic, Cleveland, OH, US; ⁶Beachwood, OH, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

63. Clinical Outcomes Associated with the Surgical Management of Severe Cervical Spondylotic Myelopathy
Parker Bohm¹; Paul M. Arnold, MD²; Joshua H. Arnold, BS³; Michael G. Fehlings, MD, PhD, FRCSC⁴; Brancko Kopjar, MD, PhD⁵; Lindsay Tetreault, PhD⁶
¹Wichita, KS, US; ²University of Kansas Medical Center/Department of Neurosurgery, Kansas City, KS, US; ³University of Kansas Medical Center, Kansas City, KS, US; ⁴Toronto Western Hospital, Toronto, ON, Canada; ⁵University of Washington, Seattle, WA, US; ⁶University of Toronto, Oakville, ON, Canada

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
2:17–2:23 p.m.
64. Radiographic Analysis of Cervical Myelopathy Patients
Kristen Nicholson, PhD1; Paul W. Millhouse, MD, MBA2; Emily Pflug, BS3; Barrett Woods, MD4; Christopher K. Kepler, MD, MBA5; Mark F. Kurd, MD6; D. Greg Anderson, MD7; Jeffrey A. Rihn, MD8; Alan S. Hilibrand, MD9; Alexander R. Vaccaro, MD, PhD2; Gregory D. Schroeder, MD2; Kris E. Radcliff, MD8
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:23–2:29 p.m.
65. Change in Impact Following Operative Treatment of Degenerative Cervical Myelopathy: A Systematic Review and Meta-Analysis
Mohammed F. Shamji, MD, PhD, FRCS1; Lindsay Tetreault, PhD2; Justin S. Smith, MD, PhD3; Paul M. Arnold, MD4; Erika D. Brodt, BS5; Joseph R. Dettori, MPH, PhD9; Michael G. Fehlings, MD, PhD, FRCS10
1University of Toronto, Oakville, ON, Canada; 2University of Toronto, Toronto, ON, Canada; 3University of Virginia, Charlottesville, VA, US; 4Washington University in St. Louis; School of Medicine, Saint Louis, MO, US; 5Blusson Spinal Cord Center, Vancouver, BC, Canada; 6Toronto, ON, Canada; 7Tacoma, WA, US; 8University of Puget Sound, Tacoma, WA, US; 9SRI, Tacoma, WA, US; 10Toronto Western Hospital, Toronto, ON, Canada
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:29–2:35 p.m.
66. Predicting Surgical Outcome Based on Features of Cervical Ossification of Posterior Longitudinal Ligament: A Systematic Review of 2,318 Studies
Hiroaki Nakashima, MD1; Lindsay Tetreault, PhD2; So Kato, MD3; Michael T. Kryshatskij4; Narihito Nagoshi, MD, PhD5; Aria Nouri, MD, MSc6; Anoushka Singh, PhD8; Michael G. Fehlings, MD, PhD, FRCS9
1Nagoya University Graduate School of Medicine, Nagoya, Japan; 2University of Toronto, Oakville, ON, Canada; 3Toronto Western Hospital, Toronto, ON, Canada; 4London, ON, Canada; 5Toronto, ON, Canada
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:35–2:41 p.m.
68. Change in Function, Pain and Quality of Life Following Structured Nonoperative Treatment in Patients with Degenerative Cervical Myelopathy: A Systematic Review
Lindsay Tetreault, PhD1; Mohammed F. Shamji, MD, PhD, FRCS1; John M. Rhee, MD2; Heidi Prather, DO3; Brian K. Kwon, MD, PhD, FRCS4; Jefferson Wilson, MD, PhD5; Ian Andersson6; Anna Dembek, PT7; Krystle Pagari8; Joseph R. Dettori, MPH, PhD9; Michael G. Fehlings, MD, PhD, FRCS10
1University of Toronto, Oakville, ON, Canada; 2University of Toronto, Toronto, ON, Canada; 3Emory University, Atlanta, GA, US; 4Washington University in St. Louis; School of Medicine, Saint Louis, MO, US; 5Blusson Spinal Cord Center, Vancouver, BC, Canada; 6Toronto, ON, Canada; 7Tacoma, WA, US; 8University of Puget Sound, Tacoma, WA, US; 9SRI, Tacoma, WA, US; 10Toronto Western Hospital, Toronto, ON, Canada
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:41–3:05 p.m.
Discussion

2:05–3:05 p.m.
Abstract Presentations: Adult Spinal Deformity
Room 209
Moderator: Norman B. Chutkan, MD, FACS

2:05–2:11 p.m.
69. The Location of Correction within the Lumbar Spine Impacts Acute Adjacent Segment Kyphosis
Renaud Lafage, MSc1; Ibrahim Obeid1; Barthelemy Liabaud1; Shay Bess, MD1; Douglas C. Burton, MD2; Justin S. Smith, MD, PhD3; Cyrus M. Jalai, BA4; Richard A. Hostin Jr, MD5; Christopher I. Shaffrey, MD6; Christopher P. Ames, MD7; Han Jo Kim, MD8; Eric O. Klineberg, MD9; Frank J. Schwab, MD10; Virginie Lafage, PhD11; International Spine Study Group12
1Hospital for Special Surgery, New York, NY, US; 2France; 3Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 4University of Kansas Medical Center, Kansas City, KS, US; 5UVA Health System, Charlottesville, VA, US; 6Southwest Scoliosis Institute, Plano, TX, US; 7University of Virginia, Charlottesville, VA, US; 8University of California, San Francisco, San Francisco, CA, US; 9UC Davis School of Medicine, Sacramento, CA, US; 10Brighton, CO, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:11–2:17 p.m.
70. Does Single- versus Two-Stage Pedicle Subtraction Osteotomy in Spinal Deformity Surgery Influence Perioperative Complications?
Daniel G. Kang, MD1; Jacob M. Buchowski, MD, MS2; Panya Luksanapruksa, MD3; Torgom Abraamyan, MD4; Christopher Chen, MD5; Ronald A. Lehman Jr., MD6; Lawrence G. Lenke, MD7
1Madigan Army Medical Center, Tacoma, WA, US; 2Washington University School of Medicine, Saint Louis, MO, US; 3Department of Orthopedic Surgery, Faculty of Medicine, Siriraj Hospital, Bangkoknoi, Bangkok, Thailand; 4OHSU, Portland, OR, US; 5Madigan Army Medical Center, Dupont, WA, United States Minor Outlying Islands; 6The Spine Hospital - Columbia University/New York Presbyterian, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

68 NASS 31st ANNUAL MEETING
2:17–2:23 p.m.

71. Operative (OP) Treatment of Adult Spinal Deformity (ASD) Patients with Moderate to Severe Disability is Superior to Nonoperative (NON) Treatment

Dana Cruz, MD1; Subaraman Ramachandran, MBBS2; Louis M. Day, BS3; Norah A. Foster, MD4; Breton Line, BS5; Virginie Lafage, PhD6; Christopher P. Ames, MD7; Christopher I. Shaffrey, MD8; Michael P. Kelly, MD9; Jeffrey L. Gum, MD10; Justin S. Smith, MD, PhD10; Frank J. Schwab, MD11; Richard A. Hostin Jr., MD12; Shay Bess, MD13; International Spine Study Group14

1Spine Research Institute, New York, NY, US; 2Southwest Scoliosis Institute, Plano, TX, US; 3Baylor Health Care System, Dallas, TX, US; 4Hospital for Joint Diseases, New York, NY, US; 5Hospital for Special Surgery, New York, NY, US; 6University of California, San Francisco, San Francisco, CA, US; 7University of Virginia, Charlottesville, VA, US; 8Washington University, Saint Louis, MO, US; 9UC Davis School of Medicine, Sacramento, CA, US; 10Southwest Scoliosis Institute, Plano, TX, US; 11Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:23–2:29 p.m.

72. Preoperative Use of a Validated Computer Based Predictive Model for Patient Selection for Adult Spinal Deformity (ASD) Surgery has the Potential to Significantly Enhance QALYs Gained at Two Years Postop: Simulation in 234 ASD Patients

Justin K. Scheer, BS1; Richard A. Hostin Jr., MD2; Chessie Robinson, MA3; Jeffrey L. Gum, MD4; Frank J. Schwab, MD5; Robert A. Hart, MD6; Virginie Lafage, PhD7; Douglas C. Burton, MD8; Shay Bess, MD9; Themistocles S. Protopsaltis, MD10; Eric O. Klineberg, MD11; Christopher I. Shaffrey, MD12; Justin S. Smith, MD, PhD13; Christopher P. Ames, MD14; International Spine Study Group15


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:29–2:35 p.m.

73. Analysis of Variation in Inpatient Two Year Episode of Care Costs for Adult Spinal Deformity across US Centers

Richard A. Hostin Jr., MD1; Chessie Robinson, MA2; Michael O’Brien, MD3; Jeffrey L. Gum, MD4; Michael P. Kelly, MD5; Steven D. Glassman, MD6; Douglas C. Burton, MD7; Christopher P. Ames, MD8; Shay Bess, MD9; David W. Polly Jr., MD10; International Spine Study Group11


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:35–2:41 p.m.

74. National Administrative Databases in Adult Spinal Deformity Surgery: A Cautionary Tale

Aaron J. Buckland, MBBS, FRACS1; Robert A. Hart, MD2; Gregory M. Mundis Jr., MD3; Daniel M. Scuibba, MD4; Renaud Lafage, MSc5; Thomas J. Errico, MD6; Shay Bess, MD7; Jonathan Vidovich, MD8; Ran Schwarzkopf, MD9; Virginie Lafage, PhD10; International Spine Study Group11

1Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 2UC Davis School of Medicine, Sacramento, CA, US; 3Washington University, Saint Louis, MO, US; 4NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 5Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:41–2:47 p.m.

75. Risk of Total Hip Arthroplasty Dislocation after Adult Spinal Deformity Correction

Aaron J. Buckland, MBBS, FRACS1; Robert A. Hart, MD2; Gregory M. Mundis Jr., MD3; Daniel M. Scuibba, MD4; Renaud Lafage, MSc5; Thomas J. Errico, MD6; Shay Bess, MD7; Jonathan Vidovich, MD8; Ran Schwarzkopf, MD9; Virginie Lafage, PhD10; International Spine Study Group11

1Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 2Oregon Health & Science University, Portland, OR, US; 3Scripps Clinic Medical Group, Department of Orthopedics, La Jolla, CA, US; 4John Hopkins University/School of Medicine, Baltimore, MD, US; 5Hospital for Special Surgery, New York, NY, US; 6New York, NY, US; 7NYU, New York, NY, US; 8Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:47–3:05 p.m.

Discussion

2:05–3:05 p.m.

Abstract Presentations:

Thoracolumbar Surgery

Room 208

Moderator: Dilip K. Sengupta, MD

2:05–2:11 p.m.


Timothy Y. Wang1; Christopher Brown, MD2; Luiz Pimenta, MD, PhD3; Robert E. Isaacs, MD

1Duke University Medical Center, Durham, NC, US; 2Duke University Medical Center, Raleigh, NC, US; 3IPC, Sao Paulo, SP, Brazil

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
2:11–2:17 p.m.
77. Minimal Clinical Improvement in Patients Undergoing Treatment for Symptomatic Lumbar Spinal Stenosis During a Follow-Up Duration of Three Years: Findings from the Lumbar Stenosis Outcome Study (LSOS)
Maria Wertli, MD, PhD; Regula Graf; Johann Steurer, MD; Ulrike Held, PhD, MSC; Giuseppe Pichierri, PhD; Francois Pochet, MD, PhD; Jakob M. Burgstaller, MD, DDS
Horton Centre for Patient Oriented Research and Knowledge Transfer, University of Zurich, Zurich, Switzerland; Spine Center, Zurich, Switzerland; Department of General Internal Medicine, Bern University Hospital, Bern University, Bern, Switzerland
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:17–2:23 p.m.
78. Impact of Functional Status of Patient on Satisfaction with Surgery 12-Months after Elective Spine Surgery for Lumbar Degenerative Disease
Clinton J. Devin, MD; Silky Chotai, MD; Mohamad Bydon, MD; Kristin Archer, PhD, DPT; Matthew J. McGirt, MD; Hui Nian; Frank E. Harrell Jr, PhD; Anthony L. Asher, MD
Vanderbilt University Medical Center, Nashville, TN, US; Mayo Clinic, Rochester, MN, US; Carolina Neurosurgery & Spine Associates, Charlotte, NC, US; Vanderbilt University, Nashville, TN, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:23–2:29 p.m.
79. The Outcomes Following Decompression and Fusion are Compromised when it is Preceded by a Discectomy or Decompression
Neil A. Manson, MD, FRCSC; Erin Bigney, MA; Kate Wagg, BA; Eden Daly, BA; Edward P. Abraham, MD
Canada East Spine Centre, Saint John, NB, Canada; Saint John Regional Hospital, Saint John, NB, Canada
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:29–2:35 p.m.
80. Clinical Outcomes Following Lumbar Fusion Using the O-Arm: A Propensity-Matched Analysis
Roy Xiao; Jacob Miller, BS; Akshay Sharma, BA; Vincent J. Alentado, BS; Daniel Lubelski, MD; Andrew T. Healy, MD; Thomas E. Mroz, MD; Edward C. Benzel, MD
Cleveland Clinic Foundation, Cleveland, OH, US; Case Western Reserve University School of Medicine, Cleveland, OH, US; Cleveland Heights, OH, US; Johns Hopkins Hospital, Department of Neurosurgery, Baltimore, MD, US; Cleveland Clinic, Cleveland, OH, US; Cleveland Clinic Foundation Departments of Orthopaedic and Neurological Surgery, Cleveland, OH, US
FDA Device/Drug Status: Approved for this indication.

2:35–2:41 p.m.
81. Trends in the Presentation, Surgical Treatment and Outcomes of Tethered Cord Syndrome: A Nationwide Study from 2001-2010
Cyrus M. Jalai, BA; Gregory W. Poorman, BA; Peter G. Passias, MD
Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:41–2:47 p.m.
82. The Utility of In-Hospital Postoperative Radiographs Following Surgical Treatment of Traumatic Thoracolumbar Injuries
Joseph S. Pyun, MD; Tristan B. Weir, BS; Kelley E. Banagan, MD; Eugene Y. Koh, MD, PhD; Daniel E. Gelb, MD; Steven C. Ludwig, MD
Westchester Medical Center, Valhalla, NY, US; University of Maryland School of Medicine, Baltimore, MD, US; University of Maryland Medical System, Baltimore, MD, US; University of Maryland, Baltimore, MD, US; University of Maryland Orthopaedic Associates, Baltimore, MD, US; University of Maryland Medical Center, Baltimore, MD, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:47–3:05 p.m.
Discussion

Abstract Presentations: Complications

2:05–2:11 p.m.
83. Anterior Column Realignment: A Detailed Analysis of Neurologic Risk and Radiographic Outcomes
Rajiv Saigal, MD, PhD; Gregory M. Mundis Jr., MD; Stacie Nguyen, MPH; Ali Bagheri, MD; Ramin Bagheri, MD; Robert K. Eastlack, MD
Miami, FL, US; Scripps Clinic Medical Group, Department of Orthopedics, La Jolla, CA, US; San Diego Spine Foundation, San Diego, CA, US; Cleveland Clinic Akron General, Akron, OH, US; Scripps Clinic Medical Group, La Jolla, CA, US; Scripps Clinic, San Diego, CA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:11–2:17 p.m.
84. Anterior Access to the Lumbar Spine: Complications Encountered in 2,881 Consecutive Procedures
Jack E. Zigler, MD; Richard D. Guyer, MD; Scott L. Blumenthal, MD; Donna D. Ohnmeiss, PhD
Texas Back Institute, Plano, TX, US; Texas Back Institute Research Foundation, Plano, TX, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
2:17–2:23 p.m.
85. Adverse Events Following Lumbar Spine Fusion: The Combined Effect of Age, Smoking and Vitamin D
Justin M. Hall, MD; Preston N. Wolfe; Theodore J. Choma, MD; Christina L. Goldstein, MD, FRSC; 1Columbus Orthopaedic Clinic, Columbus, MS, US; 2Missouri Spine Center, Columbia, MO, US; 3Missouri Orthopaedic Institute, Columbia, MO, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:23–2:29 p.m.
86. Thresholds of Body Mass Index as a Predictor of Morbidity in Lumbar Spinal Surgery Based on Surgical Invasiveness
Gregory W. Poorman, BA; Cyrus M. Jalai, BA; Alexandre Soroceanu, MD, MPH; Breton Line, BS; Shay Bess, MD; Shaleen Vira, MD; Bassel G. Diebo, MD; Subbu Ramachandran, MD; Norah A. Foster, MD; Jonathan H. Oren, MD; Themistocles S. Protopsaltis, MD; Thomas J. Errico, MD; Aaron J. Buckland, MBBS, FRACS; 1Hospital for Special Surgery, New York, NY, US; 2University of Calgary, Calgary, Canada; 3International Spine Study Group, Arvada, CO, US; 4NYU Hospital for Joint Diseases, New York, NY, US; 5Hospital for Special Surgery, New York, NY, US; 6NYU Langone Medical Center, New York, NY, US; 7New York, NY, US; 8NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:29–2:35 p.m.
87. Patient BMI is an Independent Predictor of 30-Day Hospital Readmission after Elective Spine Surgery
Owoicho Adogwa, MD, MPH; Aladine A. Elsamadicy, BS; Victoria D. Vuong, MSc, BS; Ankit A. Vasquez-Castellanos, MD; Joseph S. Cheng, MD, MS; Isaac O. Karikari, MD; Carlos A. Bagley, MD; 1Rush University Medical Center, Chicago, IL, US; 2Duke School of Medicine, Durham, NC, US; 3Chicago, IL, US; 4University of Illinois at Chicago, Chicago, IL, US; 5Vanderbilt University - Neurosurgery, Nashville, TN, US; 6Yale University, New Haven, CT, US; 7Duke University Medical Center, Durham, NC, US; 8University of Texas Southwestern Medical Center, Dallas, TX, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:35–2:41 p.m.
88. The Impact of Radiculopathy on Patients Reported Outcomes: A Propensity Matched Study on 386 Adult Spinal Deformity Patients with and without Leg Pain
Renaud Lafage, MS; Justin K. Scheer, BS; Barthelemy Liabaud, MD; Frank J. Schwab, MD; Justin S. Smith, MD, PhD; Peter G. Passias, MD; Richard A. Hostin Jr., MD; Christopher P. Ames, MD; Gregory M. Mundis Jr., MD; Douglas C. Burton, MD; Han Jo Kim, MD; Shay Bess, MD; Eric O. Klineberg, MD; Virginie Lafage, PhD; International Spine Study Group; 1Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 2University of California, San Diego, San Diego, CA, US; 3UVA Health System, Charlottesville, VA, US; 4Scripps Clinic Department of Orthopedics, La Jolla, CA, US; 5University of Kansas Medical Center, Kansas City, KS, US; 6Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 7UC Davis School of Medicine, Sacramento, CA, US; 8Brighton, CO, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:41–2:47 p.m.
89. Incidence of Lumbar Plexopathy Utilizing Mechanomyography (MMG) for Transpsoas Lateral Lumbar Interbody Fusion (LLIF)
David C. Briski, MD; Bradford S. Waddell, MD; Joseph M. Zavatsky, MD; 1Ochsner Medical Center, Jefferson, LA, US; 2Ochsner Orthopaedics, New Orleans, LA, US; 3Spine & Scoliosis Specialists, Tampa, FL, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:47–3:05 p.m.
Discussion

2:05–3:05 p.m.
Abstract Presentations:
Diagnostics and Imaging
Room 205B
Moderator: Charles H. Cho, MD, MBA

2:05–2:11 p.m.
90. Analysis of Lumbar Flexibility on Supine MRI and CT May Reduce the Need for More Invasive Spinal Osteotomy in Adult Spinal Deformity Surgery
Joseph F. Baker, MbChB, FRCS (Tr & Orth); Louis M. Day, BS; Jonathan H. Oren, MD; Michael J. Moses, BA; Gregory W. Poorman, BA; Aaron J. Buckland, MBBS, FRACS; Peter G. Passias, MD; Virginie Lafage, PhD; Frank J. Schwab, MD; Shay Bess, MD; Thomas J. Errico, MD; Themistocles S. Protopsaltis, MD; 1Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 2University of California, San Diego, San Diego, CA, US; 3Scripps Clinic Department of Orthopedics, La Jolla, CA, US; 4University of California, San Francisco, San Francisco, CA, US; 5Scripps Clinic Department of Orthopedics, La Jolla, CA, US; 6University of Kansas Medical Center, Kansas City, KS, US; 7Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 8UC Davis School of Medicine, Sacramento, CA, US; 9Brighton, CO, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:05–2:11 p.m.
91. Analysis of Lumbar Flexibility on Supine MRI and CT May Reduce the Need for More Invasive Spinal Osteotomy in Adult Spinal Deformity Surgery
Joseph F. Baker, MbChB, FRCS (Tr & Orth); Louis M. Day, BS; Jonathan H. Oren, MD; Michael J. Moses, BA; Gregory W. Poorman, BA; Aaron J. Buckland, MBBS, FRACS; Peter G. Passias, MD; Virginie Lafage, PhD; Frank J. Schwab, MD; Shay Bess, MD; Thomas J. Errico, MD; Themistocles S. Protopsaltis, MD; 1Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 2University of California, San Diego, San Diego, CA, US; 3Scripps Clinic Department of Orthopedics, La Jolla, CA, US; 4University of California, San Francisco, San Francisco, CA, US; 5Scripps Clinic Department of Orthopedics, La Jolla, CA, US; 6University of Kansas Medical Center, Kansas City, KS, US; 7Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 8UC Davis School of Medicine, Sacramento, CA, US; 9Brighton, CO, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
2:11–2:17 p.m.
91. MRI Analysis of the Combined AOSpine North America and International Studies, Part I: The Prevalence and Spectrum of Pathologies in a Global Cohort of Patients with Degenerative Cervical Myelopathy
Aria Nouri, MD, MSc1; Allan Martin, MD2; Lindsay Tetrault, PhD1; Anick Nater, MD3; So Kato, MD4; Hiroaki Nakashima, MD5; Narihito Nagoshi, MD1; PhD1; Hamed Reihani Kermani, MD1; Michael G. Fehlings, MD, PhD, FRCS1
1Toronto Western Hospital, Toronto, ON, Canada; 2Toronto, ON, Canada; 3University of Toronto, Oakville, ON, Canada; 4Toronto Western Hospital (University of Toronto), Toronto, ON, Canada; 5Nagoya University Graduate School of Medicine, Department of Orthopedic Surgery, Nagoya, Japan; 6Kerman, Islamic Republic of Iran
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:17–2:23 p.m.
92. Can MRI Detect Ruptured Posterior Longitudinal Ligament in Patients Having Non-Traumatic Cervical Disc Extrusion and Sequestration?
Torphong Bunmaprasert, MD
Department of Orthopaedics, Chiang Mai University, Chiang Mai, Thailand
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:23–2:29 p.m.
93. Prevalence of Spinal Epidural Lipomatosis on Magnetic Resonance Imaging
Nuno Rui Paulino Pereira, MD; Nina Theyskens, MD; Stein Janssen, MD; Bianca Verbeek, MD; Joseph H. Schwab, MD; Thomas D. Cha, MD, MBA
Massachusetts General Hospital, Boston, MA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:29–2:35 p.m.
94. Lumbosacral Epidural Lipomatosis: A Matched Control Study
Baris Yildirim1; Varun Puvanesarajah, BS3; Howard S. An, MD2; Amit Jain4; Francis H. Shen, MD2; Hamid Hassanzadeh, MD2
1University of Virginia School of Medicine, Charlottesville, VA, US; 2Johns Hopkins Medicine, Baltimore, MD, US; 3Rush University Medical Center, Department of Orthopedic Surgery, Chicago, IL, US; 4Portland, OR, US; 5Charlottesville, VA, US; 6University of Virginia, Department of Orthopedic Surgery, Charlottesville, VA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:35–2:41 p.m.
Allan Martin, MD1; Benjamin De Leenheer, MSc2; Julien Cohen-Adad, PhD1; Izabela Aleksanderek, PhD1; David W. Cadotte, MD, PhD1; Michael G. Fehlings, MD, PhD, FRCS1
1Toronto, ON, Canada; 2Montreal, QC, Canada; 3Toronto Western Hospital, UHN, Toronto, ON, Canada; 4University of Toronto, Toronto, ON, Canada; 5Toronto Western Hospital, Toronto, ON, Canada
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:41–2:47 p.m.
96. Association Between Paraspinous Muscle Morphology, Clinical Symptoms and Functional Status in Patients with Degenerative Cervical Myelopathy
Maryse Fortin, PhD1; Octavian Dobrescu1; Matthiew Courtemanche, BS1; Carolyn Sparrey, PhD2; Carlo Santaguida, MD1; Michael G. Fehlings, MD, PhD2; Dr. H. Weber, MD, PhD1
1Montreal, QC, Canada; 2McGill University Health Centre, Department of Orthopedic Surgery, Montreal, Quebec, Canada; 3Simon Fraser University, School of Mechatronic Systems Engineering, Burnaby, BC, Canada; 4Simon Fraser University, School of Mechatronic Systems Engineering, Surrey, BC, Canada; 5Montreal Neurological Institute, Montreal, QC, Canada; 6Toronto Western Hospital, Toronto, ON, Canada; 7McGill University Health Centre, Montreal, QC, Canada
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:47–3:05 p.m.
Discussion

3:05–3:35 p.m.
Networking Break–Beverage Service
Technical Exhibition

Exercise Video Demonstrations
The Learning Place, Technical Exhibition, Booth #1900
Patient education tools for your practice. Visit the Exercise Booth for a chance to win a Fitbit™!

3:05–3:35 p.m.
Poster Grand Rounds
The Learning Place, Yellow Theater
Technical Exhibition, Booth #1900

3:05–3:20 p.m.
P77. Interobserver Agreement in Measuring the Neural Foramina Using a 360-Degree Ultrasound: A Human Cadaver Study
Yvonne Braun, MD; Olivier D. van Wulfften Palthe, MD; Stein Janssen, MD; Sjoerd Nota, MD; Bianca Verbeek, MD; Joseph H. Schwab, MD
Massachusetts General Hospital, Boston, MA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
3:05–3:35 p.m.
**Poster Grand Rounds**
The Learning Place, Blue Theater
Technical Exhibition, Booth #1900

3:05–3:35 p.m.
**Poster Grand Rounds**
The Learning Place, Green Theater
Technical Exhibition, Booth #1900

3:05–3:35 p.m.
**Poster Grand Rounds**
The Learning Place, Purple Theater
Technical Exhibition, Booth #1900
3:20–3:35 p.m.
**P145. Preoperative Opioid Therapy Affects Return to Work Status after Multi-Level Cervical Fusion for Radiculopathy in a Workers’ Compensation Setting**
Mhamad Faour, MD1; Joshua T. Anderson2; Nicholas U. Ahn, MD3
1Cleveland, OH, US; 2Cleveland Heights, OH, US; 3University Hospital of Cleveland, Department of Orthopedic Surgery, Cleveland, OH, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

3:35–3:40 p.m.
**NASS Working for You: Coding Update**
Room 210ABC
Moderator: R. Dale Blasier, MD, MBA, FRCSC

3:40–5:10 p.m.
**Symposium: Value-based Healthcare: Impact on Caring for Spine Patients**
Room 210ABC
Moderators: Conor O’Neill, MD; Sigurd H. Berven, MD

With the accelerating changes in the health care marketplace, value will replace volume as the primary driver for reimbursement. This session will explore the foundations of value-based care for spine patients, from both a business and a clinical perspective.

**Upon completion of this session, participants should gain strategies to:**
- Design integrated practice units at their institutions that are organized around spinal disorders;
- Demonstrate value by measuring both outcomes and costs;
- Develop bundled payments for both surgical and nonsurgical care;
- Address the unique challenges in providing value-based care to patients with spinal disorders.

**Agenda**
- **Introduction**
  Conor O’Neill, MD
- **Elements of a Value-based Strategy**
  Derek Haas
- **Measuring Costs**
  Robert Kaplan
- **Unique Challenges in Creating Value-based Payment Systems in Spine**
  Sigurd H. Berven, MD
- **Discussion, Questions and Answers**
  All Faculty

3:40–5:10 p.m.
**Symposium: Complex Spinal Infections: Comprehensive Evaluation and Management**
Room 209
Moderator: Christopher G. Furey, MD

This session will review the pertinent epidemiology, pathophysiology, clinical and radiographic features of spondylodiscitis and define the role of nonsurgical management, as well as selection criteria for instrumentation options, bone graft options, and biologics.

**Upon completion of this session, participants should gain strategies to:**
- Review the pertinent epidemiology and pathophysiology of spondylodiscitis;
- Review the clinical and radiographic features of spondylodiscitis;
- Define the role (and limitations) of nonsurgical management;
- Define pertinent aspects to formulation of a surgical strategy;
- Define selection criteria for instrumentation options, bone graft options, and biologics.

**Agenda**
- **Introduction and Expectations**
  Christopher G. Furey, MD
- **Epidemiology and Pathophysiology**
  Christopher G. Furey, MD
- **Pyogenic Spondylodiscitis: Clinical Features**
  Sheeraz A. Qureshi, MD
- **Nonpyogenic Spondylodiscitis: Clinical Presentation**
  Timothy A. Moore, MD
- **Formulation of a Surgical Strategy**
  Joseph D. Smucker, MD
- **Questions and Answers**
  Panel
- **Case Presentations with Audience Participation**
During this session, attendees will learn about unique diagnostic challenges in elderly patients and strategies to develop care protocols for active elderly patients. The faculty will discuss surgical options for spinal stenosis, deformity and spondylolisthesis, and how to implement these options in the aging population, with specific goals to decrease surgical complications and postoperative “downtime.”

Upon completion of this session, participants should gain strategies to:

- Appreciate unique diagnostic challenges in elderly patients;
- Develop care protocols for the active elderly patients;
- Consider surgical options for spinal stenosis, deformity and spondylolisthesis and how to implement in the aging;
- Decrease surgical complications and postoperative “downtime.”

**Agenda**

- **Considerations of Treating the Elderly: Identifying Risk Factors and Reducing Poor Outcomes**
  Celeste Abjornson, PhD
- **The Physiatry Perspective: Interventional Management to Maximize Nonoperative Care**
  Gregory Lutz, MD
- **Preoperative and Perioperative Medical Management and Impact on Surgical Outcomes**
  Chad Craig, MD
- **Surgical Decision: Where the Data Stands on Established Surgical Treatments**
  Darren Lebl, MD
- **Surgical Decisions: Innovative Techniques and New Technologies**
  Frank P. Cammisa, MD
- **Postoperative Care Management**
  Robert Turner, PT
- **Discussion**

**Abstract Presentations: Anterior Cervical**

**3:40–5:10 p.m.**

**Symposium: Management of the Elderly Spine Patient**

Room 208

Moderators: Celeste Abjornson, PhD; Frank P. Cammisa, MD

**3:40–3:46 p.m.**

**97. Comparing One-Level versus Two-Level Cervical TDR and One-Level versus Two-Level ACDF at Seven-Years Follow-Up**

Hyun W. Bae, MD; Reginald J. Davis, MD, FACS; Michael S. Hisey, MD; Pierce D. Nunley, MD; Robert J. Jackson, MD, FACS


**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

**3:46–3:52 p.m.**

**98. Seven-Year Clinical Results of Cervical Total Disc Replacement Compared with Anterior Discectomy and Fusion for Treatment of Two-Level Symptomatic Degenerative Disc Disease: A Prospective, Randomized, Controlled, Multicenter FDA Clinical Trial**

Kris E. Radcliff, MD; Reginald J. Davis, MD, FACS; Gregory A. Hoffman, MD; Hyun W. Bae, MD; Michael S. Hisey, MD; Kee D. Kim, MD; Pierce D. Nunley, MD; Robert J. Jackson, MD, FACS

1Rothman Institute, Thomas Jefferson University, Egg Harbor Township, NJ, US; 2Tampa, FL, US; 3Orthopaedics NorthEast, PC, Fort Wayne, IN, US; 4Spine Institute St. John’s Health Center, Los Angeles, CA, US; 5Texas Back Institute, Denton, TX, US; 6UC Davis School of Medicine, Sacramento, CA, US; 7Spine Institute of Louisiana, Shreveport, LA, US; 8Laguna Hills, CA, US

**FDA Device/Drug Status:** Approved for this indication.

**3:52–3:58 p.m.**

**99. Subsequent Surgery Rates after Treatment with TDR or ACDF at One or Two Levels: Results from an FDA Clinical Trial at 7 Years**

Robert J. Jackson, MD, FACS; Reginald J. Davis, MD, FACS; Hyun W. Bae, MD; Gregory A. Hoffman, MD; Michael S. Hisey, MD; Kee D. Kim, MD; Pierce D. Nunley, MD

1Laguna Hills, CA, US; 2Tampa, FL, US; 3Spine Institute St. John’s Health Center, Los Angeles, CA, US; 4Orthopaedics NorthEast, PC, Fort Wayne, IN, US; 5Texas Back Institute, Denton, TX, US; 6UC Davis School of Medicine, Sacramento, CA, US; 7Spine Institute of Louisiana, Shreveport, LA, US

**FDA Device/Drug Status:** Approved for this indication.
3:58–4:04 p.m.
100. Dynamic Foraminal Dimensions During Neck Extension and Rotation in Fusion and Artificial Disc Replacement
Victor Chang, MD1; Stephen Bartol, MD, MBA, FRSCC2; Azam Basheer, MD2; Timothy Baumer, MS2; Daniel Oryvac, MS3; Michael J. Bey, PhD2; Colin McDonald, PhD3; Yener Yeni, PhD3
1Henry Ford West Bloomfield Hospital, West Bloomfield, MI, US; 2Henry Ford Hospital, Detroit, MI, US; 3Henry Ford Health System, Detroit, MI, US; 4Detroit, MI, US; 5Hamilton, ON, Canada
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:04–4:10 p.m.
101. The Impact of Local Steroid Application on Dysphagia Following an Anterior Cervical Discectomy and Fusion: Preliminary Results of a Prospectively, Randomized, Single Blind Trial
Dustin H. Massel, BS1; Benjamin Mayo, BA2; Junyoung Ahn3; Daniel D. Bohl, MD, MPH4; Philip Louie, MD1; Grant Shifflett, MD1; Ankur S. Narain, BA4; Fady Y. Hijji, BS4; Krishna Modi, BS2; William W. Long, BA2; Khaled A. Aboushaala, MD, MS5; Kern Singh, MD2
1Midwest Orthopaedics at Rush, Chicago, IL, US; 2Rush University Medical Center, Chicago, IL, US; 3Hospital for Special Surgery, New York, NY, US; 4Department of Orthopaedic Surgery Rush University Medical Center, Chicago, IL, US; 5Midwest Orthopaedics at Rush, Oak Park, IL, US
FDA Device/Drug Status: Depomedrol (Approved for this indication)

4:10–4:25 p.m.
Discussion

4:25–4:31 p.m.
102. The Effects of Perioperative Steroids on Dysphagia Following Anterior Cervical Spine Surgery: A Randomized, Prospective, Double-Blind Study
Shari Cui, MD1; Sanford E. Emery, MD, MBA2; Scott D. Daflner, MD2; John C. France, MD2
1West Virginia University Spine Center, Morgantown, WV, US; 2West Virginia University, Morgantown, WV, US; 3West Virginia University School of Medicine, Morgantown, WV, US; 4Robert C. Byrd Health Sciences Center, Morgantown, WV, US
FDA Device/Drug Status: Decadron (dexamethasone)–Investigational/Not approved.

103. Moved to Value Abstract Awards Presentations
Friday, October 28, 3:20–3:50 p.m.

Jefferson Wilson, MD, PhD; Lindsay Tetreault, PhD; Bizhan Aarabi, MD, FACS, FRSCC; Paul A. Anderson, MD; Paul M. Arnold, MD; Darrel S. Brodke, MD; Anthony Burns, MD, MSc; Kazuhiro Chiba, MD, PhD; Joseph R. Dettori, MPH, PhD; Julio C. Furlan, MD, PhD, MBA; James S. Harrop, MD; Langston T. Holly, MD; Susan Howley; Tara Jeji, MBA; Sukhvinder Kalsi-Ryan, PT, MS, PhD; Mark Kotter, MD, PhD; Brian K. Kwon, MD, PhD, FRSCC; Ralph Marino, MD, MS; Allan Martin, MD; Eric M. Massicotte, MD, FRSCC; Geno Merli, MD, PhD; James Middleton, MBBS, PhD; Hiroaki Nakashima, MD; Naritho Nagoishi, MD, PhD; Katherine Palmieri, MD, MBA; Mohammed F. Shamji, MD, PhD, FRSCC; Andrea C. Skelly, PhD, MPH; Albert J. Yee, MD, FRSCC; Michael G. Fehlings, MD, PhD, FRSCC

1Toronto, ON, Canada; 2University of Toronto, Oakville, ON, Canada; 3University of Maryland Medical Center, Department of Neurosurgery, Baltimore, MD, US; 4University of Wisconsin Orthopedics & Rehabilitation, Madison, WI, US; 5University of Kansas Medical Center/Department of Neurosurgery, Kansas City, KS, US; 6University Orthopaedic Center, Salt Lake City, UT, US; 7University Health Network - Toronto Rehabilitation Institute, Toronto, ON, Canada; 8Department of Orthopaedic Surgery, National Defense Medical College, Tokyo, Japan; 9Spectrum Research, Kolling Institute of Medical Research, Sydney, NSW, Australia; 10Toronto Western Hospital, Toronto, ON, Canada; 11University of Cambridge, Cambridge, United Kingdom; 12Blussion Spinal Cord Center, Vancouver, BC, Canada; 13University of Toronto, Toronto, ON, Canada; 14University of Maryland Medical Center, Baltimore, MD, US; 15University of Wisconsin Orthopedics & Rehabilitation, Madison, WI, US; 16University of Kansas Medical Center, Department of Neurosurgery, Kansas City, KS, US; 17University Orthopaedic Center, Salt Lake City, UT, US; 18University Health Network - Toronto Rehabilitation Institute, Toronto, ON, Canada; 19Thomas Jefferson University Hospital, Philadelphia, PA, US; 20The University of Sydney (John Walsh Centre for Rehabilitation Research), Sydney, NSW, Australia; 21Nagoya University Graduate School of Medicine, Department of Orthopedic Surgery, Nagoya, Japan; 22University of Kansas Hospital, Kansas City, KS, US; 23Sunnybrook Health Sciences Centre, Toronto, ON, Canada

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.


James S. Harrop, MD; Lindsay Tetreault, PhD; Bizhan Aarabi, MD, FACS, FRSCC; Paul A. Anderson, MD; Paul M. Arnold, MD; Darrel S. Brodke, MD; Anthony Burns, MD, MSc; Kazuhiro Chiba, MD, PhD; Joseph R. Dettori, MPH, PhD; Julio C. Furlan, MD, PhD, MBA; Langston T. Holly, MD; Susan Howley; Tara Jeji, MBA; Sukhvinder Kalsi-Ryan, PT, MS, PhD; Mark Kotter, MD, PhD; Brian K. Kwon, MD, PhD, FRSCC; Ralph Marino, MD, MS; Allan Martin, MD; Eric M. Massicotte, MD, FRSCC; Geno Merli, MD, PhD; James Middleton, MBBS, PhD, PhD; Hiroaki Nakashima, MD; Naritho Nagoishi, MD, PhD; Katherine Palmieri, MD, MBA; Mohammed F. Shamji, MD, PhD, FRSCC; Anoushka Singh, PhD; Andrea C. Skelly, PhD, MPH; Jefferson Wilson, MD, PhD; Albert J. Yee, MD, FRSCC; Michael G. Fehlings, MD, PhD, FRSCC

1Thomas Jefferson University, Philadelphia, PA, US; 2University of Toronto, Oakville, ON, Canada; 3University of Maryland Medical Center, Department of Neurosurgery, Baltimore, MD, US; 4University of Wisconsin Orthopedics & Rehabilitation, Madison, WI, US; 5University of Kansas Medical Center/Department of Neurosurgery, Kansas City, KS, US; 6University Orthopaedic Center, Salt Lake City, UT, US; 7University Health Network - Toronto Rehabilitation Institute, Toronto, ON, Canada; 8University of Orthopaedic Surgery, National Defense Medical College, Tokyo, Japan; 9Spectrum Research, Inc., Tacoma, WA, US; 10Toronto Western Research Institute, Toronto, ON, Canada; 11UCLA Neurosurgery, Santa Monica, CA, US; 12Christopher Reeve Paralysis Foundation, Baltimore, MD, US; 13Ontario Neurotrauma Foundation, Toronto, ON, Canada; 14University of Cambridge, Cambridge, United Kingdom; 15Blussion Spinal Cord Center, Vancouver, BC, Canada; 16University of Toronto, Toronto, ON, Canada; 17University of Maryland Medical Center, Baltimore, MD, US; 18University of Cambridge, Cambridge, United Kingdom; 19Blussion Spinal Cord Center, Vancouver, BC, Canada; 20The University of Sydney (John Walsh Centre for Rehabilitation Research), Sydney, NSW, Australia; 21Nagoya University Graduate School of Medicine, Department of Orthopedic Surgery, Nagoya, Japan; 22University of Kansas Hospital, Kansas City, KS, US; 23Sunnybrook Health Sciences Centre, Toronto, ON, Canada

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.


Michael G. Fehlings, MD, PhD, FRSCC; Jefferson Wilson, MD, PhD; Bizhan Aarabi, MD, FACS, FRSCC; Paul A. Anderson, MD; Paul M. Arnold, MD; Darrel S. Brodke, MD; Anthony Burns, MD, MSc; Kazuhiro Chiba, MD, PhD; Joseph R. Dettori, MPH, PhD; Julio C. Furlan, MD, PhD, MBA; Langston T. Holly, MD; Susan Howley; Tara Jeji, MBA; Sukhvinder Kalsi-Ryan, PT, MS, PhD; Mark Kotter, MD, PhD; Brian K. Kwon, MD, PhD, FRSCC; Ralph Marino, MD, MS; Allan Martin, MD; Eric M. Massicotte, MD, FRSCC; Geno Merli, MD, PhD; James Middleton, MBBS, PhD, PhD; Hiroaki Nakashima, MD; Naritho Nagoishi, MD, PhD; Katherine Palmieri, MD, MBA; Mohammed F. Shamji, MD, PhD, FRSCC; Anoushka Singh, PhD; Andrea C. Skelly, PhD, MPH; Lindsay Tetreault, PhD; Albert J. Yee, MD, FRSCC; Michael G. Fehlings, MD, PhD, FRSCC

1Toronto Western Hospital, Toronto, ON, Canada; 2Toronto, ON, Canada; 3University of Maryland Medical Center, Department of Neurosurgery, Baltimore, MD, US; 4University of Wisconsin Orthopedics & Rehabilitation, Madison, WI, US; 5University of Kansas Medical Center/Department of Neurosurgery, Kansas City, KS, US; 6University Orthopaedic Center, Salt Lake City, UT, US; 7University Health Network - Toronto Rehabilitation Institute, Toronto, ON, Canada; 8University of Cambridge, Cambridge, United Kingdom; 9Sunnybrook Health Sciences Centre, Toronto, ON, Canada; 10Toronto Western Hospital, Toronto, ON, Canada; 11UCLA Neurosurgery, Santa Monica, CA, US; 12Christopher Reeve Paralysis Foundation, Baltimore, MD, US; 13Ontario Neurotrauma Foundation, Toronto, ON, Canada; 14University of Cambridge, Cambridge, United Kingdom; 15Blussion Spinal Cord Center, Vancouver, BC, Canada; 16University of Toronto, Toronto, ON, Canada; 17Thomas Jefferson University Hospital, Philadelphia, PA, US; 18The University of Sydney (John Walsh Centre for Rehabilitation Research), Sydney, NSW, Australia; 19Nagoya University Graduate School of Medicine, Department of Orthopedic Surgery, Nagoya, Japan; 20University of Kansas Hospital, Kansas City, KS, US; 21Sunnybrook Health Sciences Centre, Toronto, ON, Canada

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
3:58–4:04 p.m.
110. The Postoperative DVT, PE and MI: Complications after Therapeutic Anticoagulation in the Spine Trauma Patient
Elizabeth J. Le, MD1; Brian Shiu2; Tristan B. Weir, BS3; Timothy Costales4; Nicholas Caffes5; Ehsan Jazini, MD6; Steven C. Ludwig, MD7
1University of Maryland Medical Center, Baltimore, MD, US; 2Baltimore, MD, US; 3University of Maryland School of Medicine, Baltimore, MD, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:04–4:10 p.m.
111. Timing of Operative Intervention in Traumatic Spine Injuries without Neurologic Deficit
Elliott Kim, MD1; Joseph Wick, BA2; David Stonko, MS3; Silky Chotai, MD4; Thomas Freeman, BS5; Diana G. Douleh, BS6; Akshikumar Mistry, MD6; Scott L. Parker, MD7; Clinton J. Devin, MD8
1Vanderbilt Orthopaedic Institute, Nashville, TN, US; 2Nashville, TN, US; 3Vanderbilt University School of Medicine, Nashville, TN, US; 4Vanderbilt University Medical Center, Nashville, TN, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:10–4:25 p.m.
Discussion

4:25–4:31 p.m.
112. Comparison of the Neurological Improvement Effects of One-Stage Posterior Vertebral Column Resection (PVCR) and Vertebral Column Shortening Surgery and Traditional Posterior Decompression Surgery on Thoracolumbar Spine Fracture Complicated with Spinal Cord Injury (SCI)
Jing-Ming Xie, MD1; Zhiyue Shi, MD; Ying Zhang, MD; Yingsong Wang, MD; Tao Li, MD; Ni Bi, MD
Department of Orthopaedics, 2nd Affiliated Hospital of Kunming Medical University, Kunming, Yunnan, China
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:31–4:37 p.m.
113. Variables that Predispose a Spine Patient to a Non-Emergent Transfer to a Tertiary Care Hospital
Gregory D. Schroeder, MD1; Mark F. Kurud, MD2; Christopher K. Kepler, MD, MBA3; Kris E. Radcliff, MD; Barrett Woods, MD; Seth Stake, BS; Joseph Buchholz, BS; Kristen Nicholson, PhD; Jeffrey A. Rihn, MD; D. Greg Anderson, MD; Alan S. Hillbrand, MD; Alexander R. Vaccaro, MD, PhD; Saifdar N. Khan, MD
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:37–4:43 p.m.
114. The Relationship Between MRI Features and Neurological Prognosis in Patients with Cervical Spinal Cord Injury
Akinobu Matsushita, MD, PhD
Spinal Injuries Center, liduka, Fukuoka, Japan
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:43–4:49 p.m.
115. Can the Acute MRI Features Reflect Neurological Prognosis in Patients with Cervical Spinal Cord Injury?
Akinobu Matsushita, MD, PhD
Spinal Injuries Center, liduka, Fukuoka, Japan
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:49–5:05 p.m.
116. Pre-Injury Patient Characteristics and Post-Injury Neurologic Status are Associated with Mortality Following Spinal Cord Injury
Benjamin Zmistowski, MD1; Jayanth Vatson, BA2; David Casper, MD3; Gregory D. Schroeder, MD; Christopher K. Kepler, MD, MBA
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:55–5:10 p.m.
Discussion

3:40–5:10 p.m.
Room 205C
Moderator: Scott Haldeman, MD, PhD, DC, FRACP(C), FAAN
The WHO Burden of Disease 2010 study listed spinal disorders as having a greater impact on global health than HIV/AIDS, malaria, lower respiratory infections, stroke, breast cancer, lung cancer, Alzheimer’s disease or diabetes. The WHO and World Bank have estimated that low back and neck pain afflict almost one billion people worldwide and are the major causes of disability in the world. The growth of disability related to spinal disorders is increasing much more rapidly in developing, low-income countries compared to developed, high-income countries. Currently no global approach has been developed and tested that is likely to reduce the health burden of spinal disorders. There has not been any attempt to develop an implementable comprehensive, cost-effective model of care.
that could be implemented by clinicians, community and government health agencies with different resource capacities.

The Global Spine Care Initiative (GSCI) was convened in 2014 to bring together an interdisciplinary, international team of clinicians and scientists with the goal of developing an evidence-informed model of care that would apply to all people or patients likely to present to or seek advice from a spine care clinician or clinical setting. A requirement of this model of care is that it should be implementable in communities with different resource capacities.

Upon completion of this session, participants should gain strategies to:

- Be aware of the current understanding of the burden of spinal disorders on both an individual and community level;
- Consider the classification of spinal disorders based on differences in intervention priorities that includes all potential patients or people likely to seek care or advice from a spine care clinician irrespective of their specialty;
- Be able to differentiate the levels of evidence for assessment, non-invasive active, non-invasive passive, and invasive treatment interventions and understand which intervention should be considered or not considered for different patient presentations;
- Understand how to implement a sustainable, evidence based, interdisciplinary model of care for spinal disorders in any community, hospital, government, or private health care system irrespective of the available resources.

**Agenda**

- **Psychosocial Issues in Spine-related Disability: A Systematic Review and Analysis for the Global Spine Care Initiative**
  Roger Chou, MD, FACP
- **The Global Spine Care Initiative Spinal Disorders Classification: A Consensus Approach to the Classification of Spinal Disorders**
  Claire Johnson, PhD, MSEd, DC
- **The Global Spine Care Initiative Spinal Disorders Care Pathway: A Consensus Approach to a Pathway of Care for Spinal Disorders in Communities with Different Resource Capacity**
  Deborah Kopansky-Giles, DC, FCCS, MSc
- **The Global Spine Care Initiative Results and Policy Implications: Implementation of an Evidence-based Model of Care for Spinal Disorders in Communities with Different Resource Capacity**
  Scott Haldeman, MD, PhD DC, FAAN
- **The Global Spine Care Initiative: Future Challenges and Research Proposal**
  Eric Hurwitz, PhD, DC
- **Panel Discussion: Is the GSCI Implementable and Useful to Clinicians, Governments and Policy Makers?**

**FDA Device/Drug Status:**
Roger Chou, MD, FACP: Duloxetine (Approved for this indication); Acetaminophen, NSAIDs, Opioids, Antiseizure medications, Skeletal muscle relaxants, Benzodiazepines, Corticosteroids (Not approved for this indication).

**3:40–5:10 p.m.**

**Case-based Discussion:**
**Top Cases from SpineConnect**
Room 206A
Moderator: Michael R. Klein, MD

Five top-rated cases have been chosen from hundreds posted on SpineConnect since its inception in 2014. The physician who posted the case will present the history and diagnostic studies that stimulated responses from the approximately 8,400 members of SpineConnect and ask for additional input from the audience, focusing on providing the best outcome. This interactive session will address several procedures and provide information about how and why certain techniques were used and their outcomes. SpineConnect is a NASS members-only spine care community that allows participants to discuss cases in real time with colleagues from around the world.

Upon completion of this session, participants should gain strategies to:

- Stress the importance of establishing the correct diagnosis before implementing treatment in elective cases;
- Capitalize on the advantage of networking and input from the worldwide NASS members to provide state-of-the-art spinal care for our patients and further round out knowledge and skill, sharing combined experience with cases, and avoiding pitfalls as well;
- Provide NASS members who post the cases with alternate forms of treatment, i.e. surgical vs. non-surgical;
- Engage in a forum that contributes to the commitment of NASS to educating a world-wide membership and helping physicians in other countries who may not have the same resources as those in the United States.

**Agenda**

- **Introduction**
  Michael R. Klein, MD
- **Case 1: A One Year of LBP in a 17-Year-Old Girl. Who Needs Treatment, the Girl or the Parents?**
  John P. Hammerstein, MD, Missoula, Montana
- **Case 2: Spondyloysis in a 17-Year-Old Athlete: Returning to Play After Injury**
  Richard N. Norris, MD, Northampton, Massachusetts
Case 3: Thoracic Spinal Mass in an Anuric 50-Year-Old Male
Ibrahim Abou Daya, MD, Beirut, Lebanon

Case 4: Congenital Scoliosis of 94 Degrees in 3-Year-Old Boy
Marcello O. Barbosa, MD, Brasilia, Brazil

Case 5: Painful Hyperlordosis in a 52-Year-Old Female with Multiple Sclerosis
John P. Hammerstein, MD, Missoula, Montana

Discussion, Questions and Answers

5:10–5:15 p.m.
Paul J. Slosar, MD1; Barbara D. Boyan, PhD2
1Spine Care Institute of San Francisco, San Francisco, CA, US; 2Virginia Commonwealth University-School of Engineering, Richmond, VA, US
FDA Device/Drug Status: Titan Spine Endoskeleton™; nanoLOCK™ (Approved for this indication)

5:15–5:20 p.m.
HT Medical, LLC: Development of a Porous Cellular Titanium Interbody Fusion Device
William Walsh, PhD1; Nick Cordaro, MS2; Chris Christou, PhD2; Sachin Kher, MBBS, BS3; Matthew H. Pelletier, PhD4
1Surgical and Orthopaedic Research Labs, Randwick, Australia; 2Additive Innovations, LLC, Encinitas, CA, US; 3Blacktown Hospital, Sydney, NSW, Australia
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

5:20–5:25 p.m.
Centinel Spine: Understanding the Properties of Coating with Titanium Plasma-Spray: Which Characteristics Lead to Better Clinical Outcome?
Celeste Abjornson, PhD1; Frank P. Cammisa, MD
Hospital for Special Surgery, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

5:25–5:30 p.m.
K2M Inc.: Novel 3D Printed Lamellar Titanium Interbody
John P. Kostuik, MD1; Thomas J. Morrison III, MD2; Jennifer A. Moore3; Dave Fiorella2
1Polaris Spine and Neurosurgery, Atlanta, GA, US; 2K2M, Leesburg, VA, US
FDA Device/Drug Status: Cascadia Interbody System (Approved for this indication)

5:30–5:40 p.m.
Discussion

5:40–5:45 p.m.
Nanovis: Comparison of Abrasion and Osseointegration Associated with Titanium Plasma Spray Coated PEEK versus FortiCore Deeply Porous Titanium Scaffold on PEEK
Donna D. Ohnmeiss, PhD1; Chang Yao2; Richard D. Guyer, MD3
1Texas Back Institute Research Foundation, Plano, TX, US; 2Nanovis, Columbia City, IN, US; 3Texas Back Institute, Plano, TX, US
FDA Device/Drug Status: Nanovis Forticore fusion cages (Approved for this indication)

5:45–5:50 p.m.
Globus Medical: Experimental Correlation of Radiographic Metrics and Lumbosacral Rod Strain Following Lumbopelvic Instrumentation for Deformity Correction and Finite Element Analysis of Rod Strain for Titanium, Cobalt Chrome and Stainless Steel Constructs
Bryan W. Cunningham, PhD1; Mark Moldavsky, MS2; Wenhai Wang, PhD3; Jonathan Harris4; Sigurd H. Berven, MD5
FDA Device/Drug Status: REVERE Stabilization System (Globus Medical Inc.; Audubon, PA) (Approved for this indication), INDEPENDENCE Anterior Spacers (Globus Medical Inc.; Aububon, PA) (Approved for this indication)

5:50–5:55 p.m.
Solvay Specialty Polymers: Biomechanical Performance of Novel Porous PEEK for Interbody Fusion Devices
Robert Guldberg, PhD1; Brennan Torstrick, BSL; Ken Gall, PhD2; Nathan Evans, PhD3
1Georgia Tech, Atlanta, GA, US; 2Duke University, Durham, NC, US; 3Atlanta, GA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

5:55–6:00 p.m.
Surgical Care Affiliates: Migration of Complex Spine to an Outpatient Environment
Robert S. Bray Jr., MD1
1DISC Sports and Spine, Marina Del Rey, CA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

6:00–6:10 p.m.
Discussion

5:15–6:15 p.m.
SpineConnect Reception
Room 206A
Lumbar Spinal Injections  
January 27-28 • Phoenix, AZ

13th Annual Evidence and Technology Spine Summit  
February 22-25 • Park City, UT

Spine Deformity  
March 24-25 • Burr Ridge, IL

Coding Update 2017: Essentials and Controversies of Spine Care Coding  
March 31-April 1 • Las Vegas, NV

Section on Motion Technology: Cervical Total Disc Replacement  
May 5-6 • Burr Ridge, IL

Section on Allied Health: Nurses: Introduction to Spine Care  
June 17 • Burr Ridge, IL

Advanced Injection Procedures for Complex Pain and Functional Impairment  
June 23-24 • Burr Ridge, IL

Summer Spine Meeting  
July 26-29 • San Diego, CA

Section on Allied Health: Assessment, Prognosis and Management of Traumatic Neck Pain  
September 8-9 • Burr Ridge, IL

Fundamentals of Spine Surgery and Interventional Pain Management  
September 15-16 • Burr Ridge, IL

Coding Update 2017: Essentials and Controversies of Spine Care Coding  
October 23-24 • Orlando, FL

32nd Annual Meeting  
October 25-28 • Orlando, FL

Minimally Invasive Spine Surgery with Radiation Reducing Techniques  
November 10-11 • Burr Ridge, IL

NASS  
North American Spine Society
6:30–8:00 a.m.
Continental Breakfast
Outside General Session (Room 210ABC)

6:30 a.m.–5:00 p.m.
Attendee Registration
Lobby–Level 1 West

6:50–6:55 a.m.
Announcements
Room 210ABC

6:55–7:00 a.m.
NASS Working for You: Town Hall USA Update
Room 210ABC
Moderator: John G. Finkenberg, MD

7:00–8:30 a.m.
Interdisciplinary Symposium: Professional Coaching and Enhanced Self-care to Counteract Stress, Burnout and Frustration
Room 210ABC
Moderator: Steven Adelman, MD

This session is designed to address the professional and personal challenges faced by physicians and other clinical care team members in a variety of medical practice settings. Symposium topics have been selected to address the unique challenges and stressors impacting physicians and other clinical care providers. Program content also will be of interest to medical leaders, administrators, managers and support staff who interact with practicing clinicians on a regular basis. Given the pressures and demands of the current healthcare system, physicians and other clinicians face a growing number of stressors that may impact patient care as well as personal and professional well-being. Burnout and high levels of workplace frustration have become increasingly evident at all organizational levels. Systemic, economic, and cultural factors that contribute to these occupational challenges will be identified. The faculty will describe coaching and other self-care enhancement strategies that may enhance professional performance; heighten employee morale; and, support a culture of professionalism and well-being.

Upon completion of this session, participants should gain strategies to:

- Develop a better understanding of the causes, manifestations and consequences of the occupational health challenges facing today’s healthcare providers;
- Identify organizational interventions to counteract occupational stress, address the precursors of career burnout and reduce workplace frustration and conflict;
- Introduce components of a culture of professionalism with an emphasis on how such a culture positively affects patient safety and satisfaction;
- Become acquainted with the emerging field of “performance coaching for practicing health care professionals” and with self-care strategies and techniques that are aimed at optimizing workplace performance and enhancing the general welfare of all stakeholders in today’s hectic healthcare ecosystem;
- Discuss system-wide changes designed to address the root causes of the occupational health crisis in the medical profession.

About the Faculty

Steven Adelman, MD: Psychiatrist and medical leader—Physician Health Services and UMass Medical School
Alan Morse, PhD: Psychologist, organizational consultant and professional coach—PsyVantage.com
Edward Phillips, MD: Physiatrist, medical leader and social entrepreneur—Harvard Medical School and The Institute of Lifestyle Medicine

Agenda

- Introduction and Expectations
  Steven Adelman, MD
- The Lifestyle Medicine Movement: What’s Good for Our Patients is Good for Us
  Edward Phillips, MD
- Professional Coaching to Enhance Individual, Team and Enterprise Performance
  Alan Morse, PhD
Sex and gender specificity are progressively informing research and clinical care. The recognition that sex and gender affect the expression of disease has prompted National Institutes of Health research mandates, and these differences are increasingly affecting patient management across multiple disease populations. The spine community lags in these regards despite significant variation in structure and function in men and women. Spine care providers have tended toward a “one size fits all” approach that has failed to systematically address these differences and their potential effects on outcome and costs.

This session will present data regarding these variations and introduce the attendees to the importance of sex and gender specificity in effective spine care, including an overview of existing clinical initiatives as well as developing research and trends for future spine care, presented by leaders in this rapidly evolving field.

Dr. Janice Werbinski will take attendees to a 10,000-foot view in understanding why it is imperative that medical science make the effort to study males and females separately. The “One Size Fits All” model of today’s healthcare needs to change. It’s not about men and women being equal. It’s about the evidence that increasingly shows the differences between the sexes. Bringing a sex and gender perspective to education and practice assures a comprehensive understanding that ultimately will improve medical care for all.

Upon completion of this session, participants should gain strategies to:
- Identify current research on the significance of sex and gender specificity in medicine;
- Gain a greater understanding of the importance of sex and gender variation in the delivery of spine care;
- Acknowledge future clinical and research trends regarding sex and gender specificity in the field of orthopedics and spine care;
- Comprehend the increasingly apparent interrelationship between parity and spine pain syndromes;
- Appreciate the importance of pelvic floor function to axial stability and its role in chronic pelvic pain and rehabilitation.
118. Moved to Resident and Fellow Research Awards Presentations (Friday, October 28, 3:20–3:50 p.m.)

8:36–8:42 a.m.
119. Pelvic Incidence: A Fixed Value or Can You Change It?
Howard M. Place, MD; Ann M. Hayes, DPT, MHS, OCS; Andy Hayden; Heidi Israel, PhD, FNP; Jennifer L. Brechbuhler, BSN
1Saint Louis University, Saint Louis, MO, US; 2Saint Louis University, Department of Orthopaedic Surgery, St. Louis, MO, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

8:42–8:48 a.m.
120. Further Research on the Efficacy of a New Navigable Percutaneous Disc Decompression Device (L’DISQ) in Patients with Lumbar Radicular Pain: 2-Year Follow-Up
Sung Hoon Kim; Sang-Heon Lee, MD, PhD; Nack Hwan Kim
1Korea University School of Medicine, Seoul, Democratic People’s Republic of Korea
FDA Device/Drug Status: L’DISQ – Approved for this indication.

8:48–8:54 a.m.
121. Trans-Sacral Epiduroscopic Laser Decompression (SELD) for the Treatment of Symptomatic Lumbar Disc Herniations (LDH): Single Center Experience of Clinical and Radiologic Results in Minimum 12-Months Follow-Up
Jung-Woo Hur, MD; Jin-Sung Kim, MD, PhD; Ji-hoon Seong, MD
1Seoul St. Mary’s Hospital, The Catholic University of Korea, Seoul, Democratic People’s Republic of Korea
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

8:54–9:00 a.m.
122. Greater Expectations of Pain Improvement are Associated with Less Actual Pain Improvement after Lumbar Surgery
Carol A. Mancuso, MD; Manney Reid, MD, PhD; Roland Duculan, MD; Alex Fong, BA; Manuela C. Rigaud, MA; Frank P. Cammisa, MD; Andrew A. Sama, MD; Alexander P. Hughes, MD; Darren R. Lebl, MD; Federico P. Girardi, MD
1Hospital for Special Surgery, New York, NY, US; 2Weill Cornell Medicine, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

9:00–9:06 a.m.
123. Correlating Patient Reported Outcomes to Patient Satisfaction in Patients with a Lumbar Disc Herniation
Gregory D. Schroeder, MD; Alan S. Hillbrand, MD; Alexander R. Vaccaro, MD, PhD; Wenyan Zhao, PhD; Jon D. Lurie, MD; Kris E. Radcliff, MD
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

9:06–9:30 a.m.
Discussion

9:00 a.m.–5:00 p.m.
Technical Exhibition

9:00–10:00 a.m.
Industry Presentation: Improving Surgical Efficiency with Spine Navigation and Intra-operative Imaging
Eric J. Woodard, MD
Presented by Stryker
The Learning Place, Orange Theater
Technical Exhibition, Booth #1900

9:30–10:00 a.m.
Networking Break–Beverage Service
Technical Exhibition

9:30–9:45 a.m.
Poster Grand Rounds
The Learning Place, Yellow Theater
Technical Exhibition, Booth #1900

9:30–9:45 a.m.
P156. Risk Factors for LOS Following Anterior Cervical Discectomy and Fusion (ACDF)
Joung Heon Kim, BS; Jun Kim, MD; Nathan J. Lee, BS; John Di Capua, MHS, BS; Dante M. Leven, DO, PT; Parth Kothari, BS; Sulaiman Somani; Samuel K. Cho, MD
1Icahn School of Medicine at Mount Sinai, New York, NY, US; 2Mount Sinai Medical Center, New York, NY, US; 3Mount Sinai School of Medicine, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
**Poster Grand Rounds**
The Learning Place, Green Theater
Technical Exhibition, Booth #1900

**9:30–10:00 a.m.**

**P153. Age as a Risk Factor Following Anterior Cervical Discectomy and Fusion (ACDF)**

Jun Kim, MD1; Nathan J. Lee, BS2; Parth Kothari, BS3; Sulaiman Somani4; John DiCapua, MHS, BS5; Joun Heon Kim, BS5; Dante M. Leven, DO, PT5; Samuel K. Cho, MD3

1Mount Sinai Medical Center, New York, NY, US; 2Mount Sinai School of Medicine, New York, NY, US; 3Icahn School of Medicine at Mount Sinai, New York, NY, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

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**9:30–9:40 a.m.**

**P150. The Effect of Smoking Status on Inpatient Pain Scores Following Anterior Cervical Discectomy and Fusion**

Benjamin Mayo, BA1; Dustin H. Massel, BS2; Ankur S. Narain, BA3; Fady Y. Hijji, BS3; Krishna Modi, BS3; William W. Long, BA4; Khaled A. Aboushaala, MD, MS4; Bryce Basques, MD, MHS3; Kern Singh, MD1

1Rush University Medical Center, Chicago, IL, US; 2Midwest Orthopaedics at Rush, Chicago, IL, US; 3Department of Orthopaedic Surgery Rush University Medical Center, Chicago, IL, US; 4Midwest Orthopaedics at Rush University, Oak Park, IL, US; 5Icahn School of Medicine, New Haven, CT, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

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**9:40–9:50 a.m.**

**P147. Inpatient Pain Among Worker’s and Non-Worker’s Compensation Patients Following Anterior Cervical Discectomy and Fusion**

Dustin H. Massel, BS5; Benjamin Mayo, BA1; Fady Y. Hijji, BS3; Ankur S. Narain, BA4; Krishna Modi, BS3; William W. Long, BA2; Khaled A. Aboushaala, MD, MS4; Kern Singh, MD1

1Midwest Orthopaedics at Rush, Chicago, IL, US; 2Rush University Medical Center, Chicago, IL, US; 3Department of Orthopaedic Surgery Rush University Medical Center, Chicago, IL, US; 4Midwest Orthopaedics at Rush University, Oak Park, IL, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

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**9:45–10:00 a.m.**

**P154. Prospective, Eighty-Eight Patient Series Study of the Use of a Novel 3-D Printed Titanium Truss System Cage in Anterior Cervical Spinal Surgery**

Tucker C. Callanan, BS; Brendon Walker, BS; Samuel Grinberg, BA; Frank P. Cammisa, MD; Celeste Abjornson, PhD

Hospital for Special Surgery, New York, NY, US

**FDA Device/Drug Status:** 4web Cervical Spine Truss System™ cage (Approved for this indication)

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**9:45–10:00 a.m.**


Baron S. Lonner, MD1; Yuan Ren, PhD, MSc2; Gabrielle Kassin, BS3

1Mount Sinai Beth Israel Medical Center, New York, NY, US; 2Mount Sinai Beth Israel, New York, NY, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.
10:00–10:15 a.m.
Patient-Centered Outcomes Research Institute Update:
Joe Selby, MD, MPH, Executive Director, PCORI
Room 210ABC

10:15–11:00 a.m.
Introduction and Presidential Address:
F. Todd Wetzel, MD and Christopher M. Bono, MD
Room 210ABC

11:00 a.m.–12:00 p.m.
Introduction and Presidential Guest Speaker:
Christopher M. Bono, MD and Michio Kaku, PhD
Room 210ABC

11:00 a.m.–1:00 p.m.
Surgical Innovation Lab Demonstrations
The Learning Place, Technical Exhibition, Booth #1900

- Simmetry® Minimally Invasive SI Joint Fusion with Decortication (Invitation Only)
  Blue Lab
- Xtant Medical Product Demo (Invitation Only)
  Green Lab
- Microsurgical Decompression and Motion Preserving Interlaminar Stabilization for Lumbar Spinal Stenosis
  Yellow Lab

11:00 a.m.–2:30 p.m.
NASS Bistro
Technical Exhibition, Booth #272

12:00–1:00 p.m.
Complimentary Box Lunch Medical Attendees Only
Technical Exhibition, Booth #773

Solution Showcase
Technical Exhibition, Booth #573

- 12:00 p.m.: Invibio Biomaterial Solutions
  Early Clinical Experience with a PEEK-OPTIMA™ HA Enhanced Device for Lumbar Fusion
  Presented by Dr. Timothy D. Bassett

- 12:30 p.m.: Medicrea USA
  Patient-Specific Implants in Cervico-Thoracic: Early Results Show Improved Alignment and Patient Outcomes
  Presented by Dr. Themistocles Protopsaltis

12:40 p.m.: Medicrea USA
Patient-Specific Implants in Pediatrics: Early Results Show Improved Alignment and Patient Outcomes
Presented by Dr. Andrew King

1:00–1:05 p.m.
NASS Working for You: Appropriate Use Criteria Update
Room 210ABC
Moderator: Charles A. Reitman, MD

1:05–2:05 p.m.
The Spine Journal Outstanding Paper Awards Presentations
Room 210ABC
Moderator: Eugene J. Carragee, MD

1:05–1:13 p.m.
Introduction from Eugene J. Carragee, MD

1:13–1:23 p.m.
Outstanding Paper: Medical/Interventional Science
Modifiable Risk Factors for Chronic Back Pain: Insights using the Co-Twin Control Design
Pradeep Suri, MD, MS1,2,3, Edward J. Boyko, MD, MPH4,5, Nicholas L. Smith, PhD6,7, Jeffrey G. Jarvik, MD, MPH8,9, Frances M. Williams, MD, PhD10, Gail P. Jarvik, MD, PhD6,10, Jack Goldberg, PhD11
1Seattle Epidemiologic Research and Information Center, VA Puget Sound Health Care System, Seattle, WA, US; 2Division of Rehabilitation Care Services, VA Puget Sound Health Care System, Seattle, WA, US; 3Department of Rehabilitation Medicine, University of Washington, Seattle, WA, US; 4General Medicine Service, VA Puget Sound Health Care System, Seattle, WA, US; 5Department of Epidemiology, University of Washington, Seattle, WA, US; 6Comparative Effectiveness, Cost and Outcomes Research Center, University of Washington, Seattle, WA, US; 7Departments of Radiology, Neurological Surgery, and Health Services, University of Washington, Seattle, WA, US; 8Department of Twin Research and Genetic Epidemiology, Kings College London, London, UK; 9Departments of Medicine (Medical Genetics) and Genome Sciences, University of Washington, Seattle, WA, US.

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
1:23–1:33 p.m.  
**Outstanding Paper: Value in Spine Care Surgery for Degenerative Cervical Myelopathy: A Patient-Centered Quality of Life and Health Economic Evaluation**

Christopher D. Witiw, MD1,2; Lindsay A. Tetreault, PhD3; Fabrice Smijiauskas, PhD4; Branko Kopjar, MD, PhD4; Eric Massicotte, MD, MSc1; Michael G. Fehlings, MD, PhD1,5,6

1Division of Neurosurgery, Department of Surgery, University of Toronto, Toronto, Ontario, Canada; 2Department of Public Health Sciences, University of Chicago, Chicago, IL, US; 3Institute of Medical Science, University of Toronto, Toronto, Ontario, Canada; 4Department of Health Services, University of Washington, Seattle, Washington, USA; 5Spinal Program, McEwen Centre for Regenerative Medicine, Toronto Western Hospital, University Health Network, Toronto, Ontario, Canada; 6Department of Surgery, Neural Repair and Regeneration, Spinal Program, University of Toronto, Toronto, Ontario, Canada

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

1:33–1:43 p.m.  
**Runner-Up: Medical/Interventional Science**

**Objective Measurement of Free-Living Physical Activity (Performance) in Lumbar Spinal Stenosis: Are Physical Activity Guidelines Being Met?**

Justin Norden, MPhil1; Christy Tomkins-Lane, PhD2; Aman Sinha, MPhil3; Richard Hu, MD4; Matthew Smuck, MD5

1Stanford University School of Medicine, Stanford, CA, US; 2Mount Royal University, Calgary, Alberta, Canada; 3Department of Electrical Engineering, Stanford University, Stanford, CA, US; 4Department of Surgery, University of Calgary, Calgary, Alberta, Canada; 5Department of Orthopedic Surgery, Stanford University, Redwood City, CA, US.

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

1:43–2:05 p.m.  
**Discussion**

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1:05–2:05 p.m.  
**Symposium:**

**Think Before You Tweet #socialmedia #ethics #professionalism**

Room 209  
Moderator: Carrie A. Diulus, MD

Social media is here to stay. Learning to utilize what social media has to offer and avoiding pitfalls is of growing importance for providers.

**Upon completion of this session, participants should gain strategies to:**

- Effectively use social media to improve your online reputation;
- Protect your own privacy with personal social media usage;
- Comprehend the benefits of being active with professional social media sites;
- Avoid the hazards and ethical issues around professional social media usage.

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1:05–2:05 p.m.  
**Symposium:**

**Decreasing Radiation Exposure During Spine Surgery and Interventional Procedures**

Room 208  
Moderator: Joseph P. Gjolaj, MD

Radiation exposure is a significant concern for the spine specialist. This is especially true given the advances in minimally invasive spine surgery techniques, which may rely heavily on fluoroscopy. In addition to exposing the spine surgery patient to radiation, those specialists affected include orthopaedic and neurosurgeons, interventional radiologists, interventional pain specialists, and anesthesiologists. Other medical professionals, such as physician assistants, nurses and operating room technicians, may be frequently exposed to radiation as well. This session provides a focused discussion on current strategies for decreasing radiation exposure during spine surgery and other interventional procedures, while also exploring future directions to reduce the radiation burden to both spine specialist and patient.

**Upon completion of this session, participants should gain strategies to:**

- Counsel patients and staff on the risks of radiation exposure;
- Choose the most appropriate radiation reduction techniques for your practice;
- Differentiate the magnitude of radiation from fluoroscopy versus x-ray versus computed tomography (CT) and understand risks/benefits of each modality.
Agenda

- Introduction and Objectives
  Joseph P. Gjolaj, MD
- The Essentials of Radiation Exposure and General Tips for Avoidance
  A. Jay Khanna, MD, MBA
- Minimally Invasive Spine Surgery: One Step Forward, Two Steps Back?
  Daniel M. Scuibba, MD
- The Role of Image Guidance in Reduction of Radiation Exposure
  S. Samuel Bederman, MD, PhD, FRCSC
- Free-Hand Technique in Spine Surgery: Radiation Reduction at its Best
  Mark M. Mikhail, MD
- Interventional Spine Specialist’s Guide to Radiation Reduction
  John A. Carrino, MD, MPH
- Panel Discussion
  All Faculty

1:05–2:05 p.m.

Abstract Presentations:
Lumbosacral/Pelvic
Room 205A
Moderator: Darrel S. Brodke, MD

1:05–1:11 p.m.
124. Can S2-Alar-Iliac (S2AI) Screws be Placed Accurately without Fluoroscopy?
Daniel G. Kang, MD; Jacob M. Buchowski, MD, MS; Panya Lukasanoluk, MD; Christopher Chen, MD; Ronald A. Lehman Jr., MD; Lawrence G. Lenke, MD

1:11–1:17 p.m.
125. Use of S2-Alar-Iliac Screws was Associated with Less Complications than Iliac Screws in Adult Lumbosacropelvic Fixation
Wataru Ishida, MD; Benjamin D. Elder, MD, PhD; Sheng-fu L. Lo, MD, MHS; Christina Holmes, PhD; C. Rory Goodwin, MD, PhD; Ali Bydon, MD; Daniel M. Scuibba, MD; Timothy F. Witham, MD, FACS

1:17–1:23 p.m.
126. Outcomes and Complications of Sacropelvic Fixation Using the S2 Alar-Iliac (S2AI) Technique in Adult Spinal Deformity Patients Fused to the Sacrum: A Minimum Two-Year Follow-Up Study
Tina Raman, MD; Hamid Hassanzadeh, MD; Emily Miller, BA; Paul D. Sponseller, MD; Khaled M. Kebaish, MD

1:23–1:29 p.m.
127. Lumbopelvic Fixation Provides Additional Support for Complex Sacral Fractures: A Biomechanical Investigation within Varying Comminution Severities
Ehsan Jazini, MD; Noelle Klocke, MS; Oliver Tannous, MD; Herman Johal, MD, MPH; John Hao, BS; Daniel E. Gelb, MD; Jason Nascone, MD; Robert V. O’Toole, MD; Brandon Bucklen, PhD; Steven C. Ludwig, MD

1:29–1:35 p.m.
128. S1 Pedicle Screw Salvage Technique via a Superior Articulating Process Entry Point
Yu-Po Lee, MD; Hansel E. Ihn; Saifal-Deen B. Farhan, MD; Michelle McGarry, MS; Nitin N. Bhatia, MD; Thay Lee, PhD

FDA Device/Drug Status:
- Daniel M. Scuibba, MD: Pedicle Screws: Approved for this indication.
1:35–1:41 p.m.
129. Outcomes of Lumbopelvic Fixation in the Treatment of Complex Sacral Fractures Using Minimally Invasive Surgical Techniques
Ehsan Jazini, MD1, Emeka J. Nwodim, MD2, Oliver Tannous, MD1, Comron Saifi, MD4, Nicholas Caffes3, Timothy Costales4, Tristan B. Weir, BS5, Eugene Y. Koh, MD, PhD6, Kelley E. Banagan, MD2, Daniel E. Gelb, MD6, Steven C. Ludwig, MD1
1University of Maryland Medical Center, Baltimore, MD, US; 2Bay Area Orthopaedics and Sports Medicine, Glen Burnie, MD, US; 3Baltimore, MD, US; 4Columbia University, New York, NY, US; 5University of Maryland School of Medicine, Baltimore, MD, US; 6University of Maryland, Baltimore, MD, US; 7University of Maryland Medical System, Baltimore, MD, US; 8University of Maryland Orthopaedic Associates, Baltimore, MD, US
FDA Device/Drug Status: Lumbopelvic fixation materials (Approved for this indication)

1:41–1:47 p.m.
130. Complex Combat-Related Lumbosacral Dissociations
Scott Wagner, MD1, Daniel G. Kang, MD2, Theodore Steelman, MD3, Ronald A. Lehman Jr, MD3
1Walter Reed National Military Medical Center, Bethesda, MD, US; 2Madigan Army Medical Center, Tacoma, WA, US; 3The Spine Hospital - Columbia University/New York Presbyterian, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:47–2:05 p.m.
Discussion

1:05–2:05 p.m.
Abstract Presentations: Deformity (AIS)
Room 205B
Moderator: Ronald A. Lehman, MD

1:05–1:11 p.m.
131. Cost and Clinical Outcome Analysis of Adolescent Idiopathic Scoliosis Surgeries: Experience from a Nonprofit Community Hospital
Isador H. Lieberman, MD, FRCS, MBA; Sara Brice; Xiaobang Hu, PhD
Scoliosis and Spine Tumor Center, Texas Back Institute, Texas Health Presbyterian Hospital Plano, Plano, TX, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:11–1:17 p.m.
132. The Total Cost to the Healthcare System and Downstream Effects of Adult Spinal Deformity
Gregory D. Schroeder, MD1, Tyler Kreitz, MD3, Christopher K. Kepler, MD, MBA4, Mark F. Kurd, MD5, Kris E. Radcliff, MD6, Barrett Woods, MD6, David Casper, MD7, Jason W. Savage, MD8, Jeffrey A. Rihn, MD9, D. Greg Anderson, MD10, Alan S. Hilibrand, MD10, Alexander R. Vaccaro, MD, PhD7
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:17–1:23 p.m.
133. Factors Associated with the Development of and Revision for Proximal Junctional Kyphosis in 458 Consecutive Adult Spinal Deformity Patients
Fred Nicholls, MD, MA, FRCS1, Murat S. Eksi, MD2, Christopher P. Ames, MD1, Sigurd H. Berven, MD2, Shane Burch, MD2, Dean Chou, MD2, Bobby Tay, MD2, Vedat Deviren, MD2
1University of Calgary, Calgary, AB, Canada; 2University of California San Francisco, San Francisco, CA, US; 3UCSF, Department of Orthopaedic Surgery, San Francisco, CA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:23–1:29 p.m.
134. Evolution of Surgery for Adolescent Idiopathic Scoliosis over 20 Years: Have Outcomes Improved?
Baron S. Lonner, MD1, Yuan Ren, PhD, MSc1, Patrick J. Cahill, MD1, Suken A. Shah, MD2, Randal R. Betz, MD2, Amer F. Samdani, MD1
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:29–1:35 p.m.
135. Selective Posterior Lumbar Fusion (Cobb to Cobb) in Lenke Type 5 Adolescent Idiopathic Scoliosis: Radiographic and Clinical Results
Bulent Guneri, MD1, Tunay Sanli, MA2, Sinan Kahraman, MD2, Ozcan Kaya, MD1, Emel Kaya, MD1, Selhan Karaderefer, MD2, Gurkan Gumussuyu, MD1, Gokhan Peker, MD1, Bekir Yavuz Ucar, MD1, Meric Enercan, MD1, Azmi Hamzaoglu, MD1
1Sutcu Imam University, Kahramanmaras, Turkey; 2Istanbul Spine Center, Istanbul, Turkey; 3Istanbul Bilim University, Istanbul, Turkey
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
1:35–1:41 p.m.

136. Moving Beyond Radiographs: Changes in Gait Patterns after AIS Realignment

Ashish Patel, MD1; Jeffrey Varghese, BS2; Bassel G. Diebo, MD2; Ayman Assi, PhD3; Ellen Godwin, PT, PhD3; Louis M. Day, BS4; Dan Stein; Virginie Lafage, PhD5; Carl Paulino, MD4

1Hospital for Special Surgery, New York, NY, US; 2Cedars-Sinai Medical Institute, Los Angeles, CA, US; 3Hospital for Special Surgery, New York, NY, US; 4NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 5Brooklyn, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:41–1:47 p.m.

137. The Incidence of Proximal Junctional Kyphosis (PJK) Based on Upper-Instrumented Vertebrae (UIV) in Patients Undergoing Circumferential Minimally Invasive Surgical (CMS) Correction for Adult Spinal Deformity

Neel Anand, MD1; Jason Cohen, BS2; Ryan Cohen3; Babak Khanehroo, MD3; Sheila Kahwaty, PA-C4; Eli M. Baron, MD5

1Cedars-Sinai Spine Center, Los Angeles, CA, US; 2Cedars-Sinai Medical Center, Los Angeles, CA, US; 3Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 4NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 5Brooklyn, NY, US

FDA Device/Drug Status: RrhBMP2 (infused) (Not approved for this indication)

1:47–2:05 p.m.

Discussion

1:05–2:05 p.m.

Abstract Presentations:
Cervical Complications

Room 205C
Moderator: Srinivas K. Prasad, MD

1:05–1:11 p.m.

138. Primary Drivers of Cervical Deformity: Prevalence and Effect of Surgical Treatment Strategies on Postoperative Alignment

Peter G. Passias, MD1; Cyrus M. Jalai, BA2; Virginie Lafage, PhD2; Renaud Lafage, MSc2; Themistocles S. Protopsaltis, MD2; Subbu Ramachandran, MD3; Munish C. Gupta, MD3; Robert A. Hart, MD3; Vedat Deviren, MD4; Alexandra Sorocenau, MD, MPH5; Justin S. Smith, MD, PhD6; Frank J. Schwab, MD7; Christopher I. Shaffrey, MD8; International Spine Study Group9

1NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 2Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 3Hospital for Special Surgery, New York, NY, US; 4NYU Langone Medical Center, New York, NY, US; 5Washington University School of Medicine, St. Louis, MO, US; 6Oregon Health & Science University, Portland, OR, US; 7University of California, San Francisco, San Francisco, CA, US; 8University of Calgary, Calgary, Canada; 9University of Virginia, Charlottesville, VA, US; 10University of Virginia, Charlottesville, VA, US; 11Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:11–1:17 p.m.

139. Neurological Complications in Adult Cervical Deformity Surgery

Han Jo Kim, MD1; Hongda Bao, MD2; Srawisht Iyer, MD3; Justin S. Smith, MD, PhD4; Munish C. Gupta, MD3; Todd J. Albert, MD5; Themistocles S. Protopsaltis, MD6; Gregory M. Mundis Jr., MD2; Peter G. Passias, MD2; Eric O Klineberg, MD2; Virginie Lafage, PhD2; Christopher P. Ames, MD10; International Spine Study Group11

1Hospital for Special Surgery, New York, NY, US; 2Nanjing Drum Tower Hospital, Nanjing, China; 3UVA Health System, Charlottesville, VA, US; 4Washington University School of Medicine, St. Louis, MO, US; 5Scripps Clinic Medical Group, Department of Orthopedics, La Jolla, CA, US; 6NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 7UC, Davis School of Medicine, Sacramento, CA, US; 8University of California, San Francisco, San Francisco, CA, US; 9UC, Davis School of Medicine, Sacramento, CA, US; 10Virginia Commonwealth University, Richmond, VA, US; 11Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:17–1:23 p.m.

140. The Posterior Use of BMP-2 in Cervical Deformity Surgery Does Not Result in Increased Complications: A Prospective Multicenter Study

Han Jo Kim, MD1; Hongda Bao, MD2; Srawisht Iyer, MD3; Justin S. Smith, MD, PhD4; Munish C. Gupta, MD3; Todd J. Albert, MD5; Themistocles S. Protopsaltis, MD6; Gregory M. Mundis Jr., MD2; Peter G. Passias, MD2; Brian J. Neuman, MD2; Eric O Klineberg, MD2; Virginie Lafage, PhD2; Christopher P. Ames, MD10; International Spine Study Group11

1Hospital for Special Surgery, New York, NY, US; 2Nanjing Drum Tower Hospital, Nanjing, China; 3UVA Health System, Charlottesville, VA, US; 4Washington University School of Medicine, St. Louis, MO, US; 5Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 6Scripps Clinic Medical Group, Department of Orthopedics, La Jolla, CA, US; 7NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 8UC, Davis School of Medicine, Sacramento, CA, US; 9UC, Davis School of Medicine, Sacramento, CA, US; 10University of California, San Francisco, San Francisco, CA, US; 11Brighton, CO, US

FDA Device/Drug Status: Investigational/Not approved.

1:23–1:29 p.m.

141. Reliable Intraoperative Repair Nuances of CSF Leak in Anterior Cervical Spine Surgery

Terence Verla, MD, MPH1; Lona Winnegan, FNP-C, APRN2; Jared S. Fridley, MD3; Ibrahim Omeis, MD4

1Baylor College of Medicine, Houston, TX, US; 2Baylor College of Medicine, Department of Neurosurgery, Houston, TX, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:29–1:35 p.m.

142. Multilevel ACDF with Ultra-Low Dose BMP-2 versus Posterior Approach in Multilevel Fusions to the Cervicothoracic Junction

Nicole Record, DO1; Nikhil K. Sahai, MD, MPH2; Michael J. Faloon, MD3; Ki S. Hwang, MD4; Kumar G. Sinha, MD5; Arash Emami, MD6

1St. Joseph’s Regional Medical Center/Seton Hall University, Paterson, NJ, US; 2Hospital Spine Center, Wayne, NJ, US

FDA Device/Drug Status: Use of BMP2 in multilevel ACDF (Not approved for this indication)
1:35–1:41 p.m.
143. Reoperation Rates Following Open-Door Cervical Laminoplasty
John Rodriguez-Feo, MD1; Daniel Leas, MD2; Susan Odum, PhD3; Mark F. Kurd, MD4; Robert Milam, MD5; Bruce V. Darden II, MD6

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:41–1:47 p.m.
144. Cervical Deformity Surgery Does Not Result in Postoperative Dysphagia: A Prospective Cohort Study
Han Jo Kim, MD1; Hongda Bao, MD2; Sravisht Iyer, MD1; Justin S. Smith, MD3; Michael P. Kelly, MD1; Munish C. Gupta, MD1; Todd J. Albert, MD4; Themistocles S. Protopsaltis, MD5; Gregory M. Mundis Jr., MD1; Peter G. Fassias, MD1; Brian J. Neuman, MD1; Eric O. Klineberg, MD2; Virginie Lafage, PhD3; Christopher P. Ames, MD1
1Hospital for Special Surgery, New York, NY, US; 2Nanjing Drum Tower Hospital, Nanjing, China; 3UVA Health System, Charlottesville, VA, US; 4Washington University, Saint Louis, MO, US; 5Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 6Scripps Clinic Medical Group, Department of Orthopedics, La Jolla, CA, US; 7NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 8Baltimore, MD, US; 9UC, Davis School of Medicine, Sacramento, CA, US; 10University of California, San Francisco, San Francisco, CA, US; 11Hospital for Joint Diseases, Orange, NY, US; 12Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:47–2:05 p.m.
Discussion

2:00–4:00 p.m.
Industry Presentation:
Titan Spine Introduces nanoLOCK® Surface Technology: Driving Bone Growth and Fusion Through Nanotechnology
Co-hosted by Surgical Care Affiliates
The Learning Place, Orange Theater
Technical Exhibition, Booth #1900

Surgical Innovation Lab Demonstrations
The Learning Place, Technical Exhibition, Booth #1900

› SI-BONE Presents: Sacroiliac Joint Diagnosis Best Practices and the iFuse Implant System Surgical Technique for SI Joint Fusion
Blue Lab

› Centinel Spine Gold Standard Solutions Innovation Lab
Green Lab

› Camber Spine Technologies
Yellow Lab

This session will review the anatomy of the posterior pelvic girdle. It will cover the innervation to the sacroiliac joint, prevalence, and nonoperative treatment options.

Upon completion of this session, participants should gain strategies to:
› Recognize the potential pain generators beyond the SIJ;
› Comprehend the neural anatomy surrounding the posterior pelvic girdle;
› Identify the key physical exam maneuvers for the posterior pelvic girdle.

Agenda
› Posterior Pelvic and Neural Anatomy
  Heidi Prather, DO
› Making the Diagnosis: History and Physical, and Prevalence Data
  Alison A. Stout, DO
› Consideration of the Hips: Manual Diagnosis and Treatment
  David Kartzman, DC
› Treatment Options: Physical Therapy/Manual Therapies: A Review of the Outcome Literature
  Byron J. Schneider, MD
› Treatment Options: Interventions, A Review of the Outcome Literature/The SIJ AUC-An Expert Consensus
  E. Kano Mayer, MD
› Discussion, Questions and Answers
  All Faculty

2:10–3:10 p.m.
Section Specialty Track:
Section on Rehabilitation, Interventional and Medical Spine (RIMS): Posterior Pelvic/Sacroiliac Joint Pain
Room 210ABC
Moderator: Alison A. Stout, DO

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› Recognize the potential pain generators beyond the SIJ;
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Agenda
› Posterior Pelvic and Neural Anatomy
  Heidi Prather, DO
› Making the Diagnosis: History and Physical, and Prevalence Data
  Alison A. Stout, DO
› Consideration of the Hips: Manual Diagnosis and Treatment
  David Kartzman, DC
› Treatment Options: Physical Therapy/Manual Therapies: A Review of the Outcome Literature
  Byron J. Schneider, MD
› Treatment Options: Interventions, A Review of the Outcome Literature/The SIJ AUC-An Expert Consensus
  E. Kano Mayer, MD
› Discussion, Questions and Answers
  All Faculty
2:10–2:16 p.m.
145. A Prospective, Comparative Study of Robotic-Guidance versus Freehand in Minimally Invasive Spinal Fusion Surgery: First Report from MIS ReFRESH
Samuel R. Schroerlucke, MD1; Christopher R. Good, MD2; Michael Y. Wang, MD3
1Tabor Orthopedics, Memphis, TN, US; 2Virginia Spine Institute, Reston, VA, US; 3University of Miami, Department of Neurosurgery, Miami, FL, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:16–2:22 p.m.
146. The Effects of the Learning Curve on Fluoroscopy Time in Minimally Invasive TLIF: A Retrospective Consecutive Series
Samuel C. Overley, MD1; Robert Merrill, BS2; Abhishek Kumar, MD2; Dante M. Leven, DO, PT; Sheeraz A. Qureshi, MD, MBA1
1Mount Sinai School of Medicine, New York, NY, US; 2New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:22–2:28 p.m.
147. Open versus Minimally Invasive Approach (MIS) in Placement of Pedicle Screws at the Upper-Instrumented Vertebra (UIV) and the Effect on the Incidence of Proximal Junctional Kyphosis (PJK): A Prospective Randomized Controlled Study
Emily Miller, BA1; Tina Raman, MD2; Floreana Naef, MD2; Richard L. Skolasky, ScD2; Khaled M. Kebaish, MD1
1Baltimore, MD, US; 2Johns Hopkins University, Baltimore, MD, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:28–2:34 p.m.
148. The Rate of Revision Discectomy or Eventual Need for Fusion after Open or Dilator Tube Approach for Lumbar Microdiscectomy
Steven J. McAnany, MD; Samuel C. Overley, MD; Muhammad Anwar, MBBS; Javier Guzman, MD; Samuel K. Cho, MD; Holt Cutler, BS; Andrew Hecht, MD; Sheeraz A. Qureshi, MD, MBA
1Mount Sinai Medical Center, New York, NY, NY; 2Mount Sinai School of Medicine, New York, NY, US; 3New York, NY, US; 4Icahn School of Medicine at Mount Sinai, New York, NY, US; 5Mount Sinai Spine Center and Spine Hospital, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:34–2:40 p.m.
Section on Minimally Invasive Procedures Best Paper
149. Does Greater Body Mass Index Increase the Risk for Revision Procedures Following a Single-Level Minimally Invasive Lumbar Discectomy?
Daniel D. Bohl, MD, MPH1; Junyoung Ahn1; Benjamin Mayo, BA2; Dustin H. Massel, BS2; Fady Y. Hijji, BS3; Ankur S. Narain, BA4; William W. Long, BA5; Krishna Modi, BS5; Bryce Basques, MD, MHS6; Kern Singh, MD7
1Rush University Medical Center, Chicago, IL, US; 2Midwest Orthopaedics at Rush, Chicago, IL, US; 3Department of Orthopaedic Surgery Rush University Medical Center, Chicago, IL, US; 4Yale School of Medicine, New Haven, CT, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:40–2:46 p.m.
150. Radiographic Evaluation of Percutaneous Pedicle Screw Constructs Including Minimally Invasive Facet Fusions for Unstable Spinal Column Injuries
Daniel L. Cavanaugh, MD1; Tristan B. Weir, BS2; Ehsan Jazini, MD1; Kelley E. Banagan, MD1; Eugene Y. Koh, MD, PhD1; Daniel E. Gelb, MD1; Steven C. Ludwig, MD1
1University of North Carolina Hospitals, Chapel Hill, NC, US; 2University of Maryland School of Medicine, Baltimore, MD, US; 3University of Maryland Medical Center, Baltimore, MD, US; 4University of Maryland Medical System, Baltimore, MD, US; 5University of Maryland, Baltimore, MD, US; 6University of Maryland Orthopaedic Associates, Baltimore, MD, US
FDA Device/Drug Status: Minimally invasive instrumentation (Approved for this indication)

2:46–2:52 p.m.
151. Short Segment Fixation of Unstable Thoracolumbar Vertebral Body Fractures with Percutaneous Pedicle Screws
Nikhil K. Sahai, MD, MPH1; Michael J. Faloon, MD2; Jeff Moore, MD1; Kumar G. Sinha, MD3; Ki S. Hwang, MD2; Arash Emami, MD2
1St. Joseph’s Regional Medical Center/ Seton Hall University, Paterson, NJ, US; 2University Spine Center, Wayne, NJ, US
FDA Device/Drug Status: Not approved for this indication.

2:52–3:10 p.m.
Discussion
Many factors contribute to the successful formation of a solid spinal arthrodesis. Although risk of nonunion is often due to variables outside the surgeon’s control, several patient-specific factors can be addressed preoperatively to help limit this complication. This session focuses on these issues and discusses the impact of each condition on the biology of fusion and strategies to optimize patients preoperatively to maximize the potential for solid fusion.

Upon completion of this session, participants should gain strategies to:

- Understand the impact of modifiable patient variables on bone biology;
- Understand the connection between impaired bone metabolism and failed fusion;
- Identify means of correcting patient risk factors to optimize clinical outcome.

Agenda

- Introduction and Basics of Bone Biology
  Scott D. Daffner, MD
- Osteoporosis
  R. Todd Allen, MD
- Smoking
  Christina Goldstein, MD
- Obesity, Diabetes and Metabolic Syndrome
  Christopher Chaput, MD
- Discussion
  All faculty

2:10–2:16 p.m.
Section Specialty Track: Section on Spine Motion Technology Abstract Presentations
Room 205C
Moderator: Scott L. Blumenthal, MD

2:10–2:28 p.m.
Section Specialty Track: Section on Robotics and Navigation
Room 205B
Moderator: Chetan K. Patel, MD

2:22–2:28 p.m.
154. Preservation of Spine Motion in the Surgical Treatment of AIS Patients Using an Innovative Apical Fusion Technique: A Two-Year Follow-Up Study

Allen L. Carl, MD¹; Dennis G. Crandall, MD²; Pooria Hosseini, MD³; Colin Nnadi, FRCS⁴; Michael P. Grevitt, MD, FRCS⁵; Martin Repko, MD, PhD⁶; Martin Zabka, MD⁷; Ufuk Aydinli, MD⁸; Steven J. Seme, MS⁹; Behrooz A. Akbarnia, MD¹⁰

¹Albany Medical College, Albany, NY, US; ²Sonoran Spine, Tempe, AZ, US; ³San Diego Spine Foundation, San Diego, CA, US; ⁴Nuffield Orthopaedic Centre, Oxford, United Kingdom; ⁵Notts, United Kingdom; ⁶Brno, Czech Republic; ⁷University Hospital Bratislava, Bratislava, Slovakia; ⁸Bursa, Turkey; ⁹Savage, MN, US; ¹⁰San Diego Spine Foundation, San Diego, CA, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
2:28–2:34 p.m.
155. Superiority of Cervical Arthroplasty versus ACDF: Seven-Year Outcomes from the Evaluation of the SECURE®-C Cervical Artificial Disc
William Beutler, MD, FACS1; Ildemaro J. Volcan, MD2; Paul L. Asdourian, MD3; Jacqueline Myer4; Kelly Baker, PhD4

FDA Device/Drug Status: SECURE-C Cervical Artificial Disc (Approved for this indication)

2:34–2:40 p.m.
156. Total Disc Replacement versus ACDF: Results from an FDA Clinical Trial on Single Level Treatment through 84 Months
Michael S. Hisey, MD1; Jack E. Zigler, MD2; Reginald J. Davis, MD, FACS3; Hyun W. Bae, MD4; Kee D. Kim, MD5; Robert J. Jackson, MD, FACS6; Pierce D. Nunley, MD7; Donna D. Ohnmeiss, PhD8
1Texas Back Institute, Denton, TX, US; 2Texas Back Institute, Plano, TX, US; 3Tampa, FL, US; 4Spine Institute St. John’s Health Center, Los Angeles, CA, US; 5UC Davis School of Medicine, Sacramento, CA, US; 6Laguna Hills, CA, US; 7Spine Institute of Louisiana, Shreveport, LA, US; 8Texas Back Institute Research Foundation, Plano, TX, US

FDA Device/Drug Status: Mobi-C artificial disc (Approved for this indication)

2:40–2:46 p.m.
157. Motion Preservation at the Operative Level and the Incidence of Symptomatic Adjacent Segment Disease after Treatment with SECURE®-C or ACDF
Jeffrey R. McConnell, MD1; James G. Lindley Jr., MD3; David J. McKee4; Kelly Baker, PhD5

FDA Device/Drug Status: SECURE-C Cervical Artificial Disc (Approved for this indication)

2:46–3:10 p.m.
Discussion

2:10–3:10 p.m.
Innovative Technology Presentations
Non-CME Session
Room 208
Moderator: Scott Kreiner, MD

2:10–2:15 p.m.
Philips: Augmented Reality with Intraoperative 3D Cone Beam CT Imaging for Surgical Navigation
Adrian Elmi Terander, MD1; Halldor Skulason, MD2; Michael Söderman, MD, PhD3; John Racadio, MD4; Robert Homan, BS5; Drazenko Babic, MD6; Rami Nachabe, PhD7
1Karolinska University Hospital, Stockholm, Sweden; 2Department of Neuroradiology, Stockholm, Sweden; 3Department of Neurologic Surgery, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH, US; 4Philips, Best, Netherlands; 5Philips Healthcare, Cincinnati, US

FDA Device/Drug Status: Philips Surgical Navigation (Investigational/Not approved)

2:15–2:20 p.m.
DePuy Synthes: Medical Device Innovation Addressing the Triple Aim with the Expedium Verse System
Hassan A. Serhan, PhD
DePuy Synthes, Raynham, MA, US

FDA Device/Drug Status: Expedium Verse System (Approved for this indication)

2:20–2:25 p.m.
ISTO Technologies: Characterization of CellPoint® System Performance: Comparison of Marrow-derived Aspirate and Concentrate Drawn from Two Anatomical Locations in Adult and Pediatric Patients
Enrico J. Stazzone, MD1; Curt Milliman
1Mid-County Orthopaedics, Saint Louis, MO, US

FDA Device/Drug Status: Sepax 2 RM system (Approved for this indication)

2:25–2:30 p.m.
GROUP FH ORTHO: The Innovative Viscoelastic CP-ESP Cervical Disc Prosthesis with Six Degrees of Freedom
Marc-Antoine Rousseau, MD, PhD
APHP - Hospital Avicenne, Bobigny, France

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:30–2:40 p.m.
Discussion

2:40–2:45 p.m.
Synaptive Medical: Initial Experience with a Robotics Guided Optics Platform in Spine Surgery
Thomas M. Doers, MD
Aurora Healthcare, Milwaukee, WI, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
2:45–2:50 p.m.
MEDICREA USA: Initial Results from a Series of Vertebral Body Replacement Using Patient-Specific 3D-Printed Polymer Implants in Cervical Spondylotic Myelopathy
Jean-Edouard Loret, MD1; Eric Loret, MD2; Thomas Mosnier3; Estelle Douceron, PhD4
1Tours, France; 2Sce Neurochirurgie, Tours Cedex 9, France; 3New York, NY, United States; 4Neyron, France
FDA Device/Drug Status: UNiD 3D VBR (Not approved for this indication)

2:50–2:55 p.m.
SI-Bone, Inc.: Randomized Trial of Sacroiliac Joint Fusion versus Nonsurgical Management: Two-year Outcomes
Daniel J. Cher, MD
SI-BONE, Inc., San Jose, CA, US
FDA Device/Drug Status: iFuse Implant System (Approved for this indication)

2:55–3:00 p.m.
Relievant Medsystems, Inc.: Treatment of Chronic Low Back Pain via Ablation of the Basivertebral Nerve: Results of the SMART Trial
Jeffrey Fischgrund, MD1; Rick C. Sasso, MD2; Christopher A. Yeung, MD3; Hyun W. Bae, MD4; Alfred L. Rhyne, MD5; Jorg Franke, MD6; Peter Vajkoczy; Michael J. DePalma, MD7
1Beaumont Health, Royal Oak, MI, US; 2Indiana Spine Group, Carmel, IN, US; 3Desert Institute for Spine Care, Phoenix, AZ, US; 4Spine Institute St. John’s Health Center, Los Angeles, CA, US; 5OrthoCarolina, Charlotte, NC, US; 6University of Magdeburg, Magdeburg, Germany; 7Virginia iSpine Physicians, PC, Richmond, VA, US
FDA Device/Drug Status: INTRACEPT Intravascular Nerve Ablation System (Investigational/Not approved)

3:00–3:10 p.m.
Discussion

3:10–3:40 p.m.
Networking Break—Beverage Service
Technical Exhibition

3:10–3:40 p.m.
Poster Grand Rounds
The Learning Place, Yellow Theater
Technical Exhibition, Booth #1900

3:10–3:25 p.m.
P164. The Total Cost to the Healthcare System for the Treatment of Spinal Stenosis with and without Spondylolisthesis
Christopher K. Kepler, MD, MBA1; Gregory D. Schroeder, MD2; Mark F. Kourd, MD3; Alan S. Hilibrand, MD4; Jeffrey A. Rihn, MD5; Kris E. Radcliff, MD6; Barrett Woods, MD7; Tyler Kreitz, MD8; David Casper, MD9; Jason W. Savage, MD10; D. Greg Anderson, MD11; Alexander R. Vavcaro, MD, PhD12
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

3:25–3:40 p.m.
Francis H. Shen, MD1; Varun Puvanesarajah, BS2; Hamid Hassanzadeh, MD3; Rosemarie Tyger, PA-C4; Rebecca Lehman, PA-C5; Anuj Singla, MD6; Adam L. Shimer, MD7
1Charlottesville, VA, US; 2Johns Hopkins Medicine, Baltimore, MD, US; 3University of Virginia, Department of Orthopedic Surgery, Charlottesville, VA, US; 4UVA Orthopedic Spine Center, Charlottesville, VA, US; 5University of Virginia, Charlottesville, VA, US; 6University of Virginia School of Medicine, Charlottesville, VA, US
FDA Device/Drug Status: FDA Device/Drug Status: Approved for this indication.

3:10–3:40 p.m.
Poster Grand Rounds
The Learning Place, Green Theater
Technical Exhibition, Booth #1900

3:10–3:40 p.m.
P88. Community Practice Experience with Subsequent Vertebral Compression Fractures During the Year after Vertebral Augmentation Using an Expandable Implant
Arthur H. McCain, MD1; Ryon M. Hennessy, MD2; Irina Kondrashov, BA3; Ken Y. Hsu, MD3
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
This session will discuss common metabolic diseases that affect the spine. It will outline management strategies that may improve spine outcomes.

**Upon completion of this session, participants should gain strategies to:**
- Have expanded knowledge of metabolic conditions in spine patients;
- Understand the unique treatment strategies for spine patients with metabolic conditions;
- Learn strategies for impacting metabolic patients’ lifestyle choices.

**Agenda**
- **Diabetes**
  - Carrie A. Diulus, MD
- **Obesity**
  - Jerome Schofferman, MD
3:40–5:10 p.m.
Section Specialty Track:
Section on Minimally Invasive Procedures: Minimally Invasive Spine Procedures from A to Z
Room 209
Moderators: Michael Y. Wang, MD; Asdrubal Falavigna, MD, PhD; Karthik Madhavan, MD

This session will address the risks and benefits of MIS approaches including advances, patient selection, and candidacy for MIS and outcomes for deformity surgery.

Upon completion of this session, participants should gain strategies to:
- Identify advances in minimally invasive spine (MIS) surgery;
- Weigh the risks and benefits of MIS approaches;
- Determine patient selection and candidacy for MIS surgery;
- Recognize complications unique to MIS spine surgery;
- Seek clinical outcomes for MIS deformity surgery.

Agenda
- What is the Definition of a Minimally Invasive Procedure? Nathaniel P. Brooks, MD
- Percutaneous Spinal Procedures: Will They Ever Replace Open Surgery? Sean D. Christie, MD
- Pushing the Limits of Decompression with Endoscopic Spinal Surgery Christoph Hofsletter, MD, PhD
- Lumbar Interbody Fusion: Benefits of Various Approaches Kern Singh, MD
- MIS Cervical Surgery: Have There Been Any Advances? Brian K. Kwon, MD, PhD, FRCSC
- MIS Deformity Surgery: What Does the Data Tell Us? Khoi D. Than, MD
- The Latest Advances in MIS Spinal Fixation Steven C. Ludwig, MD
- Complications Unique to MIS Spine Surgery Thomas E. Mroz, MD

3:46–3:52 p.m.
159. Cell-Based Annular Repair Using Cross-Linked High Density Collagen Gels in a Rodent Disc Model
Brenton Pennicooke, MD; Yu Moriguchi, MD; Brandon Borde

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
3:52–3:58 p.m.

160. Can Human Mesenchymal Stem Cells Reduce the Inflammatory Changes Associated with Disc Degeneration?

Gregory D. Schroeder, MD; Dessislava Markova, PhD; John D. Koerner, MD; D. Greg Anderson, MD; Panya Luksanapruksa, MD; Paul W. Millhouse, MD, MBA; Jeffrey A. Rihn, MD; Alexander R. Vaccaro, MD, PhD; Christopher K. Kepler, MD, MBA

1Rothman Institute Thomas Jefferson University, Philadelphia, PA, US; 2Philadelphia, PA, US; 3New Jersey Spinal Medicine & Surgery, Glen Rock, NJ, US; 4Rothman Institute, Philadelphia, PA, US; 5Department of Orthopedic Surgery, Faculty of Medicine, Siriraj Hospital, Bangkok, Thailand; 6Thomas Jefferson University Hospital, The Rothman Institute, Philadelphia, PA, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

3:58–4:04 p.m.

161. Serum Phosphorylated Neurofilament Heavy Subunit (pNF-H) Levels in Patients with Cervical Compressive Myelopathy

So Kato, MD; Hirotaka Chikuda, MD, PhD; Kentaro Hayakawa, MD, PhD; Junichi Ohya, MD; Katsushi Takeshita, MD, PhD; Sakae Tanaka, MD, PhD; Toru Ogata, MD, PhD

1Toronto Western Hospital, Toronto, ON, Canada; 2University of Tokyo, Tokyo, Japan; 3NTT Medical Center Tokyo, Tokyo, Japan; 4Tokyo, Japan; 5Department of Orthopaedic Surgery, Jichi Medical University, Tochigi, Japan; 6The University of Tokyo, Tokyo, Japan; 7National Rehabilitation Center, Saitama, Japan

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:04–4:10 p.m.

162. Influence of Riluzole on Osteogenic Differentiation of Human Bone Marrow Stromal Cells and Osteoblasts

Gregory D. Schroeder, MD; Christopher K. Kepler, MD, MBA; Sibylle Grad, PhD; Mauro Alini, PhD; Dessislava Markova, PhD; John D. Koerner, MD; Shanmugananthan Rajasekaran, MD, PhD; FACS; Jens R. Chapman, MD; Frank Kandziora, MD, PhD; Klaus J. Schnake, MD; Marcel F. Dvorak, MD, FRCS; F. Cumhur Oner, MD, PhD; Alexander R. Vaccaro, MD, PhD

1Rothman Institute Thomas Jefferson University, Philadelphia, PA, US; 2Philadelphia, PA, US; 3New Jersey Spinal Medicine & Surgery, Glen Rock, NJ, US; 4Rothman Institute, Philadelphia, PA, US; 5Department of Orthopaedic Surgery, Faculty of Medicine, Siriraj Hospital, Bangkok, Thailand; 6Thomas Jefferson University Hospital, The Rothman Institute, Philadelphia, PA, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:25–4:31 p.m.

163. The Bone: Implant Interface in Loaded and Unloaded Models

William Walsh, PhD; Matthew H. Pelletier, PhD; Chris Christou, PhD

Surgical and Orthopaedic Research Laboratories, Randwick, NSW, Australia

FDA Device/Drug Status: PEEK Optima HA Enhanced (Approved for this indication), PEEK Optima (Approved for this indication)

4:31–4:37 p.m.

Section on Biologics and Basic Research Best Paper

164. Trisulfated-Glycosylated Peptide Amphiphile Nanofiber Scaffold for Bone Regeneration

Ralph W. Cook IV, BS; Joseph A. Weiner, BS; Danielle S. Chun, BA; Michael S. Schallmo, BS; Ryan Freshman, BS; Sungsoo S. Lee, PhD; Timmy Fyrner, PhD; Jonghwa Yun; Chawon Yun, PhD; Samuel I. Stupp, PhD; Wellington K. Hsu, MD; Erin L. Hsu, PhD

1Northwestern University, Chicago, IL, US; 2Department of Orthopaedic Surgery, Chicago, IL, US; 3Northwestern University Feinberg School of Medicine, Chicago, IL, US; 4Feinberg School of Medicine, Department of Orthopedic Surgery, Chicago, IL, US; 5Northwestern University, Simpson Querrey Institute for BioNanotechnology, Chicago, IL, US; 6Simpson Querrey Institute, Chicago, IL, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:37–4:43 p.m.

165. BMP2 Acts Directly on Peripheral Nerves and Stimulates Rapid and Robust Proliferation of Pluripotent Stem Cells within the Nerve

Michael H. Heggeness, MD, PhD; Shang-You Yang, PhD, PhD

1University of Kansas SOM-Wichita Orthopaedic Surgery Residency Office, Wichita, KS, US; 2University of Kansas School of Medicine - Wichita, Kansas, KS, US

FDA Device/Drug Status: BMP2 Infuse™ (Not approved for this indication)

4:43–4:49 p.m.

166. A Novel Rat Discitis Model Using Bioluminescent Staphylococcus Aureus

Phillip A. Bostian, MD; Jonathan Karnes, MD; Shari Cui, MD; Sanford E. Emery, MD, MBA

1West Virginia University, Health Science Center, Morgantown, WV, US; 2West Virginia University School of Medicine, Morgantown, WV, US; 3West Virginia University Spine Center, Morgantown, WV, US; 4West Virginia University, Morgantown, WV, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
4:49–4:55 p.m.
**167. Comparative Whole Body PET/CT with 18F-Fluorodeoxyglucose and 18F-Sodium Fluoride in an Ovine Spinal Fusion Study**
Jeremiah T. Easley, DVM; Susan Kraft, DVM; Howard B. Seim III, DVM; James Benedict, PhD
1Preclinical Surgical Research Laboratory, Colorado State University, Fort Collins, CO, US; 2Fort Collins, CO, US; 3Colorado State University, Fort Collins, CO, US; 4Callaway, MN, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

4:55–5:10 p.m.
**Discussion**

3:40–5:10 p.m.
**Section Specialty Track:**
**Section on Robotics and Navigation**
Room 205B
Moderator: Chetan K. Patel, MD

3:40–5:10 p.m.
**Section Specialty Track:**
**Section on Spine Motion Technology: Debating Options for Treating Painful Lumbar Disc Degeneration and Lumbar Stenosis**
Room 205C
Moderator: Scott L. Blumenthal, MD

The session is designed to address two conditions amenable to treatment using motion preserving technologies: 1) symptomatic degenerative disc disease and 2) lumbar spinal stenosis. For each of these conditions, three surgical options and nonsurgical treatment will be presented. At the end of each section, discussion will be undertaken and the audience asked to vote for the treatment of choice based on the material presented.

**Upon completion of this session, participants should gain strategies to:**

- Describe treatment options for two-level symptomatic degenerative disc disease;
- Discuss the potential role of nonoperative management for patients with painful disc degeneration or lumbar spinal stenosis;
- List potential advantages and disadvantages of interspinous and interlaminar devices for treating lumbar stenosis.

**Agenda**

- **Introduction**
  Scott L. Blumenthal, MD
- **Two-level Lumbar Disc Degeneration Case Description**
  Scott L. Blumenthal, MD
- **Two-level Fusion**
  Robert G. Watkins IV, MD
- **Two-level Total Disc Replacement**
  Richard D. Guyer, MD
- **Lumbar Hybrid**
  Scott L. Blumenthal, MD
- **Nonoperative Treatment**
  Christopher Colloca, DC, PhD
- **Discussion and Voting**
  All Faculty
- **Lumbar Stenosis Case Description**
  Scott L. Blumenthal, MD
- **Decompression Only**
  Larry T. Khoo, MD
- **Interspinous Devices**
  A. Nick Shamie, MD
- **Decompression and Interlaminar Device**
  Michael J. Musacchio, MD
- **Nonoperative Treatment**
  Ray M. Baker, MD
- **Discussion and Voting**
  All Faculty

4:00–5:00 p.m.
**Committee Orientation Program**
Room 206A

5:00–6:00 p.m.
**Resident, Fellow and Program Directors’ Reception**
Top of Escalators, Level 2 West

**Joint Sections of NASS Reception**
Top of Escalators, Level 2 West

5:00–8:00 p.m.
**Surgical Innovation Lab Workshops**
The Learning Place, Technical Exhibition, Booth #1900

- **iFuse Implant System Surgeon Education Program (Invitation Only)**
  Blue Lab
- **Implant Luna® 3D Expandable Interbody Fusion System Surgeon Training (Invitation Only)**
  Benvenue
  Green Lab
- **M.O.R.E. Spine Workshop Discover Medacta Spine Innovations**
  Yellow Lab
6:30–8:00 a.m.
Continental Breakfast
Outside General Session (Room 210ABC)

7:00 a.m.–5:00 p.m.
Attendee Registration
Lobby–Level 1 West

7:20–7:25 a.m.
Announcements
Room 210ABC

7:25–7:30 a.m.
NASS Working for You: Advocacy Update
Room 210ABC
Moderator: John G. Finkenberg, MD

7:30–8:15 a.m.
Global Spine Forum:
AOSpine: Current Concepts in the Treatment of
Complex Cervical Spine Disorders
Room 206A
Moderator: Roger Hartl, MD

Agenda
- Introduction with Case Example
  Roger Hartl, MD, USA
- Treatment Algorithm for Front/Back Surgery of the
  Cervical Spine
  Massimo Balsano, MD, Italy
- Complication Avoidance in Cervical Surgery
  Jean A. Ouellet, MD, FRCSC, Canada
- Navigation in Complex Cervical Surgery

7:30–8:55 a.m.
Interdisciplinary Symposium:
Low Back Pain Secondary to Degenerative Disc
Disease: Interdisciplinary Perspectives on the Value of
Treatment
Room 210ABC
Moderators: S. Samuel Bederman, MD, PhD, FRCSC; Sheeraz A. Qureshi, MD, MBA

As value in healthcare becomes a larger focus, the costs and effectiveness of treating degenerative disc disease are a key topic that needs to be addressed within spine care. Physicians treating patients with degenerative disc disease should have a better understanding of the value of both nonsurgical and surgical treatment options. To that end, this session will look at the value of physical therapy, injections, fusion, and lumbar disc replacement as treatment options. This session will highlight strategies for selecting the most appropriate treatment options. Additionally, this session will address the insurer’s perspective of providing high-value care to patients with degenerative disc disease.

Upon completion of this session, participants should gain strategies to:
- Recognize the value of surgical and nonsurgical treatments for degenerative disc disease;
- Evaluate and select the appropriate treatment option for patients with degenerative disc disease;
- Identify value issues from the insurer’s perspective;
- Discuss strategies for increasing the value of treatment for patients with degenerative disc disease.

Agenda
- Introduction
  S. Samuel Bederman, MD, PhD, FRCSC and Sheeraz A. Qureshi, MD, MBA
- The Value of Physical Therapy/Chiropractic Care in the Treatment of the Patient with Degenerative Disc Disease
  Donald R. Murphy, DC
- Do Injections Have Value in the Treatment of Degenerative Disc Disease and If So, Which Ones?
  Matthew J. Smith, MD, EMHL
- When Does Surgical Fusion Provide Value in the Treatment of Degenerative Disc Disease?
  Alan S. Hilibrand, MD

AH: Accredited for Allied Health Continuing Education
Is There Value in Lumbar Disc Replacement in the Treatment of Degenerative Disc Disease?
Richard D. Guyer, MD

An Insurer’s Perspective on Treatment
Brian Justice, DC

Discussion, Questions and Answers
All Faculty

Friday, October 28
7:30–10:00 a.m.
Young Spine Surgeons Forum
Room 205B
Moderators: Saad B. Chaudhary, MD, MBA; Kris E. Radcliff, MD

The transition from training to practice is a difficult time. With the best interest of young surgeons in mind, NASS has developed a symposium to assist surgeons during their early transition to practice. Experts in the community and a distinguished group of spine surgeons that recently transitioned into both academic and private clinical practices will review several critical topics, including, Early Career Decision Making and Job Search; Practice Enhancement and Getting Involved. Distinguished speakers will provide mature perspectives on various issues relevant to developing a strong clinical practice and provide seasoned perspectives on career paths. Assessment of startup needs and resource management, marketing pearls and techniques for building patient volume in competitive markets, multi-surgeon collaboration, managing conflict of interest, consulting opportunities, along with the timing and pitfalls of incorporating new technologies into the young surgeon’s practice will be reviewed.

Upon completion of this session, participants should gain strategies to:

- Identify advantages and disadvantages of academic and private practice opportunities;
- Utilize a broader scope of resources in job hunting, and better prepare for the interview process;
- Evaluate job opportunities and orthopedic employment contracts, consulting opportunities and conflicts of interest;
- Outline basic practice structures, pearls of getting started, and marketing.

Agenda

Welcome and Introductions
Moderators: Saad B. Chaudhary, MD, MBA and Kris E. Radcliff, MD

Early Career Decision Making and Job Search
Moderator: Saad B. Chaudhary, MD, MBA
  - Selecting a Job
    Barrett Woods, MD

- Changing Jobs
  Harvey E. Smith, MD
- Panel Discussion, Questions and Answers

Introduction to NASS Leadership
- Future of Spine Surgery
  F. Todd Wetzel, MD

Practice
Moderator: Bobby Kalantar, MD
- Safely Learning New Techniques
  Gregory M. Mundis Jr., MD
- Top Ten Reasons Spine Surgeons Are Sued
  Heather Hansen, JD
- Hospital Peer Review, Value and Quality Committees
  Don K. Moore, MD
- Panel Discussion, Questions and Answers/Break

Career Path
Moderator: Kris E. Radcliff, MD
- Becoming an Academic Leader: Principles and Qualities
  Todd J. Albert, MD
- Becoming Involved in Societies
  Rick C. Sasso, MD
- Panel Discussion, Questions and Answers

7:30 a.m.–4:00 p.m.
Ticketed Session:
Optimizing Value and Outcomes in Spine Care: The Key Role of Psychologically-Informed Practice
Room 211
Co-chairs: Gregory L. Whitcomb, DC; Sherri Weiser, PhD

For more than two decades, research has called into question a purely pathoanatomical basis for axial pain and its treatment. It also is well established that spine treatments are often of limited benefit. In an environment of spiraling disability, heavy investment in purely biomedical spine care has led to skyrocketing health costs, heightened stakeholder scrutiny and calls for improved cost-to-outcome value. Concurrently, extensive science has shown that psychosocial factors are probably more predictive of the transition from acute to chronic and disabling spine pain. Data supporting the importance of early return to normal activity and work have elevated the importance of effective screening and management of nonphysical barriers to recovery.

Thought and research leaders in spine care will address the latest science on the neurophysiology and neuropsychological aspects of pain, risk screening and modification, current and future provider training, developing psychologically-informed

Thought and research leaders in spine care will address the latest science on the neurophysiology and neuropsychological aspects of pain, risk screening and modification, current and future provider training, developing psychologically-informed
care teams, and identifying and overcoming barriers to the implementation of a biopsychosocial care model.

Upon completion of this course, participants should gain strategies to:

- Describe an overview of trends in spine-related disability;
- Recognize the best-available scientific evidence regarding psychosocial factors and axial pain and the biopsychosocial model of spine care;
- Evaluate screening tools for psychosocial factors and their relationship to spine disability and strategies for risk factor modification;
- Implement practical skills for psychologically-informed spine care;
- Identify options for the development of psychologically-informed clinical care teams in a biopsychosocial model for spine care.

The North American Spine Society designates this live activity for a maximum of 12.25 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Chiropractors: NASS has received approval from the Southern California University of Health Sciences to offer continuing education credits to Chiropractors from select states.

Physician Assistants: The American Academy of Physician Assistants (AAPA) accepts Category 1 credit from AOACCME, prescribed credit from the American Academy of Family Physicians (AAFP) and AMA PRA Category 1 CME Credit™ for the Physician’s Recognition Award from organizations, such as NASS, accredited by the ACCME.

Physical Therapists: The American Physical Therapy Association of Massachusetts Continuing Education Committee has approved this course according to the Criteria for Approval of Continuing Education offerings established by the Massachusetts Physical Therapy Association. Information provided should be used within scope of practice.

Nurse Practitioners: The American Association of Nurse Practitioners (AANP) accepts AMA PRA Category 1 Credit™ from organizations accredited by the ACCME.

Nurses: This educational activity is jointly provided by AXIS Medical Education and the North American Spine Society. This activity is planned and implemented by AXIS Medical Education and the North American Spine Society. AXIS Medical Education is accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC) to provide continuing education for the healthcare team.

Credit Designation for Nursing: AXIS Medical Education designates this continuing nursing education activity for 12.25 contact hours.

Learners are advised that accredited status does not imply endorsement by the provider or ANCC of any commercial products displayed in conjunction with an activity.

AXIS Contact Information: For information about the accreditation of this program please contact AXIS at 954-281-7524 or info@axismeded.org.

8:00–9:00 a.m.
Interdisciplinary Spine Forum:
Section on Allied Health Abstract Presentations
Room 205C
Moderator: Linda Carroll, PhD

8:00–8:06 a.m.
168. Simulation of Multifactorial Causes of Low Back Pain
Jacek Cholewicki, PhD1; Pramod Pathak; N. Peter Reeves, PhD2; John M. Popovich Jr., PhD, DPT, ATC3
1MSU, Department of Surgical Specialties, Lansing, MI, US; 2East Lansing, MI, US; 3MSU Center for Orthopedic Research, Lansing, MI, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

8:06–8:12 a.m.
169. Incidence of Discharge to Post-Acute Care following Inpatient Spine Surgery
Benjamin Q. Nelson1; John W. McClellan III, MD2; Timothy A. Burd, MD3; Robin Carlson, RN, BSN, BS4
1Creighton University School of Medicine, Omaha, NE, US; 2Nebraska Spine and Pain Center, Omaha, NE, US; 3Nebraska Spine Center, LLP, Omaha, NE, US; 4Nebraska Spine Hospital, Omaha, NE, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

8:12–8:18 a.m.
170. Risk Factors for Discharge to Post-Acute Facilities after Inpatient Spine Surgery
Benjamin Q. Nelson1; John W. McClellan III, MD2; Timothy A. Burd, MD3; Robin Carlson, RN, BSN, BS4
1Creighton University School of Medicine, Omaha, NE, US; 2Nebraska Spine and Pain Center, Omaha, NE, US; 3Nebraska Spine Center, LLP, Omaha, NE, US; 4Nebraska Spine Hospital, Omaha, NE, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

8:18–8:24 a.m.
Section on Allied Health Best Paper
171. The Role of Physical Therapy and Rehabilitation after Lumbar Fusion Surgery for Degenerative Disease: A Systematic Review
Marcella A. Madera, MD1; Sylvia E. Deily, DC2; Trent McGinty, DPT, MDT3; Devender Singh, PhD4; George W. Tipton Jr., MD4; Eric Truumees, MD5
1Austin Brain & Spine, Austin, TX, US; 2Seton Spine and Rehabilitation Center, Austin, TX, US; 3Seton Spine and Scoliosis Center, Austin, TX, US; 4The Spine & Rehabilitation Center, Austin, TX, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
8:24–8:30 a.m.
**172. Reliability of the Spine CPR Score Among Emergency Physicians**
Godefroy Hardy St-Pierre, MD, FRCSC
Foothills Medical Center, Calgary, AB, Canada

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

8:30–8:36 a.m.
**173. Medical Comorbidities in Medicare Patients Treated by Neurosurgery and Orthopaedic Spine Surgeons**
Comron Sai, MD; Alex Ha, MD; Petros Petridis, MS; Lawrence G. Lenke, MD; Ronald A. Lehman Jr., MD

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

8:36–8:42 a.m.
**174. Gender Trends in Authorship of Spine-Related Academic Literature: A 38-Year Perspective**
David Sing, BS; David Ouyang; Serena S. Hu, MD
1UCSF/SFGH Orthopaedic Trauma Institute, San Francisco, CA, US; 2Stanford University School of Medicine, Redwood City, CA, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

8:42–9:00 a.m.
Discussion

8:00–10:00 a.m.
**Surgical Innovation Lab Demonstrations**
The Learning Place, Technical Exhibition, Booth #1900

- **Introduction to Mazor Robotics’ Newest Surgical Assurance Platform for Spine Surgery, the Mazor X; Mazor Robotics Renaissance Guidance System**
  Blue Lab

- **ROSA® Spine Hands-on Lab**
  Green Lab

8:00 a.m.–1:00 p.m.
**Exhibitor Registration**
Lobby–Level 1 West

8:15–8:45 a.m.
**Global Spine Forum:**
*Italian and European Society of Neuroradiology*
Room 206A

**Image Guided Spine Interventions: Advanced Procedures of the Future**
Luigi Manfre, MD, Head of Minimal Invasive Spine Dept., Cannizzaro Hpt, Catania, Italy

Degenerative lumbosacral spine instability is definitely the most frequent cause of low back pain (LBP), with the patients being frequently overexposed to chronic use of steroids to obtain pain sedation.

Three main syndromes are generally created by spinal instability: Facet Joint Syndrome (FJS), that is a chronic painful arthritis of zigo-apophyseal joints; Sacroiliac Joint Syndrome (SIJS), related to chronic sacroiliac arthritis, and spinal canal stenosis (SCS), reducing the blood supply to cauda roots, generating buttock and inferior limbs pain and motor impairment.

FJS is generally the result of local microinstability, usually secondary to disc degeneration; there are typical CT and MRI signs suggestive of chronic facet disease, but the best test to confirm a chronic FJS remains a CT-guided injection of Lidocaine at the level of zygo-apophyseal nerves. The second (frequently underestimated) cause of LBP is Sacroiliac Joint (SIJ) instability and subsequent chronic sacroiliac pain related to SIJ syndrome (SIJS). Several conditions can occur in generating SIJS: in women, postpartum SIJ instability can occur, while conventional posterior interbody fixation (PIF), as well as postural defects significantly increases sacroiliac stress. Stenosis of the spinal canal (SCS) is secondary to disc degeneration and interspinous ligaments bulging, compressing the radicular nerve, generating bilateral back and/or inferior limbs pain.

When FJS or SIJS are supposed, radioablation is generally performed. Nevertheless, approximately 21% of treated patients do not experience significant pain relief after the treatment. Other more aggressive surgery has been proposed to correct FJS such as posterior interbody fixation (PIF) with screws and bars, however new percutaneous procedures have been introduced that can be performed directly under the guide of CT scan, reducing the risks. The new fixation systems consist of trans-articular fixation (TFF) or intra-articular fixation (IFF), with new extra small transarticular screws or intraarticular titanium devices, without using more aggressive posterior fusion. TFF and IFF demonstrated similar biomechanical efficacy when compared to conventional PIF, but all the new procedures can be performed using simple local anesthesia. Moreover, a CT-guided procedure significantly reduces procedure time.
Similarly, the SIJS can be resolved with CT-guided fixation, introducing small titanium devices through the iliac bone and the sacrum using a fully CT-guided procedure, allowing very precise positioning of the devices.

Finally, SCS is successfully treated using different kinds of interspinous spacers, with or without spinous process augmentation with PMMA, to reduce grade I lysis and decompressing the stenotic spinal canal.

Faculty will describe all the new techniques to be adopted in patients affected by painful FJS, SIJS and SCS, treated with fully CT-guided techniques in simple analog-sedation.

9:12–9:18 a.m.
177. Ten-Year Follow-Up of Patients Enrolled in the FDA-Regulated Trial for Single-Level Lumbar Total Disc Replacement: One Site’s Experience
Jack E. Zigler, MD; Donna D. Ohnmeiss, PhD
1Texas Back Institute, Plano, TX, US; 2Texas Back Institute Research Foundation, Plano, TX, US
FDA Device/Drug Status: PRESTIGE LP cervical disc 2-level (Investigational/Not approved)

9:18–9:24 a.m.
178. Moved to Value Abstract Awards Presentations
Friday, October 28, 3:20–3:50 p.m.

9:24–9:30 a.m.
180. Neurologic Outcome Following Intraoperative Neurophysiological Signal Change in Cervical, Thoracic, Lumbar and Multiregional Spine Surgery
Anthony K. Sestokas, PhD; Eric A. Tesdahl, PhD; Andrew F. Cannestra, MD, PhD; Sarah E. Baran, PhD, CNIM; Jeffrey Cohen, MD, PhD; Samuel Weinstein, MD, MBA
1SpecialtyCare, Nashville, TN, US; 2Lyerly Neurosurgery, Jacksonville, FL, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

9:30–9:36 a.m.
181. The Total Cost to the Healthcare System for the Treatment of Cervical Myelopathy
Gregory D. Schroeder, MD; Christopher K. Kepler, MD, MBA; Mark F. Kurd, MD; Alan S. Hilibrand, MD, PhD; D. Greg Anderson, MD; Kris E. Radcliff, MD; Barrett Woods, MD; Tyler Kreitz, MD; David Casper, MD; Jason W. Savage, MD; Jeffrey A. Rihn, MD; Alexander R. Vaccaro, MD, PhD
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
The relationship between upper quarter and cervical spine syndromes is referenced in the spine literature. A complex relationship exists between cervical spine pain and scapulothoracic mechanics. It is often challenging for clinicians to distinguish between pain generated by cervical spine degeneration and pain generated from soft tissues of the shoulder girdle.

This session will review the etiology, clinical presentation and management of patients with concurrent cervical spine and shoulder girdle pathology. A multidisciplinary faculty will present on the interdependence of neck and scapulothoracic motion and the effects of altered shoulder girdle mechanics on cervical spine conditions. Biomechanical considerations, examination techniques and treatment modalities in common conditions arising from concurrent cervical spine and shoulder girdle pathology will be reviewed. Indications for clinical examination techniques and treatment modalities in patients who present with shoulder-neck syndromes will be presented. Presenters will emphasize the importance of utilizing reliable, sensitive and specific clinical examination techniques where they exist to screen the interdependent functions of the cervical spine and upper quarter.

Upon completion of this session, participants should gain strategies to:

- Recognize distinctive characteristics of the history, functional limitations and physical examination of individuals who present with pain and disability arising from concurrent spine and shoulder girdle pathology;
- Integrate knowledge of shoulder and spine biomechanics with clinical findings to facilitate optimal triage of patients with pain and disability arising from concurrent spine and shoulder dysfunction in a manner consistent with best practice;
- Identify the advantages and disadvantages of specific clinical examination and treatment techniques for individuals who present concurrent spine and shoulder pathology;
- Enhance the use of best practice examination and treatment techniques of individuals with concurrent spine and shoulder pathology, based on the most current evidence.
**Friday, October 28**

**10:00–10:30 a.m.**

**Poster Grand Rounds**
The Learning Place, Yellow Theater
Technical Exhibition, Booth #1900

**10:00–10:07 a.m.**

P162. Multiple Patient Reported Allergies are Associated with Worse Outcomes Following Lumbar Spine Surgery
Christopher Graves, MD; Leah Y. Carreon, MD, MSC; Borys Gvozdyev, MD; Stephanie Riley, BS; Jeffrey L. Gum, MD; Steven D. Glassman, MD

Norton Leatherman Spine Center, Louisville, KY, US; NYU/Columbia University Medical Center, Department of Orthopaedics, New York, NY, US; Louisvi, KY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**10:07–10:14 a.m.**

P28. Incisional Morbidity Associated with Anterior Surgical Approaches to the Lumbar Spine is Minimal
John R. Dimar II, MD; Thomas Bergamini; Richard Head; Mladen Djurasovic, MD; Steven D. Glassman, MD; Leahas Y. Carreon, MD, MD


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**10:14–10:21 a.m.**

P113. SRS-22R Minimum Clinically Important Difference (MCID) and Substantial Clinical Benefit (SCB) after Adult Symptomatic Lumbar Scoliosis Surgery
Leahas Y. Carreon, MD, MSC; Michael P. Kelly, MD; Charles H. Crawford III, MD; Christine R. Baldus, RN; Steven D. Glassman, MD; Christopher I. Shafray, MD; Keith H. Bridwell, MD

Norton Leatherman Spine Center, Louisville, KY, US; Washington University, Saint Louis, MO, US; University of Virginia, Charlottesville, VA, US; Washington University in St. Louis School of Medicine, Saint Louis, MO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**10:21–10:30 a.m.**

P117. Improvement in SRS22R Pain Scores after Surgery for Adolescent Idiopathic Scoliosis
Mladen Djurasovic, MD; Steven D. Glassman, MD; Daniel J. Sucato, MD; Lawrence G. Lenke, MD; Leah Y. Carreon, MD, MSC

Norton Leatherman Spine Center, Louisville, KY, US; Texas Scottish Rite Hospital for Children, Dallas, TX, US; Washington University School of Medicine, St. Louis, MO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**10:00–10:15 a.m.**

P79. A Nationwide Epidemiological Study of Newly Diagnosed Spine Metastasis in the Adult Korean Population
Seil Sohn, MD

Department of Neurosurgery, Spine Center CHA University, CHA Bundang Medical Center, Gyeonggi-do, Democratic People’s Republic of Korea

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**10:15–10:30 a.m.**

P78. Impact of Instrumented Spinal Fusion on the Development of Vertebral Compression Fracture
Shihi-Chieh Yang, MD, PhD; Yuan-Kun Tu, MD

E-Da Hospital, Kaohsiung, Taiwan, Republic of China

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**10:00–10:30 a.m.**

**Poster Grand Rounds**
The Learning Place, Green Theater
Technical Exhibition, Booth #1900

**10:00–10:15 a.m.**

P98. Long-Term Safety and Re-Operation Rates Following Cervical TDR: Prospective and Multi-Centric Study
Thierry Dufour, MD; Jean-Paul Steib, MD; Pierre Bernard, MD; Jean Huppert, MD; Eric Lioret, MD; Phong Dam Hieu, MD, PhD; Istvan Hovorka, MD; Jacques Beaurein, MD

CHR Orleãns - La Source, Orleans, France; Chirurgie du rachis, Chirurgie B, Strasbourg, France; Centre Aquitain du Dos, Merignac, France; Service De Neurochirurgie, Saint Priest En Jarez, France; CHU Hôpital Général, Dijon, France

FDA Device/Drug Status: Mobi-C (Approved for this indication)

**10:15–10:30 a.m.**

P63. Are Navigation Techniques Risk-Benefit Effective for Vertebral Transpedicular Instrumentation? A Prospective Comparative Study
Francisco Ardua, PhD, MD; David C. Noriega, PhD; Ruben Hernandez Ramajo, PhD; Israel Sanchez Llote, PhD; Borja Toribio Calvo, PhD, ACNP-BC

Valladolid University Clinic Hospital, Valladolid, Spain; Valladolid, Spain; University Clinical Hospital Valladolid, Valladolid, Spain; Hospital Clinico Universitario Valladolid, Valladolid, Spain

FDA Device/Drug Status: O ARM NAVIGATION SYSTEM (Approved for this indication)
10:00–10:30 a.m.
Poster Grand Rounds
The Learning Place, Purple Theater
Technical Exhibition, Booth #1900

10:00–10:05 a.m.
P31. Dislocation of Primary Total Hip Arthroplasty is More Common in Patients with Lumbar Spinal Fusion
Aaron J. Buckland, MBBS, FRACS; Varun Puvanesarajah, BS; Amit Jain; Eric O. Klineberg, MD; Jonathan Vidgorchik, MD; Ran Schwarzkopf, MD; Christopher I. Shaffrey, MD; Justin S. Smith, MD, PhD; Robert A. Hart, MD; Christopher P. Ames, MD; Hamid Hassanzadeh, MD; International Spine Study Group


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:05–10:10 a.m.
P172. Operative versus Nonoperative Treatment for Sagittal Deformities Characterized by Loss of Lumbar Lordosis with Normal Sagittal Vertical Axis
Craig D. Steiner, MD; Jensen Henry, BA; Bassel G. Diebo, MD; Justin S. Smith, MD, PhD; Ashish Patel, MD; Christopher I. Shaffrey, MD; Christopher P. Ames, MD; Gregory M. Mundis Jr., MD; Douglas C. Burton, MD; Shay Bass, MD; Jeffrey L. Gum, MD; Frank J. Schwab, MD; Virginie Lafage, PhD; Han Jo Kim, MD; International Spine Study Group

1 Hospital for Special Surgery, New York, NY, US; 2 NYU School of Medicine, New York, NY, US; 3 UVA Health System, Charlottesville, VA, US; 4 University of Virginia, Charlottesville, VA, US; 5 University of California, San Francisco, San Francisco, CA, US; 6 University of Virginia, Department of Orthopedic Surgery, Charlottesville, VA, US; 7 Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:10–10:15 a.m.
P153. Does Myelopathy or Alignment Improvement Drive Acute Postoperative Outcomes in Cervical Deformity Patients?
Peter G. Passias, MD; Cyrus M. Jalali, BA; Justin S. Smith, MD, PhD; Gregory W. Poornam, BA; Themistocles S. Protopsaltis, MD; Brian J. Neuman, MD; Daniel M. Sculbbia, MD; Bassel G. Diebo, MD; Renaud Lafage, MSc; Virginie Lafage, PhD; Christopher P. Ames, MD; Christopher I. Shaffrey, MD; International Spine Study Group


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:15–10:20 a.m.
P139. Operative versus Nonoperative Treatment for Sagittal Deformities Characterized by Loss of Lumbar Lordosis with Normal Sagittal Vertical Axis
Craig D. Steiner, MD; Jensen Henry, BA; Bassel G. Diebo, MD; Justin S. Smith, MD, PhD; Ashish Patel, MD; Christopher I. Shaffrey, MD; Christopher P. Ames, MD; Gregory M. Mundis Jr., MD; Douglas C. Burton, MD; Shay Bass, MD; Jeffrey L. Gum, MD; Frank J. Schwab, MD; Virginie Lafage, PhD; Han Jo Kim, MD; International Spine Study Group

1 Hospital for Special Surgery, New York, NY, US; 2 NYU School of Medicine, New York, NY, US; 3 UVA Health System, Charlottesville, VA, US; 4 University of Virginia, Charlottesville, VA, US; 5 University of California, San Francisco, San Francisco, CA, US; 6 University of Virginia, Department of Orthopedic Surgery, Charlottesville, VA, US; 7 Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:20–10:25 a.m.
P166. Recovery Kinetics of Radiographic and Implant-Related Revision Patients Following Adult Spinal Deformity Surgery
Peter G. Passias, MD; Cyrus M. Jalali, BA; Virginie Lafage, PhD; Justin K. Scheer, BS; D. Kojo Hamilton, MD; Breton Line, BS; Shay Bass, MD; Frank J. Schwab, MD; Christopher P. Ames, MD; Douglas C. Burton, MD; Robert A. Hart, MD; Eric O. Klineberg, MD; International Spine Study Group

1 NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 2 Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 3 Hospital for Special Surgery, New York, NY, US; 4 University of California, San Diego, San Diego, CA, US; 5 University of Pittsburgh School of Medicine, Pittsburgh, PA, US; 6 International Spine Study Group, Arvada, CO, US; 7 University of California, San Francisco, San Francisco, CA, US; 8 University of Kansas Medical Center, Kansas City, KS, US; 9 Oregon Health & Science University, Portland, OR, US; 10 UC Davis School of Medicine, Sacramento, CA, US; 11 Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:30–10:35 a.m.
P107. Operative versus Nonoperative Treatment for Lumbar Spinal Deformity with Loss of Lumbar Lordosis
Richard A. Orth, MD; David B. Wilson, MD; Christopher P. Ames, MD; Hamid Hassanzadeh, MD; International Spine Study Group

1 UVA Health System, Charlottesville, VA, US; 2 University of Virginia, Charlottesville, VA, US; 3 Hospital for Special Surgery, New York, NY, US; 4 Scripps Clinic Medical Group, Department of Orthopedics, La Jolla, CA, US; 5 Washington University School of Medicine, St. Louis, MO, US; 6 UC Davis School of Medicine, Sacramento, CA, US; 7 NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 8 Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 9 Baltimore, MD, US; 10 Vancouver Spine Surgery Institute, Vancouver, BC, Canada; 11 Warren Alpert Medical School of BU/RI Hospital, Providence, RI, US; 12 University of California, San Diego, San Diego, CA, US; 13 International Spine Study Group, Arvada, CO, US; 14 University of Calgary, Calgary, Canada; 15 Oregon Health & Science University, Portland, OR, US; 16 Baylor Scoliosis Center, Plano, TX, US; 17 University of Kansas Medical Center, Kansas City, KS, US; 18 University of California, San Francisco, San Francisco, CA, US; 19 The Spine Hospital/Columbia Doctors/New York Presbyterian/The Allen Hospital, New York, NY, US; 20 Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
10:25–10:30 a.m.
P143. Analysis of Early Distal Junctional Kyphosis (DJK) after Cervical Deformity Correction

Themistocles S. Protopsaltis, MD1; Subaraman Ramchandran, MBBS1; Han Jo Kim, MD3; Brian J. Neuman, MD1; Emily Miller, BA1; Peter G. Passias, MD1; Alexandrov Sorocoeanu, MD, MPH2; Virginie Lafage, PhD2; Renaud Lafage, MSc2; Munish C. Gupta, MD6; Robert A. Hart, MD2; Justin S. Smith, MD, PhD5; Frank J. Schwab, MD2; Shay Bess, MD1; Christopher I. Shaffrey, MD1; Christopher P. Ames, MD2; International Spine Study Group11

1Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 2Hospital for Special Surgery, New York, NY, US; 3Baltimore, MD, US; 4NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 5University of Calgary, Calgary, Canada; 6Washington University School of Medicine, St. Louis, MO, US; 7Oregon Health & Science University, Portland, OR, US; 8UVA Health System, Charlottesville, VA, US; 9University of Virginia, Charlottesville, VA, US; 10University of California, San Francisco, San Francisco, CA, US; 11Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:30–10:40 a.m.
NASS Recognition Awards Presentation
Room 210ABC

The 2016 Recognition Awards are presented to outstanding society members.

Leon Wiltse Award: Keith Bridwell, MD
Henry Farfan Award: Makarand V. Risbud, PhD
David Selby Award: James Reynolds, MD
Spine Advocacy Award: Charles Mick, MD

10:30 a.m.–12:00 p.m.
Abstract Presentations:
Spine Surgery in the Elderly Population
Room 209
Moderator: Darrel S. Brodke, MD

10:30–10:36 a.m.
182. Readmission Rates, Reasons and Risk Factors in Elderly Patients Treated with Lumbar Fusion for Degenerative Pathology

Varun Puvanesarajah, BS1; Hamid Hassanzadeh, MD3; Adam L. Shimer, MD3; Francis H. Shen, MD1; Anuj Singla, MD4

1Johns Hopkins University Medicine, Baltimore, MD, US; 2University of Virginia, Department of Orthopedic Surgery, Charlottesville, VA, US; 3Charlottesville, VA, US; 4University of Virginia School of Medicine, Charlottesville, VA, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:36–10:42 a.m.
183. Complications and Readmission after Lumbar Spine Surgery in Elderly Patients: An Analysis of 2320 Patients

Ahmed Saleh, MD1; Addisu Mesfin, MD3; Caroline Thirukumaran, MBBS, MHA1; Robert W. Molinari, MD1

1University of Rochester, Rochester, NY, US; 2Rochester, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:42–10:48 a.m.
184. Frailty Index is a Significant Predictor of Complications and Readmissions Following Posterior Lumbar Fusion

Nathan J. Lee, BS1; Parth Kothari, BS1; Dante M. Leven, DO, PT; Jeremy Steinberger, MD1; Javier Guzman, MD3; Branko Skovrlj, MD3; Samuel K. Cho, MD1

1Mount Sinai School of Medicine, New York, NY, US; 2New York, NY, US; 3Mount Sinai School of Medicine Department of Neurosurgery, New York, NY, US; 4Icahn School of Medicine at Mount Sinai, New York, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:48–10:54 a.m.
185. Effect of Age on Postoperative Complications and Patient Reported Outcomes in Severe Adult Spinal Deformity: Patients ≤60 Years versus >60 Years

Amit Jain1; Lawrence G. Lenke, MD2; Christopher I. Shaffrey, MD2; Michael G. Fehlings, MD, PhD, FRSCC4; Benny Dahl, MD, PhD2; Christopher P. Ames, MD2; Yukihiro Matsuyama, MD, PhD2; Yong Qiu, MD2; Hossein Mehidian, FRCS2; Kenneth M. Cheung, MD, FRCS2; Frank J. Schwab, MD3; Ferran Pellise, MD, PhD3; Leah Y. Carreon, MD, MSc3; Floreana Naef, MD4; Khaled M. Kebaish, MD3

1Portland, OR, US; 2Washington University School of Medicine, Saint Louis, MO, US; 3University of Virginia, Charlottesville, VA, US; 4Toronto Western Hospital, Toronto, ON, Canada; 5Spine Unit, Rigshospitalet and University of Copenhagen, Copenhagen, Denmark; 6University of California, San Francisco, San Francisco, CA, US; 7Hamamatsu University School of Medicine, Hamamatsu, Japan; 8The Affiliated Drum Tower Hospital of Nanjing University Medical School, Nanjing, China; 9QMC University Hospital, Nottingham, Nottinghamshire, United Kingdom; 10Queen Mary Hospital, Hong Kong, Hong Kong; 11Hospital for Special Surgery, New York, NY, US; 12Barcelona, Spain; 13Norton Leatherman Spine Center, Louisville, KY, US; 14Johns Hopkins University, Baltimore, MD, US; 15Baltimore, MD, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
10:54–11:00 a.m.

186. Medical Complication Profile for Elective Orthopaedic Surgery in the Elderly, Establishment of a Baseline Complication Rate for THA, TKA, and Spine Fusion
Eric O. Klineberg, MD1; Amit Jain2; Varun Puvanesarajah, BS3; Christopher I. Shaffrey, MD4; Justin S. Smith, MD, PhD5; Shay Bess, MD6; Douglas C. Burton, MD7; Virginie Lafage, PhD8; Han Jo Kim, MD9; Daniel M. Scibba, MD10; Christopher P. Ames, MD11; Justin K. Scheer, BS12; Munish C. Gupta, MD13; Hamid Hassanzadeh, MD14; International Spine Study Group15

1UC Davis School of Medicine, Sacramento, CA, US; 2Portland, OR, US; 3Johns Hopkins Medicine, Baltimore, MD, US; 4University of Virginia, Charlottesville, VA, US; 5UVA Health System, Charlottesville, VA, US; 6Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 7University of Kansas Medical Center, Kansas City, KS, US; 8Hospital for Special Surgery, New York, NY, US; 9John Hopkins University/ School of Medicine, Baltimore, MD, US; 10University of California, San Francisco, San Francisco, CA, US; 11University of California, San Diego, San Diego, CA, US; 12Washington University School of Medicine, St. Louis, MO, US; 13University of Virginia, Department of Orthopedic Surgery, Charlottesville, VA, US; 14Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:00–11:15 a.m.
Discussion

11:15–11:21 a.m.

187. Complications and Mortality Following One- to Two-Level Lumbar Fusion Surgery in Patients Above 80 Years of Age
Varun Puvanesarajah, BS1; Amit Jain2; Adam L. Shimer, MD3; Xudong J. Li, MD, PhD4; Anuj Singla, MD5; Francis H. Shen, MD5; Hamid Hassanzadeh, MD7

1Johns Hopkins Medicine, Baltimore, MD, US; 2Portland, OR, US; 3University of Virginia Department of Orthopaedic Surgery, Charlottesville, VA, US; 4University of Virginia School of Medicine, Department of Orthopaedic Surgery, Charlottesville, VA, US; 5University of Virginia, Department of Orthopedic Surgery, Charlottesville, VA, US; 7International Spine Study Group

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:21–11:27 a.m.

188. Reoperation Rates in Lumbar Spine Surgery: Statistically Significant Differences Exist in the Same Dataset when Different Definitions for Reoperation are Applied
Donna D. Ohnmeiss, PhD1; Richard D. Gayer, MD2; Scott L. Blumenthal, MD2; Jack E. Zigler, MD3

1Texas Back Institute Research Foundation, Plano, TX, US; 2Texas Back Institute, Plano, TX, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:27–11:33 a.m.

189. Predictive Model for Discharge to Home after Elective Surgery for Lumbar Degenerative Disease: An Analysis from National Neurosurgery Quality Outcomes Database Registry
Silky Chotai, MD1; Clinton J. Devin, MD2; Mohamad Bydon, MD2; Kristin Archer, PhD, DPT3; Matthew J. McGirt, MD4; Hui Nian5; Frank E. Harrell Jr., PhD6; Anthony L. Asher, MD7


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:33–11:39 a.m.

190. Comparison of Perioperative Adverse Event Rates after Single-Level Transforaminal Lumbar Interbody Fusion versus Anterior/Posterior Fusion for Spondylolytic Spondylolisthesis: 30-Day Outcomes of 635 Cases
Matthew Webb1; Adam M. Lukasiewicz, MSc2; Andre Samuel, BA3; Benjamin J. Geddes, MD4; Arya G. Varthi, MD5; Michael D. Daubs, MD6; Jonathan N. Grauer, MD7

1Yale University School of Medicine, New Haven, CT, US; 2New Haven, CT, US; 3Yale New Haven Hospital, New Haven, CT, US; 4University of Nevada School of Medicine, Las Vegas, NV, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:39–11:45 a.m.

191. Influence of Back Extensor Strength on T1 Pelvic Angle and Other Spino-Pelvic Alignment in Elderly Women
Michio Hongo, MD, PhD1; Naohisa Miyakoshi, MD, PhD2; Yuji Kasukawa, MD3; Yoshinori Ishikawa, MD, PhD3; Yoichi Shimada, MD, PhD4

1Department of Orthopedic Surgery, Akita University Graduate School of Medicine, Akita, Japan; 2Akita University Graduate School of Medicine, Akita, Japan; 3Akita University Graduate School of Medicine, Akita, Japan; 4Rehabilitation Div Akita University Hospital, Akita, Japan

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:45–12:00 p.m.
Discussion
Abstract Presentations: Low Back Pain and Imaging Modalities
Room 208
Moderator: Douglas P. Beall, MD

10:30–10:36 a.m.
192. CT-Based Bone Mineral Density as a Predictor of Catastrophic Proximal Juxtanodal Fracture
Swamy Kurra¹; Richard A. Tallarico, MD²; Adam Green; William F. Lavelle, MD³
¹SUNY Upstate Medical University, Syracuse, NY, US; ²Upstate Orthopedics LLC, East Syracuse, NY, US; ³East Syracuse, NY, US
FDA Device/Drug Status: CT scan (Approved for this indication), DEXA scan (Approved for this indication)

10:36–10:42 a.m.
193. Osteopenia Screening Utilizing a Novel CT-Based DEXA Equivalent Algorithm
Edward Jung, MD, MSc¹; Omar Kadri, MD²; Kevin Taliaferro, MD²; Morenikeji Buraimoh, MD²; Stephen Bartol, MD, MBA, FRCSC²
¹Henry Ford Health System, Detroit, MI, US; ²Henry Ford Hospital, Detroit, MI, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:42–10:48 a.m.
194. 3D-Navigation Reduces Radiation Exposure and Operative Time in Lumbopelvic Fixations
Martin F. Hoffmann, MD; Thomas A. Schildhauer
Bochum, Germany
FDA Device/Drug Status: Brainlab Navigation System (Approved for this indication), DepuySynthes USS Spinal Fixator (Approved for this indication)

10:48–10:54 a.m.
Norah A. Foster, MD⁴; Bria Moore; Kenneth R. Womack II, MS⁵; Daniel J. Blizzard, MD⁴; Isaac O. Karikari, MD⁴; Melissa Erickson, MD⁴; William J. Richardson, MD⁴
¹Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; ²U.S. Nuclear Regulatory Commission, Atlanta, GA, US; ³Duke University, Durham, NC, US; ⁴Duke University Medical Center, Durham, NC, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:54–11:00 a.m.
196. The Impact of a Precise Mechanical Diagnosis for Low Back Pain: A Cost Comparison with Standard Community Care
Ronald G. Donelson, MD, MS¹; Kevin F. Spratt, PhD²
¹SelfCare First, LLC, Hanover, NH, US; ²Department of Orthopaedics, Lebanon, NH, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:00–11:15 a.m.
Discussion

11:15–11:21 a.m.
197. Diagnosing the Undiagnosed: Osteoporosis in Patients Undergoing Lumbar Fusion
Scott Wagner, MD¹; Daniel G. Kang, MD²; Theodore Steelman, MD³; Melvin D. Helgeson, MD⁴; Ronald A. Lehman Jr., MD⁴
¹Walter Reed National Military Medical Center, Bethesda, MD, US; ²Madigan Army Medical Center, Tacoma, WA, US; ³The Spine Hospital, Columbia University/New York Presbyterian, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:21–11:27 a.m.
198. Variable Changes of Pelvic Parameters from Standing to Supine Positions in Patients of Lumbar Degenerative Disease
Soo-An Park, MD, PhD¹; Dai-Soon Kwak, PhD²; Yoonvin Kim, MD³
¹Uijeongbu St. Mary’s Hospital, The Catholic University of Korea, Uijeongbu-si, Gyeonggi-do, Republic of Korea; ²The Catholic University of Korea, Seoul, Republic of Korea; ³The Catholic University of Korea, Uijeongbu St. Mary’s Hospital, Uijeongbu, Republic of Korea
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:27–11:33 a.m.
199. Objective Radiographic Disc Integrity Metric Identifies Disc Abnormalities in Whiplash Patients
Matthew F. Gornet, MD¹; John A. Hipp, PhD²; Anne G. Copay, PhD³; Francine W. Schranck, RN, BSN⁴
¹The Orthopedic Center of St. Louis, St. Louis, MO, US; ²Houston, TX, US; ³SPIRITT Research, St. Louis, MO, US; ⁴Saint Louis, MO, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:33–11:39 a.m.
200. Diffusion Tensor Imaging in Cervical Spondylosis: A Prospective Observational Study
Patrick Reid, MD¹; Darryl Sneag, MD²; Tina Jeon, PhD²; Tucker C. Callanan, BS³; John C. Quinn, MD²; Darren R. Lebl, MD²
¹Hospital for Special Surgery, New York, NY, US; ²Rutgers University, Newark, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
11:39–11:45 a.m.
201. Total Disability Index (TDI) a Single Functional Status Measure in Patients with Neck and/or Back Pain
Dana Cruz, MD1; Matthew Spiegel, BS, MD2; Louis M. Day, BS3; Robert A. Hart, MD4; Christopher P. Ames, MD5; Douglas C. Burton, MD6; Justin S. Smith, MD, PhD7; Christopher I. Shaffrey, MD8; Frank J. Schwab, MD9; Thomas J. Errico, MD10; Shay Bess, MD11; Virginie Lafage, PhD12; Themistocles S. Protopsaltis, MD13
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:45–12:00 p.m.
Discussion

10:36–10:42 a.m.
203. Three-Column Osteotomy for Correction of Cervical Deformity: Alignment Changes and Early Complications in a Multicenter Prospective Series of 24 Patients
Justin S. Smith, MD, PhD1; Christopher I. Shaffrey, MD2; Han Jo Kim, MD3; Brian J. Neuman, MD4; Eric O. Klineberg, MD5; Frank J. Schwab, MD6; Virginie Lafage, PhD7; Renaud Lafage, MSc8; Justin K. Scheer, BS9; Themistocles S. Protopsaltis, MD10; Peter G. Passias, MD11; Gregory M. Mundis Jr., MD12; Robert A. Hart, MD13; Vedat Deviren, MD14; Shay Bess, MD15; Christopher P. Ames, MD16; International Spine Study Group17
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
10:54–11:15 a.m.
Discussion

11:15–11:21 a.m.
207. Incidence and Etiology of Unplanned Reoperations Following Index Surgery in the Adult Symptomatic Lumbar Scoliosis NIH-Sponsored Clinical Trial
Charles H. Crawford III, MD; Steven D. Glassman, MD; Leah Y. Carreon, MD, MSc; Christopher I. Shaffrey, MD; Tyler R. Koski, MD; Christine R. Baldus, RN; Keith H. Bridwell, MD

1Northwestern Medical Faculty Foundation, Chicago, IL, US; 2Washington University School of Medicine, Saint Louis, MO, US; 3Northwestern Medical Faculty Foundation, Chicago, IL, US; 4Washington University School of Medicine, Saint Louis, MO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:21–11:27 a.m.
208. Development and External Validation of the Adult Spine Deformity (ASD) Frailty Index (ASD-FI)
Emily Miller, BA; Daniel M. Sculuba, MD; Brian J. Neuman, MD; Justin S. Smith, MD, PhD; Khaled M. Kebaish, MD; Frank Kleinjuck, MD; Ibrahim Obeid; Francisco J. Perez-Grueso, MD; Ferran Pellise, MD, PhD; Christopher F. Ames, MD; ESSG European Spine Study Group

International Spine Study Group

1Baltimore, MD, US; 2Johns Hopkins University, Baltimore, MD, US; 3University of Virginia, Charlottesville, VA, US; 4University of California, San Francisco, San Francisco, CA, US; 5University of California, San Francisco, San Francisco, CA; 6University of California, San Francisco, San Francisco, CA, France; 7Spine Unit, Rigshospitalet and University of Copenhagen, Copenhagen, Denmark; 8QMC University Hospital, Nottingham, Nottinghamshire, United Kingdom; 9Queen Mary Hospital, Hong Kong, Hong Kong; 10Hospital for Special Surgery, New York, NY, US; 11Barcelona, Spain; 12Norton Leatherman Spine Center, Louisville, KY, US; 13University of Arizona, Tucson, AZ, USA; 14University of Virginia, Charlottesville, VA, US; 15Baltimore, MD, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:27–11:33 a.m.
Louis M. Day, BS; Subaraman Ramchandran, MBBS; Dana Cruz, MD; Breton Line, BS; Aaron J. Buckland, MBBS, FRACS; Themistocles S. Protospiatis, MD; John A. Bendo, MD; Peter G. Passias, MD; Jonathan H. Oren, MD; Jeffrey M. Spivak, MD, MSc; Jeffrey A. Goldstein, MD, FACS; Tessa K. Huncke; Thomas J. Errico, MD; Shay Bess, MD


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:33–11:39 a.m.
210. Incidence of Proximal Junctional Kyphosis in Patients with Adult Spinal Deformity Fused to the Pelvis: Analysis of 198 Patients
Amit Jain; Floreana Naef, MD; Lawrence G. Lenke, MD; Yong Qiu, MD; Yukihiro Matsuyma, MD, PhD; Christopher P. Ames, MD; Michael G. Fehlings, MD, PhD, FRCS; Benny Dahl, MD, PhD; Hossein Mehedian, FRCS; Kenneth M. Cheung, MD, FRCS; Frank J. Schwab, MD; Ferran Pellise, MD, PhD; Leah Y. Carreon, MD, MSc; Christopher I. Shaffrey, MD; Khaled M. Kebaish, MD

1Portland, OR, US; 2Johns Hopkins University, Baltimore, MD, US; 3Washington University School of Medicine, Saint Louis, MO, US; 4The Affiliated Drum Tower Hospital of Nanjing University Medical School, Nanjing, China; 5Hamamatsu University School of Medicine, Hamamatsu, Japan; 6University of California, San Francisco, San Francisco, CA, US; 7Toronto Western Hospital, Toronto, ON, Canada; 8Spine Unit, Rigshospitalet and University of Copenhagen, Copenhagen, Denmark; 9QMC University Hospital, Nottingham, Nottinghamshire, United Kingdom; 10Queen Mary Hospital, Hong Kong, Hong Kong; 11Hospital for Special Surgery, New York, NY, US; 12Barcelona, Spain; 13Norton Leatherman Spine Center, Louisville, KY, US; 14University of Arizona, Tucson, AZ, USA; 15Baltimore, MD, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:39–11:45 a.m.
211. Unfused Thoracic Spine Reciprocal Alignment Changes Following Adult Spinal Deformity (ASD) Surgery Can Be Predicted
Renaud Lafage, MSc; Jeffrey L. Gum, MD; Barthelemy Liabaud, MD; Frank J. Schwab, MD; Justin S. Smith, MD, PhD; Christopher P. Ames, MD; Richard A. Hostin Jr., MD; Christopher I. Shaffrey, MD; Gregory M. Mundis Jr., MD; Douglas C. Burton, MD; Robert A. Hart, MD; Shay Bess, MD; Munish C. Gupta, MD; Virginie Lafage, PhD; International Spine Study Group

1Hospital for Special Surgery, New York, NY, US; 2Norton Leatherman Spine Center, Louisville, KY, US; 3UVA Health System, Charlottesville, VA, US; 4University of California, San Francisco, San Francisco, CA, US; 5Southwest Scoliosis Institute, Plano, TX, US; 6University of Virginia, Charlottesville, VA, US; 7Scripps Clinic Medical Group, Department of Orthopedics, La Jolla, CA, US; 8University of Kansas Medical Center, Kansas City, KS, US; 9Oregon Health & Science University, Portland, OR, US; 10Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 11Washington University School of Medicine, St. Louis, MO, US; 12Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:45 a.m.–12:00 p.m.
Discussion
Abstract Presentations: Spinal Tumors
Room 205B
Moderator: Joshua E. Heller, MD

10:30–10:36 a.m.
Michael G. Fehlings, MD, PhD, FRCSC; Anick Nater, MD; Lindsay Tetraault, PhD; Branko Kopjar, MD, PhD; Paul M. Arnold, MD; Mark B. Dekutoski, MD; Joel A. Finkelstein, MD; Charles G. Fisher, MD, FRCSC, MHS; John C. France, MD; Ziya L. Gokaslan, MD, FACS; Laurence D. Rhines, MD; Peter Rose, MD; James M. Schuster, MD, PhD; Alexander R. Vaccaro, MD, PhD

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:36–10:42 a.m.
213. Preoperative Predictive Factors of Survival, Neurological, Functional and Health Related Quality of Life Outcomes in Surgically Treated Patients with Metastatic Epidural Spinal Cord Compression: A Systematic Literature Review
Anick Nater, MD; Allan Martin, MD; David Choi, PhD, FRCS; Michael G. Fehlings, MD, PhD, FRCSC

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:42–10:48 a.m.
214. Development of a Prognostic Survival Algorithm for Patients with Metastatic Spine Disease
Nuno Rui Paulino Pereira, MD; Stein Janssen, MD; Marco Ferrone, MD; Joseph H. Schwab, MD

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:48–10:54 a.m.
215. Malignant Spinal Cord Compression: Clinical Outcomes and Survival According to Treatment Modality: Results of a Prospective Audit
Suzanne McIlroy, MCSP, MSc; Saurabh Kapoor, MS, MBBS; David Bell, MD

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:54–11:00 a.m.
216. Healthcare Resource Utilization and Patient-Reported Outcomes following Elective Surgery for Intradural Extramedullary Spinal Tumors
Silky Chotai, MD; Scott L. Zuckerman, MD; Scott L. Parker, MD; David Stonko, MS; Andrew Hale; Joseph Wick, BA; Matthew J. McGirt, MD; Joseph S. Cheng, MD, MS; Clinton J. Devin, MD

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:00–11:18 a.m.
Discussion

11:18–11:24 a.m.
217. Surgical Resection of Intradural Extramedullary Spinal Tumors: Patient-Reported Outcomes and Minimum Clinically Important Difference
Scott L. Zuckerman, MD; Silky Chotai, MD; Clinton J. Devin, MD; Scott L. Parker, MD; David Stonko, MS; Joseph Wick, BA; Andrew Hale; Matthew J. McGirt, MD; Joseph S. Cheng, MD, MS

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:24–11:30 a.m.
218. Patient-Reported Outcomes after Sacral Resection Based on the Level of Nerve Root Resection
Olivier D. van Wulfoten Palthe, MD; Matthew Houdek, MD; Peter Rose, MD; Michael J. Yaszenski, MD, PhD; Francis J. Hornicek Jr., MD, PhD; Joseph H. Schwab, MD

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
11:30–11:36 a.m.
219. Analysis of the Sacral Tumor Survey and Recommendation for Future Development
Olivier D. van Wulffen Palthe, MD; Stein Janssen, MD; Jay Wunder, MD, MSc; Peter Rose, MD; Michael J. Yaszemski, MD, PhD; Francis J. Hornicek Jr., MD, PhD; Joseph H. Schwab, MD

1Massachusetts General Hospital, Boston, MA, US; 2Mount Sinai Hospital, Toronto, ON, Canada; 3Mayo Clinic Department of Orthopedic Surgery, Rochester, MN, US; 4Rochester, MN, US; 5Boston, MA, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:36–11:42 a.m.
220. Are Allogeneic Blood Transfusions Associated with Decreased Survival after Surgical Treatment for Spinal Metastases?
Nuno Rui Paulino Pereira, MD; Stein Janssen, MD; Joseph H. Schwab, MD
Massachusetts General Hospital, Boston, MA, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:42 a.m.–12:00 p.m.
Discussion

10:30 a.m.–12:00 p.m.
Global Spine Forum Symposium: Challenges in Spine Care: Life as a Spine Surgeon
Room 206A
Moderator: Norman B. Chutkan, MD

This session focuses on international challenges that spine surgeons face in their countries today presented by invited international organizations through faculty presentations and panel discussions.

Agenda
› Association of Spine Surgeons of India
  Presenter: Dr. Raghava D. Mulukutla, President Elect—ASSI
› DWG/German Spine Society
  Michael Winking, MD, President of the German Spine Society (DWG)
› Brazilian Association of Minimally Invasive Spine Surgery
  • Spine Surgery in Brazil: Our Vision and Our History
    Pil Sun Choi, MD, President of ABCMIC
    (Brazilian Association of Minimally Invasive Spine Surgery)
  • Minimally Invasive Spine Surgery in Brazil: The Current State and Challenges
    Wilson Dratcu, MD, President of SBC-MISS
    (Brazilian Minimally Invasive Spine Surgery Society)
› Chinese Association of Orthopedic Surgeons
  Yong Hai, MD, PhD, Orthopedic Surgery, Beijing Chaoyang Hospital
› Discussion/Questions and Answers

10:30 a.m.–6:00 p.m.
Ticketed Hands-on Course: Fundamentals of Spine Surgery and Intervventional Pain Management Resident/Fellow Training Course
The Learning Place, Orange Theater
Technical Exhibition, Booth #1900
Co-chairs: Edward J. Dohring, MD; Donna M. Lahey, RNFA

This course will introduce anatomic approaches to the cervical, thoracic and lumbar spine as well as surgical and interventional injection indications, principles, techniques, and skills. Lectures will provide the background for hands-on cadaver sessions where participants will have the opportunity to practice these techniques with faculty who are considered experts in their fields.

Attendees will have the unique opportunity to learn about both nonoperative (interventional injections) and operative (surgical) approaches in the treatment of spinal disorders. The focus of this educational experience will be to provide the fundamental knowledge and skills necessary in order to benefit the most from spinal fellowship training.

Upon completion of this course, participants should gain strategies to:
› Demonstrate fundamental knowledge of spine anatomical structures and their relationship to each other;
› Describe the key anatomic landmarks in the spine necessary to perform safe interventional and surgical procedures;
› Incorporate the knowledge learned and skills acquired during fellowship training and future practice.

The North American Spine Society designates this live activity for a maximum of 13.5 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.
10:40 a.m.–12:00 p.m.
Research Grant and Fellowship Awards Presentations
Room 210ABC
Moderator: Charles A. Reitman, MD

10:40–10:48 a.m.
2013 Research Grant Award Winner
Co-Culture with Human Annulus Cells or Exposure to Annulus Cell Conditioned Media Significantly Increase F11 Neurite Growth
Helen E. Gruber, PhD, H. James Norton, PhD, Edward N. Hanley, MD
Department of Orthopaedic Surgery, Carolinas Medical Center, Charlotte, NC, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:48–10:56 a.m.
2013 Research Grant Award Winner
Pathophysiological Role of ADAM8 (A Disintegrin and Metalloproteinase 8) in Intervertebral Disc Degeneration
Yeja Zhang, MD, PhD1; Miersalijiang Yasen, MD, PhD; Maurizio Pacifici, PhD2; Howard S. An, MD3; Motomi Enomoto-Iwamoto, DDS, PhD4
1Penn Medicine at Rittenhouse, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, US; 2Children’s Hospital of Philadelphia, Philadelphia, PA, US; 3Rush University Medical Center, Department of Orthopedic Surgery, Chicago, IL, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:56–11:04 a.m.
2013 Research Grant Award Winner
Stem Cell-Derived Live Bone Mimics for Superior Spinal Arthrodesis
Carl A. Gregory, PhD1; Bret H. Clough1; Eoin P. McNeill1; Chris D. Chaput, MD2
1Institute for Regenerative Medicine, Texas A&M Health Science Center, Temple, TX, US; 2Scott and White Hospital, Department of Orthopedics, Temple, TX, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:04–11:12 a.m.
2013 Research Grant Award Winner
Blast Overpressure Exposure Induces Axonal Injury and Glial Reactivity Changes in the Rat Spinal Cord
Srinivasu Kallakuri, PhD1; Heena Purkait, MS2; John M Cavanaugh, MD, MSC3
1Wayne State University, Department of Biomedical Engineering, Detroit, MI, US; 2Detroit, MI, US; 3Wayne State University, Bioengineering Center, Detroit, MI, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:12–11:20 a.m.
2013 Research Grant Award Winner
Can Potent Anti-Oxidative and Anti-Inflammatory Nano-Fullerene Replace Steroids for Treatment of Disc Degeneration?
Li Jin, PhD1; Francis Shen, MD2; Xudong Li, MD, PhD3
1Charlottesville, VA, US; 2University of Virginia School of Medicine, Department of Orthopaedic Surgery, Charlottesville, VA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:20–11:28 a.m.
2014 Research Grant Award Winner
Metastatic Cancer Pain in a Rat Model of Human Breast Cancer
Rachel Sarabia-Estrada, DVM, PhD1; Alejandro Ruiz-Valls, MD1; Ana M. Ampuero, BS1; Rory Goodwin, MD1; Ismael Jimenez-Estrada, PhD2; Samantha D'Souza, BS1; Alfredo Quinones-Hinojosa, MD2; Daniel M. Sciubba, MD1
1Johns Hopkins University School of Medicine, Department of Neurosurgery, Baltimore, MD, US; 2Physiology, Biophysics and Neurosciences, Research Center and Advanced Studies IPN, Mexico City, Mexico
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:28–11:55 a.m.
Discussion/Questions and Answers

11:55–12:00 p.m.
2016 Research Grants and Fellowship Awards Presentation

12:00 p.m.–1:30 p.m.
NASS Bistro
Technical Exhibition, Booth #272
Complimentary Box Lunch Medical Attendees Only
Technical Exhibition, Booth #773

Solution Showcase
Technical Exhibition, Booth #573
› 12:00 p.m.: DJO Global
Continuum of Care Solutions for Spine and the Efficacy of Electrical Stimulators for Bone Healing
› 12:30 p.m.: Misonix
Ultrasonic BoneScalpel MIS Applications
Presented by Dr. Juan Uribe
Complex Spine Using Ultrasonic BoneScalpel
Presented by Dr. Isador Lieberman
Friday, October 28

1:00–1:45 p.m.
Global Spine Forum:
Chinese Association of Orthopedic Surgeons
Room 206A
Moderators: Yong Hai, MD, PhD; Baoge Liu, MD, PhD

- Selective Posterior Decompression with CoFlex Interlaminar Dynamic Stabilization for Degenerative Lumbar Stenosis: Seven-Year Outcomes
  Yong Hai, MD, PhD
- Severe Rigid Cervical Spine Kyphotic Deformity: Measurement and Osteotomy Techniques
  Baoge Liu, MD, PhD
- Unilateral Pedicle Screws Fixation with TLIF for the Treatment of Lumbar Degenerative Disease: Five Years Follow-up Results
  Hua Li, MD, PhD
- Double Door Open Laminoplasty (Kurokawa Method)—Technique Key Points and Clinical Applications
  Rui Gu, MD, PhD
- The Key Points and Indication of Oblique Lateral Interbody Fusion
  Yang Liu, MD, PhD
- Incidence and Risk Factors for Proximal Junctional Kyphosis Following Posterior Spinal Fusion in Adolescent Idiopathic Scoliosis
  Yawei Li, MD, PhD
- Panel Discussion

1:00–2:45 p.m.
Interdisciplinary Spine Forum:
Whiplash-associated Disorders (WAD): A Biopsychosocial Perspective on Its Assessment and Management: Part 1
Room 205C
Moderators: Linda Carroll, PhD; Jim Elliott, PhD, PT

Through integrated global and interdisciplinary research efforts, it has become clear that understanding and managing traffic-related whiplash-associated disorders (WAD) involves appreciating the complex interplay between biological, psychological and social/environmental processes. In this session, faculty will explore the emerging advancements in understanding, assessing and managing WAD from the perspective of engineering, psychology, epidemiology, radiology, implementation sciences and rehabilitation.

Upon completion of this session, participants should gain strategies to:
- Explain whiplash-associated disorders from a biopsychosocial perspective;
- Describe and discuss the pathomechanics of the whiplash event and the biomechanical factors influencing injury risk;
- Critically discuss the value and caveats of diagnostic imaging for patients with traumatic neck pain;
- Identify and describe risk factors for chronicity in patients with acute WAD;
- Describe and discuss the assessment of radiculopathy using manual provocation tests;
- Describe and discuss the use of self-report measures to aid in prognosis and tracking recovery;
- Discuss and contrast the current best evidence on effectiveness of interventions for both recent and persistent WAD;
- Understand the biopsychosocial nature of whiplash-associated disorders (WAD) and its risk, prognosis, assessment/diagnosis and treatment from an evidence-based perspective.

Agenda
- What is “Whiplash-associated Disorder?” Overview and Epidemiology
  Linda J. Carroll, PhD
- Viewing Whiplash-associated Disorders from a Biopsychosocial Perspective
  Dave Walton, PT, PhD
- The Biomechanics of Whiplash-associated Disorders: Mechanisms of Injury and Biomechanical Factors Influencing Risk
  Brian Stemper, PhD
- Natural History of WAD Recovery: How Long Does Recovery Take? What are the Clinically Relevant Risk Factors for Poor Recovery? Do Medical/Legal Factors Play a Role? Presentation of a Tool for Predicting Recovery
  Linda Carroll, PhD and Dave Walton, PT, PhD

1:10–1:15 p.m.
NASS Working for You: Leaders of Congressional Healthcare Committees
Room 210ABC
Moderator: John G. Finkenberg, MD

1:15–2:45 p.m.
Symposium:
Intradiscal Biologic Therapy
Room 210ABC
Moderator: Michael J. DePalma, MD

In this intradiscal biologic technologies session, faculty will address the pathophysiology underlying discogenic low back pain, imaging predictors of discs that may respond to such technologies, and the basic and clinical science behind these experimental technologies.
Upon completion of this session, participants should gain strategies to:

- Recognize the pathophysiology of painful lumbar intervertebral discs;
- Describe various experimental intradiscal biologic technologies;
- Recognize the inherent strengths and weakness of these technologies;
- Identify the potential role for disc stimulation in selecting target discs for intradiscal technologies.

**Agenda**

- **Perspective of Discogenic Low Back Pain Clinical Dilemma**
  Michael J. DePalma, MD
- **Pathophysiology of Discogenic Low Back Pain and Basic Science of Potential Intradiscal Therapeutic Agents**
  Jeffrey C. Lotz, PhD
- **Clinical and Radiographic Indications for Lumbar Discogenic Low Back Pain**
  Douglas P. Beall, MD
- **Metabolic and Mechanical Agents**
  Michael J. DePalma, MD
- **Cellular Supplementation Technologies**
  Kasra Amirdelfan, MD
- **Discussion**
  Faculty

1:15–2:45 p.m.

**Symposium:**

**Managing the Delivery of Spine Care: What Can Healthcare Learn from the Business Community**

Room 209

Moderator: Alok D. Sharan, MD, MHCDS

The changing landscape in healthcare requires a new framework for the delivery of healthcare. Navigating the new value-based reimbursement programs is introducing a tremendous amount of uncertainty for spine care providers. The goal of this session is to introduce basic management concepts from the business community that can help spine care providers as they rethink their overall framework for the delivery of care. Faculty will draw lessons from other industries that have undergone transformational changes and apply them to spine care providers.

Upon completion of this session, participants should gain strategies to:

- Appreciate the need for an organizational strategy;
- Comprehend the role of competition at the level of value creation in healthcare;
- Know how to execute an innovation within their organization;
- Recognize the role of leadership in the transition to value-based healthcare.

**Agenda**

- **Introduction**
  Alok D. Sharan, MD, MHCDS
- **The Need for a New Strategy in Healthcare**
  Alok D. Sharan, MD, MHCDS
- **Understanding the New Rules of Competition in Healthcare**
  Scott G. Tromanhauser, MD, MBA
- **The Role of Innovation in Value-based Care**
  Alexander R. Vaccaro, MD, PhD
- **The Role of Leadership in Navigating the Uncertainty of Value-based Care**
  Todd J. Albert, MD
- **Discussion, Questions and Answers**
  Faculty

Over the past several years, there has been a significant proliferation of the formulations and materials available as allogeneic bone graft. In addition, the recent controversy associated with the use of BMPs has resulted in many surgeons changing their choice of bone graft for spinal fusion. Navigating the literature to determine the science behind the processing of the grafts and their efficacy for successful fusion is often difficult and confusing. The goal of this session is to review the current classes of allogeneic bone graft material available and educate the audience as to the science behind their processing and efficacy.

Upon completion of this session, participants should gain strategies to:

- Identify the various classes of allogeneic bone graft on the market;
- Understand the difference in processing methods for these grafts;
- Be familiar with the efficacy and risks associated with each class of graft.

**Agenda**

- **Introduction: Why Are Allografts Coming Back?**
  Alan Dang, MD
- **The Variability of Allografts**
  Christopher Chaput, MD
- **Cellular Allografts**
  Carl A. Gregory, PhD
- **Panel Discussion/Questions and Answers**
FRIDAY, OCTOBER 28

1:15–1:21 p.m.

**Abstract Presentations:**

**Deformity Complications**

Room 205A

Moderator: Ronald A. Lehman, MD

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**1:15–2:45 p.m.**

**Abstract Presentations:**

**Deformity Complications**

Room 205A

Moderator: Ronald A. Lehman, MD

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**1:15–1:21 p.m.**

**221. HRQOL Scores Underestimate the Impact of Major Complications in Lumbar Degenerative Scoliosis Surgery**

Steven D. Glassman, MD; Keith H. Bridwell, MD; Christopher I. Shaffrey, MD; Charles C. Edwards, MD; Jon D. Lurie, MD; Leah Y. Carreon, MD, MD; Charles C. Edwards, MD; Jon D. Lurie, MD; Michael G. Fehlings, MD, PhD, FRCSC; Benny Dahl, MD, NY, US; 1Norton Leatherman Spine Center, Louisville, KY, US; 2Washington University in St. Louis School of Medicine, Saint Louis, MO, US; 3University of Virginia, Charlottesville, VA, US; 4Baltimore, MD, US; 5Dartmouth College, Lebanon, NH, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

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**1:21–1:27 p.m.**

**222. Rates of Recovery and Outcomes after Neurologic Complications in Adult Spinal Deformity Surgery**

Han Jo Kim, MD; Sravisht Iyer, MD; Frank J. Schwab, MD; Themistocles S. Protopsaltis, MD; Peter G. Passias, MD; Richard A. Hostin Jr., MD; Gregory M. Mundis Jr., MD; Vedat Deviren, MD; Christopher I. Shaffrey, MD; Khaled M. Kebaish, MD; Justin S. Smith, MD, PhD; Shay Bess, MD; Christopher P. Ames, MD; Eric O. Klineberg, MD; International Spine Study Group

1Hospital for Special Surgery, New York, NY, US; 2Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 3NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 4Southwest Scoliosis Institute, Plano, TX, US; 5Scripps Clinic Medical Group, Department of Orthopedics, La Jolla, CA, US; 6University of California, San Francisco, San Francisco, CA, US; 7University of Virginia, Charlottesville, VA, US; 8Baltimore, MD, US; 9UVA Health System, Charlottesville, VA, US; 10UC Davis School of Medicine, Sacramento, CA, US; 11Brighton, CO, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

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**1:27–1:33 p.m.**

**223. Complications and Patient-Reported Outcomes of Primary versus Revision Surgery for Severe Adult Spinal Deformity: A ScoliRisk-1 Sub-Analysis**

Amit Jain; Floreana Naef, MD; Lawrence G. Lenke, MD; Christopher I. Shaffrey, MD; Michael G. Fehlings, MD, PhD, FRCS; Benny Dahl, MD, PhD; Christopher P. Ames, MD; Yukihiro Matsuyama, MD, PhD; Yong Qu, MD; Hossein Mehdian, FRCS; Kenneth M. Cheung, MD, FRCS; Frank J. Schwab, MD; Ferran Pellise, MD, PhD; Leah Y. Carreon, MD, MSc; Khaled M. Kebaish, MD

1Portland, OR, US; 2Johns Hopkins University, Baltimore, MD, US; 3Washington University School of Medicine, Saint Louis, MO, US; 4University of Virginia, Charlottesville, VA, US; 5Toronto Western Hospital, Toronto, ON, Canada; 6Spine Unit, Rigshospitalet and University of Copenhagen, Copenhagen, Denmark; 7University of California, San Francisco, San Francisco, CA, US; 8Hamamatsu University School of Medicine, Hamamatsu, Japan; 9The Affiliated Drum Tower Hospital of Nanjing University Medical School, Nanjing, China; 10QMC University Hospital, Nottingham, Nottinghamshire, United Kingdom; 11Queen Mary Hospital, Hong Kong, Hong Kong; 12Hospital for Special Surgery, New York, NY, US; 13Barcelona, Spain; 14Norton Leatherman Spine Center, Louisville, KY, US; 15Baltimore, MD, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

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**1:33–1:39 p.m.**


Tina Raman, MD; Emily Miller, BA; Christopher T. Martin, MD; Khaled M. Kebaish, MD

1Johns Hopkins University, Baltimore, MD, US; 2Baltimore, MD, US; 3University of Iowa, Iowa City, IA, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

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**1:39–1:45 p.m.**

**225. Bimalid Incidence and Causes of Proximal Junctional Kyphosis (PJK) in Adult Spinal Deformity (ASD)**

Munish C. Gupta, MD; Bassel G. Diebo, MD; Themistocles S. Protopsaltis, MD; Robert A. Hart, MD; Justin S. Smith, MD, PhD; Christopher P. Ames, MD; Renaud Lafage, MSc; Justin K. Scheer, BS; Han Jo Kim, MD; Shay Bess, MD; Douglas C. Burton, MD; Peter G. Passias, MD; Frank J. Schwab, MD; Virginie Lafage, PhD; International Spine Study Group

1Washington University School of Medicine, St. Louis, MO, US; 2Hospital for Special Surgery, New York, NY, US; 3Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 4Oregon Health & Science University, Portland, OR, US; 5UVA Health System, Charlottesville, VA, US; 6University of California, San Francisco, San Francisco, CA, US; 7University of California, San Diego, San Diego, CA, US; 8University of Kansas Medical Center, Kansas City, KS, US; 9NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 10Brighton, CO, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

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**1:45–2:00 p.m.**

**Discussion**

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**2:00–2:06 p.m.**

**226. Diabetes is a Risk Factor for Postoperative Complications in Patients Undergoing Anterior Cervical Discectomy and Fusion: An Analysis of 8,720 Patients**

Dante M. Leven, DO, PT; Parth Kothari, BS; Sulaiman Somani; Joung Heon Kim, BS; John Di Capua, MHS, BS; Jun Kim, MD; Samuel K. Cho, MD

1Mount Sinai School of Medicine, New York, NY, US; 2Icahn School of Medicine at Mount Sinai, New York, NY, US; 3Icahn School of Medicine at Mount Sinai, New York, NY, US; 4Mount Sinai Medical Center, New York, NY, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.
2:06–2:12 p.m.
227. Validation of the Orthopaedic Perioperative Effective Risk Assessment Score in Posterolateral Spinal Fusion
David Sing, BS1; Lionel N. Metz, MD2
1UCSF/SFGH Orthopaedic Trauma Institute, San Francisco, CA, US; 2University of California, San Francisco, San Francisco, CA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:12–2:18 p.m.
228. Predictors of Hospital Readmission and Surgical Site Infection in the United States, Denmark and Japan: Is Risk Stratification a Universal Language?
Steven D. Glassman, MD1; Leah Y. Carreon, MD, MSc1; Mikkel Andersen, MD2; Anthony L. Asher, MD2; Soren Eiskjaer, MD2; Martin Gehrchen, MD2; Shiro Imagama, MD, PhD2; Ken Ishii, MD, PhD2; Takashi Kaito, MD, PhD2; Yukihiro Matsuyama, MD, PhD2; Hiroshi Moridaira, MD, PhD2; Christopher I. Shaffrey, MD2; Morio Matsumoto, MD2
1Norton Leatherman Spine Center, Louisville, KY, US; 2Sygehus Lillebælt - Middelfart Sygehus, Middelfart, Denmark; 3Carolina Neurosurgery & Spine Associates, Charlotte, NC, US; 4Aalborg, Denmark; 5University Hospital of Copenhagen, Rigshospitalet, Copenhagen, Denmark; 6Nagoya University Graduate School of Medicine, Nagoya, Japan; 7Keio University School of Medicine / KSRG, Tokyo, Japan; 8Kawachinagano, Japan; 9Hamamatsu University School of Medicine, Hamamatsu, Japan; 10Dokkyo Medical University, Tochigi, Japan; 11University of Virginia, Charlottesville, VA, US; 12Keio University School of Medicine, Tokyo, Japan
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:18–2:24 p.m.
229. Complex Dural Defects Complicating Lumbar Spinal Stenosis Surgery
Katherine Sadowski, BS1; Sanford E. Emery, MD, MBA2; Nicholas U. Ahn, MD3; Christopher G. Furey, MD4
1Cleveland, OH, US; 2West Virginia University, Morgantown, WV, US; 3University Hospital of Cleveland/Department of Orthopedic Surgery, Cleveland, OH, US; 4Case Western Reserve University, Cleveland, OH, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:24–2:30 p.m.
230. Predictive Factors in Spine Surgery Complication Malpractice Litigation
Roy J. Ruttiman, MSc, BS1; Adam Eltorai, BA2; John M. DePasse, MD3; Bielinsky Brea, BS4; Alan H. Daniels, MD5
1University Orthopedics, Providence, RI, US; 2Providence, RI, US; 3Warren Alpert Brown University Department of Orthopaedic Surgery, Providence, RI, US; 4Natick, MA, US; 5Warren Alpert Medical School of BU/RI Hospital, Providence, RI, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:30–2:45 p.m.
Discussion
Friday, October 28

3:15–4:00 p.m.
Global Spine Forum:
Indonesian Spine Society
Room 206A

The New Classification of Lumbar Degenerative Cascade
The Concept of MISS and Dynamic Stabilization in Lumbar Spine
Bambang Darwono, MD, PhD

3:15–4:45 p.m.
Interdisciplinary Spine Forum:
Whiplash-associated Disorders (WAD): A Biopsychosocial Perspective on Its Assessment and Management: Part 2
Room 205C
Moderators: Linda Carroll, PhD; Jim Elliott, PhD, PT

Through integrated global and interdisciplinary research efforts, it has become clear that understanding and managing traffic-related whiplash-associated disorders (WAD) involves appreciating the complex interplay between biological, psychological and social/environmental processes. In this session, faculty will explore the emerging advancements in understanding, assessing and managing WAD from the perspective of engineering, psychology, epidemiology, radiology, implementation sciences and rehabilitation.

Upon completion of this session, participants should gain strategies to:
- Explain whiplash-associated disorders from a biopsychosocial perspective;
- Describe and discuss the pathomechanics of the whiplash event and the biomechanical factors influencing injury risk;
- Critically discuss the value and caveats of diagnostic imaging for patients with traumatic neck pain;
- Identify and describe risk factors for chronicity in patients with acute WAD;
- Describe and discuss the assessment of radiculopathy using manual provocation tests;
- Describe and discuss the use of self-report measures to aid in prognosis and tracking recovery;
- Discuss and contrast the current best evidence on effectiveness of interventions for both recent and persistent WAD;
- Understand the biopsychosocial nature of whiplash-associated disorders (WAD) and its risk, prognosis, assessment/diagnosis and treatment from an evidence-based perspective.

Agenda
- Advanced Imaging in WAD: How is Imaging Used? How Should It Be Done? When Should It Be Used? What Do the Findings Mean?
  - Joel R. Meyer, MD and Jim Elliott, PT, PhD
  - Gregory L. Whitcomb, DC and Dave Walton, PT, PhD
- How Should WAD Be Treated? Evidence-based Interventions for WAD
  - Pierre Côté, DC, PhD
- Panel Discussion/Questions and Answers

3:20–3:50 p.m.
Value Abstract Awards Presentations
Room 210ABC
Moderator: Emily K. Karlen, MPT

3:20–3:27 p.m.
103. A Comparison of Patient Centered Outcome Measures to Evaluate Dysphagia and Dysphonia after Anterior Cervical Discectomy and Fusion (ACDF)
Alpesh A. Patel, MD, FACS1; Surabhi Bhatt, BS2; Brett D. Rosenthal, MD3; Junyoung Ahn4; Jason W. Savage, MD5; Wellington K. Hsu, MD5; Kern Singh, MD6
1Northwestern Department of Orthopaedics, Chicago, IL, US; 2Northwestern University School of Medicine, Chicago, IL, US; 3Rush University Medical Center, Chicago, IL, US; 4Cleveland Clinic Center for Spine Health, Cleveland, OH, US; 5Northwestern University, Chicago, IL, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

3:27–3:34 p.m.
178. Surgical versus Nonsurgical Treatment for Cervical Radiculopathy: A Cost-Effectiveness Analysis
Jeffrey A. Rihn, MD1; Suneel Bhat, MD2; James S. Harrop, MD3; Zoher Ghogawala, MD, FACS4; Jonathan N. Grauer, MD5; Alan S. Hilibrand, MD6
1Thomas Jefferson University Hospital, The Rothman Institute, Philadelphia, PA, US; 2Thomas Jefferson University Hospital, Philadelphia, PA, US; 3Thomas Jefferson University, Philadelphia, PA, US; 4Lahey Hospital & Medical Center, Burlington, MA, US; 5Yale University School of Medicine, New Haven, CT, US; 6Rothman Institute, Philadelphia, PA, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
3:34–3:41 p.m.

205. Cost-Effectiveness of Surgical Treatment of Adult Spinal Deformity: Comparison of Posterior-Only versus Anterior-Posterior Approach

Jeffrey L. Gum, MD1; Richard A. Hostin Jr., MD2; Chessie Robinson, MA3; Steven D. Glassman, MD4; Douglas C. Burton, MD5; David W. Polly Jr., MD6; Shay Bess, MD6; Michael P. Kelly, MD7; Christopher I. Shaffrey, MD8; Justin S. Smith, MD9; Virginie Lafage, PhD10; Frank J. Schwab, MD10; Christopher P. Ames, MD10; Leah Y. Carreon, MD, MS11; International Spine Study Group12


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

3:41–3:50 p.m.

Discussion

3:20–3:50 p.m.

Resident and Fellow Research Awards Presentations

Room 209
Moderator: Andrew J. Schoenfeld, MD

3:20–3:27 p.m.

67. Is Preoperative Duration of Symptoms a Significant Predictor of Functional Status and Quality of Life Outcomes in Patients Undergoing Surgery for the Treatment of Degenerative Cervical Myelopathy?

Lindsay Tetrauget, PhD1; Jefferson Wilson, MD, PhD2; Branko Kopjar, MD, PhD2; Paul M. Arnold, MD3; Pierre Côté, DC, PhD4; Michael G. Fehlings, MD, PhD4; FRCSC5

1University of Toronto, Oakville, ON, Canada; 2Toronto, ON, Canada; 3University of Washington, Seattle, WA, US; 4University of Toronto; 5University of Ontario Institute of Technology, Oshawa, ON, Canada; 6Toronto Western Hospital, Toronto, ON, Canada

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

3:27–3:34 p.m.

118. Adipokines and the Intervertebral Disc: A Biochemical Link Exists Between Obesity, Intervertebral Disc Degeneration and Low Back Pain

Anand Segar, BHB, MbChB, DPhil(Oxon)1,2; Jill Urban, PhD3; Jeremy C.T. Fairbank, MD4

1Botnar Institute of Musculoskeletal Sciences, Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences (NDORMS), University of Oxford, Oxford, UK; 2Nuffield Orthopaedic Centre, Oxford University Hospitals NHS Trust, Oxford, UK; 3Department of Physiology, Anatomy and Genetics, University of Oxford, Oxford, UK

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

3:34–3:41 p.m.

270. Do Lumbar Decompression and Fusion Patients Recall Their Preoperative Status? A Cohort Study of Recall Bias in Patient-Reported Outcomes

Ilyas Aleem, MD, MSc, FRCSC1; Jonathan S. Duncan, MD; Amin Mohamed Ahmed, MBBS2; Mohammad Zarrabian, DC, MD3; Jason C. Eck, DO, MS4; John M. Rhee, MD5; Michelle J. Clarke, MD5; Bradford L. Currier, MD6; Ahmad N. Nasser, MD7

1Mayo Clinic, Rochester, MN, US; 2University of Toledo Medical Center, Toledo, OH, US; 3Toronto, ON, Canada; 4Center for Sports Medicine and Orthopedics, Chattanooga, TN, US; 5Emory University, Atlanta, GA, US; 6Mayo Clinic/Department of Orthopedic Surgery, Rochester, MN, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

3:41–3:50 p.m.

Discussion

3:50–4:02 p.m.

Abstract Presentations:

Anterior Cervical and Complications

Room 210ABC
Moderator: Richard D. Guyer, MD

3:50–3:56 p.m.

231. Revision Strategies in Cervical Disc Arthroplasty Failures

Daniel G. Kang, MD1; Ronald A. Lehman Jr., MD2; Jacob M. Buchowski, MD, MS3; K. Daniel Riew, MD4


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

3:56–4:02 p.m.

232. Complications and Reoperation Rate Following Cervical Lateral Mass Screw Fixation

Daniel G. Kang, MD1; Jacob M. Buchowski, MD, MS2; Panya Luksanapruksa, MD3; Christopher Chen, MD4; Ronald A. Lehman Jr., MD5; K. Daniel Riew, MD6

1Madigan Army Medical Center, Tacoma, WA, US; 2Washington University School of Medicine, Saint Louis, MO, US; 3Department of Orthopedic Surgery, Faculty of Medicine, Siriraj Hospital, Bangkok, Thailand; 4Madigan Army Medical Center, Dupont, WA, United States Minor Outlying Islands; 5The Spine Hospital, Columbia University/New York Presbyterian, New York, NY, US; 6The Spine Hospital/Columbia Doctors/New York Presbyterian/The Allen Hospital, New York, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
4:02–4:08 p.m.
233. Multimodal versus Patient Controlled Analgesia Following Anterior Cervical Decompression and Fusion Procedures
Daniel D. Bohl, MD, MPH; Philip Louie, MD; Junyoung Ahn; Benjamin Mayo, BA; Dustin H. Massel, BS; Ankur S. Narain, BA; Fady Y. Hiji, BS; William W. Long, BA; Krishna Modi, BS; Kern Singh, MD
1Rush University Medical Center, Chicago, IL, US; 2Midwest Orthopaedics at Rush, Chicago, IL, US; 3Department of Orthopaedic Surgery Rush University Medical Center, Chicago, IL, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:08–4:14 p.m.
234. Trends in Cost and Utilization of Biologics in Anterior Cervical Discectomy and Fusions
Vadim Goz, MD; Zorica Buser, PhD; Anthony D’Oro, BA; Jong-Beom Park, MD, PhD; Jim A. Youssef, MD, PhD; S. Tim Yoon, MD, PhD; Hans J. Meisel, MD, PhD; Jeffrey C. Wang, MD; Darrel S. Brodke, MD
1University of Utah, Salt Lake City, UT, US; 2Hoffman Medical Research Center, Keck School of Medicine, USC, Los Angeles, CA, US; 3South Pasadena, CA, US; 4Catholic University of Korea School of Medicine, Uijongbu-si, Kyunggi-do, Democratic People’s Republic of Korea; 5Durango, CO, US; 6The Emory Spine Center, Atlanta, GA, US; 7BG-Clinic Bergmannstrost - Department of Neurosurgery, Halle, Germany; 8USC Spine Center, Los Angeles, CA, US; 9University Orthopaedic Center, Salt Lake City, UT, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:14–4:20 p.m.
235. Prevalence, Progression and Clinical Implications of Heterotopic Ossification after Cervical Disc Arthroplasty at Seven Years
Pierce D. Nunley, MD; Eubulus J, Kerr III, MD; David A. Cavanaugh, MD; Andrew Utter, MD; Kelly Frank, MS; Marcus Stone, PhD
1Spine Institute of Louisiana, Shreveport, LA, US; 2Spine Institute of Louisiana Foundation, Shreveport, LA, US
FDA Device/Drug Status: Approved for this indication.

4:20–4:26 p.m.
236. Predicting the Minimum Clinically Important Difference in Patients Undergoing Surgery for the Treatment of Degenerative Cervical Myelopathy
Lindsay Tetreault, PhD; Jefferson Wilson, MD, PhD; Mark Kotter, MD, PhD; Branko Kopjar, MD, PhD; Pierre Côté, DC, PhD; Paul M. Arnold, MD; Michael G. Fehlings, MD, PhD, FRSC
1University of Toronto, Oakville, ON, Canada; 2Toronto, ON, Canada; 3University of Cambridge, Cambridge, United Kingdom; 4University of Washington, Seattle, WA, US; 5University of Ontario Institute of Technology, Oshawa, ON, Canada; 6University of Kansas Medical Center/Department of Neurosurgery, Kansas City, KS, US; 7Toronto Western Hospital, Toronto, ON, Canada
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
4:08–4:14 p.m.
241. Patient-Reported Outcomes Three Months after Surgery Accurately Predicts One-Year Outcomes
Owoicho Adogwa, MD, MPH1; Aladine A. Elsamadicy, BS2; Victoria D. Vuong, MSc, BS3; Ankit Mehta, MD4; Raul A. Vasquez-Castellanos, MD5; Joseph S. Cheng, MD, MS6; Carlos A. Bagley, MD7; Isaac O. Karikari, MD8
1Rush University Medical Center, Chicago, IL, US; 2Duke School of Medicine, Durham, NC, US; 3Chicago, IL, US; 4University of Illinois at Chicago, Chicago, IL, US; 5Vanderbilt University Neurosurgery, Nashville, TN, US; 6Yale University, New Haven, CT, US; 7University of Texas Southwestern Medical Center, Dallas, TX, US; 8Duke University Medical Center, Durham, NC, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:14–4:20 p.m.
242. Predictors of Chronic Opioid Therapy after Lumbar Fusion Surgery for Degenerative Disc Disease in a Workers’ Compensation Setting
Joshua T. Anderson1; Erik Tye, BA2; Arnold Haas, BS3; Nicholas U. Ahn, MD4
1Cleveland Heights, OH, US; 2Case Western Reserve University School of Medicine, Cleveland, OH, US; 3Ohio Bureau of Worker’s Compensation, Columbus, OH, US; 4University Hospital of Cleveland Department of Orthopedic Surgery, Cleveland, OH, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:20–4:26 p.m.
243. Validation of the Spine CPR Score
Godefroy Hardy St-Pierre, MD, FRCSC
Foothills Medical Center, Calgary, AB, Canada
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:26–4:32 p.m.
244. How Common is the Ponticulus Posticus? A CT-Based Analysis of 3,000 Patients
Ahmed Saleh, MD1; Jillian Gruber, BA2; Wajeeh Bakhsh, MD2; Paul T. Rubery Jr., MD4; Addisu Mesfin, MD1
1University of Rochester, Rochester, NY, US; 2University of Rochester School of Medicine and Dentistry, Rochester, NY, US; 3University of Rochester Medical Center, Rochester, NY, US; 4Rochester, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:32–4:50 p.m.
Discussion

3:50–3:55 p.m.
Abstract Presentations: Socioeconomics and Surgical Decision Making
Room 208
Moderator: Conor O’Neill, MD

3:50–3:56 p.m.
Ralph W. Cook IV, BS1; Joseph A. Weiner, BS1; Michael S. Schallmo, BS2; Danielle S. Chun, BA3; Kathryn Barth, BA4; Sameer Singh, BA5; Sohaib Hashmi, MD2; Wellington K. Hsu, MD3
1Northwestern University, Chicago, IL, US; 2Northwestern University Feinberg School of Medicine, Chicago, IL, US; 3Department of Orthopaedic Surgery, Chicago, IL, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

3:56–4:02 p.m.
246. Insurance Status Predicts Care Quality and Patient Safety in the Lumbar Spine Fusion Population
Joseph E. Tanenbaum, BA1; Vincent J. Alentado, BS2; Jacob Miller, BS3; Daniel Lubelski, MD4; Edward C. Benzel, MD5; Thomas E. Mroz, MD6
1Cleveland Clinic Center for Spine Health, Cleveland, OH, US; 2Cleveland Heights, OH, US; 3Cleveland Clinic Foundation, Cleveland, OH, US; 4Johns Hopkins Hospital, Department of Neurosurgery, Baltimore, MD, US; 5Cleveland Clinic Foundation Departments of Orthopaedic and Neurological Surgery, Cleveland, OH, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:02–4:08 p.m.
247. Early Effects of Medicare’s Bundled Payment Program for Lumbar Fusion on Episode Costs, Volume and Safety
Brook I. Martin, PhD, MPH1; Jon D. Lurie, MD2; Kevin J. McGuire, MD3
1Dartmouth-Hitchcock Medical Center, Lebanon, NH, US; 2Dartmouth College, Lebanon, NH, US; 3Beth Israel Deaconess Medical Center, Boston, MA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:08–4:14 p.m.
248. The Impact of Commercial Health Plan Prior Authorization Programs on the Utilization of Services for Low Back Pain
Robert Goodman, DO1; Corey Powell, PhD2; Paul Park, MD3
1Blue Care Network of Michigan, Southfield, MI, US; 2University of Michigan, Ann Arbor, MI, US; 3University of Michigan Department of Neurosurgery, Ann Arbor, MI, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
4:14–4:20 p.m.
249. Determining the Drivers of Variability in 90-Day Cost for Primary Single-Level Microdiscectomy
Silky Chotai, MD1; Ahilan Sigvanesan, MD2; Scott L. Parker, MD3; John A. Siatlycki, MD4; Kristin Archer, PhD, DPT1; Hui Nian5; Matthew J. McGirt, MD6; Clinton J. Devin, MD7

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

4:20–4:26 p.m.
Jeffrey L. Gum, MD1; Leah Y. Carreon, MD, MSc2; Richard A. Hostin Jr., MD2; Cheesie Robinson, MA3; Steven D. Glassman, MD1; Michael P. Kelly, MD4; Douglas C. Burton, MD4; David W. Polly Jr., MD4; Justin S. Smith, MD, PhD5; Christopher I. Shaffrey, MD6; Frank J. Schwab, MD7; Virginie Lafage, PhD8; Robert A. Hart, MD9; Han Jo Kim, MD9; Eric O. Klineberg, MD10; Alexandre Soroceau, MD, MPH11; Themistocles S. Protopsaltis, MD12; Munish C. Gupta, MD13; Christopher P. Ames, MD13; Shay Bess, MD13; International Spine Study Group14

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

4:26–4:32 p.m.
251. Effect of Employment Status on Length of Hospital Stay, 30-Day Readmission and Patient-Reported Outcomes after Spine Surgery
Owoicho Adogwa, MD, MPH1; Aladine A. Elsamadicy, BS2; Ankit Mehta, MD2; Raul A. Vasquez-Castellanos, MD3; Joseph S. Cheng, MD, MS4; Carlos A. Bagley, MD5; Isaac O. Karikari, MD7

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

3:50–3:56 p.m.
252. A Novel Score Predicting Spine Global Sagittal Alignment based on a Lateral Cervical Plain Radiograph
D. Kojo Hamilton, MD1; Ezequiel Goldschmidt, MD2; Federico Angirman, MD3; Bruno Ferreiro; Peter G. Passias, MD4; Justin K. Scheer, BS5; Themistocles S. Protopsaltis, MD6; Virginie Lafage, PhD7; Renaud Lafage, MSc8; Frank J. Schwab, MD9; Shay Bess, MD10; Christopher P. Ames, MD11; Zachary Tempel, MD12; Adam S. Kanter, MD13; David O. Okonkwo, MD14; International Spine Study Group15

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.
4:08–4:14 p.m.  
255. Utilization of Preoperative Magnetic Resonance Imaging for Determining the Flexibility of Sagittal Imbalances  
Akshay Sharma, BA1; Sina Pourtaheri, MD2; Jason W. Savage, MD3; Iain H. Kalfas, MD4; Thomas E. Mroz, MD5; Edward C. Benzel, MD6; Michael P. Steinmetz, MD7  
1Case Western Reserve University School of Medicine, Cleveland, OH, US; 2Saint Louis University, St. Louis, MO, US; 3Nanjing Drum Tower Hospital, Nanjing, China; 4Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 5Spine Research Institute, New York, NY, US; 6NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:14–4:20 p.m.  
256. The Use of the PALM Palpation Meter for Measuring Pelvic Tilt and its Correlation with Radiographic Measures  
Ann M. Hayes, DPT, MHS, OCS1; Howard M. Place, MD2; Andy Hayden; Jennifer L. Brechbuhler, BSN3  
1Saint Louis University, St. Louis, MO, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:20–4:26 p.m.  
257. Orientation of the Upper Instrumented Segment Influences Proximal Junctional Disease Following Adult Spinal Deformity (ASD) Surgery  
Renaud Lafage, MS6; Breton Line, BS7; Barthelemy Liabaud, MD8; Frank J. Schwab, MD9; Justin S. Smith, MD, PhD10; Jeffrey L. Gum, MD11; Christopher P. Ames, MD12; Richard A. Hostin Jr., MD13; Gregory M. Mundis Jr., MD14; Douglas C. Burton, MD15; Han Jo Kim, MD16; Shay Bess, MD17; Eric O. Klineberg, MD18; Virginie Lafage, PhD19; International Spine Study Group20  
1Hospital for Special Surgery, New York, NY, US; 2International Spine Study Group, Arvada, CO, US; 3UVA Health System, Charlottesville, VA, US; 4Norton Leatherman Spine Center, Louisville, KY, US; 5University of California, San Francisco, San Francisco, CA, US; 6Southwest Scoliosis Institute, Plano, TX, US; 7Sciences Clinic Medical Group, Department of Orthopedics, La Jolla, CA, US; 8University of Kansas Medical Center, Kansas City, KS, US; 9Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 10UC, Davis School of Medicine, Sacramento, CA, US; 11Brighton, CO, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:26–4:32 p.m.  
258. Does Pelvic Incidence Increase with Age? An Analysis of 1625 Adults  
Hongda Bao, MD1; Barthelemy Liabaud, MD2; Jeffrey Varghese, BS3; Renaud Lafage, MSc4; Basseil G. Diebo, MD5; Cyrus M. Jalali, BA6; Subaraman Ramchandran, MBBS7; Gregory W. Poorman, BA8; Dana Cruz, MD9; Thomas J. Errico, MD10; Themistocles S. Protopsaltis, MD11; Peter G. Pessias, MD12; Aaron J. Buckland, MBBS, FRACS13; Frank J. Schwab, MD14; Virginie Lafage, PhD15  
1Nanjing Drum Tower Hospital, Nanjing, China; 2NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 3Norton Leatherman Spine Center, Louisville, KY, US; 4Spine Research Institute, New York, NY, US; 5NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 6Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 7Orthopedic Biomechanics Lab, Hines, IL, US; 8EDward Hines Jr. VA Hospital, Hines, IL, US; 9University of Illinois Hospital, Hines, IL, US; 10UC, Davis School of Medicine, Sacramento, CA, US; 11Brighton, CO, US; 12Hospital for Special Surgery, New York, NY, US; 13Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 14Spine Research Institute, New York, NY, US; 15Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
Friday, October 28

4:08–4:14 p.m.

262. Direct Measure of Cervical Interbody Forces In Vivo: Load Reversal after Plating
Eric H. Ledet, PhD1; Josh Peterson1; Rebecca A. Wachs, MS1; Mary Beth M. Grabowsky, PhD2; Joseph Glennon3; Darryl J. DiRisio, MD4
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:14–4:20 p.m.

263. Biomechanical Stability of a Stand-Alone Interbody Spacer with Integrated Screws in Two-Level and Hybrid Cervical Fusion Constructs
Daniel G. Kang, MD1; Scott Wagner, MD2; Robert W. Tracey, MD2; Christopher Chen, MD3; Ronald A. Lehman Jr., MD4
1Madigan Army Medical Center, Tacoma, WA, US; 2Walter Reed National Military Medical Center, Bethesda, MD, US; 3Madigan Army Medical Center, Dupont, WA, United States Minor Outlying Islands; 4The Spine Hospital, Columbia University/New York Presbyterian, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:20–4:26 p.m.

264. Biomechanical and Histologic Comparison of a Novel 3-D Printed Porous Titanium Interbody Cage to PEEK
Kirk C. McGilvray, PhD1; Christian M. Puttlitz, PhD2; Sigurd H. Berven, MD3; Wellington K. Hsu, MD4; Thomas E. Mroz, MD4; Jeremiah T. Easley, DVM5; Howard B. Seim III, DVM6
1Colorado State University, Fort Collins, CO, US; 2UCSF, Department of Orthopaedic Surgery, San Francisco, CA, US; 3Northwestern University, Chicago, IL, US; 4Cleveland Clinic Foundation Departments of Orthopaedic and Neurological Surgery, Cleveland, OH, US; 5Preclinical Surgical Research Laboratory, Colorado State University, Fort Collins, CO, US; 6Emory University, Atlanta, GA, US
FDA Device/Drug Status: UniLIF PEEK Spacer System - Stryker Spine (Approved for this indication), Osteoconductive Porous Titanium Cage - Stryker Spine (Approved for this indication), FDA 510k approved plasma sprayed titanium coated PEEK cage (Approved for this indication)

4:26–4:32 p.m.

265. Lumbar Spine Kinematics and Spondylosis Vary by Motion Segment Level in Individuals with Low Back Pain
Bryce Basques, MD, MHS1; Grant Shifflett, MD2; Michael Fice; Alejandro Espinoza Orias, PhD3; Gunnar B. Andresson, MD, PhD4; Howard S. An, MD4; Nozomu Inoue, MD, PhD5
1Yale School of Medicine, New Haven, CT, US; 2Hospital for Special Surgery, New York, NY, US; 3Rush University Medical Center, Chicago, IL, US; 4Gunnar Andresson, Scottsdale, AZ, US; 5Rush University Medical Center, Department of Orthopedic Surgery, Chicago, IL, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:32–4:38 p.m.

266. Sacral Screw Strain in a Long Posterior Spinal Fusion Construct with Sacral Alar-Iliac (S2AI) versus Iliac Fixation
Daniel G. Kang, MD1; Scott Wagner, MD2; Robert W. Tracey, MD2; Christopher Chen, MD3; Khaled M. Kebaish, MD4; Lawrence G. Lenke, MD4; Ronald A. Lehman Jr., MD4
1Madigan Army Medical Center, Tacoma, WA, US; 2Walter Reed National Military Medical Center, Bethesda, MD, US; 3Madigan Army Medical Center, Dupont, WA, United States Minor Outlying Islands; 4Baltimore, MD, US; 5Washington University School of Medicine, Saint Louis, MO, US; 6The Spine Hospital, Columbia University/New York Presbyterian, New York, NY, US
FDA Device/Drug Status: Approved for this indication.

4:38–4:50 p.m.

Discussion

4:00–4:45 p.m.

Global Spine Forum:
Saudi Spine Society
Room 206A

Ibrahim Assiri, MD, MPA, FRCSC, FACS, King Fahad Medical City, Riyadh

Quality and Influence of Saudi Spine Surgery Publications: A Bibliometric Analysis
Prof. Saleh Baeesa, MD, FRCSC, King Abdul Aziz University, Jeddah

Challenges in Separating Pyopaugus Conjoined Twin: The Saudi Extensive Experience
Ahmed Al Ferayan, MD, King Abdul Aziz Medical City, Riyadh

Early Onset Scoliosis; Challenges in Choosing the Appropriate Treatment Modality
Abdulmonem Alsiddiky, MD, King Saud University, Riyadh

Pitfalls in Surgery for Spine Ependymoma
Ahmad AlKhani, MD, FRCSC, King Faisal Specialist Hospital and Research Center, Riyadh

Panel Discussion

Saudi Spine Society: Strategic Projects
Sami AlEissa, MD, King Abdul Aziz Medical City, Riyadh

4:45–5:45 p.m.

International Reception
Open to all attendees and exhibitors
Top of Escalators, Level 2 West
Spinal Cord Stimulation (SCS) is a viable tool for the RIGHT patient. Typically, technology is considered for those patients with mostly radicular pain who have “failed” surgery or for those with Complex Regional Pain Syndrome (CRPS.) Newer technology is evolving which allows spine care professionals to use this tool more effectively for even more patients. As always, it is important to properly screen and trial patients to understand the appropriate SCS indications. Spine care professionals need to understand when a percutaneous versus laminectomy implant is most appropriate.

**Upon completion of this session, participants should gain strategies to:**
- Determine indications and screening for SCS patients;
- Recognize the theory behind the use of SCS;
- Identify the evolving technology, associated updated indications, and potential costs;
- Determine temporary/trial and permanent percutaneous SCS placements;
- Determine advantages of permanent percutaneous versus laminotomy implants;
- Establish selection criteria for permanent percutaneous versus laminotomy implants;
- Identify the role of spinal cord stimulation in the surgeons’ armamentarium.

**Agenda**
- **Introduction, Case Presentations**
  Michael B Furman, MD, MS
- **SCS Principles—Overview**
  Michael B Furman, MD, MS
- **SCS: Integrating SCS into a Surgical Practice**
  F. Todd Wetzel, MD
- **Evolving SCS Technology**
  Steven M. Falowski, MD, FACS
- **Discussion—Case Review**
  Moderator: Michael B. Furman, MD, MS

**Optimizing Value and Outcomes in Spine Care: The Key Role of Psychologically-Informed Practice (Continued)**

For more than two decades, research has called into question a purely pathoanatomical basis for axial pain and its treatment. It also is well established that spine treatments are often of limited benefit. In an environment of spiraling disability, heavy investment in purely biomedical spine care has led to skyrocketing health costs, heightened stakeholder scrutiny and calls for improved cost-to-outcome value. Concurrently, extensive science has shown that psychosocial factors are probably more predictive of the transition from acute to chronic and disabling spine pain. Data supporting the importance of early return to normal activity and work have elevated the importance of effective screening and management of nonphysical barriers to recovery.

Thought and research leaders in spine care will address the latest science on the neurophysiology and neuropsychological aspects of pain, risk screening and modification, current and future provider training, developing psychologically-informed care teams, and identifying and overcoming barriers to the implementation of a biopsychosocial care model.
Upon completion of this session, participants should gain strategies to:

- Describe an overview of trends in spine-related disability;
- Recognize the best-available scientific evidence regarding psychosocial factors and axial pain and the biopsychosocial model of spine care;
- Evaluate screening tools for psychosocial factors and their relationship to spine disability and strategies for risk factor modification;
- Implement practical skills for psychologically-informed spine care;
- Identify options for the development of psychologically-informed clinical care teams in a biopsychosocial model for spine care.

The North American Spine Society designates this live activity for a maximum of 12.25 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

7:30 a.m.–2:00 p.m.

**Ticketed Hands-on Course:**

**Fundamentals of Spine Surgery and Interventional Pain Management Resident/Fellow Training Course (Continued)**

The Learning Place, Orange Theater
Technical Exhibition, Booth #1900
Co-chairs: Edward J. Dohring, MD; Donna M. Lahey, RNFA

This course will introduce anatomic approaches to the cervical, thoracic and lumbar spine as well as surgical and interventional injection indications, principles, techniques, and skills. Lectures will provide the background for hands-on cadaver sessions where participants will have the opportunity to practice these techniques with faculty who are considered experts in their fields.

Attendees will have the unique opportunity to learn about both nonoperative (interventional injections) and operative (surgical) approaches in the treatment of spinal disorders. The focus of this educational experience will be to provide the fundamental knowledge and skills necessary in order to benefit the most from spinal fellowship training.

Upon completion of this session, participants should gain strategies to:

- Demonstrate fundamental knowledge of spine anatomical structures and their relationship to each another;
- Describe the key anatomic landmarks in the spine necessary to perform safe interventional and surgical procedures;
- Incorporate the knowledge learned and skills acquired during fellowship training and future practice.

The North American Spine Society designates this live activity for a maximum of 13.5 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

9:00–10:00 a.m.

**Abstract Presentations:**

**Lumbar Stenosis**

Room 205A
Moderator: W. Ryan Spiker, MD

9:06–9:12 a.m.

**267. The Clinical Spectrum of PROMIS Physical Function Scores Over Time in Patients with Operative Lumbar Pathology**

Stephen Pehler, MD; Sukanta Maitra, MD; W. Ryan Spiker, MD; Brandon D. Lawrence, MD; Darrel S. Brodke, MD

1University of Utah Orthopedic Center, Salt Lake City, UT, US; 2Salt Lake City, UT, US; 3University of Utah Orthopaedics, Salt Lake City, UT, US; 4University Orthopaedic Center, Salt Lake City, UT, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

9:12–9:18 a.m.

**269. Lumbar Stenosis Outcome Study (LSOS): Two Years Follow-Up Results of a Multicenter Cohort Study in Patients with Symptomatic Degenerative Lumbar Spinal Stenosis**

Maria Wertli, MD, PhD; Jakob M. Burgstaller, MD, DDS; Michael Meyer, MD; Francois Porchet, MD, PhD; Johann Steurer, MD; Giuseppe Pichierri, PhD; Ulrike Held, PhD, MSc

1Horten Centre for Patient Oriented Research and Knowledge Transfer, Zurich University, Zurich, Switzerland; 2Division of General Internal Medicine, Bern University Hospital, Bern University, Bern, Switzerland; 3Spine Center, Zurich, Switzerland; 4Spital Oberengadin Samedan, Graubuenden, Switzerland

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

9:06–9:12 a.m.

**268. Using PROMIS Health Domains to Identify Clinically Meaningful Change in Lumbar Degenerative Spine Disease: Concurrent Validity and Responsiveness**

Shalini Selvarajah, MD; Brian J. Neuman, MD; Richard L. Skolasky, ScD

1Johns Hopkins University, Baltimore, MD, US; 2Baltimore, MD, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

270. Moved to Resident and Fellow Research Awards Presentations

Friday, October 28, 3:20–3:50 p.m.
9:18–9:24 a.m.

271. Interspinous Process Fixation versus Pedicle Screw Fixation in Circumferential Arthrodesis: Outcomes from a Prospective Randomized Multicenter Trial

Kee D. Kim, MD1; Ryan P. DenHaese, MD2; K. Brandon Strenge, MD2; Clint P. Hill, MD3; Peter G. Passias, MD2; Paul M. Arnold, MD4; Ripul R. Panchal, DO5; Chris Ferry, MS6; Brieta Bejin, MS7; Sarah B. Martineck, PA-C8; Camille Moore, MS9


FDA Device/Drug Status: Aspen MIS Fusion System (Zimmer Biomet Spine) (Approved for this indication)

9:24–9:30 a.m.

272. Surgery for Degenerative Conditions of the Lumbar Spine in Parkinson’s Disease: Comparative Analysis from the Nationwide Inpatient Sample Database

Joseph F. Baker, MbChB, FRCS (Tr & Orth)1; Shearwood McClelland III, MD2; Breton Line, BS3; Justin S. Smith, MD, PhD4; Heather Gold, PhD5; Robert A. Hart, MD6; Christopher P. Ames, MD7; Shay Bess, MD8


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

9:30–9:36 a.m.

273. Effects of Liposomal Bupivacaine on Patient Recovery after Long Spinal Fusions: A Prospective, Randomized Study

Michael S. Chang, MD1; Jan Revelle, RN2; Dennis G. Crandall, MD3; Yu-Hui Chang, PhD4

1Sonoran Spine Center, Tempe, AZ, US; 2Sonoran Spine, Tempe, AZ, US; 3Mayo Clinic, Scottsdale, AZ, US

FDA Device/Drug Status: Liposomal bupivacaine (Exparel) (Approved for this indication)

9:36–10:00 a.m.

Discussion

9:00–10:00 a.m.

Abstract Presentations:

Deformity Outcomes

Room 205B

Moderator: Michael D. Daubs, MD

9:00–9:06 a.m.

274. Outcomes of Open Staged Corrective Surgery in the Setting of Adult Spinal Deformity

Peter G. Passias, MD1; Gregory W. Poorman, BA2; Cyrus M. Jalai, BA2; Breton Line, BS3; Bassel G. Diebo, MD4; Paul Park, MD5; Robert A. Hart, MD6; Douglas C. Burton, MD7; Frank J. Schwab, MD8; Virginie Lafage, PhD9; Shay Bess, MD10; Thomas J. Errico, MD11; International Spine Study Group12

1NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 2Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 3International Spine Study Group, Arvada, CO, US; 4Hospital for Special Surgery, New York, NY, US; 5University of Michigan Department of Neurosurgery, Ann Arbor, MI, US; 6Oregon Health & Science University, Portland, OR, US; 7University of Kansas Medical Center, Kansas City, KS, US; 8Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

9:06–9:12 a.m.

275. Long-Term Surgical Outcomes of Degenerative Lumbar Scoliosis: A Comparison of Long versus Short Fusion

Michael S. Chang, MD1; Mara D. Immediato, PA-C2; Christopher Wilp; Jan Revelle, RN3; Dennis G. Crandall, MD4; Yu-Hui Chang, PhD5

1Sonoran Spine Center, Tempe, AZ, US; 2Sonoran Spine Center, Mesa, AZ, US; 3Sonoran Spine, Tempe, AZ, US; 4Mayo Clinic, Scottsdale, AZ, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

9:12–9:18 a.m.

276. Complication Rates Associated with 3-Column Osteotomy in 82 Adult Spinal Deformity Patients: Retrospective Review of a Prospectively Collected Multicenter Consecutive Series with Minimum Two-Year Follow-Up

Justin S. Smith, MD, PhD1; Munish C. Gupta, MD2; Eric O. Klineberg, MD2; Christopher I. Shaffrey, MD3; Frank J. Schwab, MD4; Virginie Lafage, PhD5; Barthelemy Liabaud, MD6; Han Jo Kim, MD7; Robert A. Hart, MD8; Richard A. Hostin Jr., MD9; Douglas C. Burton, MD10; Vedat Deviren, MD11; Shay Bess, MD12; Christopher P. Ames, MD13; International Spine Study Group14

1UVA Health System, Charlottesville, VA, US; 2Washington University School of Medicine, St. Louis, MO, US; 3UC Davis School of Medicine, Sacramento, CA, US; 4University of Virginia, Charlottesville, VA, US; 5Hospital for Special Surgery, New York, NY, US; 6Oregon Health & Science University, Portland, OR, US; 7Southwest Scoliosis Institute, Plano, TX, US; 8University of Kansas Medical Center, Kansas City, KS, US; 9University of California, San Francisco, San Francisco, CA, US; 10Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 11Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
9:24–9:30 a.m.
278. Consistency of Direct Cost Reporting across Regional Deformity Centers in the U.S.
Ioannis A. Avramis, MA, MD; Sigurd H. Berven, MD; Douglas C. Burton, MD; Chessie Robinson, MA; Jeffrey L. Gurn, MD; Leah Y. Carreon, MD, MSc; Christopher P. Ames, MD; Shay Bess, MD; Steven D. Glassman, MD; Michael P. Kelly, MD; Vedat Deviren, MD; Michael O’Brien; Richard A. Hostin Jr.; International Spine Study Group

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

9:30–9:36 a.m.
279. Preoperative Fibrinogen Testing is Associated with Total Blood Loss in Adult Spinal Deformity Correction
Matthew J. Geck, MD; Devender Singh, PhD; Eric Truumees, MD; Dana L. Hawthorne, PA-C
Seton Spine and Scoliosis Center, Austin, TX, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

9:36–9:42 a.m.
280. The Impact of Obesity on Compensatory Mechanisms in Response to Progressive Sagittal Malalignment
Cyrus M. Jalai, BA; Bassel G. Diebo, MD; Dana Cruz, MD; Gregory W. Poorman, BA; Shaleen Vira, MD; Aaron J. Buckland, MBBS, FRACS; Renaud Lafage, MSc; Shay Bess, MD; Frank J. Schwab, MD; Thomas J. Errico, MD; Virginie Lafage, PhD; Peter G. Passias, MD

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

9:42–10:00 a.m.
Discussion
9:24–9:30 a.m.
285. Stability with Cortical Screw-Rod versus Pedicle Screw-Rod Fixation in the Lumbar Spine: Effects of Screw Size
Anna G. Newcomb, MS1; Jennifer Lehrman, MS2; Phillip Reyes2; Steven Chang, MD3; Kingsley R. Chin, MD4; Neil Crawford, PhD5; Brian Kelly, PhD2
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

9:30–9:36 a.m.
286. A Biomechanical Evaluation of a Potential PJK Treatment Option Utilizing a Reduction Band Tether of the Spinous Process at the Proximal Adjacent Level
Vikas V. Patel, MD1; David Ou-Yang, MD2; Mark Moldavsky, MS3; Brandon Bucklen, PhD4; Erika Matheis, MS4
1University of Colorado School of Medicine, Aurora, CO, US; 2University of Colorado, Aurora, CO, US; 3Audubon, PA, US; 4Globus Medical Inc., Audubon, PA, US
FDA Device/Drug Status: SILC Fixation System (Globus Medical Inc) (Approved for this indication), Revere Stabilization System (Globus Medical Inc) (Approved for this indication)

9:36–9:42 a.m.
287. Comparison of Neck Position Sense and Balance Control Between Neck Pain Patients and Pain-Free Controls
Cheng-Li Lin, MD1; Cheng-Feng Lin, PhD2
1National Cheng Kung University, Tainan, Taiwan, Republic of China; 2Tainan, Taiwan, Republic of China
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

9:42–10:00 a.m.
Discussion

10:00–10:30 a.m.
Networking Break–Beverage Service
Top of Escalators, Level 2 West

10:30 a.m.–12:00 p.m.
Symposium:
Improving Outcomes and Reducing Complications for the Surgical Treatment of Degenerative Lumbar Scoliosis
Room 205A
Moderator: Michael D. Daubs, MD

This session will focus on strategies to reduce complications when treating degenerative lumbar scoliosis including appropriate nonoperative treatment. The session will consist of short didactics and case discussion with an expert panel and audience participation.

Upon completion of this session, participants should gain strategies to:

- Improve treatment outcomes and reduce complications through better patient selection, appropriate recommendations for nonoperative and operative treatment techniques and procedures;
- Determine best practices preoperative work-up for degenerative lumbar scoliosis;
- Understand the ideal patient profile for the best treatment outcomes in DLS;
- Understand the role of non-operative treatment in DLS;
- Determine appropriate indications for limited decompressive surgery;
- Recognize appropriate indications for limited decompression and fusion;
- Identify appropriate indications for complex surgery including osteotomies.

Agenda

- Introduction
  Michael D. Daubs, MD
- Best Practices: Preoperative Work up and Screening for DLS
- The Appropriate Indications for Limited Decompression, Decompression and Fusion, and Complex Reconstruction Including Osteotomies
  Sigurd H. Berven, MD
- Best Strategies to Avoid Common Complications
  David W. Polly, MD
- Illustrative Case Discussions with Faculty and Participants
  Panel: Michael D. Daubs, MD; Sigurd H. Berven, MD; David W. Polly, MD
It is a challenge for spine surgeons to operate on high risk patients and cancer as the rate of complications are quite high, although they benefit from spine surgery. Cardio-pulmonary dysfunction, morbid obesity, cancer patients, elderly population and immunocompromised patients or a combination of these are considered high risk. Life expectancy in United States has been increasing, with the elderly population (>75 years) expected to reach nearly 45 million by 2050. With increased life expectancy, there are several co-existing medical conditions which influence the recovery during the perioperative period.

The perioperative period is the most critical time where the body mobilizes several resources to start the process of healing. One of the keys to manage this is through perioperative fluid management and control of pain, though only one aspect of recovery. Delayed surgical site healing can be low grade infection, high BMI with several skin folds, insufficient mobilization, smoking, poor nutrition, diabetes, immune compromise, use of non-steroidal anti-inflammatory drugs, corticosteroids, and chemotherapy. The body is unable to repair this after the initial inflammatory healing response subsides noted by normalizing CRP levels in second week of surgery.

The wound closures need to be very meticulous, especially in cancer patients due to poor condition of the tissue from the disease itself in addition to chemo radiation. There are several options to treat the metastatic diseases in spine using minimally invasive stabilization, to radiofrequency ablation and laser ablation.

In this session, faculty will discuss the strategies to stabilize and manage the high risk cardiopulmonary patients especially in the perioperative period, management of patients with delayed healing of surgical site and spinal fluid leak and different methods of wound closures in infection and cancer patients including skin flaps. Decision making in approach to patients with cancer and different options of surgery and outcome, dermal matrix, allograrte, use of collagenase and wound vacuum placement also will be discussed. Faculty will review the recent updates, optimum timing for each intervention and evidence supporting each of these approaches to provide an overview of their efficacy, effectiveness, safety and costs.

Upon completion of this session, participants should gain strategies to:
- Identify high risk patients and multimodal approaches to prevent perioperative complications;
- Recognize mechanisms of normal healing process;
- Compare different options for wound closure in cancer and infection including use of skin/muscle flaps and wound closures in morbidly obese patients;
- Cite evidence supporting various forms of healing promoters and the appropriate time to use them;
- Use minimally invasive procedures and radio frequency ablation in cancer patients to minimize exposure and dissection;
- Make decisions in delayed surgical site healing.

**Agenda**
- **Introduction to Management of High Risk Individuals**
  Michael Y. Wang, MD
- **Pathophysiology of Postoperative Healing**
  Yi Lu, MD
- **Morbid Obesity, Diabetes and Infection Wound Closure Options**
  Joseph S. Cheng, MD, MS
- **Spinal Fluid Leak Management at Various Levels of Spine Surgery**
  Zoher Ghogawala, MD, FACS
- **Recent Updates in Healing Promoters and When to Use Them: Wound Vac, Primary Closure**
  Faculty
- **Minimally Invasive Procedure and Radio Frequency Ablation in Cancer Patients to Minimize Exposure and Dissection**
  Christoph Hofstetter MD, PhD
- **Radio Frequency Ablation and MIS in Cancer Patients**
  Daniel M. Sciubba, MD
- **Perioperative Management of Cardiopulmonary/Cancer Patients**
  Karthik Madhavan, MD
- **Data Management in Spine Surgery and Complication Identification**
  Anand Veeravagu, MD
- **Discussion, Questions and Answers**
  Michael Y. Wang, MD and Daniel K. Resnick, MD, MS
10:30 a.m.–12:00 p.m.
Symposium:
Changing Behavior through Physical Therapy: Improving Patient Outcomes
Room 205C
Moderator: Kristin Archer, PhD, DPT

Psychosocial risk factors, such as fear of movement and pain catastrophizing, have a negative influence on rehabilitation outcomes and often result in higher levels of pain and disability. Evidence-based cognitive-behavioral strategies have been well established to address these risk factors. Changing Behavior through Physical Therapy (CBPT) is a program designed to integrate these strategies into rehabilitation practice. CBPT includes graded activity, goal setting, problem solving, cognitive restructuring, and relaxation training and is delivered using a motivational interviewing approach. This interactive session will introduce the CBPT program through presentations, group discussion, demonstration, and short videos. Clinicians and researchers will learn practical strategies to help patients manage their pain and stress and increase their activity level. This session will provide a program for addressing psychosocial risk factors and improving outcomes in patients with acute, sub-acute, and chronic musculoskeletal pain, including those recovering from spine surgery.

Upon completion of this session, participants should gain strategies to:

- Describe a targeted approach to rehabilitation for patients at-risk for poor rehabilitation outcomes;
- Explain how evidence-based cognitive and behavioral strategies can be integrated into clinical care;
- Identify strategies for addressing psychosocial risk factors to improve pain, disability, and physical activity;
- Describe how the principles of motivational interviewing skills can be used to facilitate behavior change within a rehabilitation framework.

Agenda

- Introduction to Changing Behavior through Physical Therapy (CBPT) Program
  Kristin R. Archer, PhD, DPT
- Cognitive-Behavioral Based Strategies for Addressing Psychosocial Risk Factors
  Kristin R. Archer, PhD, DPT
- Principles of Motivational Interviewing to Change Behavior
  Susan W. Vanston, MS, PT
- Practical Application of CBPT Strategies
  Susan W. Vanston, MS, PT
- Discussion

12:00 p.m.
Meeting Adjourns

POST TO YOUR CALENDAR

13th Annual Evidence & Technology Spine Summit
February 22-25, 2017
The Canyons Village, Park City, UT
www.spine.org/ETSS

Education and Collaboration: The Spine Summit will host spine care providers from multiple disciplines to discuss topics that impact all providers. In the relaxed setting of The Canyons Village, participation is not only encouraged but part of the curriculum through case-based discussions and debates.
**P1. Bone Morphogenetic Proteins in Spinal Surgery: What is the Fusion Rate and Do They Cause Cancer?**

Gregory M. Malham, MBChB, MD, FRACS
Melbourne, Victoria, Australia

**FDA Device/Drug Status:** rhBMP-2 (Approved for this indication), rhBMP-7 (Approved for this indication)

**P2. BMP Use and the Risk of Revision Surgery Following Long Posterolateral Fusions in the Elderly**

Varun Puvanesarajah, BS1; Amit Jain2; Jourdan M. Cancienne, MD3; Adam L. Shimer, MD4; Francis H. Shen, MD5; Hamid Hassanzadeh, MD4
1Johns Hopkins Medicine, Baltimore, MD, US; 2Portland, OR, US; 3University of Virginia, Charlottesville, VA, US; 4University of Virginia Department of Orthopaedic Surgery, Charlottesville, VA, US; 5Charlottesville, VA, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

**P3. The Effect of P Acnes Co-Injection on Intervertebral Disc Degeneration in a Rat Model: Does It Mimic Modic Changes?**

Tomas Zamora, MD1; Marcelo Andia, MD, PhD2; Joaquin Palma; Antonieta Solar; Patricia Garcia, MD1
1Santiago, Chile; 2Pontificia Universidad Católica de Chile, Santiago, Chile

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.


Ashley A. Murgatroyd, BS; Wenhai Wang, PhD; Noelle Klocke, MS; Bryan W. Cunningham, PhD
Globus Medical Inc., Audubon, PA, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

**P5. An Investigational Study of Titanium Plasma Spray on Osseointegration of PEEK and Titanium Implants: An In Vivo Ovine Model**

Bryan W. Cunningham, PhD1; Ashley A. Murgatroyd, BS1; Mark Moldavsky, MS2; Mir Hussain1; Wenhai Wang, PhD1
1Globus Medical Inc., Audubon, PA, US; 2Audubon, PA, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

**P6. Location of Prophylactic Vertebral Cement above Long- Instrumented Constructs Affects Junctional Endplate Stress: A Finite Element Model**

David C. Briski, MD1; Joseph M. Zavatsky, MD2
1Ochsner Medical Center, Jefferson, LA, US; 2Spine & Scoliosis Specialists, Tampa, FL, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

**P7. In-Vitro Analysis of Hyperlordotic Lateral Interbody Spacers and Their Potential for Lordosis Change: A Correlation Between Interbody Height and Angle**

Heidi M. Hullinger, MD1; Mir Hussain2; Noelle Klocke, MS3; Rex A. Marco, MD4; Sean Jenkins, BS5; John Hao, BS3; Brandon Bucklen, PhD3

**FDA Device/Drug Status:** Lateral Spacers (Approved for this indication), Lumbar Pedicle Screws (Approved for this indication)

**P8. Multi-Level Histopathological Analysis of an Ovine Cervical Spine Intervertebral Disc Degeneration Model**

Christopher J. Colloca, DC, PhD
International Spine Research Foundation, Chandler, AZ, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

**P9. Combined High-Dose Parathyroid Hormone (1–34) and Low-Dose rhBMP-2 Therapy in the Rabbit Model of Posterolateral Lumbar Spinal Fusion**

Christina Holmes, PhD1; Benjamin D. Elder, MD, PhD2; Sheng-fu L. Lo, MD, MHS4; Wataru Ishida, MD2; Timothy F. Witham, MD, FACS3
1Baltimore, MA, US; 2Johns Hopkins Hospital, Baltimore, MD, US; 3Johns Hopkins University School of Medicine, Baltimore, MD, US

**FDA Device/Drug Status:** Forteo (Investigational/Not approved), BMP-2 (Investigational/Not approved)
P10. Annulus Fibrosus Cells Express and Utilize Chemokine (C-C motif) Receptor 5 for Migration
Weijun Liu, MD1; David Liu, MS, MS, BS2; Justin Zheng, BS3; Peng Shi, PhD4; Po-Hsin Chou, MD5; Chundo Oh, PhD4; Di Chen, MD, PhD4; Howard S. An, MD6; Ana Chee, PhD4
1Pu Ai Hospital, Wuhan, China; 2Rosalind Franklin University of Medicine and Science College of Pharmacy, North Chicago, IL, US; 3University of Illinois College of Medicine, Peoria, IL, US; 4Rush University Medical Center, Chicago, IL, US; 5Taipei Veterans General Hospital, Taipei, Taiwan, Republic of China; 6Rush University Medical Center, Department of Orthopedic Surgery, Chicago, IL, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P11. Biomechanics of Transforaminally Deployed Expandable Lumbar Interbody Fusion Cage
Leonard I. Voronev, MD, PhD1; Michael R. Conti Mica, MD2; Gerard Carandang, MS3; Robert M. Havey, MS4; Bartosz Wojewnik, MD5; Avinash G. Patwardhan, PhD6
1Loyola University Chicago/Edward Hines Jr. VA Hospital, Hines, IL, US; 2Loyola University Medical Center, Maywood, IL, US; 3Edward Hines Jr. VA Hospital, Hines, IL, US; 4Loyola University Medical Center Department of Orthopaedic Surgery, Maywood, IL, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P12. Biomechanical Analysis of Anterior Cervical Discectomy and Fusion Supplemented with Machined Intrafacet Allograft Spacers
Raymond J. Hah, MD1; Paul A. Anderson, MD2
1Keck School of Medicine of USC, Los Angeles, CA, US; 2University of Wisconsin Orthopedics & Rehabilitation, Madison, WI, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

Joseph P. Gjolaj, MD1; Brandon P. Hirsch, MD2; Loren Latta, PhD3; Frank J. Eismont, MD4
1Jackson Memorial Hospital Department of Orthopaedic Surgery, Miami, FL, US; 2Miami Beach, FL, US; 3University of Miami School of Medicine Department of Ortho Rehab, Miami, FL, US
FDA Device/Drug Status: Expandable Cage, Lateral Plate and Pedicle Screws/Rods NuVasive (Approved for this indication)

P14. Human Cadaveric Thoracic Spine Range-of-Motion with a Compressive Follower Load Increases with Rib Cage Removal
Erin Mannen, PhD1; Elizabeth A. Friis, PhD1; Hadley L. Sis, BS2; Benjamin M. Wong, BS2; Eileen Cadel, MS3; Dennis Anderson, PhD4
1The University of Kansas, Mechanical Engineering, Lawrence, KS, US; 2University of Kansas, Lawrence, KS, US; 3Beth Israel Deaconess Medical Center, Boston, MA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P15. Biomechanical Comparison of Low versus High Density Constructs Using Three Different Types of Screws
Julien Cln, PhD1; Mark Driscoll, PhD2; Hubert Labelle, MD3; Stefan Parent, MD; Jean-Marc Mac-Thiong, MD, PhD4; Hassan A. Serhan, PhD5; Suken A. Shah, MD6; Baron S. Lonner, MD6
1Spinolitics, Montreal, QC, Canada; 2Département d’orthopédie, Montreal, QC, Canada; 3Hôpital du Sacre-Coeur de Montreal, Montreal, QC, Canada; 4DePuy Synthes, Raynham, MA, US; 5DuPont Hospital for Children, Wilmington, DE, US; 6Mount Sinai Beth Israel Medical Center, New York, NY, US
FDA Device/Drug Status: Expedium Verse spinal implant system (Approved for this indication)

Jacob M. Buchowski, MD, MS1; Gregory M. Mundis Jr., MD2; John A. Ferguson, FRACS3; Han-Jo Kim, MD4; John P. Kostuik, MD5; Michael Barrus, BS6; John A. Schmidt, PhD7
1Washington University School of Medicine, Saint Louis, MO, US; 2Scripps Clinic Medical Group, Department of Orthopedics, La Jolla, CA, US; 3New York, NY, US; 4Hospital for Special Surgery, New York, NY, US; 5Phoenix, AZ, US; 6K2M, Inc., Leesburg, VA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P17. Biomechanical Evaluation of Less Invasive Midline Lumbar Fixation
Christopher D. Chaput, MD1; John (Sean) P. Malloy IV, DO, PT, ATC2; Nestor Rodriguez-Martinez, MD3; Anna G. Newcomb, MS4; Lisa A. Ferrara, PhD5
1Scott & White Hospital Department of Orthopaedic Surgery, Dallas, TX, US; 2East Coast Orthopaedics, PA, Pompano Beach, FL, US; 3Phoenix, AZ, US; 4BNI Spinal Biomechanics Lab, Phoenix, AZ, US; 5Orthokinetic Technologies, LLC, Southport, NC, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P18. Comprehensive Experimental Analysis of Lumbar Sacral Rod Strain Following Unilateral Iliac Screw Instrumentation for Deformity Correction
Bryan W. Cunningham, PhD1; Mark Moldavsky, MS2; Jonathan Harris3; Sigurd H. Berven, MD4
FDA Device/Drug Status: REVERE (Approved for this indication)

Wenhai Wang, PhD1; Jonathan Harris; Mir Hussain; Brandon Bucklen, PhD
Globus Medical Inc., Audubon, PA, US
FDA Device/Drug Status: Coalition MIS (Not approved for this indication)
**P20. Ranges of Cervical Intervertebral Disc Deformation During an In-Vivo Dynamic Flexion-Extension of the Neck**
Yan Yu, MD, PhD1; Thomas D. Cha, MD, MBA1; Gregory Moore IV, BS1; Haiqing Mao, MD1; Tsung-Yuan Tsai, PhD1; Jing-Sheng Li, PT1; Kirkham B. Wood, MD2; Guoan Li, PhD2
1Massachusetts General Hospital, Boston, MA, US; 2Stanford University School of Medicine, Redwood City, CA, US; 3Harvard Medical School, Boston, MA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P21. Growing Rod Treatment for Early Onset Scoliosis Increases Thoracic Volume**
Po-Chih Lee, MS1; Charles Gerald T. Ledonio, MD1; Arthur Erdman, PhD2; David W. Polly Jr., MD1
1University of Minnesota, Minneapolis, MN, US; 2Minneapolis, MN, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P22. Divergent Configuration Improves Insertion Torque and Pullout Strength of Anterior Cervical Screws**
Fred Xavier, MD, PhD
Hospital for Special Surgery, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P23. Spinal Fusion Implant Stiffness Affects Load Sharing**
Josh Peterson; Carolyn Chlebek; Eric H. Ledet, PhD
Rensselaer Polytechnic Institute, Troy, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P24. Cervical Plate Stiffness Affects the Distribution of Loads and the Location of the Instantaneous Axis of Rotation of the Spine In Vitro**
Josh Peterson1; Carolyn Chlebek2; Ashley Clough; Alexandra Wells; Eric H. Ledet, PhD2
1Rensselaer Polytechnic Institute, Troy, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P25. Impact of Irrigation and Debridement on Interbody Fusion Rate Following Index Lumbar Spine Surgery**
Timothy Y. Wang1; Oren N. Gottfried, MD2
1Duke University Medical Center, Durham, NC, US; 2Duke University, Durham, NC, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P26. Reduction in Wound Complications and Revision Surgery with Plastic Surgery Closure in the Treatment of Neuromuscular Scoliosis**
Brandon W. Cook, MD1; David C. Briski, MD2; Joseph M. Zavatsky, MD3
1Ochsner Foundation Clinic, Jefferson, LA, US; 2Ochsner Medical Center, Jefferson, LA, US; 3Spine & Scoliosis Specialists, Tampa, FL, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P27. Vertebroplasty Associated with a Lower Risk of Mortality and Morbidity of Aged Patients with Painful Vertebral Compression Fractures: A Population-Based Propensity Score Matching Cohort Study in Taiwan**
JiannHer Lin, MD1; Yi-Chen Hsieh, PhD2; Li-Nien Chien, PhD, MPH2; Wan-Ling Tsai, MSc, NP2; Yung Hsiao Chang, MD, PhD4
1Taipei Medical University Hospital, Department of Neurosurgery, Taipei, Taiwan, Republic of China; 2Taipei Medical University, Taipei, Taiwan, Republic of China; 3Taipei, Taiwan, Republic of China; 4Taipei Medical University Hospital, Taipei, Taiwan, Republic of China
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P28. Incisional Morbidity Associated with Anterior Surgical Approaches to the Lumbar Spine is Minimal**
John R. Dimar II, MD1; Thomas Bergamini; Richard Head2; Mladen Djurasovic, MD1; Steven D. Glassman, MD1; Leah Y. Carreon, MD, MSc1
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P29. What is the Effect of Open versus Percutaneous Screws on Complications Among Patients Undergoing Lateral Interbody Fusion for Adult Spinal Deformity?**
Khoi D. Than, MD1; Stacie Nguyen, MPH2; Paul Park, MD3; Dean Chou, MD1; Frank LaMarca, MD2; Juan S. Uribe, MD2; Todd Vogel, MD2; Pierce D. Nunley, MD2; Robert K. Eastlack, MD2; Neel Anand, MD2; Adam S. Kanter, MD2; Vedat Deviren, MD2; Gregory M. Mundis Jr., MD2; International Spine Study Group12
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
**P30. Failure Patterns of Prophylactic Techniques Utilized to Prevent Proximal Junctional Failure (PJF) Following Adult Spinal Deformity (ASD) Surgery Are Predictable: A Guideline for Surgeons**

Breton Line, BS1; Shay Bess, MD2; Justin S. Smith, MD, PhD3; Christopher I. Shaffrey, MD4; Eric O. Klineberg, MD5; Han Jo Kim, MD6; Virginie Lafage, PhD7; Frank J. Schwab, MD7; Alexandre Soroceanu, MD, MPH8; Douglas C. Burton, MD9; Munish C. Gupta, MD10; Vedat Deviren, MD11; Christopher P. Ames, MD12; Robert A. Hart, MD13; International Spine Study Group14

1International Spine Study Group, Arvada, CO, US; 2Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 3UVA Health System, Charlottesville, VA, US; 4University of Virginia, Charlottesville, VA, US; 5UC Davis School of Medicine, Sacramento, CA, US; 6Hospital for Special Surgery, New York, NY, US; 7University of Calgary, Calgary, Canada; 8University of Kansas Medical Center, Kansas City, KS, US; 9Washington University School of Medicine, St. Louis, MO, US; 10University of California, San Francisco, San Francisco, CA, US; 11Oregon Health & Science University, Portland, OR, US; 12Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P31. Dislocation of Primary Total Hip Arthroplasty is More Common in Patients with Lumbar Spinal Fusion**

Aaron J. Buckland, MBBS, FRACS1; Varun Puvanesarajah, BS2; Amit Jain3; Eric O. Klineberg, MD4; Jonathan Vigidorchik, MD5; Ran Schwarzkoepf, MD6; Christopher I. Shaffrey, MD7; Justin S. Smith, MD, PhD7; Robert A. Hart, MD8; Christopher P. Ames, MD9; Hamid Hassanzadeh, MD10; International Spine Study Group11


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P32. Estimated Blood Loss is a Weak Predictor of Major Complications in Adult Spine Deformity Surgery**

Eric O. Klineberg, MD1; Stacie Nguyen, MPH2; Michael P. Kelly, MD3; Shay Bess, MD4; Christopher I. Shaffrey, MD5; Justin S. Smith, MD, PhD6; Virginie Lafage, PhD7; Frank J. Schwab, MD7; Thomas J. Enrico, MD8; Douglas C. Burton, MD9; Han Jo Kim, MD10; Christopher P. Ames, MD11; Munish C. Gupta, MD12; Robert A. Hart, MD13; Themistocles S. Protopsaltis, MD14; Renaud Lafage, MSc15; Justin K. Scheer, BS16; Gregory M. Mundis Jr., MD17; International Spine Study Group18


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P33. The Fate of Adult Spinal Deformity (ASD) Patients Incurring Rod Fracture after Thoracolumbar Fusion without Prior Three-Column Osteotomy**

D. Kojo Hamilton, MD1; John Buza, MD2; Peter G. Passias, MD3; Cyrus M. Jalai, BA4; Han Jo Kim, MD5; Robert A. Hart, MD6; Tamir Ailon, MD, MPH7; Munish C. Gupta, MD8; Christopher P. Ames, MD9; Vedat Deviren, MD5; Alan H. Daniels, MD10; Virginie Lafage, PhD7; Shay Bess, MD4; Eric O. Klineberg, MD11; Christopher I. Shaffrey, MD12; Amit Jain13; Justin S. Smith, MD, PhD13; International Spine Study Group14

1University of Pittsburgh School of Medicine, Pittsburgh, PA, US; 2NYU Langone Orthopedics, New York, NY, US; 3NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 4Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 5Hospital for Special Surgery, New York, NY, US; 6Oregon Health & Science University, Portland, OR, US; 7Vancouver Spine Surgery Institute, Vancouver, BC, Canada; 8Washington University School of Medicine, St. Louis, MO, US; 9University of California, San Francisco, San Francisco, CA, US; 10Warren Alpert Med School of BU/RI Hospital, Providence, RI, US; 11UC Davis School of Medicine, Sacramento, CA, US; 12University of Virginia, Charlottesville, VA, US; 13Portland, OR, US; 14UVA Health System, Charlottesville, VA, US; 15Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P34. Postoperative Surgical Site Infection Increases Mortality Following Elective Spine Surgery**

David Casper, MD1; Douglas Hollern, MD2; Benjamin Zmistowski, MD3; Gregory D. Schroeder, MD4; Susan Lammers, BS5; Alan S. Hlibrand, MD5; Mark F. Kurd, MD6; Jason W. Savage, MD7; Kris E. Radcliff, MD8; Jeffrey A. Rihn, MD9; Barrett Woods, MD10; D. Greg Anderson, MD11; Alexander R. Vaccaro, MD, PhD12; Christopher K. Kepler, MD, MBA13


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P35. Does Concave Versus Convex Approach Matter when Using Lateral Lumbar Interbody Fusion for Adult Degenerative Scoliosis?
Adam S. Kanter, MD1; Joseph M. Zavatsky, MD2; Gregory M. Mundis Jr., MD3; Zachary Tempel, MD4; Stacie Nguyen, MPH5; Dean Chou, MD6; Paul Park, MD7; Juan S. Uribe, MD8; Michael Y. Wang, MD9; Neel Anand, MD10; Robert K. Eastlack, MD11; Khoi D. Than, MD12; David O. Okonkwo, MD13; International Spine Study Group14


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P36. Lumbar Discography and Failed Back Syndrome in Patients Receiving Workers’ Compensation
Joshua T. Anderson1; Jeffrey A. O’Donnell, BS2; Arnold Haas, BS3; Nicholas U. Ahn, MD4

1Cleveland Heights, OH, US; 2University Hospitals Case Medical Center, Department of Orthopaedic Surgery, Cleveland, OH, US; 3Ohio Bureau of Worker’s Compensation, Columbus, OH, US; 4University Hospital of Cleveland, Department of Orthopedic Surgery, Cleveland, OH, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P37. Perioperative Complications Associated with Posterolateral Spine Fusions: A Study of Elderly Medicare Beneficiaries
Varun Puvanesarajah, BS1; Jourdan M. Cancienne, MD2; Brian C. Werner, MD3; Amit Jain4; Anuj Singla, MD5; Adam L. Shimer, MD6; Francis H. Shen, MD7; Hamid Hassanzadeh, MD8

1Johns Hopkins Medicine, Baltimore, MD, US; 2University of Virginia, Charlottesville, VA, US; 3University of Virginia, Department of Orthopaedic Surgery, Charlottesville, VA, US; 4Portland, OR, US; 5University of Virginia, School of Medicine, Charlottesville, VA, US; 6University of Virginia, School of Medicine, Charlottesville, VA, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P38. Complications and Mortality after Lumbar Spinal Fusion in Elderly Patients with Late Stage Renal Disease
Varun Puvanesarajah, BS1; Amit Jain2; Daniel Hess, MD3; Adam L. Shimer, MD4; Francis H. Shen, MD5; Hamid Hassanzadeh, MD6

1Johns Hopkins Medicine, Baltimore, MD, US; 2Portland, OR, US; 3University of Virginia, Charlottesville, VA, US; 4University of Virginia, Department of Orthopaedic Surgery, Charlottesville, VA, US; 5Charlottesville, VA, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P39. Stand-Alone Lateral Lumbar Interbody Fusion: Preoperative Risk Factors for Subsidence
Luis Marchi, MS1; Fernanda Fortti, Rubens Jensen, MD2; Rodrigo A. Amaral, MD3; Etevaldo Coutinho, MD4; Leonardo Oliveira, MD5; Luiz Pimenta, MD, PhD6

1São Paulo, Brazil; 2IPC - Instituto de Patologia da Coluna, Sao Paulo, Brazil

FDA Device/Drug Status: CoRoent cages (Not approved for this indication)

P40. Low Body Mass is a Negative Independent Risk Factor in Elective Cervical Spine Surgery
Cyrus M. Jalai, BA1; Gregory W. Poorman, BA2; Breton Line, BS2; Shay Bess, MD3; Shaleen Vira, MD4; Bassel G. Diebo, MD5; Norah A. Foster, MD5; Jonathan H. Oren, MD6; Themistocles S. Protopsaltis, MD7; Aaron J. Buckland, MBBS, FRACS8; Thomas J. Errico, MD9; Virginie Lafage, PhD10; Peter G. Passias, MD11


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P41. Does Malnutrition Predict Infection after Revision Spine Surgery?
Paul Yi, MD1; David Sing, BS2; Lionel N. Metz, MD3


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P42. Congenital versus Idiopathic Scoliosis: Comparison of In-Hospital Co-Morbidities Using Nationwide Inpatient Database (KID)
Peter G. Passias, MD1; Gregory W. Poorman, BA2; Cyrus M. Jalai, BA3; Bassel G. Diebo, MD4; Shaleen Vira, MD4; Joseph F. Baker, MBChB, FRCS (Tr & Orth)5; Kartik Shenoy, MD6; Saqib Hasan, MD7; John Buza, MD8; Wesley Bronson, MD9; Justin C. Paul, MD, PhD10; Ian Kaye, MD11; Abiola Atanda, MD12; Ryan T. Cassilly, MD13; Norah A. Foster, MD14; Jonathan H. Oren, MD15; Virginie Lafage, PhD16; Thomas J. Errico, MD17


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P43. Reducing Infections in Spine Tumor Surgery Using Intrawound Vancomycin Powder and Betadine Irrigation
Addisu Mesfin, MD

University of Rochester, Rochester, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P44. The Utility of Preoperative Labs in Predicting Postoperative Complications Following Posterior Lumbar Fusion

Nikita Lakomkin, BA1; Vadim Goz, MD2; Joseph S. Cheng, MD, MS3; Darrel S. Brodke, MD4; W. Ryan Spiker, MD5
1Nashville, TN, US; 2University of Utah, Salt Lake City, UT, US; 3Yale University, New Haven, CT, US; 4University Orthopaedic Center, Salt Lake City, UT, US; 5University of Utah Orthopaedics, Salt Lake City, UT, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P45. The Effect of Surgeon Volume on Complications, Length of Stay and Costs Following Anterior Cervical Fusion

Bryce Basques, MD, MHS1; Philip Louie, MD2; Grant Shifflett, MD3; Dustin H. Massel, BS4; Benjamin Mayo, BA5; Javier Guzman, MD6; Daniel D. Bohl, MD, MPH7; Kern Singh, MD8
1Yale School of Medicine, New Haven, CT, US; 2Rush University Medical Center, Chicago, IL, US; 3Hospital for Special Surgery, New York, NY, US; 4Midwest Orthopaedics At Rush, Chicago, IL, US; 5New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P46. Lumbar Disc Geometry Affects the Risk for Rod Fracture in Adult Spinal Deformity (ASD) Surgery

David C. Briski, MD1; Joseph M. Zavatsky, MD2
1Ochsner Medical Center, Jefferson, LA, US; 2Spine & Scoliosis Specialists, Tampa, FL, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P47. S2-Alar-Iliac Screws were Associated with a Lower Rate of Symptomatic Screw Prominence than Iliac Screws: Radiographical Analysis on the Minimal Distance from a Screw Head to Skin

Wataru Ishida, MD1; Benjamin D. Elder, MD, PhD2; Sheng-fu L. Lo, MD, MHS3; Christina Holmes, PhD4; C. Rory Goodwin, MD, PhD5; Ali Bydon, MD1; Daniel M. Sciubba, MD6; Timothy F. Witham, MD, FACS7
1Johns Hopkins Hospital, Baltimore, MD, US; 2Baltimore, MA, US; 3Johns Hopkins University, Baltimore, MD, US; 4John Hopkins University School of Medicine, Baltimore, MD, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P48. Preoperative Nutritional Status is an Independent Predictor of 30-Day Hospital Readmission after Elective Spine Surgery

Aladine A. Elsamadicy, BS1; Owoicho Adogwa, MD, MPH2; Ankit Mehta, MD3; Raul A. Vasquez-Castellanos, MD4; Joseph S. Cheng, MD, MS5; Carlos A. Bagley, MD6; Isaac O. Karikari, MD7
1Duke School of Medicine, Durham, NC, US; 2Rush University Medical Center, Chicago, IL, US; 3University of Illinois at Chicago, Chicago, IL, US; 4Vanderbilt University Neurosurgery, Nashville, TN, US; 5Yale University, New Haven, CT, US; 6University of Texas Southwestern Medical Center, Dallas, TX, US; 7Duke University Medical Center, Durham, NC, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P49. Comparison of Perioperative Adverse Event Rates after Single-Level Transforaminal Lumbar Interbody Fusion versus Anterior/Posterior Fusion for Lumbar Spondylosis: 30-Day Outcomes of 1,274 cases

Matthew Webb1; Andre Samuel, BA2; Adam M. Lukasiewicz, MSc3; Benjamin J. Geddes, MD4; Arya G. Varthi, MD5; Jonathan N. Grauer, MD6
1Yale University School of Medicine, New Haven, CT, US; 2New Haven, CT, US; 3Yale New Haven Hospital, New Haven, CT, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P50. Similar Rates of Perioperative Complications in Cervical Disc Arthroplasty Patients and Fusion Patients

Susan Odum, PhD1; Bryce Van Doren, MPH2; Leo R. Spector, MD3; Bruce V. Darden II, MD4
1OrthoCarolina Research Institute, Charlotte, NC, US; 2OrthoCarolina, Charlotte, NC, US; 3OrthoCarolina Spine Center, Charlotte, NC, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P51. Psoas Size Predicts Survival in Patients with Lung Cancer Metastasis to the Spine

Hesham Zakaria, MD1; Azam Basheer, MD2; David Boyce-Fappiano, BS3; Erinna Elibe, BS4; Ian Lee, MD5; Brent Griffith, MD6; Farzan Siddiqui, MD7; Victor Chang, MD8
1Henry Ford Hospital, Detroit, MI, US; 2Henry Ford Health System, Detroit, MI, US; 3Detroit, MI, US; 4Henry Ford West Bloomfield Hospital, West Bloomfield, MI, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P52. The Effect of Vancomycin Powder on the Rates of Infection and Pseudarthrosis in Lumbar Spine Surgery: A Retrospective Analysis of 453 Patients

Sukanta Maitra, MD1; Jordan Kump; Zach Lee, BS2; Yue Zhang3; Stephen Pehler, MD4; W. Ryan Spiker, MD5; Brandon D. Lawrence, MD6; Darrel S. Brodke, MD7
1Salt Lake City, UT, US; 2University of Utah Department of Orthopedics, Salt Lake City, UT, US; 3University of Utah Orthopaedics, Salt Lake City, UT, US; 4University of Utah Orthopaedics, Salt Lake City, UT, US; 5University Orthopaedic Center, Salt Lake City, UT, US
FDA Device/Drug Status: Vancomycin powder (Not approved for this indication)

P53. Psoas Size Predicts Perioperative Morbidity after Lumbar Spine Surgery

Hesham Zakaria, MD1; Azam Basheer, MD2; Brent Griffith, MD3; Victor Chang, MD4
1Henry Ford Hospital, Detroit, MI, US; 2Henry Ford Health System, Detroit, MI, US; 3Henry Ford West Bloomfield Hospital, West Bloomfield, MI, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
**P54. Complications with Minimally Invasive Transforaminal Lumbar Interbody Fusion (MIS-TLIF) in the Morbidly Obese Population with Degenerative Spondyloolisthesis**

Eiman Shafa, MD; James D. Schwender, MD
Twin Cities Spine Center, Minneapolis, MN, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

**P55. Nutritional Insufficiency as a Predictor for Adverse Outcomes in Anterior Cervical Discectomy and Fusion**

Parth Kothari, BS1; John Di Capua, MHS, BS2; Sulaiman Soman2; Joung Heon Kim, BS3; Dante M. Leven, DO, PT; Jun Kim, MD4; Nathan J. Lee, BS5; Samuel K. Cho, MD2

1Mount Sinai School of Medicine, New York, NY, US; 2Icahn School of Medicine at Mount Sinai, New York, NY, US; 3Icahn School of Medicine at Mount Sinai, New York, NY, US; 4Mount Sinai Medical Center, New York, NY, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

**P56. Re-Operation Following Sacral Alar-Iliac (S2AI) versus Traditional Iliac Pelvic Fixation**

Daniel G. Kang, MD1; Jacob M. Buchowski, MD, MS2; Mahati Mokkarala, BS3; Panya Luksanapruksa, MD3; Christopher Chen, MD4; Lawrence G. Lenke, MD1

1Madigan Army Medical Center, Tacoma, WA, US; 2Washington University School of Medicine, St. Louis, MO, US; 3Department of Orthopedic Surgery, Faculty of Medicine, Siriraj Hospital, Bangkok, Bangkok, Thailand; 4Madigan Army Medical Center, DuPont, WA, United States Minor Outlying Islands

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

**P57. Utility of Supine Lateral Radiographs in the Assessment of Segmental Instability in Degenerative Lumbar Spondyloolisthesis**

Foster Chen, MD1; Woojin Cho, MD, PhD2; Louis F. Amorosa, MD1

1Montefiore Medical Center, Bronx, NY, US; 2New York, NY, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

**P58. Influences of Posterior Vertebral Column Resection on Hydrodynamic Changes of Cerebrospinal Fluid in Scoliosis Patients with Cervical Syringomyelia**

Zhou Liu, MD; Jing-Ming Xie, MD; Yingsong Wang, MD; Zhi Zhao, MD; Ni Bi, MD; Ying Zhang, MD
Department of Orthopaedics, 2nd Affiliated Hospital of Kunming Medical University, Kunming, Yunnan, China

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

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**P59. Evaluation of Lumbar Instability Using Digital Tomosynthesis**

Katsumasa Tanimoto, MD, PhD
Chitose, Japan

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

**P60. Robotic-Guided Sacro-Pelvic Fixation Using S2 Alar-Iliac Screws: Feasibility and Accuracy**

Isador H. Lieberman, MD, FRCS, MBA; Xiaobang Hu, PhD
Scoliosis and Spine Tumor Center, Texas Back Institute, Texas Health Presbyterian Hospital Plano, Plano, TX, US

**FDA Device/Drug Status:** Mazor Robotics Renaissance Guidance System (Approved for this indication)

**P61. Fundamental Differences and Changes in Pelvic Parameters Depending on Age, Gender and Race**

Dante M. Leven, DO, PT; Robert Merrill, BS1; Jun Kim, MD2; Joshua J. Meaie, BS3; Kelly Suchman, BS3; Joung Heon Kim, BS4; Rachel Bronheim, BA4; Sander Gidumal, BA4; Samuel K. Cho, MD4

1New York, NY, US; 2Mount Sinai Medical Center, New York, NY, US; 3Mount Sinai School of Medicine, New York, NY, US; 4Icahn School of Medicine at Mount Sinai, New York, NY, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

**P62. Prediction of Shoulder Balance**

Tara Brenner1; Stephen A. Albanese, MD2; Danielle A. Katz, MD3; Dongliang Wang, PhD4; William F. Lavelle, MD1

1Syracuse, NY, US; 2SUNY Upstate Medical University, Syracuse, NY, US; 3East Syracuse, NY, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

**P63. Are Navigation Techniques Risk-Benefit Effective for Vertebral Transpedicular Instrumentation? A Prospective Comparative Study**

Francisco Ardura, PhD, MD1; David C. Noriega, PhD2; Ruben Hernandez Ramajo, PhD2; Israel Sanchez Lite, PhD2; Borja Toribio Calvo, PhD, ACNP-BC2

1Valladolid University Clinic Hospital, Valladolid, Spain; 2Valladolid, Spain; 3University Clinical Hospital Valladolid, Valladolid, Spain; 4Hospital Clinico Valladolid, Valladolid, Spain; 5Hospital Clinico Universitario Valladolid, Valladolid, Spain

**FDA Device/Drug Status:** O ARM NAVIGATION SYSTEM (Approved for this indication)
P64. Measurement of Spinopelvic Angles on Prone Intraoperative Long-Cassette Lateral Radiographs Predicts Postoperative Standing Global Alignment in Adult Spinal Deformity Surgery
Jonathan H. Oren, MD; Louis M. Day, BS; Joseph F. Baker, MbChB, FRCS (Tr & Orth); Norah A. Foster, MD; Michael J. Moses, BA; Subaraman Ramchandran, MBBS; Dana Cruz, MD; Cyrus M. Jalai, BA; Ryan T. Cassilly, MD; Peter G. Pas, MD; Shay Bess, MD; Thomas J. Errico, MD; Themistocles S. Protopsaltis, MD

1New York, NY, US; 2Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 3Spine Research Institute, New York, NY, US; 4NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P65. Pedicle Screw Impinging the Aorta: A Diagnostic Dilemma Resolved on Prone CT Scan
Vishal Sarwahi, MD; Beverly Thornhill, MD; Stephen Wendolowski, BS; Rachel Gecelter, BS; Terry D. Amaral, MD

1North Shore LIJ Health System, New Hyde Park, NY, US; 2Albert Einstein College of Medicine, Bronx, NY, US; 3Lake Success, NY, US; 4Montefiore Medical Center, Bronx, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P66. Cervical Ossification of the Posterior Longitudinal Ligament (OPLL): A CT-Based Analysis of 3000 Patients
Jillian Gruber, BA; Ahmed Saleh, MD; Wajeeh Bakhsh, MD; Paul T. Rubery Jr., MD; Addisu Mesfin, MD

1University of Rochester School of Medicine and Dentistry, Rochester, NY, US; 2University of Rochester, Rochester, NY, US; 3University of Rochester Medical Center, Rochester, NY, US; 4Rochester, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P67. How Common is a C8 Radiculopathy? Evaluation of 5,995 EMG Studies
Mark Bauerfeind, MD; David Speach, MD; Addisu Mesfin, MD

1University of Rochester Medical Center, Rochester, NY, US; 2University of Rochester, Rochester, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P68. The Pelvis and the Spine: A Dynamic Relationship
Andy Hayden; Howard M. Place, MD; Ann M. Hayes, DPT, MHS, OCS; Heidi Israel, PhD, FNP; Jennifer L. Brechbuhler, BSN

1Saint Louis University, St. Louis, MO, US; 2Saint Louis University, Department of Orthopaedic Surgery, St. Louis, MO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P69. Pre-Insertion Pedicle Screw Testing Using Mechanomyography
Nolan M. Wessell, MD; Stephen Bartol, MD, MBA, FRCS

1Henry Ford Health System, Department of Orthopaedic Surgery, Detroit, MI, US; 2Henry Ford Hospital, Detroit, MI, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P70. The Effect of Aging on Cervical Parameters in a Normative North American Population
Justin A. Iorio, MD; Jensen Henry, BA; Renaud Lafage, MSc; Barthelemy Liabaud, MD; Brenda A. Sides; Munish C. Gupta, MD; Virginie Lafage, PhD; Han Jo Kim, MD

1Temple University Hospital, Department of Orthopaedics, Philadelphia, PA, US; 2NYU School of Medicine, New York, NY, US; 3Hospital for Special Surgery, New York, NY, US; 4Washington University School of Medicine, St. Louis, MO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P71. Abnormal Preoperative Disc Mechanics Does Not Impair the Outcomes of CDA
Matthew F. Gornet, MD; John A. Hipp, PhD; Francine W. Schranck, RN, BSN; Anne G. Copay, PhD

1The Orthopedic Center of St. Louis, St. Louis, MO, US; 2Houston, TX, US; 3Saint Louis, MO, US; 4SPIRITT Research, St. Louis, MO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P72. Life is a Lordosing Event in the Subaxial Cervical Spine: An Analysis of Upper and Lower Cervical Regions Based on Age and Thoracolumbar Sagittal Malalignment
Jensen Henry, BA; Renaud Lafage, MSc; Barthelemy Liabaud, MD; Themistocles S. Protopsaltis, MD; Peter G. Passias, MD; Aaron J. Buckland, MBBS, FRACS; Thomas J. Errico, MD; Hongda Bao, MD; Subaraman Ramchandran, MBBS; Louis M. Day, BS; Cyrus M. Jalai, BA; Gregory W. Poorman, BA; Dana Cruz, MD; Frank J. Schwab, MD; Virginie Lafage, PhD

1NYU School of Medicine, New York, NY, US; 2Hospital for Special Surgery, New York, NY, US; 3Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 4NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 5Nanjing Drum Tower Hospital, Nanjing, China; 6Spine Research Institute, New York, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P73. Principal Radiographic Characteristics for Cervical Spinal Deformity: A Health-Related Quality of Life Analysis
Houngda Bao, MD1; Jeffrey Varghese, BS2; Renaud Lafage, MSc3; Barthelemy Liaubaud, MD4; Bassel G. Diebo, MD2; Subaranan Ramchandran, MBBS5; Louis M. Day, BS6; Cyrus M. Jalai, BA1; Dana Cruz, MD4; Thomas J. Errico, MD2; Thmistocles S. Protopsaltis, MD1; Peter G. Passias, MD2; Aaron J. Buckland, MBBS, FRACS2; Frank J. Schwab, MD2; Virginie Lafage, PhD2
1Nanjing Drum Tower Hospital, Nanjing, China; 2Hospital for Special Surgery, New York, NY, US; 3NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P74. Suction Drain Tip Culture after Spine Surgery: Can it Predict a Surgical Site Infection?
Hojin Lee, MD1; Jae-Sung Ahn, MD, PhD2
1Chungnam National University Hospital, Daejeon, Republic of Korea; 2Daejeon, Democratic People’s Republic of Korea
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

Doniel Drazin, MD, MA1; Ken Catchpole, PhD2; Robert S. Pashman, MD3; J. Patrick Johnson, MD3; Terrence T. Kim, MD4
1Cedars-Sinai Institute for Spinal Disorders, Los Angeles, CA, US; 2Medical University of South Carolina, Charleston, SC, US; 3The Spine Center Cedars Sinai, Los Angeles, CA, US; 4Los Angeles, CA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P76. Preoperative Rib Cage Measurement Reproducibility Using 3D Stereoradiographic Reconstructions in Adolescent Idiopathic Scoliosis
Houssam Bouloussa, MD, MSc1; Raphael Pietton, MD2; Claudio Vergari, PhD3; Wafa Skalli, PhD4; Raphael Vialle, MD5
1Hôpital Armand Trousseau, Paris, France; 2Trousseau Hospital, Paris, France; 3University of Exeter, Exeter, Devon, United Kingdom; 4Institut de Biomecanique Humaine Georges Charpak, Paris, France; 5Hôpital Trousseau Paris, Paris, France
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P77. Interobserver Agreement in Measuring the Neural Foramina Using a 360-Degree Ultrasound: A Human Cadaver Study
Yvonne Braun, MD; Olivier D. van Wuijfften Palthe, MD; Stein Janssen, MD; Sjoerd Nots, MD; Bianca Verbeek, MD; Joseph H. Schwab, MD
Massachusetts General Hospital, Boston, MA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P78. Impact of Instrumented Spinal Fusion on the Development of Vertebral Compression Fracture
Shih-Chieh Yang, MD, PhD; Yuan-Kun Tu, MD
E-Da Hospital, Kaohsiung, Taiwan, Republic of China
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P79. A Nationwide Epidemiological Study of Newly Diagnosed Spine Metastasis in the Adult Korean Population
Seil Sohn, MD
Department of Neurosurgery, Spine Center CHA University, CHA Bundang Medical Center, Gyeonggi-do, Democratic People’s Republic of Korea
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P80. Prevalence and Factors Affecting Cervical Deformity in Adolescent Idiopathic Scoliosis Patients
Isador H. Lieberman, MD, FRCS, MBA; Xiaobang Hu, PhD
Scoliosis and Spine Tumor Center, Texas Back Institute, Texas Health Presbyterian Hospital Plano, Plano, TX, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P81. Limitations of Using Population-Based Databases to Assess Trends in Spinal Stereotactic Radiosurgery
Shearwood McClelland III, MD1; Cyrus M. Jalai, BA2; Samuel Ryu, MD3; Peter G. Passias, MD4
1Division of Spine Surgery, New York, New York; 2Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 3Department of Radiation Oncology, Stony Brook, New York; 4NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P82. Incidence of Congenital Spinal Abnormalities Among Paediatric Patients and Their Association with Scoliosis and Systemic Anomalies
Peter G. Passias, MD1; Gregory W. Poorman, BA2; Cyrus M. Jalai, BA3; Bassel G. Diebo, MD4; Shaleen Vira, MD4; Joseph F. Baker, MbChB, FRCS (Tr & Orth)5; Kartik Shenoy, MD6; Saqib Hasan, MD6; John Buza, MD6; Wesley Bronson, MD4; Justin C. Paul, MD, PhD7; Ian Kaye, MD2; Abiola Atanda, MD8; Norah A. Foster, MD2; Ryan T. Cassilly, MD2; Jonathan H. Oren, MD8; Virginie Lafage, PhD9; Thomas J. Errico, MD2
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P83. The Prevalence of Klippel-Feil Syndrome: A CT-Based Analysis of 3,000 Patients
Ahmed Saleh, MD1; Jillian Gruber, BA2; Wajeeh Bakhsh, MD1; Paul T. Rubery Jr., MD1; Addisu Mesfin, MD1
1University of Rochester, Rochester, NY, US; 2University of Rochester School of Medicine and Dentistry, Rochester, NY, US; 3University of Rochester Medical Center, Rochester, NY, US; 4Rochester, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P84. Racial and Ethnic Differences in Treatment Utilization for Degenerative Lumbar Spondylolisthesis
Ugochi Ukegbu, MPH1; Alexandra Constantin, PhD2; Joseph A. Sclafani, MD1; Venu Akuthota, MD4
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P85. Evaluating the Efficacy of Chlorhexidine Use at Home Before Surgery
Melvin C. Makhni, MD, MBA1; Kola Jegede; K. Daniel Riew, MD2
1Columbia University Medical Center, New York, NY, US; 2The Spine Hospital/Columbia Doctors/New York Presbyterian/The Allen Hospital, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P86. The Cost of Complexity in Pediatric Scoliosis
Melvin C. Makhni, MD, MBA Columbia University Medical Center, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P87. Deriving a Clinical Prediction Model for Degenerative Spine Disorders
Godefroy Hardy St-Pierre, MD, FRCSC
Foothills Medical Center, Calgary, AB, Canada
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P88. Community Practice Experience with Subsequent Vertebral Compression Fractures During the Year after Vertebral Augmentation Using an Expandable Implant
Arthur H. McCain, MD1; Ryon M. Hennessy, MD2; Irina Kondrashov, BA3; Ken Y. Hsu, MD1
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P89. Does Level of Response to SI Joint Block Predict Response to SI Joint Fusion?
David W. Polly Jr., MD1; Daniel J. Cher, MD2; Peter G. Whang, MD, FACS3; Clay J. Frank, MD4; Jonathan N. Sembrano, MD1
1University of Minnesota, Minneapolis, MN, US; 2SI-BONE, Inc., San Jose, CA, US; 3Yale University School of Medicine, New Haven, CT, US; 4Integrated Spine Care, S.C., Wauwatosa, WI, US
FDA Device/Drug Status: Ifuse by SI-Bone, Inc. (Approved for this indication)

P90. A Randomized Control Trial Evaluating the Effectiveness of Selective Nerve Root Injections in Patients with Lumbar Disc Herniation
Neil A. Manson, MD, FRCSC1; Melissa D. McKeon, MSc1; Erin Bigney, BA1; Kate Wagg, BA2; Eden Daly, BA2; Edward P. Abraham, MD1,2
1Canada East Spine Centre, Saint John, NB, Canada; 2Saint John Regional Hospital, Saint John, NB, Canada
FDA Device/Drug Status: Sensoricane (Approved for this indication)

P91. Effect of Depression on Patient Reported Outcomes Following Cervical Epidural Steroid Injection for Degenerative Spine Disease
Elliott Kim, MD1; Silky Chotai, MD2; Byron J. Schneider, MD1; Ahilan Sivaganesan, MD1; Matthew J. McGirt, MD1; Clinton J. Devin, MD1
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P92. Comparison of Outcomes Between Artificial Disc Replacements and Bone Marrow Concentrate Injections at the Same Clinic for Chronic Discogenic Low Back Pain
Tyler Santomaso, BS1; Fernando Techy, MD2; Kenneth A. Pettine, MD3
1Premier Stem Cell Institute, Johnstown, CO, US; 2Rocky Mountain Spine and Orthopaedics, Johnstown, CO, US; 3Rocky Mountain Assoc. in Ortho Medicine PC, Johnstown, CO, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P93. Interventional Treatment and Physical Therapy Utilization for Degenerative Lumbar Spondylolisthesis within Medicare Beneficiaries from 2000-2011: Descriptive Analysis and Impacts on Surgery Frequency
Joseph A. Sclafani, MD1; Christian Mayfield, BS2; Ugochi Ukegbu, MPH1; Venu Akuthota, MD4
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P94. Randomized Controlled Trial of Minimally Invasive Sacroiliac Joint Fusion Using Triangular Titanium Implants versus Non-Surgical Management for Sacroiliac Joint Dysfunction: 12-Month Outcomes

David W. Polly Jr., MD; Daniel J. Cher, MD; Peter G. Whang, MD, FACS; Clay J. Frank, MD; John A. Glaser, MD; Jonathan N. Sembrano, MD

1University of Minnesota, Minneapolis, MN, US; 2SI-BONE, Inc., San Jose, CA, US; 3Yale University School of Medicine, New Haven, CT, US; 4International Spine Care, S.C., Wawwatosa, WI, US; 5Medical University of South Carolina Department of Orthopaedic Surgery, Charleston, SC, US

FDA Device/Drug Status: iFuse by SI-Bone, Inc. (Approved for this indication)

P95. Yoga versus Physical Therapy versus Education for Chronic Low Back Pain: A Randomized Non-Inferiority Trial in an Underserved Community-Based Population

Robert Saper, MD; Patricia Herman, ASC-OR; Eric Roseen, DC; Chelsey Lemaster, MS, MPH

1Boston Medical Center, Boston, MA, US; 2RAND, Santa Monica, CA, US; 3Boston Medical Center, Department of Family Medicine, Boston, MA, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P96. Key Preoperative Predictors of Surgical Outcomes in Patients with Metastatic Epidermal Spinal Cord Compression: Results from a Survey of 438 AOSpine International Members

Michael G. Fehlings, MD, PhD, FRCS; Anick Nater, MD; Lindsay Tetreault, PhD

1Toronto Western Hospital, Toronto, ON, Canada; 2Toronto Western Hospital (University of Toronto), Toronto, Ontario, Canada; 3University of Toronto, Oakville, ON, Canada

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P97. Differences in Lumbar Spinal Surgery Expectations for Chronic Opioid versus Non-Opioid Users

Alexander P. Hughes, MD; Roland Duculan, MD; Jennifer Shue, MS; Paul Schadler, MD; Oliver Saxi; Alexa Feldman, FNP; FNPN; Federico P. Girardi, MD; Frank P. Cammisa, MD; Andrew A. Sama, MD; Darren R. Lebl, MD; Carol A. Mancuso, MD


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P98. Long-Term Safety and Reoperation Rates Following Cervical TDR: Prospective and Multicentric Study

Thierry Dufour, MD; Jean-Paul Steib, MD; Pierre Bernard, MD; Jean Huppert, MD; Eric Lioire, MD; Phong Dam Hieu, MD, PhD; Istvan Hovorka, MD; Jacques Beaurnais, MD

1CHR Orléans - La Source, Orleans, France; 2Chirurgie du rachis, Chirurgie B, Strasbourg, France; 3Centre Aquitain du Dos, Merignac, France; 4Service De Neurochirurgie, Saint Priest En Jarez, France; 5Sce Neurochirurgie, Tours Cedex 9, France; 6University Medical Center Brest France, Brest, France; 7Nice, France; 8Neurochirurgie CHU Hôpital Général, Dijon, France

FDA Device/Drug Status: Mobi-C (Approved for this indication)

P99. Lumbar Total Disc Replacement by the Lateral Approach: Up to 10-Year Follow-Up

Luís Marchi, MS; Rodrigo A. Amaral, MD; Etevaldo Coutinho, MD; Fernanda Fortti; Leonardo Oliveira, MD; Luiz Pimenta, MD, PhD

1São Paulo, Brazil; 2IPCB - Instituto de Patologia da Coluna, Sao Paulo, Brazil

FDA Device/Drug Status: XL-TDR(R) (Investigational/Not approved)

P100. The StArT Back Screening Tool in Secondary Care: Do Psychological Subscale Scores Differ Among Patients with Acute, Subacute and Chronic Spine Pain

Angela Lis, PhD; Tara Brennan, MPH; LiJin Joo; Sherri Weiser, PhD

1Hospital for Joint Diseases Occupational and Industrial Orthopaedic Center, New York, NY, US; 2New York University Medical Center, New York, NY, US; 3New York, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P101. Cost Utility Analysis of Operative versus Non-Operative Treatment for Adolescent Idiopathic Scoliosis

Amit Jain; Michael P. Kelly, MD; William Padula; Lawrence G. Lenke, MD; Thomas J. Errico, MD; Khaled M. Kebaish, MD; Paul D. Sponseller, MD

1Portland, OR, US; 2Washington University, St. Louis, MO, US; 3Washington University School of Medicine, Saint Louis, MO, US; 4Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 5Baltimore, MD, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P102. Disparities in Reportable Quality Metrics by Insurance Status in the Primary Spine Neoplasm Population

Syed K. Mehdi, BS; Joseph E. Tanenbaum, BA; Vincent J. Alentado, BS; Edward C. Benzel, MD; Thomas E. Mroz, MD

1The Cleveland Clinic, Cleveland, OH, US; 2Cleveland Clinic Center for Spine Health, Cleveland, OH, US; 3Cleveland Heights, OH, US; 4Cleveland Clinic Foundation, Cleveland, OH, US; 5Cleveland Clinic Foundation Departments of Orthopaedic and Neurological Surgery, Cleveland, OH, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P103. Optimizing the Process Flow Chart for the Inpatient Management of Osteoporotic Vertebral Compression Fractures (OVCF)

Jonathan Morris, MD; Alan Job, BS; Woojin Cho, MD, PhD; Atif Ahmed, MD, DDS; Yungtai Lo, PhD; Soo Yeon Kim, MD; Alok D. Sharan, MD, MHSCS


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P104. Association Between Race and Postoperative Outcomes in a Universally Insured Population Following Lumbar Spine Surgery
Andrew J. Schoenfeld, MD
Brigham and Women’s Hospital, Boston, MA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P105. How Does Case Type, Length of Stay, and Comorbidities Affect Medicare DRG Reimbursement for Minimally Invasive Surgery (MIS) for Deformity?
Pierce D. Nunley, MD1; Richard G. Fessler, MD, PhD2; Paul Park, MD3; Joseph M. Zavatsky, MD4; Gregory M. Mundis Jr., MD4; Juan S. Uribe, MD5; Robert K. Eastlack, MD6; Dean Chou, MD4; Michael Y. Wang, MD7; Neel Anand, MD8; Adam S. Kanter, MD9; Christopher I. Shaffrey, MD10; Jeffrey L. Glassman, MD11; Justin S. Smith, MD, PhD12; Christopher I. Shaffrey, MD13; International Spine Study Group14
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P106. Incidental durotomy Following Lumbar Spine Surgery: Analysis of a Longitudinal National Database
Anand Veeravagu, MD1; Ian D. Connolly, MS2; Tej D. Azad3; Layton Lamsam, BS4; Christian Swinney, BA5; John Ratliff, MD6
1Stanford University School of Medicine, Palo Alto, CA, US; 2Stanford University School of Medicine, Stanford, CA, US; 3Stanford University School of Medicine, Pawhuska, US; 4Stanford University School of Medicine / Hospital & Clinics, Palo Alto, CA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P107. Adult Spinal Deformity Patients with Previous Fusions have an Equal Chance of Reaching Substantial Clinical Benefit Thresholds in Health-Related Quality of Life Measures But Do Not Reach the Same Absolute Level of Improvement
Tamir Ailon, MD, MPH1; Justin S. Smith, MD, PhD2; Christopher I. Shaffrey, MD3; Alexandra Sorocoeau, MD, MPH4; Virginie Lafage, PhD5; Frank J. Schwab, MD6; Douglas C. Burton, MD7; Robert A. Hart, MD8; Jeffrey L. Gurn, MD9; Richard A. Hostin Jr., MD10; Michael P. Kelly, MD11; Steven D. Glassman, MD12; Shay Bess, MD13; Christopher P. Ames, MD14; International Spine Study Group15
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P108. Cervical Spine Sagittal Alignment in 241 OPLL Patients: Does it Affect the Spinal Cord Compression and Clinical Findings?
Byung Wan Choi, MD
Inje University, Haeundae Paik Hospital, Busan, Republic of Korea
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P109. Surgical and Medical Effects of Different Curve Shape to Posterior Vertebral Column Resection (PVCr) Correction: Sharp Angular Curve versus Hairpin-Like Round Curve
Jing-Ming Xie, MD; Yingsong Wang, MD; Zhi Zhao, MD; Tao Li, MD; Ni Bi, MD; Zhou Liu, MD
Department of Orthopaedics, 2nd Affiliated Hospital of Kunming Medical University, Kunming, Yunnan, China
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P110. Evolution of Syrinx in Scoliosis Patients Associated with Untreated Syringomyelia who Underwent One-Stage Posterior Correction for Spinal Deformities
Ying Zhang, MD; Jing-Ming Xie, MD; Ni Bi, MD; Tao Li, MD; Zhiyue Shi, MD; Yingsong Wang, MD
Department of Orthopaedics, 2nd Affiliated Hospital of Kunming Medical University, Kunming, Yunnan, China
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P111. Clinical Efficacy of Tranexamic Acid in Major Spinal Deformity Surgery
Ho Yong Choi, MD
Seoul National University Bundang Hospital, Seongnam, Gyeonggi, Republic of Korea
FDA Device/Drug Status: tranexamic acid (Not approved for this indication)

P112. Lumbar Stenosis Severity Predicts Worsening Sagittal Malalignment on Full-Body Standing Stereорadiographs
Aaron J. Buckland, MBBS, FRACS1; Subbu Ramachandran, MD2; Louis M. Day, BS3; Shay Bess, MD4; Themistocles S. Protopsaltis, MD5; Peter G. Passias, MD6; Bassel G. Diebo, MD7; Barthelemy Liabaud, MD8; Renaud Lafage, MSc9; Virginie Lafage, PhD9; Thomas J. Enrico, MD10
1Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 2NYU Langone Medical Center, New York, NY, US; 3NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 4Hospital for Special Surgery, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P113. SRS-22R Minimum Clinically Important Difference (MCID) and Substantial Clinical Benefit (SCB) after Adult Symptomatic Lumbar Scoliosis Surgery
Leah Y. Carreon, MD, MSc1; Michael P. Kelly, MD2; Charles H. Crawford III, MD3; Christine R. Baldus, RN; Steven D. Glassman, MD4; Christopher I. Shaffrey, MD5; Keith H. Bridwell, MD6
1Norton Leatherman Spine Center, Louisville, KY, US; 2Washington University, Saint Louis, MO, US; 3University of Virginia, Charlottesville, VA, US; 4Washington University in St. Louis School of Medicine, Saint Louis, MO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P114. Comparative Analysis of Perioperative Outcomes Using Nationally Derived Hospital Discharge Data Relative to a Prospective Multicenter Surgical Database of Adult Spinal Deformity Surgery
Gregory W. Poorman, BA1; Peter G. Passias, MD2; Aaron J. Buckland, MBBS, FRACS1; Cyrus M. Jalai, BA1; Michael P. Kelly, MD2; Daniel M. Sciubba, MD2; Brian J. Neuman, MD7; D. Kojo Hamilton, MD8; Amit Jain1; Virginie Lafage, PhD9; Shay Bess, MD3; Eric O. Klineberg, MD10; International Spine Study Group11
1Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 2NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 3Washington University, St. Louis, MO, US; 4John Hopkins University School of Medicine, Baltimore, MD, US; 5Baltimore, MD, US; 6University of Pittsburgh School of Medicine, Pittsburgh, PA, US; 7Portland, OR, US; 8Hospital for Special Surgery, New York, NY, US; 9UC Davis School of Medicine, Sacramento, CA, US; 10Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P115. Continuous Variable Predictive Modeling of Length of Hospital Stay (LOS) Following Adult Spinal Deformity (ASD) Correction: Analysis of 653 Patients with an Accuracy of 75% within 2 Days
Justin K. Scheer, BS1; Tamir Ailon, MD, MPH2; Justin S. Smith, MD, PhD3; Robert A. Hart, MD4; Douglas C. Burton, MD5; Shay Bess, MD6; Brian J. Neuman, MD7; Peter G. Passias, MD8; Emily Miller, BA9; Christopher I. Shaffrey, MD10; Frank J. Schwab, MD11; Virginie Lafage, PhD12; Eric O. Klineberg, MD13; Christopher P. Ames, MD14; International Spine Study Group15
1Case Western Reserve University School of Medicine, Cleveland, OH, US; 2International Spine Study Group, Arvada, CO, US; 3Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 4UBA Health System, Charlottesville, VA, US; 5University of Virginia, Charlottesville, VA, US; 6Washington University School of Medicine, St. Louis, MO, US; 7UC Davis School of Medicine, Sacramento, CA, US; 8NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 9University of Kansas Medical Center, Kansas City, KS, US; 10Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 11University of California, San Francisco, San Francisco, CA, US; 12Oregon Health & Science University, Portland, OR, US; 13Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P116. The Risks of Surgery for Octogenarians with Degenerative Lumbar Scoliosis
Arya Ahmady, BS1; Katherine Sadowski, BS2; Sanford E. Emery, MD, MBA3; Nicholas U. Ahn, MD4; Christopher G. Furey, MD5
1Case Western Reserve University School of Medicine, Cleveland, OH, US; 2Cleveland, OH, US; 3West Virginia University, Morgantown, WV, US; 4University Hospital of Cleveland Department of Orthopedic Surgery, Cleveland, OH, US; 5Case Western Reserve University, Cleveland, OH, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P117. Improvement in SRS22R Pain Scores after Surgery for Adolescent Idiopathic Scoliosis
Mladen Djurasovic, MD1; Steven D. Glassman, MD2; Daniel J. Sucato, MD2; Lawrence G. Lenke, MD3; Leah Y. Carreon, MD, MSc4
1Norton Leatherman Spine Center, Louisville, KY, US; 2Texas Scottish Rite Hospital for Children, Dallas, TX, US; 3Washington University School of Medicine, St. Louis, MO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P118. When Do Surgeons Choose Upper Thoracic versus Lower Thoracic Proximal End Point for Fusion of Adult Spinal Deformity Patients?
Alan H. Daniels, MD1; Breton Line, BS2; Virginie Lafage, PhD3; Justin S. Smith, MD, PhD4; Christopher I. Shaffrey, MD5; Munish C. Gupta, MD6; Eric O. Klineberg, MD7; Frank J. Schwab, MD8; Peter G. Passias, MD9; Douglas C. Burton, MD9; Shay Bess, MD10; Christopher P. Ames, MD11; Robert A. Hart, MD12; International Spine Study Group13
1Warren Alpert Medical School of BU/RI Hospital, Providence, RI, US; 2International Spine Study Group, Arvada, CO, US; 3Hospital for Special Surgery, New York, NY, US; 4UVA Health System, Charlottesville, VA, US; 5University of Virginia, Charlottesville, VA, US; 6Washington University School of Medicine, St. Louis, MO, US; 7UC Davis School of Medicine, Sacramento, CA, US; 8NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 9University of Kansas Medical Center, Kansas City, KS, US; 10UC Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 11University of California, San Francisco, San Francisco, CA, US; 12Oregon Health & Science University, Portland, OR, US; 13Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

Malla K. Keefe1; Justin K. Scheer, BS2; Mitsuru Yagi, MD, PhD3; Justin S. Smith, MD, PhD4; Christopher I. Shaffrey, MD5; Shay Bess, MD6; Virginie Lafage, PhD7; Frank J. Schwab, MD7; Naobumi Hosogane6; Morio Matsumoto, MD8; Christopher P. Ames, MD9; International Spine Study Group10

1San Francisco, CA, US; 2University of California, San Diego, San Francisco, CA, US; 3National Hospital Organization Murayama Medical Center, Tokyo, Japan; 4UVA Health System, Charlottesville, VA, US; 5University of Virginia, Charlottesville, VA, US; 6Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 7Hospital for Special Surgery, New York, NY, US; 8Saitama, Japan; 9Keio University School of Medicine, Tokyo, Japan; 10University of California, San Francisco, San Francisco, CA, US; 11Brighton, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P120. Predicting Satisfied, Non-Depressed with Optimal Self-Image Patients at Two-Year Follow-Up: Propensity Matched Comparisons in Operative and Nonoperative Adult Spinal Deformity Cohorts**

Bassel G. Diebo, MD1; Cyrus M. Jalai, BA2; Gregory W. Poorman, BA2; Barthelemy Liabaud, MD3; Thomas J. Errico, MD3; Shay Bess, MD5; Alexandra Soroceanu, MD, MPH5; D. Kojo Hamilton, MD6; Daniel M. Scuibba, MD6; Eric O. Klineberg, MD7; Renaud Lafage, MSc7; Virginie Lafage, PhD7; Frank J. Schwab, MD7; Peter G. Passias, MD8; International Spine Study Group9

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FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P121. Scoliosis Surgery with Intraoperative Neuromonitoring in the United States: Demographic Analysis and Risk of Neurological Injury**

Remi M. Ajiboye, MD, MPH1; Howard Park, MD2; Jeremiah R. Cohen3; Evan Vellios, MD4; Adedayo O. Ashana, MD4; Elizabeth L. Lord, MD5; Stephen Zoller, MD6; Zurica Buser, PhD7; Jeffrey C. Wang, MD7

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FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P122. T1 Tilt and Clavicle Angle are the Best Predictors of Postoperative Shoulder Balance**

Vishal Sarwahi, MD1; Stephen Wendolowski, BS2; Rachel Gecelter, BS3; Terry D. Amaral, MD4; Beverly Thornhill, MD4

1North Shore LJI Health System, New Hyde Park, NY, US; 2Lake Success, NY, US; 3Montefiore Medical Center, Bronx, NY; 4Bronx, NY, US; 5Albert Einstein College of Medicine, Bronx, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P123. LEAN Management Principles Applied to Scoliosis Surgery Have Improved Patient Safety and Increased Surgical Efficiency**

Vishal Sarwahi, MD1; Terry D. Amaral, MD2; Rachel Gecelter, BS3; Stephen Wendolowski, BS4; Melanie Gambassi, NP5


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P124. A New Method for Determining the Distal Fusion Level and Saving Levels in AIS**

Vishal Sarwahi, MD1; Stephen Wendolowski, BS2; Rachel Gecelter, BS3; Terry D. Amaral, MD4


FDA Device/Drug Status: Approved for this indication.

**P125. Assessment of the Disc and Facet Degeneration in the Unfused Lumbar Spine after Stopping Fusion at L3 in AIS: An MRI Study. How Much Disc Wedging and Residual Curve Can Be Accepted?**

Sinan Kahraman, MD1; Selhan Karadereler, MD2; Ozcan Kaya, MD2; Gurkan Gumussuyu, MD2; Bulent Guneri, MD1; Levant O. Ulusoy, MD1; Ayhan Mutlu, MD2; Gokhan Peker, MD1; Tunay Sanli, MA1; Bekir Yavuz Ucar, MD1; Meric Enercan, MD1; Azmi Hamzaoglu, MD1

1Istanbul Spine Center, Istanbul, Turkey; 2Sutcu Imam University, Kahramanmaras, Turkey; 3Istanbul Bilim University, Istanbul, Turkey

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

**P126. Increase in Spinal Deformity Patients in Patients Age 60 and Over is Not Associated with Increased Complications**

David Sing, BS1; Sigurd H. Berven, MD2; Shane Burch, MD2; Lionel N. Metz, MD2

1UCSF/SFGH Orthopaedic Trauma Institute, San Francisco, CA, US; 2UCSF, Department of Orthopaedic Surgery, San Francisco, CA, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P127. Outcomes and Complications of Sacropelvic Fixation Using S2 Alar-Iliac (S2AlI) Technique in Adult Spinal Deformity Patients Fused to the Sacrum: A Five-Year Follow-Up Study
Tina Raman, MD; Emily Miller, BA; Paul D. Sponseller, MD; Khaled M. Kebaish, MD
1Johns Hopkins University, Baltimore, MD, US; 2Baltimore, MD, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P128. The Relationship Between Coronal Malalignment and Gait Patterns: Preliminary Analysis on a Prospectively Collected AIS Database
Jeffrey Varghese, BS; Ashish Patel, MD; Bassel G. Diebo, MD; Ayman Assi, PhD; Ellen Godwin, PT, PhD; Louis M. Day, BS; Hongda Bao, MD
1UCSF Department of Orthopedic Surgery, San Francisco, CA, US; 2Johns Hopkins University, Baltimore, MD, US; 3Baltimore, MD, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P129. Prevalence of Osteotomy Site Pseudarthrosis after Three-Column Osteotomies for Adult Spinal Deformity
Tina Raman, MD; Hamid Hassanzadeh, MD; John Thompson, MD; Khaled M. Kebaish, MD
1Johns Hopkins University, Baltimore, MD, US; 2University of Virginia, Department of Orthopedic Surgery, Charlottesville, VA, US; 3Baltimore, MD, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P130. The Value of Multilevel Fusions for Adult Spinal Deformity: A Retrospective Analysis of Outcomes and Cost of Care
Daniel Beckerman, BA; Matt Callahan, MBA; Linda Racine; Sigurd H. Berven, MD; Shane Burch, MD; Vedat Deviren, MD
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P131. Outcomes in Adult Deformity Surgery: What Happens to Those Patients Who are Lost to Follow-Up
Daniel Beckerman, BA; Tamara Sharf; Linda Racine; Shane Burch, MD; Sigurd H. Berven, MD
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P132. Estimated X-Ray Exposure and Additional Cancer Risk During Surgical Treatment of Scoliosis in the Growing Spine
Peter R. Loughenbury, MbChB, MSc, FRCSI; Stephanie Gentles, MbChB; Emma Murphy, MbChB; James Tomlinson; Robert Dunsmuir, FRCS(Ed), FRCS (Tr & Orth); Nigel W. Gummerson, FRCS; Abhay Rao, FRCS (Tr and Orth); Emma Rowbotham, FRCS; Peter A. Milner, FRCS; Almas L. Khan, MBBS, FRCS
1Royal Hospital for Sick Children, Edinburgh, United Kingdom; 2Department of Spinal Surgery Leeds General Infirmary, Leeds, West Yorkshire, UK; 3Department of Spinal Surgery, Leeds, UK; 4Leeds Teaching Hospitals, Leeds, UK; 5Leeds General Infirmary, Leeds, Yorkshire, UK; 6Leeds Teaching Hospitals NHS Trust, Leeds, West Yorkshire, UK; 7Spinal Surgery Department, Leeds, United Kingdom
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P133. Evaluation of the Fluctuation of Health-Related Quality of Life Scores and Radiographic Sagittal Parameters for Follow-Up in Adult Spine Deformity Patients
Ibrahim Obeid; Francisco J. Perez-Grueso, MD; Vincent Chaladier, MD; Louis Boissiere, MD; Ahmet Alanay, MD; Frank Kleinstuck, MD; Anne F. Männion, PhD; Daniel Larrieu; Caglar Yilgor; Ferran Pellise, MD, PhD; ESSG European Spine Study Group
1France; 2H. De La Paz (Madrid), Madrid, Spain; 3Spine Unit I, CHU Bordeaux, Bordeaux, France; 4Bordeaux University Hospital, France; 5Acibadem Maslak Hospital Spine Center, Istanbul, Turkey; 6Switzerland; 7Schulthess Klinik, Zurich, Switzerland; 8Istanbul, Pangelat/SISL, Turkey; 9Barcelona, Spain; 10European Spine Study Group, Barcelona, Spain
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P134. The Health Impact of Symptomatic Adult Cervical Deformity: Comparison to United States Population Norms and Chronic Disease States Based on the EQ5D
Justin S. Smith, MD, PhD; Breton Line, BS; Shay Bess, MD; Christopher I. Shaffrey, MD; Han Jo Kim, MD; Gregory M. Mundis Jr., MD; Justin K. Scheer, BS; Eric O. Klineberg, MD; Munish C. Gupta, MD; Alan H. Daniels, MD; Michael P. Kelly, MD; Jeffrey L. Gum, MD; Frank J. Schwab, MD; Virginie Lafage, PhD; Renaud Lafage, MSc; Tamir Ailon, MD, MPH; Peter G. Passias, MD; Themistocles S. Protopsaltis, MD; Robert A. Hart, MD; Douglas C. Burton, MD; Vedat Deviren, MD; Christopher P. Ames, MD; International Spine Study Group
1UVA Health System, Charlottesville, VA, US; 2International Spine Study Group, Arvada, CO, US; 3Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 4University of Virginia, Charlottesville, VA, US; 5Hospital for Special Surgery, New York, NY, US; 6Scripps Clinic Medical Group, Department of Orthopedics, La Jolla, CA, US; 7University of California, San Diego, San Diego, CA, US; 8UC Davis School of Medicine, Sacramento, CA, US; 9Washington University School of Medicine, St. Louis, MO, US; 10Warren Alpert Medical School of BU/RH Hospital, Providence, RI, US; 11Washington University, St. Louis, MO, US; 12Norton Leatherman Spine Center, Louisville, KY, US; 13Vancouver Spine Surgery Institute, Vancouver, BC, Canada; 14NP Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 15Oregon Health & Science University, Portland, OR, US; 16University of Kansas Medical Center, Kansas City, KS, US; 17University of California, San Francisco, San Francisco, CA, US; 18Brighton, CO, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P135. Outcomes of Operative Treatment for Adult Cervical Deformity: A Prospective Multicenter Assessment with One-Year Follow-Up

Justin S. Smith, MD, PhD1; Christopher I. Shaffrey, MD2; Han Jo Kim, MD3; Gregory M. Mundis Jr., MD4; Munish C. Gupta, MD5; Eric O. Klineberg, MD6; Frank J. Schwab, MD7; Virginie Lafage, PhD8; Renaud Lafage, MSc9; Peter G. Passias, MD10; Themistocles S. Protopsaltis, MD11; Brian J. Neuman, MD12; Tamir Ailon, MD, MPH13; Alan H. Daniels, MD14; Justin K. Scheer, BS15; Breton Line, BS16; Alexandra Sorocceanu, MD, MPH17; Khaled M. Kebaish, MD18; Robert A. Hart, MD19; Michael O’Brien20; Douglas C. Burton, MD21; Vedat Deviren, MD22; Todd J. Albert, MD1; K. Daniel Riew, MD23; Shay Bess, MD24; Christopher P. Ames, MD25; International Spine Study Group26

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FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P136. Quality of Life Outcomes Following Surgical Management of Coexistent Parkinson’s Disease and Cervical Spondylotic Myelopathy

Roy Xiao1; Jacob Miller, BS2; Daniel Lubelski, MD3; Thomas E. Mroz, MD4; Edward C. Benzel, MD5; Aijit A. Krishnaney, MD6; Andre Machado, MD7

1Cleveland Clinic Foundation, Cleveland, OH, US; 2Johns Hopkins Hospital, Department of Neurosurgery, Baltimore, MD, US; 3Cleveland Clinic Foundation, Departments of Orthopaedic and Neurological Surgery, Cleveland, OH, US; 4Cleveland Clinic, Cleveland, OH, US; 5Beachwood, OH, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P137. Comparative Analysis of Intraoperative Complications Between a Multicenter Prospective Cervical Deformity Database versus a Nationwide Sample

Cyrus M. Jalali, BA1; Peter G. Passias, MD2; Gregory W. Poorman, BA3; Justin S. Smith, MD, PhD4; Justin K. Scheer, BS5; Daniel M. Sciubba, MD6; D. Kojo Hamilton, MD7; Gregory M. Mundis Jr., MD8; Eric O. Klineberg, MD9; Virginie Lafage, PhD10; Christopher I. Shaffrey, MD11; Christopher P. Ames, MD12; International Spine Study Group13

1Hospital for Joint Diseases at NYU Langone Medical Center, New York, NY, US; 2NY Spine Institute, NYU Medical Center Hospital for Joint Diseases, New York, NY, US; 3UVA Health System, Charlottesville, VA, US; 4University of California, San Diego, San Diego, CA, US; 5John Hopkins University School of Medicine, Baltimore, MD, US; 6University of Pittsburgh School of Medicine, Pittsburgh, PA, US; 7Scripps Clinic Medical Group, Department of Orthopedics, La Jolla, CA, US; 8UC, Davis School of Medicine, Sacramento, CA, US; 9Hospital for Special Surgery, New York, NY, US; 10University of Virginia, Charlottesville, VA, US; 11University of California, San Francisco, CA, US; 12University of Virginia, Charlottesville, VA, US; 13University of California, San Francisco, CA, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P138. Comparison of Frailty Based on Cervical and Global SVA Classification

Emily Miller, BA1; Brian J. Neuman, MD2; Daniel M. Sciubba, MD3; Justin K. Scheer, BS4; Justin S. Smith, MD, PhD5; Gregory M. Mundis Jr., MD6; Alan H. Daniels, MD7; Amit Jain, MD8; Tamir Ailon, MD, MPH9; Khaled M. Kebaish, MD10; Frank J. Schwab, MD11; Virginie Lafage, PhD12; Eric O. Klineberg, MD13; Christopher P. Ames, MD14; International Spine Study Group15

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FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P139. Does Myelopathy or Alignment Improvement Drive Acute Postoperative Outcomes in Cervical Deformity Patients?

Peter G. Passias, MD1; Cyrus M. Jalali, BA2; Justin S. Smith, MD, PhD3; Gregory W. Poorman, BA4; Themistocles S. Protopsaltis, MD5; Brian J. Neuman, MD6; Daniel M. Sciubba, MD7; Bassel G. Diebo, MD8; Renaud Lafage, MSc9; Virginie Lafage, PhD9; Christopher P. Ames, MD10; Christopher I. Shaffrey, MD11; International Spine Study Group12


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P140. Tandem Stenosis: Should the Cervical Spine Always Be Addressed First?

Christopher G. Furey, MD1; Katherine Sadowski, BS2; Arya Ahmady, BS3; Nicholas U. Ahn, MD4

1Case Western Reserve University, Cleveland, OH, US; 2Cleveland, OH, US; 3Case Western Reserve University School of Medicine, Cleveland, OH, US; 4University Hospital of Cleveland, Department of Orthopedic Surgery, Cleveland, OH, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P141. Influence of Demineralized Bone Matrix on Clinical and Radiological Outcome in Anterior Cervical Discectomy and Fusion

Ehab Shibani, MD1; Bernhard Meyer, MD2; Jens Lehmbreg, MD3

1Neurosurgery Department, Munich, Germany; 2Munich, Germany

FDA Device/Drug Status: Approved for this indication.
P142. Development of an Inventory to Measure Dysphagia and Dysphonia after Cervical Spine Surgery

Alexander P. Hughes, MD; Andrew A. Sama, MD; Federico P. Girardi, MD; Frank P. Cammissa, MD; Ashutosh Kacker, MD; Lukas P. Lampe, MD; Oliver Sax; Jennifer Shue, MS; Mohamed A. Moawad, BA; Janina Kueper; Carol A. Mancuso, MD

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P143. Analysis of Early Distal Junctional Kyphosis (DJK) after Cervical Deformity Correction

Themistocles S. Protopsaltis, MD; Subaraman Ramchandran, MBBS; Han Jo Kim, MD; Brian J. Neuman, MD; Emily Miller, BA; Peter G. Passias, MD; Alexandra Sorocceanu, MD, MPH; Virginie Lafage, PhD; Renaud Lafage, MSC; Munish C. Gupta, MD; Robert A. Hart, MD; Justin S. Smith, MD, PhD; Frank J. Schwab, MD; Shay Bess, MD; Christopher I. Shaffrey, MD; Christopher P. Ames, MD; International Spine Study Group

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P144. The Routine Use of Intraoperative Neuromonitoring During ACDFs for the Treatment of Spondylotic Myelopathy and Radiculopathy is Questionable: A Review of 17304 Cases

Remi M. Ajiboye, MD, MPH; Anthony D’Oro, BA; Rafael A. Buerba, MD; Stephen Zoller, MD; Adedayo O. Ashana, MD; Zorica Buser, PhD; Jeffrey C. Wang, MD; Sina Pourtaheri, MD

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P145. Preoperative Opioid Therapy Affects Return to Work Status after Multilevel Cervical Fusion for Radiculopathy in a Workers’ Compensation Setting

Mhamad Faour, MD; Joshua T. Anderson; Nicholas U. Ahn, MD

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P146. Evaluation of Online Anterior Cervical Discectomy and Fusion Patient Education Materials

William W. Long, BA; Krishna Modi, BS; Fady Y. Hijji, BS; Ankur S. Narain, BA; Dustin H. Massel, BS; Benjamin Mayo, BA; Kern Singh, MD

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P147. Inpatient Pain Among Worker’s and Non-Worker’s Compensation Patients Following Anterior Cervical Disectomy and Fusion

Dustin H. Massel, BS; Benjamin Mayo, BA; Fady Y. Hijji, BS; Ankur S. Narain, BA; Krishna Modi, BS; William W. Long, BA; Khaled A. Aboushaala, MD, MS; Kern Singh, MD

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P148. Indications for Direct Laryngoscopic Examination of Vocal Cord Function Prior to Anterior Cervical Surgery

Anirudh K. Gowd; Alireza K. Nazerni, MS; Jonathan J. Carmouche, MD; Todd J. Albert, MD; Caleb J. Behrend, MD

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P149. There is Not an Increased Risk of Adjacent Segment Disease at the Cervico-Thoracic Junction Following an Anterior Cervical Disectomy and Fusion to C7

Philip Louie, MD; Steven M. Presciutti, MD; Stephanie Lantorno, BA; Daniel D. Bohl, MD, MPH; Grant Shifflett, MD; Howard S. An, MD

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P150. The Effect of Smoking Status on Inpatient Pain Scores Following Anterior Cervical Disectomy and Fusion

Benjamin Mayo, BA; Dustin H. Massel, BS; Ankur S. Narain, BA; Fady Y. Hijji, BS; Krishna Modi, BS; William W. Long, BA; Khaled A. Aboushaala, MD, MS; Bryce Basques, MD, MHS; Kern Singh, MD

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P151. Predictive Model for Patient-Centered Efficacy of Elective Spine Surgery for Degenerative Cervical Disease
Ahilan Sivaganesan, MD; Silky Chotai, MD; Scott L. Parker, MD; Matthew J. McGirt, MD; Clinton J. Devin, MD
1Vanderbilt University Medical Center, Nashville, TN, US; 2Vanderbilt University, Nashville, TN, US; 3Carolina Neurosurgery & Spine Associates, Charlotte, NC, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P152. Racial Disparity in Total Hospital Length of Stay for Adults Undergoing Elective ACDF
Parth Kothari, BS; Nathan J. Lee, BS; Javier Guzman, MD; Jeremy Steinberger, MD; Branko Skovrlj, MD; Dante M. Leven, DO, PT; Samuel K. Cho, MD
1Mount Sinai School of Medicine, New York, NY, US; 2New York, NY, US; 3Mount Sinai School of Medicine, Department of Neurosurgery, New York, NY, US; 4Icahn School of Medicine at Mount Sinai, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P153. Age as a Risk Factor Following Anterior Cervical Discectomy and Fusion (ACDF)
Jun Kim, MD; Nathan J. Lee, BS; Parth Kothari, BS; Sulaiman Somani; John Di Capua, MHS, BS; Joung Heon Kim, BS; Dante M. Leven, DO, PT; Samuel K. Cho, MD
1Mount Sinai Medical Center, New York, NY, US; 2Mount Sinai School of Medicine, New York, NY, US; 3Icahn School of Medicine at Mount Sinai, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P154. Prospective, Eighty-Eight Patient Series Study of the Use of a Novel 3-D Printed Titanium Truss System Cage in Anterior Cervical Spinal Surgery
Tucker C. Callanan, BS; Brendon Walker, BS; Samuel Grinberg, BA; Frank P. Cammisa, MD; Celeste Abjornson, PhD
Hospital for Special Surgery, New York, NY, US
FDA Device/Drug Status: 4web Cervical Spine Truss System™ cage (Approved for this indication)

P155. ASA as a Risk Factor Following Anterior Cervical Discectomy and Fusion (ACDF)
Sulaiman Somani; John Di Capua, MHS, BS; Joung Heon Kim, BS; Jun Kim, MD; Dante M. Leven, DO, PT; Nathan J. Lee, BS; Parth Kothari, BS; Samuel K. Cho, MD
1Mount Sinai School of Medicine, New York, NY, US; 2Icahn School of Medicine at Mount Sinai, New York, NY, US; 3Mount Sinai Medical Center, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P156. Risk Factors for LOS Following Anterior Cervical Discectomy and Fusion (ACDF)
Joung Heon Kim, BS; Jun Kim, MD; Nathan J. Lee, BS; John Di Capua, MHS, BS; Dante M. Leven, DO, PT; Parth Kothari, BS; Sulaiman Somani; Samuel K. Cho, MD
1Icahn School of Medicine at Mount Sinai, New York, NY, US; 2Mount Sinai Medical Center, New York, NY, US; 3Mount Sinai School of Medicine, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P157. Return to Play in Contact Athletes Following Anterior Cervical Discectomy and Fusion: A Meta-Analysis
Steven J. McAnany, MD; Samuel C. Overley, MD; Steven Andelman, MD; Jun Kim, MD; Samuel K. Cho, MD; Sheeraz A. Qureshi, MD, MBA; Andrew Hecht, MD
1Mount Sinai Medical Center, New York, NY, US; 2Mount Sinai School of Medicine, New York, NY, US; 3Mount Sinai Hospital, New York, NY, US; 4Icahn School of Medicine at Mount Sinai, New York, NY, US; 5Mount Sinai Spine Center and Spine Hospital, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

Muhammad B. Janjua, MD; Jeffrey P. Greenfield, MD; Ali A. Baaj, MD; Anthony K. Frempong-Boadu, MD
1New York, NY, US; 2Presbyterian Hospital, Department of Neurological Surgery, New York, NY, US; 3Weill Cornell Medicine, Department of Neurological Surgery, New York, NY, US; 4NYU Medical Center, Department of Neurosurgery, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P159. A Comparison of Geriatric and Non-Geriatric Patient Outcomes Following Extreme Lateral Interbody Fusion (XLIF)
Timothy Y. Wang; Ronnie Shammas, BS; Oren N. Gottfried, MD; Luiz Pimenta, MD, PhD; Christopher Brown, MD; Robert E. Isaacs, MD
1Duke University Medical Center, Durham, NC, US; 2Durham, NC, US; 3Duke University, Durham, NC, US; 4IPC, Sao Paulo, SP, Brazil; 5Duke University Medical Center, Raleigh, NC, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

Shearwood McClelland III, MD; Jeffrey A. Goldstein, MD, FACS
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FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P161. Postoperative Complications in Patients Undergoing Minimally Invasive Sacroiliac Fusion

Kyle Schoell1; Zorica Buser, PhD2; Andre Jakoi, MD3; Martin H. Pham, MD4; Neil N. Patel, MD4; John C. Liu, MD5; Patrick C. Hsieh, MD, MS6; Jeffrey C. Wang, MD6
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FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P162. Multiple Patient Reported Allergies are Associated with Worse Outcomes Following Lumbar Spine Surgery

Christopher Graves, MD1; Leah Y. Carreon, MD, MSc2; Borys Gvozdyev, MD2; Stephanie Riley, BS3; Jeffrey L. Gum, MD4; Steven D. Glassman, MD5
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FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P163. Inpatient Outcomes in Dialysis Dependent Patients Undergoing Elective Lumbar Surgery for Degenerative Lumbar Disease

Andrew S. Chung, DO1; Joshua W. Hustedt, MD2; Neil Olmsscheid, BA3; Norman B. Chutkan, MD, FACS4
1University of Arizona College of Medicine - Phoenix, Orthopedic Surgery Residency, Phoenix, AZ, US; 2Yale University School of Medicine, New Haven, CT, US; 3Glendale, AZ, US; 4The CORE Institute, Phoenix, AZ, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P164. The Total Cost to the Healthcare System for the Treatment of Spinal Stenosis with and without Spondylolisthesis

Christopher K. Kepler, MD, MBA1; Gregory D. Schroeder, MD2; Mark F. Kurd, MD3; Alan S. Hillbrand, MD4; Jeffrey A. Rihn, MD5; Kris E. Radcliff, MD6; Barrett Woods, MD6; Tyler Kreitz, MD6; David Casper, MD7; Jason W. Savage, MD8; D. Greg Anderson, MD9; Alexander R. Vaccaro, MD, PhD10

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P165. Assessment of a Novel Adult Spinal Deformity (ASD) Frailty Index (ASD-FI) to Assist with Risk Stratification for ASD Surgery

Emily Miller, BA1; Amit Jain2; Alan H. Daniels, MD3; Brian J. Neuman, MD4; Alexandra Sorocoeanu, MD, MPH5; Tamir Ailon, MD, MPH6; Daniel M. Scibba, MD7; Shayan Bess, MD7; Breton Line, BS8; Virgina Lafage, PhD9; Justin K. Scheer, BS10; Khaled M. Kebaish, MD11; Justin S. Smith, MD, PhD12; Christopher P. Ames, MD13; International Spine Study Group


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P166. Recovery Kinetics of Radiographic and Implant-Related Revision Patients Following Adult Spinal Deformity Surgery

Peter G. Passias, MD1; Cyrus M. Jalai, BA2; Virginie Lafage, PhD3; Justin K. Scheer, BS4; D. Kojo Hamilton, MD6; Breton Line, BS7; Shayan Bess, MD8; Frank J. Schwab, MD9; Christopher P. Ames, MD10; Douglas C. Burton, MD11; Robert A. Hart, MD12; Eric O. Klineberg, MD13; International Spine Study Group
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FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P167. The Influence of Sub-Diagnosis on Radiographic and Clinical Outcomes after Lumbar Fusion for Degenerative Disc Disorders: A 15-Year Meta-Analysis

Amandeep Bhalla, MD1; Andrew J. Schoenfeld, MD2; Jaiben George, MD3; Christopher M. Bono, MD4
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FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P168. Predictors of Return to Work after Lumbar Fusion for Degenerative Disc Disease in Workers’ Compensation Subjects

Joshua T. Anderson1; Erik Tye, BA2; Arnold Haas, BS3; Nicholas U. Ahn, MD4
1Cleveland Heights, OH, US; 2Case Western Reserve University School of Medicine, Cleveland, OH, US; 3Ohio Bureau of Worker’s Compensation, Columbus, OH, US; 4University Hospital of Cleveland, Department of Orthopedic Surgery, Cleveland, OH, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P169. Prognostic Factors for Return to Work Status Following Lumbar Fusion Among Workers’ Compensation Subjects with Spondylolisthesis
Joshua T. Anderson¹; Jay M. Levin, BA²; Arnold Haas, BS³; Nicholas U. Ahn, MD⁴
¹Cleveland Heights, OH, US; ²University Hospital Case Medical Center, Department of Orthopaedic Surgery, Cleveland, OH, US; ³Ohio Bureau of Worker’s Compensation, Columbus, OH, US; ⁴University Hospital of Cleveland, Department of Orthopedic Surgery, Cleveland, OH, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P170. Multilevel Lumbar Fusion is Associated with Lower Return to Work Rates Among Workers’ Compensation Subjects with Degenerative Disc Disease
Joshua T. Anderson¹; Jeffrey A. O’Donnell, BS²; Arnold Haas, BS³; Nicholas U. Ahn, MD⁴
¹Cleveland Heights, OH, US; ²University Hospitals Case Medical Center, Department of Orthopaedic Surgery, Cleveland, OH, US; ³Ohio Bureau of Worker’s Compensation, Columbus, OH, US; ⁴University Hospital of Cleveland, Department of Orthopedic Surgery, Cleveland, OH, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

Francis H. Shen, MD¹; Varun Puvanesarajah, BS²; Hamid Hassanzadeh, MD³; Rosemarie Tyger, PA-C⁴; Rebecca Lehman, PA-C⁵; Anuj Singla, MD⁶; Adam L. Shimer, MD⁷
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FDA Device/Drug Status: Approved for this indication.

P172. Operative versus Nonoperative Treatment for Sagittal Deformities Characterized by Loss of Lumbar Lordosis with Normal Sagittal Vertical Axis
Craig D. Steiner, MD¹; Jensen Henry, BA²; Bassel G. Diebo, MD³; Justin S. Smith, MD, PhD⁴; Ashish Patel, MD⁵; Christopher I. Shaffrey, MD⁶; Christopher P. Ames, MD⁷; Gregory M. Mundis, Jr., MD⁸; Douglas C. Burton, MD⁹; Shay Bess, MD¹⁰; Jeffrey L. Gum, MD¹¹; Frank J. Schwab, MD¹²; Virginie Lafage, PhD¹³; Han Jo Kim, MD¹⁴; International Spine Study Group¹⁵
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FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P173. Lumbar Hybrid Surgery with Total Disc Replacement at One Level and Fusion at the Adjacent Level: Does Fusion Type Impact Outcome?
Scott L. Blumenthal, MD¹; Richard D. Guyer, MD²; Jack E. Zigler, MD³; Donna D. Ohnmeiss, PhD⁴
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FDA Device/Drug Status: Charite and ProDisc-L (Not approved for this indication)

P174. Longitudinal Assessment of Robotic-Assisted Spine Surgery: Accuracy and Improvements in Efficiency
Dennis Devito, MD¹; Meagan Fernandez, DO²; Daniel J. Blizzard, MD³
¹Children’s Orthopedics of Atlanta, Atlanta, GA, US; ²Geisinger Medical Center, Danville, PA, US; ³Duke University, Durham, NC, US
FDA Device/Drug Status: SpineAssist (Mazor Robotics, Ltd., Israel) (Approved for this indication)

P175. Can Surgical Innovation Decrease Operative Time, Surgeon Variability and Surgical Morbidity in AIS Surgery: A Study of Operative Efficiency
Baron S. Lonner, MD¹; Yuan Ren, PhD, MSc²; Gabrielle Kassin, BS³
¹Mount Sinai Beth Israel Medical Center, New York, NY, US; ²Mount Sinai Beth Israel, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P176. Transcranial Motor-Evoked Potentials for Prediction of Postoperative Neurologic Deficit Following Surgery for Thoracolumbar Scoliosis
Samuel Miller, BS¹; Sean Donegan²; Niesha Voigt, BA³; Adam Eltorai, BA⁴; Alan H. Daniels, MD⁵; Teena Shetty, MD⁶
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FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P177. Supine Radiographs Outperform Standing Radiographs in Predicting Postoperative Alignment of Unfused Thoracic Segments
Ashish Patel, MD¹; Jeffrey Varghese, BS²; Barthelemy Liabaud, MD; Bassel G. Diebo, MD; Renaud Lafage, MSc; Frank J. Schwab, MD; Virginie Lafage, PhD; Han Jo Kim, MD
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FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P178. Short (Two Weeks) versus Long (Six Weeks) Postoperative Restrictions Following Lumbar Discectomy: A Prospective Randomized Control Study
Christopher M. Bono, MD1; Andrew J. Schoenfeld, MD1; Dana A. Leonard, BA1; Kirkham B. Wood, MD1; Mitchel Harris, MD, FACS1
1Brigham and Women’s Hospital, Boston, MA, US; 2Stanford University School of Medicine, Redwood City, CA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P179. Predictive Model for Return to Work after Elective Surgery for Lumbar Degenerative Disease: An Analysis from National Neurosurgery Quality Outcomes Database Registry
Kristin Archer, PhD, DPT1; Clinton J. Devin, MD1; Silky Chotai, MD1; Mohamad Bydon, MD1; Matthew J. McGirt, MD1; Hui Nian4; Frank E. Harrell Jr., PhD1; Anthony L. Asher, MD1
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P180. Minimally Invasive Lateral Lumbar Interbody Fusion (LLIF) versus Transforaminal Lumbar Interbody Fusion (TLIF): Patient Centered Results
David C. Briski, MD1; Brandon W. Cook, MD2; Joseph M. Zavatsky, MD3
1Ochsner Medical Center, Jefferson, LA, US; 2Ochsner Foundation Clinic, Jefferson, LA, US; 3Spine & Scoliosis Specialists, Tampa, FL, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P181. Fluoroscopy and Surgery Times in Freehand Open, Freehand Minimally Invasive and Robotic Minimally Invasive, Short and Long Fusions
Thomas M. Sweeney II, MD, PhD1; Tan D. Ly, DO2
1Southeastern Spine Center & Research Institute, Sarasota, FL, US; 2Southeastern Spine Center, Sarasota, FL, US
FDA Device/Drug Status: Mazor Robotics Renaissance (Approved for this indication)

P182. Efficacy of Liposomal Bupivacaine for Postoperative Pain after Spine Surgery
Jonathan Hughes, MD1; Christopher D. Chaput, MD2; Yolanda Munoz Maldonado, PhD1; Mark D. Rahm, MD3
1Baylor Scott and White, Temple, TX, US; 2Scott & White Hospital, Temple, TX, US; 3Baylor Scott and White Health, Temple, TX, US
FDA Device/Drug Status: EXPAREL, Pacira Pharmaceuticals, Inc, Parsippany, NJ, USA: Approved for this indication.

P183. The Importance of Sagittal Alignment in Correcting Thoracolumbar Coronal Curves to Avoid Flattening of Thoracic Kyphosis
Shyam Kishan, MD1; Karl E. Rathjen, MD1; Dennis R. Knapp Jr., MD1; Mark D. Rahm, MD1; Stewart Tucker, FRCS, MBBS1; Matthew E. Cunningham, MD, PhD1; Virginie Lafage, PhD1; Renaud Lafage, MSc1; Hongda Bao, MD1; Oheneba Boachie-Adjei, MD1
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FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P184. Effects of Intraoperative Anesthetic Medications on Postoperative Urinary Retention after Single Level Lumbar Fusion
Benjamin Mayo, BA1; Philip Louie, MD1; Daniel D. Bohl, MD, MPH1; Junyoung Ahn1; Ehsan Tabarreae, MD1; Dustin H. Massel, BS1; Fady Y. Hijji, BS1; Ankur S. Narain, BA1; Krishna Modi, BS1; William W. Long, BA1; Kern Singh, MD1
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FDA Device/Drug Status: Phenylephrine: Approved for this indication. Neostigmine: Approved for this indication.

P185. Assessing Online Patient Education Readability for Lumbar Fusion Procedures
Krishna Modi, BS1; William W. Long, BA1; Benjamin Mayo, BA1; Dustin H. Massel, BS1; Ankur S. Narain, BA1; Fady Y. Hijji, BS1; Kern Singh, MD1
1Rush University Medical Center, Chicago, IL, US; 2UCSF, San Francisco, CA, US; 3Midwest Orthopaedics at Rush, Chicago, IL, US; 4Department of Orthopaedic Surgery Rush University Medical Center, Chicago, IL, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P186. Lower Narcotic Dose and Higher Inpatient Pain Scores Lead to Longer Hospital Stays Following Transforaminal Lumbar Interbody Fusion
Benjamin Mayo, BA1; Dustin H. Massel, BS1; Daniel D. Bohl, MD, MPH1; Ankur S. Narain, BA1; Fady Y. Hijji, BS1; William W. Long, BA1; Krishna Modi, BS1; Kern Singh, MD1
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FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P187. Segmental Range of Motion Preservation Following Lumbar Total Disc Replacement: Post Hoc Analysis of a Randomized Controlled IDE Trial
Rolando Garcia Jr., MD, MPH; James J. Yue, MD
1Orthopedic Care Center, Aventura, FL, US; 2Yale University School of Medicine, Department of Orthopaedic Surgery, New Haven, CT, US

FDA Device/Drug Status: Activ L (Approved for this indication), Prodisc L (Approved for this indication)

P188. Number of Major Complications as a Predictor for Mortality and Length of Stay in Elective Anterior Lumbar Fusion (ALF) in ACS NSQIP
Nathan J. Lee, BS; Jun Kim, MD; Dante M. Leven, DO, PT; John Di Capua, MHS, BS; Sulaiman Somani; Joung Heon Kim, BS; Parth Kothari, BS; Samuel K. Cho, MD
1Mount Sinai School of Medicine, New York, NY, US; 2Mount Sinai Medical Center, New York, NY, US; 3Icahn School of Medicine at Mount Sinai, New York, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P189. Number of Major Complications as a Predictor for Mortality and Length of Stay in Elective Posterior Lumbar Fusion (PLF) in ACS NSQIP
John Di Capua, MHS, BS; Joung Heon Kim, BS; Sulaiman Somani; Parth Kothari, BS; Nathan J. Lee, BS; Jun Kim, MD; Dante M. Leven, DO, PT; Samuel K. Cho, MD
1Icahn School of Medicine at Mount Sinai, New York, NY, US; 2Mount Sinai Medical Center, New York, NY, US; 3Mount Sinai School of Medicine, New York, NY, US; 4Mount Sinai Medical Center, New York, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P190. Bone Morphogenetic Protein-2 in Adult Spinal Deformity Surgery: A Meta-Analysis
Gregory W. Poorman, BA; Cyrus M. Jalai, BA; Anthony J. Boniello, BS; Nancy Worley, MS, BA; Shearwood McClelland III, MD; Peter G. Passias, MD
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FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P191. Return to Play in Adolescent Athletes with Symptomatic Spondylolysis without Lisfranc: A Meta-Analysis
Samuel C. Overley, MD; Steven J. McAnany, MD; Steven Andelman, MD; Jun Kim, MD; Samuel K. Cho, MD; Sheeraz A. Qureshi, MD, MBA; Andrew Hecht, MD
1Mount Sinai School of Medicine, New York, NY, US; 2Mount Sinai Medical Center, New York, NY, US; 3Mount Sinai Hospital, New York, NY, US; 4Icahn School of Medicine at Mount Sinai, New York, NY, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P192. Efficacy and Safety of Riluzole in Acute Spinal Cord Injury (SCI): Rationale and Design of AOSpine Phase III Multicenter Double Blinded Randomized Controlled Trial (RISCIS)
Michael G. Fehlings, MD, PhD, FRCSC; Branko Kopjar, MD, PhD; Robert G. Grossman, MD
1Toronto Western Hospital, Toronto, ON, Canada; 2University of Washington, Seattle, WA, US; 3The Methodist Hospital, Houston, TX, US

FDA Device/Drug Status: Riluzole: This abstract discusses an FDA approved drug in the off-label indication. (Not approved for this indication)

P193. The Effect of Chronic Liver Disease on Acute Outcomes Following Cervical Spine Trauma
Andrew J. Schoenfeld, MD; Christopher M. Bono, MD; Mitchell Harris, MD, FACS; James D. Kang, MD
Brigham and Women’s Hospital, Boston, MA, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P194. One-Year Follow-Up Clinical and Radiological Results of Two Different Percutaneous Procedures for the Treatment of Vertebral Compression Fractures: A Randomized Comparative Prospective Study
Francisco Ardura, PhD, MD; David C. Noriega, PhD; Ruben Hernandez Ramajo, PhD; Borja Toribio Calvo, PhD, ACNP-BC; Israel Sánchez Lite, PhD
1Valladolid University Clinic Hospital, Valladolid, Spain; 2Valladolid, Spain; 3University Clinical Hospital Valladolid, Valladolid, Spain; 4Hospital Clínico Universtario Valladolid, Valladolid, Spain; 5Hospital Clinic Valladolid, Valladolid, Spain

FDA Device/Drug Status: Expansive intravertebral implant Spinejack, Vexim SA, France (Investigational/Not approved), kyphon balloon kyphoplasty, Medtronic, USA (Approved for this indication)
**P195. Guidelines for the Management of Patients with Spinal Cord Injury: The Type and Timing of Rehabilitation**

Anthony Burns, MD, MSc; Jefferson Wilson, MD, PhD; Bizhan Aarabi, MD, FACS, FRCS(C); Paul A. Anderson, MD; Darrel S. Brodke, MD; Kazuhiro Chiba, MD, PhD; Joseph R. Dettori, MPH, PhD; Julio C. Furlan, MD, PhD, MBA; James S. Harrop, MD; Langston T. Holly, MD; Susan Howley; Tara Jeji, MD; Sukhvinder Kalsi-Ryan PT, MS, PhD; Mark Kotter, MD, PhD; Brian K. Kwon, MD, PhD, FRCS(C); Ralph Marino, MD, MS; Allan Martin, MD; Eric M. Massicotte, MD, FRCS(C); Geno Merli, MD; James Middleton, MBBS, PhD; Hiroaki Nakashima, MD, PhD; Narihito Nagoshi, MD, PhD; Katherine Palmieri, MD, MBA; Mohammed F. Shamji, MD, PhD, FRCS(C); Anoushka Singh, PhD; Andrea C. Skelly, PhD, MPH; Lindsay Tetreault, PhD; Albert J. Yee, MD, FRCS(C); Michael G. Fehlings, MD, PhD, FRCS(C);

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**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

**P196. Traumatic Cervical Spine Injuries in Older Adults**

Anthony Asemota, MD

Baltimore, MD, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

**P197. Operative Management of Combat Spine Trauma**

Scott Wagner, MD; Daniel G. Kang, MD; Theodore Steelman, MD; Ronald A. Lehman Jr., MD

1 Walter Reed National Military Medical Center, Bethesda, MD, US; 2 Madigan Army Medical Center, Tacoma, WA, US; 3 The Spine Hospital, Columbia University/New York Presbyterian, New York, NY, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

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**Amirfeldan, Kasa:** Consulting: St. Jude Medical (Amount not disclosed); Speaking and/or Teaching Arrangements: Saluda (Amount not disclosed); Trips/Travel: Nuel Medical (Amount not disclosed); Scientific Advisory Board: Mesoblast (Amount not disclosed), Nevro (Scientific Advisory Board), Nuel Medical (Scientific Advisory Board).

**Ammerman, Joshua M.:** Consulting: Medtronic (Amount not disclosed); Speaking and/or teaching arrangements: Benvenuto (Amount not disclosed); Scientific Advisory Board: Benvenuto (Amount not disclosed).

**An, Howard S.:** Royalties: U&I (C), Zimmer Spine (B); Stock Ownership: U&I (<1%), Spinal Kinetics (<1%), Medyssey (<1%); Consulting: Bioventus (B); Board of Directors: Articular Engineering (21%); Scientific Advisory Board: Spinal Kinetics (<1%); Endowments: Rush University Medical Center (D, Paid directly to institution/employer); Research Support - Staff and/or Materials: Yuhan (E, Paid directly to institution/employer); Grants: SpinalCyte (F, Paid directly to institution/employer); Fellowship Support: AOSpine (E, Paid directly to institution/employer).

**Anand, Neel:** Royalties: Medtronic (F), NuVasive (D), Globus Medical (C); Stock Ownership: Globus (Amount not disclosed), Medtronic (Amount not disclosed); Private Investments: Paradigm Spine (<1%), Bonovo Orthopaedics (<1%), Pearl Diver (<1%), Theracel (<1%); Consulting: NuVasive (None); Speaking and/or Teaching Arrangements: Medtronic (B); Trips/Travel: Medtronic (Amount not disclosed); Scientific Advisory Board: Globus Medical (None).

**Anderson, D. Greg:** Royalties: DePuy Synthes Spine (F); Stock Ownership: ISD (18%); Consulting: DePuy Synthes Spine (C); Speaking and/or Teaching Arrangements: DePuy Synthes Spine (C), Trips/Travel: DePuy Synthes Spine (B), Board of Directors: Society of Minimally Invasive Spine Surgery (None), Scientific Advisory Board: ISD (None); Other Office: Society for Minimally Invasive Spine Surgery (Chairman).

**Anderson, Paul A.:** Royalties: Stryker (C), Pioneer/RTI (C); Stock Ownership: Pioneer (<1%), Titan Surgical (<1%), Expanding Orthopedics (<1%), Stryker (<1%); Consulting: Pioneer (None), Aesculap (C); Scientific Advisory Board: SI-BONE (Stock option); Other: JBJS Deputy Editor (B).

**Andersson, Gunnar B.:** Stock Ownership: Biomimicry (<1%), Bonovo Orthopaedics (<1%), Crosstrees Biomedical (<1%), Ouroboros (<1%); Sparteck Medical (30,000 Shares), Spinal Kinetics (150,000 Shares); Private Investments: Ascent Biomedical (<1%); Consulting: Zimmer (None); Board of Directors: International Society for the Advancement of Spine Surgery (None), International Society for the Study of the Lumbar Spine (None); Scientific Advisory Board: Zimmer (None), ISTO technologies (B), BioSET (None), Ouroboros (None), Sparteck Medical (Stock options), Spinal Kinetics (Stock options), United Healthcare (A).

**Ardura, Francisco:** Consulting: Vexim S.A. (B, Paid directly to institution/employer); Neo Medical S.A. (B, Paid directly to institution/employer); Speaking and/or Teaching Arrangements: Vexim S.A. (B, Paid directly to institution/employer); Relationships Outside the One-Year Requirement: Vexim S.A. (Research Support: Investigator Salary, Dissolved 12/2014, C).

**Arnold, Paul M.:** Stock Ownership: Z-Plasty (<1%); Private Investments: Z-Plasty (<1%); Consulting: Stryker Spine (D), Medtronic Sofamor Danek (C), FioMed (C); Speaking and/or Teaching Arrangements:
<table>
<thead>
<tr>
<th>Name</th>
<th>Royalties/Other Relationships</th>
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<tr>
<td>Asher, Anthony L.</td>
<td>Aesculap (F), Medtronic (E), Eli Lilly (D), Vexim (C), Speaking and/or Teaching Arrangements:</td>
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<td>Medtronic (E), Eli Lilly (D), Trips/Travel: Medtronic (B), Vexim (B), Benvenue (B), Board of Directors: Vexim (C), Research Support - Investigator Salary: Alphatec Spine (D), Research Support - Staff and/or Materials: Benvenue (B).</td>
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<td>Aesculap (F), Medtronic (E), Eli Lilly (D), Vexim (C), Speaking and/or Teaching Arrangements: Medtronic (E), Eli Lilly (D), Trips/Travel: Medtronic (B), Vexim (B), Benvenue (B), Board of Directors: Vexim (C), Research Support - Investigator Salary: Alphatec Spine (D), Research Support - Staff and/or Materials: Benvenue (B).</td>
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<td>Beaulaurin, Jacques</td>
<td>Royalties: LDR Medical (E), Stock Ownership: LDRH (&lt;1%); Consulting: LDR Medical (B), Speaking and/or Teaching Arrangements: LDR Medical (None); Trips/Travel: LDR Medical (None).</td>
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<td>Bederman, S. Samuel</td>
<td>Royalties: SpineArt (D); Consulting: SpineArt (B), Ulrich Medical USA (B), Mazor Robotics (B), Vertebral Technologies (B).</td>
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<tr>
<td>Bejin, Brieta</td>
<td>Other Office: Zimmer Biomet Spine (Salary); Relationships Outside the One-Year Requirement: Zimmer Biomet Spine (Salary).</td>
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<td>Bellabarba, Carlo</td>
<td>Relationships Outside the One-Year Requirement: Synthes (B).</td>
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<td>Benzel, Edward C.</td>
<td>Stock Ownership: OrthoMEMS (&lt;1%); AxioMed (&lt;1%); Private Investments: AxioMed (&lt;1%); Consulting: Turning Point (1%); Speaking and/or Teaching Arrangements: DePuy (None); Scientific Advisory Board: OrthoMEMS (Amount not disclosed); Turning Point (Consulting disclosed).</td>
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<td>Berven, Sigurd H.</td>
<td>Royalties: Medtronic (F); Stock Ownership: Prospidyan (Stock options); Scientific Advisory Board: Medtronic (C), Paid directly to institution/employer), ISTO Technologies (C), Paid directly to institution/employer), Relevant Medsystems (D, Paid directly to institution/employer); Grants: CIRM (I).</td>
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<tr>
<td>Bess, Shay</td>
<td>Royalties: Pioneer (B); Consulting: K2M (B), AlloSource (B); Speaking and/or Teaching Arrangements: K2M (B); Trips/Travel: K2M (B); Scientific Advisory Board: AlloSource (B); Grants: DePuy Spine (B, Paid directly to institution/employer), Medtronic (A, Paid directly to institution/employer), K2 Medical (A, Paid directly to institution/employer), Innovasis (E, Paid directly to institution/employer), Biomet (D, Paid directly to institution/employer).</td>
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<td>Betz, Randal R.</td>
<td>Royalties: DePuy Spine (B), Medtronic (B); Stock Ownership: Abyrx (&lt;1%), Medovex (25000 Shares), MiMedx (31000 Shares), Advanced Vertebral Solutions (5000 Shares), SpineMedica (25000 Shares), SpineGuard (0%); Consulting: DePuy Synthes Spine (B), SpineGuard (B), Abyrx (B), Zimmer-Biomet (B), Globus Medical (B), Medtronic (B), Speaking and/or Teaching Arrangements: DePuy Spine (C), Scientific Advisory Board: DePuy Synthes Spine (B).</td>
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<td>Beuller, William</td>
<td>Royalties: Globus Medical (D), Aesculap (B); Stock Ownership: Globus Medical (&lt;1%); Consulting: Globus Medical (A), Carevature (A); Scientific Advisory Board: Globus Medical (A).</td>
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<td>Bhattacharya, N.</td>
<td>Royalties: Alphatec Spine (D), SeaSpine (E), Biomet (C), Stryker (C); Stock Ownership: Diffusion (&lt;1%); Consulting: Biomet Spine (B), Stryker Spine (A), Alphatec Spine (B), SeaSpine (B), SpineArt (E); Scientific Advisory Board: Diffusion (Stock option).</td>
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<td>Bloch, Daniel</td>
<td>Consulting: Pulmonx (B).</td>
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<td>Block, Andrew R.</td>
<td>Research Support - Staff and/or Materials: University of Minnesota Press (C, Paid directly to institution/employer).</td>
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<td>Blumenthal, Scott L.</td>
<td>Stock Ownership: FiozMed (&lt;1%); VertiFlex (&lt;1%); Centinel Spine (&lt;1%); Speaking and/or Teaching Arrangements: LDR (C), VertiFlex (B), Aesculap Spine (D); Scientific Advisory Board: Aesculap (B), FiozMed (None), VertiFlex (C).</td>
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Boachie-Adjei, Oheneba: Royalties: K2M (E), Weigao (E); Stock Ownership: K2M (E); Consulting: K2M (D), Weigao (D); Speaking and/or Teaching Arrangements: K2M (B), Weigao (B); Trips/Travel: K2M (B), Weigao (B).

Boloussa, Houssam: Scientific Advisory Board: K2M (C); Research Support - Staff and/or Materials: K2M (A); Fellowship Support: K2M (B).

Bohn, Daniel D.: Grants: CSRS (B, Paid directly to institution/employer).

Boissiere, Louis: Grants: DePuy Synthes (D, Paid directly to institution/employer).

Bono, Christopher M.: Royalties: Wolters Kluwer (B); Consulting: CRICO (B), United Health Care (B, Advisory Board); Board of Directors: North American Spine Society (D, President); Other Office: JAaos (B, Deputy Editor Stipend); Fellowship Support: OmegaD (D, Paid directly to institution/employer).


Bouloussa, Houssam: Consulting: EOS Imaging (A), ProvenMed Technologies (None); Speaking and/or Teaching Arrangements: EOS Imaging (A); Trips/Travel: EOS Imaging (B); Relationships Outside the One-Year Requirement: EOS Imaging (Trips/Travel, Dissolved 12/2014, B).

Boyko, Edward J.: Grant: VA Research & Development (G, Paid directly to institution).

Bransford, Richard J.: Speaking and/or Teaching Arrangements: Globus (B), Aospine North America (C); Grants: Synthes DePuy (B, Paid directly to institution/employer); Fellowship Support: DePuy Synthes (E, Paid directly to institution/employer); AO spine (E, Paid directly to institution/employer).

Bray, Robert S.: Royalties: RSB (None); Board of Directors: DISC Surgery Center Newport Beach (None), Diagnostic and Interventional Surgical Center (None); Other Office: Sca Physician Advisory Board (None).

Bridwell, Keith H.: Grants: NIH (F, Paid directly to institution/employer); Fellowship Support: Aospine North America (E, Paid directly to institution/employer).

Brooke, Darrel S.: Royalties: Amedica (F), DePuy Synthes (H), Medtronic (C); Stock Ownership: Amedica (<1%); Consulting: Amedica (A); Board of Directors: CSRS (None), Fellowship Support: Aospine (E, Paid directly to institution/employer).

Brooks, Nathaniel P.: Consulting: Medtronic Spine (C); Speaking and/or Teaching Arrangements: DePuy Synthes (B).

Bruss, Daniel: Royalties: Pearson Assessments (D, Paid directly to institution/employer); Scientific Advisory Board: Medtronic (B, Paid directly to institution/employer); Other Office: American Psychological Association (Travel expenses, Paid directly to institution/employer); Relationships Outside the One-Year Requirement: NASS (Speaking and/or Teaching Arrangement, Dissolved 10/2015, A), American Academy of Physical Medicine and Rehabilitation (Speaking and/or Teaching Arrangement, Dissolved 06/2015, A).

Buchowski, Jacob M.: Royalties: Wolters Kluwer Health (A), Globus Medical (D); Consulting: Advance Medical (E), Corelink (B), Glg Gerson Lehrman Group (A), Globus Medical (B), Medtronic (B); Speaking and/or Teaching Arrangements: Broadwater/vertical Health (A), DePuy (C), Globus Medical (B), Orthofix (C); Trips/Travel: Global Spine Tumor Study Group (Gstsg) (Travel expenses), Ao Foundation (Travel expenses), DePuy (Travel expenses), Medtronic (Travel expenses), Iagg (Travel expenses), Orthofix (Travel expenses); Board of Directors: CSRS (Board Member, Program Committee, Research Committee, Resident/fellow Grant Sub-committee Chair); Scientific Advisory Board: Aoa Investment Committee (None).

Bucklen, Brandon: Other Office: Globus Medical (Salary).

Burch, Shane: Consulting: Medtronic (B); Speaking and/or Teaching Arrangements: Medtronic (C); Scientific Advisory Board: Medtronic (B); Research Support - Staff and/or Materials: Lily (E, Paid directly to institution/employer); Fellowship Support: NuVasive (D, Paid directly to institution/employer); Globus (E, Paid directly to institution/employer).

Burke, Timothy A.: Stock Ownership: Custom Spine (13%, Paid directly to institution/employer).

Burkus, Douglas C.: Royalties: DePuy Synthes (C); Consulting: DePuy Synthes (B); Board of Directors: Kansas University Physicians (None), International Spine Study Group (None); Research Support - Investigator Salary: DePuy Spine (B).

Buser, Zorica: Consulting: Xencor Medical (B).

Cahill, Patrick J.: Consulting: DePuy Synthes Spine (B), Ellipse Technologies (B).

Camisa, Frank P.: Device or Biologic Distributorship (Physician-Owned Distributorship): Alphatec (B); Royalties: NuVasive (C); Stock Ownership: Alphatec Spine (88021 Shares), NuVasive (14580 Shares), Paradigm Spine (<1%); Small Bone Innovations (<1%); Spinal Kinetics (20000 Shares); Private Investments: Ivy Healthcare I and II (B), Woven Orthopedic Technologies (F), Royer Biomedical (E), Promethean Surgical Devices (D), Liventa Bioscience (E), BioAssets Development Corporation (Amount not disclosed); Bonovo Orthopedic (C), Healthpointcapital Partners (C), NuVasive (Common Shares), BI Members (C), Mff Systems (None), Viscogiosi Brothers Venture Partners III (C); Consulting: Alphatec Spine (B), Vertical Spine (Stock options), NuVasive (Common Shares), Paradigm Spine (Stock Ownership disclosed), DePuy Synthes (A), Spinal Partners III (Consulting disclosed), Spinal Kinetics (B); Scientific Advisory Board: Alphatec (Common Stock), Spine Partners III (Medical Advisory Board), Spinal Kinetics (Stock Options, Common Stock), Paradigm Spine (Stock Options), Healthpointcapital Partners (Private Investments disclosed), Ivy Healthcare Partners (Private Investments disclosed); Research Support - Staff and/or Materials: Spinal Kinetics (C, Paid directly to institution/employer), DePuy (E, Paid directly to institution/employer), Bacterin (F, Paid directly to institution/employer), Integra (F, Paid directly to institution/employer), NuTech (F, Paid directly to institution/employer), Vertical Spine (E, Paid directly to institution/employer); Fellowship Support: NuVasive (E, Paid directly to institution/employer).

Cannestra, Andrew F.: Royalties: Rti (A); Private Investments: TrueMotion Spine (<1%); Consulting: NuVasive (E), Amendia (F), DePuy (B), SpineGuard (B), Atlas (B), Mazor Robotics (C); Speaking and/or Teaching Arrangements: NuVasive (A); Research Support - Staff and/or Materials: Mazor (B).

Carl, Allen L.: Stock Ownership: Intrinsic Therapeutics (<1%); Consulting: K Spine (B); Scientific Advisory Board: Replication Medical (<1%); Research Support - Staff and/or Materials: DePuy (D, Paid directly to institution/employer).

Carragee, Eugene J.: Stock Ownership: Simpircia (<1%); Intrinsic Orthopedics (<1%); Board of Directors: North American Spine Society (Editor in Chief of the Spine Journal, Paid directly to institution/employer); Research Support - Investigator Salary: Kaiser - Nh grant (C, Paid directly to institution/employer); Fellowship Support: Orthopaedic Education Research Foundation (Oref) (E, Paid directly to institution/employer), Ao foundation (E, Paid directly to institution/employer).

Carreon, Leah Y.: Trips/Travel: University of Louisville (B), Center for Spine Surgery and Research, Region of Southern Denmark (B); Scientific Advisory Board: University of Louisville Institutional Review Board (University of Louisville Institutional Review Board), Scoliosis Research Society Research Committee (Scoliosis Research Society Committee).
Chang, Michael S.; Cha, Thomas D.; Carrino, John A.; Chaput, Christopher D.; Chee, Ana; Chapman, Jens R.;}

- **Employer (B);** Fellowship Support: AOSpine (B, Paid directly to institution/employer).
- **Travel:** The Philosophical Breakfast Club (Travel expenses); Grants: NS Society (D, Paid directly to institution/employer).
- **Catchpole, Ken:** Device or Biologic Distributorship (Physician-Owned Distributorship): Medtronic (B, Paid directly to institution/employer); Speaking and/or Teaching Arrangements: Quality Improvement Niagara (B); Travel/Travel: The Philosophical Breakfast Club (Travel expenses); Grants: Medtronic (B).
- **Chen, Robert:** Consulting: Merz (B), Allergan (B); Trips/travel: Merz (B), Allergan (B); Grants: Medtronic (D, Paid directly to institution/employer).
- **Cheng, Joseph S.:** Board of Directors: North American Spine Society (Fellowship Policy Review Chair); Other Office: AANS/CNS (Council of State Neurosurgical Societies Recording Secretary).
- **Cheung, Kenneth M.:** Board of Directors: Scoliosis Research Society (Travel expenses); Research Support - Staff and/or Materials: Research Grants Council (F, Paid directly to institution/employer).
- **Chiba, Kazuhiro:** Consulting: Seikagaku (G, Paid directly to institution/employer), General Insurance Rating Organization of Japan (E), Health Insurance Claims Review & Reimbursement Services (F); Speaking and/or Teaching Arrangements: Astellas Pharmaceutical (F), Hisamitsu Pharmaceutical (F), Showa Yakuhin Kako (F), Pfizer Japan (F), Kaken Pharmaceutical (F); Trips/Travel: Seikagaku (F); Board of Directors: Japanese Society for Spine Surgery and related Research (Council Member), Cervical Spine Research Society Asia Pacific section (Board of Directors), Japanese Orthopedic Association (Council Member); Grants: Ministry of Health Labor and Welfare of Japan (B, Paid directly to institution/employer).
- **Chin, Kingsley R.:** Device or Biologic Distributorship (Physician-Owned Distributorship): SpineFrontier Device Company (B); Stock Ownership: North American Spine Society (None); Research Support - Staff and/or Materials: Swedish Neuroscience Institute (A, Paid directly to institution/employer).
- **Chin, Steven:** Royalties: Globus (C), Zimmer (C); Stock Ownership: Nevro (Amount not disclosed).
- **Chang, Michael S.:** Consulting: Stryker (C), SeaSpine (B), L&D (B), DePuy (B); Consulting and/or Teaching Arrangements: Stryker (B), Medtronic (B).
- **Chang, Victor:** Consulting: Globus Medical (C), DePuy Synthes (B); Consulting: Orthofix (B), Medtronic (B), Stryker (B); Research Support (Staff and/or Materials): Zimmer Biomet (B, Paid directly to institution/employer); Grants: OREF (D, Paid directly to institution/employer).
- **Chang, Victor:** Consulting: Globus Medical (C), DePuy Synthes (B); Consulting: Orthofix (B), Medtronic (B), Stryker (B); Research Support (Staff and/or Materials): Zimmer Biomet (B, Paid directly to institution/employer); Grants: OREF (D, Paid directly to institution/employer).
- **Chin, Kingsley R.:** Device or Biologic Distributorship (Physician-Owned Distributorship): SpineFrontier Device Company (A); Ownership: SpineFrontier (80%); Travel/Travel: SpineFrontier (B); Board of Directors: SpineFrontier (Stock Ownership disclosed); Other Office: Chief Executive Officer (Stock Options).
- **Cheung, Alexander C.:** Consulting: DePuy Spine (D), NuVasive Spine (B).
- **Chen, Charles H.:** Board of Directors: North American Spine Society (Evidence Compilation and Analysis Chair); Other Office: American Society of Neuroradiology (Finance Management Committee Chair).
- **Choi, David:** Other Office: Global Spine Tumour Study Group (E, Paid directly to institution/employer).
- **Choma, Theodore J.:** Stock Ownership: Gentis (1%); Consulting and/or Teaching Arrangements: AOSpine North America (B); Trips/Travel: AO North America (Travel expenses); Board of Directors: AOSpine North America (B, Treasurer); Scientific Advisory Board: Editor in Chief Global Spine Journal (A), Research Support - Staff and/or Materials: Swedish Neuroscience Institute (A, Paid directly to institution/employer); Travel/Travel: The Philosophical Breakfast Club (Travel expenses); Grants: North American Spine Society (D, Paid directly to institution/employer); Fellowship Support: AOSpine (F, Paid directly to institution/employer), K2M (F, Paid directly to institution/employer).
- **Chaput, Christopher D.:** Royalties: Globus (B), Face-Link (A); Consulting: Globus (B), Face-Link (B); Research Support - Staff and/or Materials: Medtronic (D, Paid directly to institution/employer), NuVasive (B, Paid directly to institution/employer).
- **Chaudhary, Saad B.:** Speaking and/or Teaching Arrangements: Medtronic (B), DePuy Synthes (B); Scientific Advisory Board: U & I Corporation (A).
- **Chee, Ana:** Grants: Yuhan Corp (F, Paid directly to institution/employer), SpinalClyde (F, Paid directly to institution/employer), North American Spine Society (D, Paid directly to institution/employer), AOSpine (F, Paid directly to institution/employer); Relationships Outside the One-Year Requirement: SpinalClyde (Grant, Dissolved 12/2012, E).
- **Chen, Di:** Grants: Amgen (E, Paid directly to institution/employer).
Coe, Jeffrey D.: Stock Ownership: Phygen (<1%), Implantium (3%). Alphatec (<1%); Consulting: NuVasive (None), SI-BONE (None), Benvenue Medical (C); Speaking and/or Teaching Arrangements: NuVasive (C), Providence Medical (B); Board of Directors: California Orthopaedic Association (None); Research Support - Staff and/or Materials: Medtronic, Sofamor Danek (B), SI-BONE (B).

Cordaro, Nick: Private Investments: Additive Innovations, LLC (100%); Board of Directors: Additive Innovations, LLC (D); Scientific Advisory Board: Additive Innovations, LLC (D); HT Medical LLC (6%); Other Office: Additive Innovations, LLC (D).

Coric, Domagoj: Royalties: Spine Wave (<1%), DiscGenics (<1%), Premia Spine (<1%); Consulting: Medtronic (c), Global Medical (F), United Healthcare (B), Spine Wave (C), Medtronic (C); Speaking and/or Teaching Arrangements: Global Medical (C), Spine Wave (C), Medtronic (B); Scientific Advisory Board: United Healthcare (B).

Côté, Pierre: Speaking and/or Teaching Arrangements: European Spine Society (B); Trips/Travel: European Spine Society (B); Paid directly to institution/employer; Scientific Advisory Board: European Spine Society Task Force on Research (None); Grants: Ontario Government - Ministry of Finance (None); Paid directly to institution/employer; Other: Rand Corporation (B); Paid directly to institution/employer).

Crandal, Dennis G.: Royalties: Medtronic (E); Consulting: Medtronic (B), Ellipse Technology (None), Spine Wave (B), Zygia (None); Board of Directors: Dignity Oasis Hospital (None); Scientific Advisory Board: Ellipse Technology (None).

Crawford, Charles H.: Consulting: Medtronic (C), Alphatec (C); Speaking and/or Teaching Arrangements: DePuy-Synthes (B), Titan Spine (A); Trips/Travel: North American Spine Society (A), SRS (A); Other Office: Scoliosis Research Society (Committee Member), North American Spine Society (Committee Member).

Crawford, Neil: Stock Ownership: Excelsius Surgical (15%), Global Medical (5000 Shares); Other Office: Global Medical (Salary).

Cunningham, Ryan W.: Stock Ownership: Global Medical Inc. (<1%); Trips/Travel: Global Medical (B); Board of Directors: Global Medical (None); Scientific Advisory Board: Global Medical (None); Other Office: Director of Musculoskeletal Research (Salary).

Cunningham, Matthew E.: Speaking and/or Teaching Arrangements: DePuy/J&J (Amount not disclosed, Paid directly to institution/employer); Research Support - Staff and/or Materials: K2M (A, Paid directly to institution/employer), RTI (A, Paid directly to institution/employer).

Currier, Bradford L.: Royalties: DePuy Spine (E, Paid directly to institution/employer); Zimmer Biomet (A, Paid directly to institution/employer), Stryker Spine (B, Paid directly to institution/employer); Private Investments: Tenex (<1%), Spineology (<1%); Board of Directors: LSRS (Past President, Board of Directors), Spine Study Group (Board of Directors); Fellowship Support: AOSpine North America (E, Paid directly to institution/employer).

Daffner, Scott D.: Stock Ownership: Pfizer (<1%), Amgen (<3%); Other Office: CSRS (Research Committee), North American Spine Society (Section on Biologics & Basic Research, Membership Committee); Research Support - Staff and/or Materials: Pfizer (A, Paid directly to institution/employer), Bioventus (A, Paid directly to institution/employer), Spinal Kinetics (A, Paid directly to institution/employer); Grants: CSRS (F, Paid directly to institution/employer), AO Foundation (F, Paid directly to institution/employer); Fellowship Support: AOSpine (E, Paid directly to institution/employer); Relationships Outside the One-Year Requirement: Medtronic (Fellowship Support, Dissolved 08/2011, D, Paid directly to institution), Medtronic (Fellowship Support, Dissolved 08/2011, D, Section on Biologics and Basic Science).

Dagenais, Simon: Royalties: Elsevier (A); Stock Ownership: Pacira Pharmaceuticals (<1%); Private Investments: Palladian Health (<1%); Consulting: University of South Florida (D), Palladian Health (B);

Scientific Advisory Board: Société Franco-Européenne de Chiropraxie (SOFEC) (None), Palladian Health (Consulting disclosed); Other Office: North American Spine Society (Value Committee, Low Back Pain Guidelines Committee).

Dahl, Benny: Speaking and/or Teaching Arrangements: Medtronic (B, Paid directly to institution/employer), Globus Medical (B); Grants: Medtronic (D, Paid directly to institution/employer), K2M (D, Paid directly to institution/employer).

Dang, Alan: Consulting: DePuy Synthes Biomaterials (F, Paid directly to institution/employer); Speaking and/or Teaching Arrangements: Medtronic (B); Other Office: Dang Orthopaedics (Co-founder/Owner); Research Support - Staff and/or Materials: CGBio (A, Paid directly to institution/employer).

Daniels, Alan: Consulting: Stryker (C), Globus (B), DePuy (B); Trips/Travel: Medtronic (A), Globus (B); Research Support - Staff and/or Materials: Orthofix (B, Paid directly to institution/employer); Fellowship Support: Orthofix (B, Paid directly to institution/employer).

Darden, Bruce V.: Royalties: Stryker (D, Paid directly to institution/employer); Stock Ownership: BioMedFlex (100 Shares); Consulting: Stryker (B), Synthes (B); Board of Directors: Cervical Spine Research Society (None), Lumbar Spine Research Society (None); Scientific Advisory Board: Stryker Biologic (None); Fellowship Support: AO (E, Paid directly to institution/employer).

Daubs, Michael D.: Royalties: Synthes Spine (F); Consulting: DePuy Synthes Spine (B); Speaking and/or Teaching Arrangements: AO spine North America (B); Board of Directors: AOSpine North America (B); Fellowship Support: AOspine North America (D, Paid directly to institution/employer).

Davis, Reginald J.: Royalties: Zimmer Spine (B, Paid directly to institution/employer); Consulting: Zimmer Spine (B, Paid directly to institution/employer), Paradigm Spine (B, Paid directly to institution/employer), Paragon Spine (B, Paid directly to institution/employer), LDR (B); Speaking and/or Teaching Arrangements: Biomet (B, Paid directly to institution/employer); Trips/Travel: Zygia (B, Paid directly to institution/employer).

Dekutoski, Mark B.: Other Office: The CORE Institute (Quality Committee and Research Committee); Research Support - Staff and/or Materials: SpineNet (A, Paid directly to institution/employer); Grants: Mayo Foundation Office of Intellectual Properties (D, Paid directly to institution/employer).

DenHaese, Ryan P.: Royalties: Biomet Lanx (F), Consulting: Biomet Lanx (D); Speaking and/or Teaching Arrangements: Biomet Lanx (G); Trips/Travel: Biomet Lanx (D); Other Office: Biomet Lanx (Director of Medical Education).

Depalma, Michael J.: Consulting: VertiFlex (Amount not disclosed, Paid directly to institution/employer); Trips/Travel: Medtronic (Amount not disclosed); Board of Directors: International Spine Intervention Society (Travel expenses, Paid directly to institution/employer), Virginia Spine Research Institute (President, Director of Research, Paid directly to institution/employer), Scientific Advisory Board: Medtronic (Amount not disclosed, Paid directly to institution/employer).

DePasse, John M.: Other: Stryker (None).
Devito, Dennis: Royalties: NuVasive (A); Consulting: NuVasive (A). DePuy Spine (Amount not disclosed, Paid directly to institution/employer). Trips/Travel: DePuy Spine (B); Grants: Stryker spine (C, Paid directly to institution/employer).

Deviren, Vedat: Royalties: NuVasive (E); Consulting: NuVasive (D); Research Support - Staff and/or Materials: NuVasive (B, Paid directly to institution/employer); Fellowship Support: AO Spine (E, Paid directly to institution/employer), NuVasive (E, Paid directly to institution/employer), Globus (E, Paid directly to institution/employer); Other: Guideon (A).

Devito, Dennis: Royalties: Medicrea Spine (E); Stock Ownership: Mazor Robotics (<1%); Consulting: Medicrea Spine (B), Precision Spine (B), Sea Spine (B); Speaking and/or Teaching Arrangements: DePuy/Synthes (Travel expenses), Mazor Robotics (Travel expenses); Trips/Travel: Medicrea (Travel expenses), Mazor (Travel expenses); Scientific Advisory Board: Spine Craft (None); Research Support - Investigator Salary: Mazor robotics (B); Research Support - Staff and/or Materials: K2M (A).

Dinar, John R.: Royalties: Medtronic (None); Speaking and/or Teaching Arrangements: DePuy (C); Board of Directors: SRS (Education Council Chair), FOSA (Treasurer); Other: Spine (Reviewer), JBIJS (Associate Editor), Spine Deformity (Reviewer), Global Spine (Reviewer).

Difrisio, Darryl J.: Stock Ownership: Revivo Spine (33%); Board of Directors: Revivo Medical (Stock Ownership).

Diuuls, Carrie A.: Speaking and/or Teaching Arrangements: Reboot Holdings PTY LTD (B); Trips/Travel: Reboot Holding PTY LTD (B).

Djurasevic, Mladen: Consulting: Medtronic Sofamor Danek (H); Consulting: Medtronic (None); Speaking and/or Teaching Arrangements: DePuy (C); Board of Directors: SRS (Education Council Chair), FOSA (Treasurer); Other: Spine (Reviewer), JBIJS (Associate Editor), Spine Deformity (Reviewer), Global Spine (Reviewer).

Dohring, Edward J.: Royalties: Stryker (E, Paid directly to institution/employer); Board of Directors: North American Spine Society (Education Council Director); Research Support - Staff and/or Materials: Medtronic (B, Paid directly to institution/employer).


Douceur, Estelle: Other Office: Mediarea (Salary).

Drapeau, Susan J.: Stock Ownership: Medtronic (None).

Dreisberger, Thomas E.: Stock Ownership: Scientific Exercise (<1%); Consulting: Scientific Exercise (Executive Vice President of Outcomes Research); Speaking and/or Teaching Arrangements: Various (Amount not disclosed), Trips/Travel: Scientific Exercise (Travel expenses), North American Spine Society (Travel expenses); Board of Directors: McKenzie Institute International (C).

Driscoll, Mark: Stock Ownership: Spinologics Inc. (5%); Consulting: DePuy Synthes (Amount not disclosed, Paid directly to institution/employer), K2M (Amount not disclosed, Paid directly to institution/employer); Other Office: Spinologics (Salary); Grants: K2M (A, Paid directly to institution/employer), DePuy Synthes (A, Paid directly to institution/employer).

Dryer, Randall F.: Royalties: NuVasive (E), Medtronic (E), Globus (D); Consulting: Globus (C).

Dufour, Thierry: Royalties: LDR medical (E); Trips/Travel: Synthes (B).

Dumas, Megan: Other Office: K2M (Salary).

Dunsmuir, Robert: Speaking and/or Teaching Arrangements: DePuy (Amount not disclosed).

Dvorak, Marcel F.: Royalties: Medtronic (G); Consulting: Medtronic (Amount not disclosed); Speaking and/or Teaching Arrangements: Medtronic (Consulting disclosed), Synthes (Amount not disclosed, AOSpine (Amount not disclosed); Trips/Travel: Medtronic (Travel expenses); Board of Directors: Vancouver Hospital Foundation Board (None); Scientific Advisory Board: Medtronic (Consulting disclosed); Endowments: University of British Columbia (F), Research Support - Staff and/or Materials: Medtronic (F), Grants: Medtronic (F), DePuy Spine (G), Rick Hansen Institute (H); Fellowship Support: Medtronic (E), Synthes (E), DePuy (E).

Eastlack, Robert K.: Royalties: Globus Medical (B), NuTech (A); Stock Ownership: NuVasive (<1%), Spine Innovations (7%), Invuity (<1%), Alphatec (<1%), Diffusion (<1%); Private Investments: Top Doctors Labs (100%); Spine Innovations (8%), Nocimed (<1%); Consulting: K2M (C), Titan (A), SeaSpine (B), Atlas (None), Ulrich (A), NuVasive (F), Aesculap (C), NuTech (None), Stryker (B), CareVature (Stock Options, Paid directly to institution/employer), DePuy/Synthes (C), Alphatec (B); Speaking and/or Teaching Arrangements: AOSpine (B), Synthes/DePuy (None), Eli Lilly (B), UCSF (B); Board of Directors: San Diego Spine Foundation (None), InjureFree (Stock Options), Nocimed (None), SOLAS (None), Spine Innovations (Director), Scientific Advisory Board: Alphatec (None), Diffusion (None), Top Doctors (None), Aesculap (None); Grants: Integra (C, Paid directly to institution/employer), NuVasive (D); Fellowship Support: NuVasive (D, Paid directly to institution/employer).

Eck, Jason C.: Speaking and/or Teaching Arrangements: AOSpine (B).

Edwards, Charles C.: Stock Ownership: Renovis Surgical (5%); Board of Directors: Renovis Surgical (None).

Elskjaer, Soren: Consulting: Medtronic (B).

Elsmont, Frank J.: Royalties: Alphatec Spine Company (E); Stock Ownership: Alphatec Spine Company (C); Consulting: Alphatec Spine Company (C); Scientific Advisory Board: Alphatec Spine Company (B).

Elliott, James M.: Private Investments: Pain ID (35%); Consulting: Pain ID (None).

Emery, Sanford E.: Board of Directors: American Board Orthopaedic Surgery (None), American Orthopaedic Association (None); Fellowship Support: AO Foundation (E, Paid directly to institution/employer).

Erickson, Melissa: Speaking and/or Teaching Arrangements: DePuy Synthes (B), Trips/Travel: DePuy Synthes (A).

Errico, Thomas J.: Royalties: Fastenetic (F); Speaking and/or Teaching Arrangements: K2M (C); Trips/Travel: K2M (D); Research Support - Staff and/or Materials: Pfizer (B, Paid directly to institution/employer); Grants: NIH via WashUL (B, Paid directly to institution/employer); Fellowship Support: OMEGA (C, Paid directly to institution/employer).

Espinoza Oria, Alejandro: Research Support - Investigator Salary: NIH NCCAM (D, Paid directly to institution/employer); Relationships Outside the One-Year Requirement: National Institutes of Health (Grant, Dissolved 09/2011).

Espinoza-Rebmann, Kathrin: Other Office: AO Foundation (Salary).

Evans, Nathan: Stock Ownership: Vettera, Inc. (C); Fellowship Support: National Science Foundation (D, Paid directly to institution/employer).

Fairbank, Jeremy: Royalties: Oswestry Disability Index (B).

Farrell, Dennis: Stock Ownership: Link SPINE (2%); Other Office: Link SPINE (F).

Fedder, Ira L.: Royalties: Globus Medical (B); Stock Ownership: Globus Medical (25,000 shares); Private Investments: Neo (100 shares); Consulting: Tyber Medical (SAB); Speaking and/or teaching arrangements: Titan Spine (Consulting disclosed); Trips/travel: FORE (A); Board of Directors: Motion Intelligence (Board of Directors); Scientific Advisory Board: Globus (B).

Ferguson, John A.: Stock Ownership: K2M (<1%); Consulting: K2M (B), Ellipse Technologies (A); Speaking and/or Teaching Arrangements: K2M (C).

Fernandez, Meagan: Consulting: Mazor (B), Medicrea (B).

Ferrara, Lisa A.: Consulting: OrthoKinetic Technologies (Amount not disclosed, Paid directly to institution/employer); Scientific Advisory Board: 4 Web (<1%).

Ferry, Chris: Other Office: Zimmer Biomet Spine (Salary); Relationships Outside the One-Year Requirement: Zimmer Biomet Spine (Other Office, Dissolved 07/2015, E).

Fessler, Richard G.: Royalties: Stryker (B), DePuy (B), Medtronic (B); Private Investments: In Queue Innovations (50%); Consulting: DePuy (None).
Disclosure Index

Finkenberg, John G.: Board of Directors: North American Spine Society (Advocacy Council Director, Travel expenses); Research Support - Staff and/or Materials: Biotest (B), K2M, Inc. (Salary).

Fiorella, Dave: Other Office: K2M, Inc. (Salary).

Fischgrund, Jeffrey: Royalties: Stryker (D); Consulting: Stryker (F).

Fisher, Charles G.: Royalties: Medtronic (G); Consulting: Medtronic (E, Paid directly to institution/employer), NuVasive (B); Speaking and/or Teaching Arrangements: Medtronic (B), AO Spine B (None), NuVasive (B); Research Support - Staff and/or Materials: Medtronic (F, Paid directly to institution/employer); Grants: OREF (E, Paid directly to institution/employer); Fellowship Support: Medtronic (E, Paid directly to institution/employer), AO Spine (E, Paid directly to institution/employer), Johnson & Johnson (D, Paid directly to institution/employer).

France, John C.: Speaking and/or Teaching Arrangements: AO Spine (Amount not disclosed); Board of Directors: CSRS (Travel expenses); Fellowship Support: AO Foundation (E, Paid directly to institution/employer).

Frank, Clay J.: Speaking and/or Teaching Arrangements: SI-BONE (B, Paid directly to institution/employer), Trips/Travel: SI-BONE (Travel expenses, Paid directly to institution/employer); Research Support - Investigator Salary: SI-BONE (B, Paid directly to institution/employer); Research Support - Staff and/or Materials: Wheaton Franciscan Healthcare (B, Paid directly to institution/employer).

Franke, Jorg: Royalties: Medacta (B); Consulting: Medtronic (Amount not disclosed); Speaking and/or Teaching Arrangements: Medtronic (Amount not disclosed), Zimmer (Amount not disclosed), Paradigm (Amount not disclosed); Board of Directors: SSE, IGASS, German Spine Society (Board member); Scientific Advisory Board: SSE (Education Chair).

Freeman, Thomas: Stock Ownership: ABT (<1%).

Frempong-Boadu, Anthony K.: Speaking and/or Teaching Arrangements: Medtronic (B).

Furman, Michael B.: Royalties: Elsevier (B, Paid directly to institution/employer), Speaking and/or Teaching Arrangements: SIS (A); Trips/Travel: North American Spine Society (A).

Gall, Ken: Stock Ownership: Vertera (20%, Co-founder); Consulting: Vertera (Stock options); Board of Directors: Vertera (Stock options).


Geck, Matthew J.: Royalties: Zimmer (D); Stock Ownership: DiFusion (2%); Private Investments: DiFusion (Amount not disclosed); Consulting: Globus (B), Board of Directors: SpineHope (None).

Gehrchen, Martin: Consulting: Globus Medical (B), Medtronic (B), K2M (B), Speaking and/or Teaching Arrangements: Globus Medical (B), Medtronic (B), K2M (B).

Gehl, Daniel E.: Royalties: Globus Medical (A), Depuy Synthes Spine (C); Consulting: Synthes Spine (B); Speaking and/or Teaching Arrangements: AO Spine North America (B); Fellowship Support: Synthes Spine (E).

Gerling, Michael C.: Consulting: Stryker (B); Speaking and/or Teaching Arrangements: Stryker (B).

Ghiselli, Gary: Private Investments: DiFusion (9%); Consulting: New Era Orthopedics (B).

Ghogawala, Zober: Board of Directors: American Association of Neurological Surgeons - NeuroPoint Alliance (Board of Directors), Congress of Neurological Surgeons (Vice President), Cervical Spine Research Society (Board of Directors), North American Spine Society (Clinical Research Development Chair); Research Support - Staff and/or Materials: Stuart Foundation (F, Paid directly to institution/employer); Grants: NIH (A), PCORI (H, Paid directly to institution/employer).

Girardi, Federico P.: Royalties: Lanx (B, Paid directly to institution/employer), NuVasive (C, Paid directly to institution/employer), Ortho Development Corp. (C, Paid directly to institution/employer), DePuy Spine (D, Paid directly to institution/employer); Stock Ownership: Small Bone Innovations (<1%), Pioneer Surgical Technology (<1%), LifeSpine (<1%), Centinel Spine (<1%), Spinal Kinetics (<1%); Paradigm Spine (<1%); Consulting: Lanx (B), Gerson Lehman Group (A); SpineArt USA (C), Ortho Development Corp. (C), DePuy Spine (B); Speaking and/or Teaching Arrangements: PharmaWrite (None), Scientific Advisory Board: Scient’x USA (None), Spinal Kinetics (None), Centinel Spine (None), SpineArt USA (None), HealthpointCapital (Amount not disclosed), Paradigm Spine (Amount not disclosed).

Glaser, John A.: Relationships Outside the One-Year Requirement: SI-BONE (Grant).

Glassman, Steven D.: Royalties: Medtronic (H); Board of Directors: Scoliosis Research Society (Past President); Scientific Advisory Board: NQOD (None); Research Support - Staff and/or Materials: Norton Healthcare (A, Paid directly to institution/employer); Other: NuVasive (None).

Gokaslan, Ziya L.: Stock Ownership: Spinal Kinetics (<1%); Speaking and/or Teaching Arrangements: AO Foundation (Amount not disclosed); Trips/Travel: AO Foundation (Travel expenses); Research Support - Staff and/or Materials: AO Spine International (A, Paid directly to institution/employer).

Goldestein, Christina L.: Trips/Travel: AO Spine North America (B, Paid directly to institution/employer); Other Office: AO Spine North America (Fellowship Committee), North American Spine Society (Section on Biologics and Basic Science).

Goldstein, Jeffrey A.: Royalties: NuVasive (C); Consulting: NuVasive (A), RTI (A), NLT Spine (A); Board of Directors: ISASS (None); Fellowship Support: OREF (A, Paid directly to institution/employer), AO Spine (E, Paid directly to institution/employer).

Goodman, Brady S.: Stock Ownership: Mesoblast (<1%), DiscGenics (<1%); Consulting: DiscGenics (A); Other Office: Mesoblast (None, Paid directly to institution/employer), ISTO (None, Paid directly to institution/employer).

Goodman, Robert: Other: Blue Care Network of Michigan (Salary).

Goodwin, C. Rory: Grants: NREF (D, Paid directly to institution/employer). The Johns Hopkins Neurosurgery Pain Research Institute (E, Paid directly to institution/employer), Burroughs Wellcome Fund (C, Paid directly to institution/employer); Fellowship Support: UNCF-Merck Postdoctoral Science Fellowship (E, Paid directly to institution/employer).

Gornet, Matthew F.: Royalties: Medtronic (F); Stock Ownership: Bonovo (4%), Ouroboros (4%), International Spine & Orthopedic Institute (5%), Nocimed (4%), Viscogliosi Bros Venture Partners (11%); Consulting: K2M (Amount not disclosed), Medtronic (Amount not disclosed).

Gottfried, Oren N.: Consulting: RTI (D); Speaking and/or Teaching Arrangements: RTI (D).

Grabsowsky, Mary Beth M.: Other Office: Biotest Spine & Bone Healing Technologies (Salary), Becton, Dickinson and Company (Salary).

Grauer, Jonathan N.: Consulting: Stryker (B), Andante Medical Devices (B), Vertex (B), Medtronic (A), Bioventus (B), ISTO technologies (None); Grants: Orthopaedic Trauma Association (B, Paid directly to institution/employer); Other: Legal Consulting (Amount not disclosed).

Green, Bart: Consulting: Brighthill (F); Speaking and/or Teaching Arrangements: NCNIC (B); Trips/Travel: NCNIC (A).

Gregory, Carl A.: Stock Ownership: Theodent Holdings (<1%, Paid directly to institution/employer); Consulting: SpineSmith (None); Scientific Advisory Board: Theodent Holdings (Stock Ownership disclosed, Paid directly to institution/employer); Research Support - Staff and/or Materials: SpineSmith Partners (A).

Groff, Michael W.: Royalties: Johnson & Johnson (A), EBI (D); Consulting: EBI spine (None), Depuy (B); Fellowship Support: Society of Neurologic Surgeons (E).
Grossman, Robert G.: Scientific Advisory Board: Vertex Pharmaceuticals (B); Christopher Reeve Foundation (A), InSightec (A).

Gruber, Helen E.: Research Support - Staff and/or Materials: North American Spine Society (D).

Guldberg, Robert: Stock Ownership: Vertera (<1%); Consulting: Vertera (B); Scientific Advisory Board: MiMedx (Stock options); Research Support (Staff and/or Materials): MiMedx (D).

Gum, Jeffrey L.: Consulting: LifeSpine (C), Medtronic (C), DePuy (B), Alphatec (B), Stryker (C), Acuity (B), PAKmed (A); Speaking and/or Teaching Arrangements: MiMedx (A), Pacira Pharmaceuticals (A); Grants: Fischer Owen Fund (B); Other: American Journal of Orthopaedics (Advisory/Editorial Board), The Spine Journal, American Journal of Orthopaedics (Reviewer), NuVasive (Amount not disclosed), International Spine Study Group Foundation (Amount not disclosed, Paid directly to institution/employer), Integra (Amount not disclosed, Paid directly to institution/employer); Relationships Outside the One-Year Requirement: OREF (Fellowship Support, Dissolved 07/2014, A), AOSpine (Fellowship Support, Dissolved 07/2014).

Gummerson, Nigel W.: Consulting: Stryker (B), K2M (B); Speaking and/or Teaching Arrangements: Stryker (B), K2M (B).

Gupta, Munish C.: Royalties: DePuy (F); Stock Ownership: Pioneer (100 Shares); Private Investments: Spinal Ventures (2%); Consulting: DePuy (B), Orthofix/Medica (C); Speaking and/or Teaching Arrangements: DePuy (B), Trips/Travel: DePuy Spine (B); Board of Directors: FOA (None); Scientific Advisory Board: SRS (SRS Fellowship and Translational Committee Chair); Relationships Outside the One-Year Requirement: FOA (Board of Directors, Dissolved 2/2015, Treasurer).

Guyer, Richard D.: Royalties: Alphatec (B); Stock Ownership: Spinal Motion (None); Private Investments: Spinal Ventures I and II (5%); Consulting: DePuy/Synthes (B); Speaking and/or Teaching Arrangements: Synthes (None); Scientific Advisory Board: K2M (B), Flexuspine (Stock options), Spinal Kinetics (Stock options), Nanovis (A), Crocker Technologies (A), MiMedx (A); Fellowship Support: OREF (A, Paid directly to institution/employer), AOSpine (D, Paid directly to institution/employer), Medtronic Neurological Division (C, Paid directly to institution/employer).

Gvozdyev, Boris: Trips/Travel: DePuy Synthes (Amount not disclosed), Amendia (Amount not disclosed), Medtronic (Amount not disclosed).

Haldeman, Scott: Royalties: Stock Ownership: Palladian Health (<1%); Consulting: Palladian Health (F); Trips/Travel: NCCAM (B), CMCC (B), WFC (B); Board of Directors: Canadian Memorial Chiropractic College (Trips/Travel disclosed), World Spine Care (None); Scientific Advisory Board: itchmedical (None); Other Office: WFC Research Council (None).


Hanna, Michael: Stock Ownership: Mercury Medical Research & Writing (100%), Mercury Spine Healthcare Consulting (100%); Consulting: Invibio (B, Paid directly to institution/employer), Locotec (B, Paid directly to institution/employer), Invuity (B, Paid directly to institution/employer), North American Spine Foundation (A); Speaking and/or Teaching Arrangements: North American Spine Foundation (None); Trips/Travel: North American Spine Foundation (Travel expenses); Board of Directors: Mercury Healthcare Innovation Greenhouse (None); Research Support - Investigator Salary: Invibio (Consulting disclosed), Locotec (Consulting disclosed), Invuity (consulting disclosed), North American Spine Foundation (Consulting disclosed).

Harrell, Frank E.: Consulting: Medtronic (B, Paid directly to institution/employer); Research Support - Investigator Salary: Medtronic (D).

Harris, Jonathan: Other Office: Employee (Salary).

Harris, Mitchell: Consulting: HCR (None), Medtronic (Amount not disclosed, Paid directly to institution/employer); Board of Directors: North American Spine Society (Governance Committee Chair).

Harrop, James S.: Royalties: Jaypee Publishing (A); Consulting: DePuy Spine (C, Paid directly to institution/employer); Speaking and/or Teaching Arrangements: Medtronic (None); Board of Directors: Jefferson Medical College Physician Board (None); Scientific Advisory Board: Bioventus (B); Other Office: Bioventus (B), Asterias (B); Grants: AOSpine (E, Paid directly to institution/employer); Fellowship Support: NREF (E, Paid directly to institution/employer); Other: Tejin (B).

Hart, Robert A.: Royalties: SeaSpine (E), DePuy Synthes (B); Consulting: DePuy Synthes (C), Globus (B); Speaking and/or Teaching Arrangements: DePuy Synthes (C), Globus (B); Other Office: Aaos (Editor), International Spine Study Group (Executive Committee), CSRS (Editorial Committee), Educational Board, Spine (Assistant Editorial Board), Aaos (Instructional Course Committee), American Orthopaedic Association (Leadership Development Committee), Cervical Spine Research Society (Education Committee), Lumbar Spine Research Society (Membership Committee), North American Spine Society (Governance Committee), Oregon Association of Orthopaedics (Board Member), OREF (Review Committee, Prospective Clinical Grant Research), SCIosS Orthopedic Research (Deformity Committee); Grants: ISSGF (C, Paid directly to institution/employer); Fellowship Support: OMEGA (D), DePuy Synthes (E); Relationships Outside the One-Year Requirement: Medtronic (Grant, Dissolved 12/2007, D), DePuy Synthes (Fellowship Support, Dissolved 07/2010, E), AO (Speaking and/or Teaching Arrangement, Dissolved 12/2005, B).

Hartigan, Carol: Royalties: Up To Date In Medicine (On Line Medical Reference (A); Scientific Advisory Board: The Spine Journal (Advisory Editorial Board).

Heary, Robert F.: Royalties: DePuy Spine (F), Zimmer (C), Thieme (A); Board of Directors: CSRS (Board Member), LSRS (Board Member), AANS (Board Member).

Hecht, Andrew: Royalties: Zimmer Spine (B, Paid directly to institution/employer); Consulting: Stryker Spine (None), Medtronic (B), Zimmer Spine (C, Paid directly to institution/employer); Speaking and/or Teaching Arrangements: Medtronic (None); Scientific Advisory Board: Musculoskeletal Transplant Foundation (None), Zimmer Spine (C); Grants: OREF Grant (C).

Heggeness, Michael H.: Royalties: Relevant Medsystems (C, Paid directly to institution/employer), K2M (C, Paid directly to institution/employer); Stock Ownership: Relevant Medsystems (45000 Shares); Consulting: Intrinsic Orthopaedics (None); Other: North American Spine Society (Travel expenses).

Hennessy, Ron M.: Consulting: Benvenue Medical (C); Speaking and/or Teaching Arrangements: Benvenue Medical (Consulting disclosed); Scientific Advisory Board: Benvenue Medical (Consulting disclosed).

Hersman, Stuart H.: Relationships Outside the One-Year Requirement: DePuy Synthes Spine (Consulting, Dissolved 03/2014, B), DePuy Synthes Spine (Speaking and/or Teaching Arrangement, Dissolved 03/2014, B).

Hillbrand, Alan S.: Royalties: Biomet Spine (G), Amedica (D), Aesculap (B); Stock Ownership: Amedica (<1%), LifeSpine (<1%); Spinal Ventures (3%); Private Investments: Benvenue (B), Nxegn (B), Paradigm Spine (B), Pioneer (<1%); PSD (B), Vertiflex (B); Board of Directors: Aaos (Communications Cabinet Chair), CSRS (President), North American Spine Society (Continuing Medical Education Chair).

Hill, Clint P.: Royalties: Zimmer/Biomet (E); Private Investments: Vertera Spine (<1%); Consulting: Zimmer/Biomet (E); Speaking and/or Teaching Arrangements: Zimmer/Biomet (Amount not disclosed); Trips/Travel: Zimmer/Biomet (Travel expenses); Research Support - Investigator Salary: Zimmer/Biomet (D); Research Support - Staff and/or Materials: Zimmer/Biomet (B).

Hipp, John A.: Stock Ownership: Medical Metrics (8%); Consulting: Medical Metrics (Amount not disclosed, Paid directly to institution/employer); Other Office: Medical Metrics (Salary).

Hisey, Michael S.: Royalties: Zimmer Spine (B), LDR Spine (B); Stock Ownership: Spine Wave (<1%); Private Investments: Medical Venture Fund (<1%); Consulting: Zimmer Spine (B), LDR Spine (D); Speaking and/or Teaching Arrangements: LDR Spine (Amount not disclosed); Board of Directors: Texas Health Presbyterian Hospital of Flower Mound (Amount not disclosed), TBI CRO (None).
Hoffman, Gregory A.: Royalties: LDR Spine (B); Stock Ownership: LDR Spine (50,000 Shares); Private Investments: Path 4 Venture Capital Fund (3%); Consulting: LDR Spine (C); Speaking and/or Teaching Arrangements: LDR Spine (B); Trips/Travel: LDR Spine (Speaking and/or Teaching Arrangements disclosed); Scientific Advisory Board: LDR Spine (None); Research Support - Staff and/or Materials: LDR Spine (D).

Hofstetter, Christoph P.: Consulting: In Vivo therapeutics (B).

Holly, Langston T.: Consulting: Medtronic (C); Grants: NIH (F, Paid directly to institution/employer).

Holmes Higgin, Debbey: Stock Ownership: Benvenue Medical (<1%); Paid directly to institution/employer); Other Office: Benvenue Medical (Salary).

Horn, Scott I.: Speaking and/or Teaching Arrangements: NASS (Travel expenses), AAPMR (Travel expenses), SIS (AMA CPT Advisor, Health Policy Chair, Travel expenses); Board of Directors: Spine Intervention Society (Travel expenses); Other Office: SIS (Speaking and/or Teaching Arrangements disclosed).

Hornberger, John: Research Support - Staff and/or Materials: Benvenue (D, Paid directly to institution/employer).

Hornicek, Francis J.: Consulting: Stryker Corporation (B), Biomed Valley Discoveries (B); Speaking and/or Teaching Arrangements: Stryker Spine (B), Stryker Corporation (B); Board of Directors: AATB (None); Scientific Advisory Board: DTRF (None), Chordoma Foundation (None); Grants: SPORE, NIH Grant (A).

Hostin, Richard A.: Consulting: DePuy Spine (B); Research Support - Staff and/or Materials: DePuy Spine (F), Seeger (F), NuVasive (F), DJO (E), K2M (D).

Hovorka, Istvan: Royalties: LDR Medical (E).

Hsieh, Patrick C.: Consulting: DePuy Synthes Spine (C), Medtronic (D); Speaking and/or Teaching Arrangements: Siemens (B).

Hsu, Erin L.: Other Office: Orthopaedic Research Society (Media Relations and Communications Committee); Grants: Medtronic (D); Relationships Outside the One-Year Requirement: Medtronic Sofamor Danek (Grant, Dissolved 05/2011, F).

Hsu, Wellington K.: Consulting: Stryker (D), Relievant (C), Bacterin (A), CeramTec (C), Graftys (A), Globus (B), AONA (B), Medtronic (C), Bioventus (B); Speaking and/or Teaching Arrangements: AONA (B); Trips/Travel: Stryker (B), Pioneer Surgical (B), Medtronic (B), Bioventus (A), AONA (B); Board of Directors: Lumbar Spine Research Society (None), Cervical Spine Research Society (None); Scientific Advisory Board: Bioventus (None); Grants: Medtronic (E, Paid directly to institution/employer).

Hu, Richard: Stock Ownership: Vivametrica (32%); Private Investments: Vivametrica (32%); Board of Directors: Vivametrica (CEO); Other Office: CEO (Stock Options).

Hu, Serena S.: Royalties: NuVasive (F); Consulting: Medtronic (A); Speaking and/or Teaching Arrangements: Medtronic (None); Trips/Travel: Synthes, Medtronic (None); Board of Directors: ISSLS (None).

Hughes, Alexander P.: Research Support - Investigator Salary: MedXed (C, Paid directly to institution/employer); Fellowship Support: NuVasive (E, Paid directly to institution/employer).

Hullinger, Heidi M.: Speaking and/or Teaching Arrangements: Magnifi Group (A); Trips/Travel: Mazor (Travel expenses); Research Support - Staff and/or Materials: Globus (A).

Huppert, Jean: Royalties: LDR Medical France (F); Stock Ownership: LDRH (<1%).

Hurwitz, Eric: Consulting: RAND Corporation (B), Western University of Health Sciences (B), National Institutes of Health (A), Southern California University of Health Sciences (B), The North Carolina State Health Plan for Teachers and State Employees (B); Trips/Travel: Global Spine Care Initiative (B), RAND Corporation (B); Other Office: The Spine Journal (Deputy Editor); Research Support - Investigator Salary: National Institutes of Health (B, Paid directly to institution/employer); Other: Palmer Center for Chiropractic Research (Palmer Center for Chiropractic Research Data Chair, Safety Monitoring Committee, World Spine Care (World Spine Care Research Committee Co-chair), Global Spine Care Initiative (Global Spine Care Initiative Scientific Secretariat).

Hussain, Mir: Other: Musculoskeletal Education and Research Center (Salary).

Hwang, Steven W.: Speaking and/or Teaching Arrangements: North American Spine Society (A), DePuy (None).

Inoue, Nozomu: Research Support - Investigator Salary: NIH (D, Paid directly to institution/employer); Research Support - Staff and/or Materials: NIH (E, Paid directly to institution/employer); Grants: NIH (F, Paid directly to institution/employer).

Isaacs, Robert E.: Royalties: NuVasive (F); Stock Ownership: Villaspine Limited (100%), Providence (<1%), Safery Spine (Amount not disclosed), SafeWire (33334 Shares), Vertera (<1%); Private Investments: SafeWire (30000 Shares); Consulting: NuVasive (D); Trips/Travel: Vertera (A); Board of Directors: SafeWire (Stock Options), Safery Spine (Director); Scientific Advisory Board: Providence (B); Research Support - Staff and/or Materials: NuVasive (C, Paid directly to institution/employer).

Isenman, David: Consulting: Annexon Biosciences (B).

Jackson, Robert J.: Royalties: Globus Spine (C); Stock Ownership: Medtronic (<1%), LDRH (<1%), Globus Spine (<1%); Speaking and/or Teaching Arrangements: LDR (C); Relationships Outside the One-Year Requirement: LDR (Research Support: Staff and/or Materials, Dissolved 07/2015, A).

Janssen, Michael E.: Device or Biologic Distributorship (Physician-Owned Distributorship): WYCO Implant Distribution (D); Consulting: Cerapedics Osteobiologics (E, Paid directly to institution/employer); Speaking and/or Teaching Arrangements: DePuy Synthes (B); Research Support - Staff and/or Materials: Synthes-DePuy Spine (C, Paid directly to institution/employer).

Janssen, Stein: Grants: KWF Kankerbestrijding (B).

Jarvik, Jeffrey G.: Royalties: Springer Publishing (A); Stock Ownership: PhysioSonics (<1%); Consulting: HealthHelp (C), Google (A); Speaking/Teaching Arrangements: Radiologic Society of North America (B).

Jenis, Louis G.: Royalties: Stryker Spine (E); Consulting: Stryker Spine (C); Scientific Advisory Board: SurgiVision - Vallum (None).

Jenkins, Sean: Other Office: Globus Medical (Salary).

Jeray, Kyle J.: Consulting: Zimmer (D), Eli Lilly (A); Speaking and/or Teaching Arrangements: AO North America (Travel expenses).

Johnson, Claire: Consulting: NCMIC (D), Global Spine Care Initiative (Travel expenses).

Johnson, J. Patrick: Grants: Medtronic (F).

Jones, Kristen E.: Consulting: Bard-Daval (A).

Justice, Brian: Stock Ownership: Spine Care Partners (20%); Other Office: Vice President (None); Other: Primary Spine Provider Network (20%).

Kalantar, S. B.: Stock Ownership: 4 Web (<1%); Consulting: NuVasive (B), Precision Spine (B), Medtronic (B); Speaking and/or Teaching Arrangements: NuVasive (B).

Kalfas, Iain H.: Royalties: Mako Surgical (B); Stock Ownership: Paradigm Spine (<1%).

Kalsi-Ryan, Sukhvinder: Royalties: GRASSP (B, Paid directly to institution/employer); Consulting: Neural Outcomes Consulting (B, Paid directly to institution/employer).

Kanter, Adam S.: Royalties: Lanx (F, Paid directly to institution/employer); Consulting: Neural Outcomes Consulting (B, Paid directly to institution/employer).


Karnes, Jonathan: Research Support - Staff and/or Materials: Amnion Medical (D, Paid directly to institution/employer).

Katz, Danielle A.: Stock Ownership: Proctor & Gamble (<1%), Bristol-Myers Squibb (<1%), Eli Lilly (<1%), GlaxoSmithKline (<1%), Johnson & Johnson (<1%), Merck (<1%), Novartis (<1%), Roche (<1%).
Sanofi-Aventis (<1%); Trips/Travel: Aaos (Travel expenses); American College of Surgeons (Travel expenses); Other Office: American College of Surgeons (Travel expenses); Aaos Auc (Travel expenses); Other: Johnson & Johnson (Amount not disclosed).

Kebaish, Khaled M.: Consulting: DePuy Spine (E); Speaking and/or Teaching Arrangements: K2M (C, Paid directly to institution/employer); Trips/Travel: Orthofix (C).

Keefe, Malla K.: Consulting: DePuy Synthes (B).

Kelly, Michael P.: Fellowship Support: Aospine (E, Paid directly to institution/employer).

Kepler, Christopher K.: Research Support - Staff and/or Materials: Csrs (D, Paid directly to institution/employer); Grants: Nih (A, Paid directly to institution/employer).

Kerr, Eubulus J.: Royalties: Gs Medical (B, Paid directly to institution/employer); Private Investments: Paradigm Spine (<1%); Consulting: Gs Medical (A).

Khan, Almas L.: Speaking and/or Teaching Arrangements: Stryker Spine (Travel expenses); Trips/Travel: Stryker (B).

Khanna, A. Jay: Royalties: Thieme Medical Publishers (B), Ortho Development (B); Private Investments: New Era Orthopaedics (15%); Cortical Concepts (16%); Avitus Orthopaedics (9%); Consulting: Orthofix Spine (C); Speaking and/or Teaching Arrangements: Aospine North America (B); Trips/Travel: Aospine North America (A); Scientific Advisory Board: Orthofix Spine (B); Other Office: Johns Hopkins Center for Bioengineering, Innovation and Design (Advisory Board); Grants: Siemens Healthcare (B, Paid directly to institution/employer).

Khoo, Larry T.: Consulting: TranS1 Corporation (Amount not disclosed); Speaking and/or Teaching Arrangements: TranS1 (Consulting disclosed).

Kim, Choll W.: Royalties: Globus (C); Stock Ownership: Spineview (<1%); Consulting: Biomet (Amount not disclosed), Globus (Amount not disclosed), K2M (Amount not disclosed), Joimax (Amount not disclosed); Speaking and/or Teaching Arrangements: Gs Medical (Amount not disclosed); Trips/Travel: Gs Medical (Travel expenses); Board of Directors: Gs Medical (Board of Directors); Research Support - Staff and/or Materials: Gs Medical (E).

Kim, Han Jo: Royalties: Zimmer Biomet (A); Consulting: K2M (C), Zimmer Biomet (C).

Kim, Kee D.: Royalties: Ldr (D), Globus (B), Spinal USA (D); Stock Ownership: Molecular Matrix (<1%); Consulting: Globus (B); Speaking and/or Teaching Arrangements: Zimmer Biomet (B); Board of Directors: Molecular Matrix (Stock options); Scientific Advisory Board: InVivo Therapeutics (B); Research Support - Staff and/or Materials: Globus (C, Paid directly to institution/employer).

Kim, Terrence T.: Consulting: Synthes DePuy (Amount not disclosed); Grants: Medtronic (B).

Kishan, Shyam: Royalties: Globus Medical (B).

Klineberg, Eric O.: Consulting: DePuy (C, Paid directly to institution/employer); Stryker (C, Paid directly to institution/employer); Speaking and/or Teaching Arrangements: K2M (C, Paid directly to institution/employer); Aospine (C, Paid directly to institution/employer); Grants: T32 (C, Paid directly to institution/employer); Fellowship Support: Aospine (E, Paid directly to institution/employer).

Kloke, Noelle: Stock Ownership: Globus Medical (<1%); Other Office: Globus Medical (Salary).

Knight, Reginald Q.: Stock Ownership: Vti (<1%); Consulting: Stryker (C); Speaking and/or Teaching Arrangements: Stryker Spine (Consulting disclosed); Scientific Advisory Board: Spine Universe (None), Vertera (None), Gerstner Medical (Amount not disclosed).

Koerner, John D.: Research Support - Staff and/or Materials: Medtronic (D, Paid directly to institution/employer); Other: Novartis (None).


Kopjar, Branko: Consulting: Smith and Nephew (F), Cerapedics (C), Amendia (B), BAROnova (B), Hip Innovation Technologies (D), Innovative Surgical Designs (D), Cerapedics (G).

Koski, Tyler R.: Royalties: Nuvasive (F); Stock Ownership: Nuvasive (8000 Shares); Consulting: Nuvasive (B), Mb Innovations / Spine Wave (None), Medtronic (B); Speaking and/or Teaching Arrangements: Medtronic (Consulting disclosed); Trips/Travel: Medtronic (B), Nuvasive (A); Scientific Advisory Board: SpineCme (None); Research Support - Staff and/or Materials: Medtronic (B, Paid directly to institution/employer); Grants: Medtronic (C, Paid directly to institution/employer).

Kostuik, John P.: Stock Ownership: K2M (5%); Board of Directors: K2M (Salary).

Kraemer, Paul E.: Royalties: Globus Medical (B); Private Investments: Diffusion (<1%); Consulting: Medtronic (B), K2M (B); Speaking and/or teaching arrangements: Medtronic (B), DePuy Synthes (B); Scientific Advisory Board: Diffusion (Unknown).

Kreiner, Scott: Stock Ownership: Ldr Holdings (<1%); Speaking and/or Teaching Arrangements: North American Spine Society (Travel expenses); Trips/Travel: Isis (Travel expenses).

Kucharzyk, Donald: Royalties: Precision Spine (C), Consulting: Benvenue Medical (Amount not disclosed), Biomet Zimmer (Amount not disclosed), Precision Spine (Amount not disclosed), Speaking and/or teaching arrangements: Precision Spine (Amount not disclosed), Benvenue Medical (Amount not disclosed), Biomet Zimmer (Amount not disclosed); Trips/travel: Precision Spine (Amount not disclosed), Biomet Zimmer (Amount not disclosed), Benvenue Medical (Amount not disclosed); Scientific Advisory Board: Precision Spine (B); Research Support (Investigator Salary): Benvenue Medical (A).
Lavelle, William F.: Speaking and/or Teaching Arrangements: Stryker (A); Other Office: SAS (Governing Board); Grants: Covidien (B, Paid directly to institution/employer), Medtronic (D, Paid directly to institution/employer), DePuy, A Johnson & Johnson (C, Paid directly to institution/employer), Vertebral Technologies (E, Paid directly to institution/employer).
Lawrence, Brandon D.: Speaking and/or Teaching Arrangements: AOSpine North America (A); Grants: Lumbar Spine Research Society (C, Paid directly to institution/employer), Fellowship Support: AOSpine North America (E, Paid directly to institution/employer).
Ledet, Eric H.: Private Investments: Paradigm Spine (<1%); Consulting: Medacta Spine (B); Speaking and/or Teaching Arrangements: Paradigm Spine (A); Trips/Travel: Medacta Spine (A).
Leal, Darren R.: Speaking and/or Teaching Arrangements: Medtronic (B); Scientific Advisory Board: K2M MIS Advisory Team (B).
Ledet, Eric H.: Private Investments: ReVivo Medical (24%), 1/O Surgical (25%), InSense Medical (30%); Consulting: Intrinsic Therapeutics (B); Other Office: ReVivo Medical (None), InSense Medical (None); Grants: Musculoskeletal Transplant Foundation (E, Paid directly to institution/employer), NIH (F, Paid directly to institution/employer).
Ledonio, Charles Gerald T.: Consulting: Greatbatch (B); Research Support - Investigator Salary: Medtronic (C, Paid directly to institution/employer), DOD (C, Paid directly to institution/employer), OREF (C, Paid directly to institution/employer), Chest Wall and Spine Deformity Foundation (B, Paid directly to institution/employer); Research Support - Staff and/or Materials: SRS (D, Paid directly to institution/employer).
Lee, Ian: Consulting: Monteris (A); Speaking and/or Teaching Arrangements: Varian (B); Trips/Travel: Varian (B).
Lee, Sang-Heon: Royalties: U&I (C); Consulting: U&I (None); Scientific Advisory Board: U&I (None).
Lee, Yu-Po: Consulting: DePuy (D).
Lehman, Ronald A.: Consulting: Medtronic (B); Speaking and/or Teaching Arrangements: Medtronic (D), DePuy (C), Stryker (C); Grants: Department of Defense (DOD) (I, Paid directly to institution/employer), Defense Medical Research Development Program (DMRDP) (H, Paid directly to institution/employer).
Leizman, Daniel J.: Grants: Medtronic (E, Paid directly to institution/employer).
Lenke, Lawrence G.: Royalties: Medtronic (I), Quality Medical Publishing (B); Consulting: Medtronic (E), DePuy Synthes Spine (C), K2M (C), Speaking and/or Teaching Arrangements: DePuy Synthes Spine (C), K2M (C), Trips/Travel: BroadWater (B), Scoliosis Research Society (B), Seattle Science Foundation (B), Stryker Spine (A), Medtronic (B), AOSpine (B); Endowments: Golden Endowed Professorship (F, Paid directly to institution/employer); Research Support - Staff and/or Materials: Fox Family Foundation (G, Paid directly to institution/employer), AOSpine/SRS (B, Paid directly to institution/employer); Grants: Axial-Biotech (A, Paid directly to institution/employer); Fellowship Support: AOSpine North America (C, Paid directly to institution/employer), OREF (D, Paid directly to institution/employer).
Lewis, Stephen J.: Private Investments: Thompson Medical (5%); Consulting: Medtronic (D); Speaking and/or Teaching Arrangements: Stryker (D); Trips/Travel: AOSpine (B); Scientific Advisory Board: Augmedix (Amount not disclosed); Fellowship Support: Medtronic DePuy Spine (D, Paid directly to institution/employer).
Li, Qianyi: Research Support - Staff and/or Materials: Benvener Medical (B, Paid directly to institution/employer).
Liebermann, Isador H.: Stock Ownership: Mazor Robotics (<1%); Private Investments: Bionik Laboratories (<1%); Consulting: Mazor Surgical (D), Globus Spine (B), Misonix (B), Stryker Spine (B); Speaking and/or Teaching Arrangements: Johnson & Johnson Synthes (B), Scientific Advisory Board: Stryker (B).
Light, Andrea: Stock Ownership: DePuy Synthes Spine (<1%); Other: DePuy Synthes Spine (Salary).
Lindley, James G.: Royalties: Globus Medical (C); Scientific Advisory Board: Globus Medical (None).
Lonner, Baron S.: Royalties: DePuy Synthes (G); Stock Ownership: Spine Search (<1%); Paradigm Spine (5272 Shares); Private Investments: Paradigm Spine (E); Consulting: DePuy Synthes (D); Speaking and/or Teaching Arrangements: DePuy Synthes (C), K2M (C); Board of Directors: Spine Search (None); Scientific Advisory Board: DePuy Synthes (None); Other Office: SRS Spine Deformity Journal (Editorial Board); Grants: DePuy Synthes (D), AOSpine (D), John and Marcella Fox Fund (B), OREF (C).
Lore, Jean-Edouard: Consulting: Medirecia (B); Trips/travel: Medirecia (B).
Lutz, Jeffrey C.: Royalties: University of California (B); Stock Ownership: ISTO Technologies (<1%), Relievant Med Systems (<1%), Nocimed (9%), Simpircia (<1%), Aleeva Medical (<1%), SMC Biotech (<1%); Private Investments: Nocimed (<1%); Consulting: Applied Biomechanics (Amount not disclosed); Scientific Advisory Board: Relievant (Amount not disclosed), SMC Biotech (Amount not disclosed); Research Support - Investigator Salary: Orthofix (B, Paid directly to institution/employer); Research Support - Staff and/or Materials: Orthofix (E, Paid directly to institution/employer); Grants: Orthofix (E, Paid directly to institution/employer).
Lutz, Jeffery C.: Royalties: University of California (B); Stock Ownership: ISTO Technologies (<1%), Relievant Med Systems (<1%), Nocimed (9%), Simpircia (<1%), Aleeva Medical (<1%), SMC Biotech (<1%); Private Investments: Nocimed (<1%); Consulting: Applied Biomechanics (Amount not disclosed); Scientific Advisory Board: Relievant (Amount not disclosed), SMC Biotech (Amount not disclosed); Research Support - Investigator Salary: Orthofix (B, Paid directly to institution/employer); Research Support - Staff and/or Materials: Orthofix (E, Paid directly to institution/employer); Grants: Orthofix (E, Paid directly to institution/employer).
Ludwig, Steven C.: Royalties: DePuy Synthes Spine (G); Stock Ownership: ISD (4%), In-Sight Medical (18%); Private Investments: Advanced Spinal Intellectual Properties (29%); Consulting: DePuy Synthes (D); Speaking and/or Teaching Arrangements: AOSpine (B); Board of Directors: Advanced Spinal Intellectual Properties (D); Scientific Advisory Board: SRS Spine Deformity Journal (Editorial Board); Fellowship Support: OREF Grant (E, Paid directly to institution/employer).
Lurie, Jon D.: Stock Ownership: NewVert (<1%); Consulting: Foundation for Informed Medical Decision Making (None), FizoMed (None), NewVert (None).
Ly, Tan D.: Consulting: Alphatec (B); Speaking and/or Teaching Arrangements: Alphatec (B).
Mac-Thiong, Jean-Marc: Stock Ownership: Spinologics (30%); Private Investments: Spinologics (30%); Consulting: K2M (Amount not disclosed, Paid directly to institution/employer), EOS Imaging (Amount not disclosed), DePuy Synthes (Amount not disclosed, Paid directly to institution/employer), Zimmer (Amount not disclosed, Paid directly to institution/employer); Board of Directors: Spinologics (30%); Scientific Advisory Board: Spinologics (30%); Other Office: Spinologics (30%); Endowments: Medtronic (D, Paid directly to institution/employer); Research Support - Investigator Salary: Fonds de Recherche du Québec - Santé (D); Grants: Scoliosis Research Society (C, Paid directly to institution/employer), Department of the Army – United States Army Medical Research Acquisition Activity (E, Paid directly to institution/employer), Fonds de Recherche du Québec.
– Nature et technologies (E, Paid directly to institution/employer), Canadian Foundation for Innovation (E, Paid directly to institution/employer), Canadian Institutes of Health Research (E, Paid directly to institution/employer), Fondation de Recherche et d’Éducation en Orthopédie de Montréal (FRÉOM) (B, Paid directly to institution/employer), Natural Sciences and Engineering Research Council of Canada (C, Paid directly to institution/employer), Fellowship Support: Medtronic Canada (D, Paid directly to institution/employer).

Main, Chris J.: Royalties: The Back Book (B); Scientific Advisory Board: MedRisk International Scientific advisory Board (B); Other Office: American Physical Therapy Association (B).

Malham, Gregory M.: Consulting: Medtronic (B, Paid directly to institution/employer), Stryker (B, Paid directly to institution/employer), NuVasive (B, Paid directly to institution/employer); Speaking and/or Teaching Arrangements: Medtronic (B, Paid directly to institution/employer), Stryker (B, Paid directly to institution/employer), NuVasive (B, Paid directly to institution/employer), Trips/Travel: Medtronic (B, Paid directly to institution/employer), Stryker (B, Paid directly to institution/employer), NuVasive (B, Paid directly to institution/employer).

Malloy, John (Sean): Consulting: Link Spine (B). Precision (B), Amendia (B), Biomet (B), Speaking and/or Teaching Arrangements: RTI Surgical (B), Providence (B).

Maloney, Michael: Other: ISTO Technologies (Salary).

Manson, Neil A.: Consulting and/or Teaching Arrangements: Medtronic (B); Scientific Advisory Board: Medtronic (B), Halifax Biomedical (B); Research Support - Staff and/or Materials: Medtronic (E, Paid directly to institution/employer).

Marco, Rex A.: Consulting: Aesculap (B); Speaking and/or Teaching Arrangements: DePuy Synthes (E), NuVasive (B), Globus Medical (C); Scientific Advisory Board: Aesculap (None); Fellowship Support: Globus (E, Paid directly to institution/employer).

Marino, Ralph: Consulting: Vertex Pharmaceuticals (B, Paid directly to institution/employer), The Source for Market Research (A).

Martin, Brook L: Consulting: Washington State Department of Health (D); Other Office: Gold Standard Research (Amount not disclosed, Paid directly to institution/employer); Research Support - Investigator Salary: Dartmouth College (F, Paid directly to institution/employer); Grants: Dartmouth College (F, Paid directly to institution/employer).

Martin, Christopher T: Trips/Travel: Globus (Amount not disclosed).


Massicotte, Eric M.: Consulting: Global View Point (Amount not disclosed, Paid directly to institution/employer); Speaking and/or Teaching Arrangements: AOSpine North America (Amount not disclosed), Canadian Neuroscience Federation Society (Scientific Committee); Grants: Medtronic (B, Paid directly to institution/employer), DePuy (B, Paid directly to institution/employer), Zimmer (B, Paid directly to institution/employer).

Matheis, Erika: Stock Ownership: Globus Medical (<1%); Other: Globus Medical (E).

Matsumoto, Morio: Consulting: LDR (B); Scientific Advisory Board: Kyocera (A); Research Support - Staff and/or Materials: Medtronic Japan (D, Paid directly to institution/employer).

Mayer, E. Kano A.: Consulting: Inspire Sleep (B); Speaking and/or Teaching Arrangements: North American Spine Society (B); Trips/Travel: Spine Injection Society (A).

Mayer, John M.: Consulting: Palladian Muscular Skeletal Health (B); Speaking and/or Teaching Arrangements: Rehab Essentials (B); Scientific Advisory Board: Palladian Muscular Skeletal Health (None); Research Support - Investigator Salary: FEMA (D, Paid directly to institution/employer); Research Support - Staff and/or Materials: FEMA (F, Paid directly to institution/employer); Grants: FEMA (F, Paid directly to institution/employer).


McAfee, Paul C.: Royalties: Globus Medical (F); Stock Ownership: Breakaway Imaging- Medtronic (50%); Private Investments: Globus Medical (50%), Cervitech (5%); Consulting: Abbott Pharmaceutical (F); Speaking and/or Teaching Arrangements: Pioneer Surgical (F); Trips/Travel: DePuy Spine (G); Board of Directors: Disc Motion Technology (F); Scientific Advisory Board: SpineMedica (D); Other Office: Bonovo (F); Endowments: Impliant (E); Fellowship Support: Globus Medical (E); Other: Too Numerous to Add (Amount not disclosed).

McCain, Arthur: Consulting: Benvenu Medical (B); Scientific Advisory Board: Benvenu Medical (B).

McClellan, John W.: Royalties: Custom Spine (D); Stock Ownership: Custom Spine (<1%); Other Office: Spine (Reviewer).

McConnell, Jeffrey R.: Royalties: Globus Medical (E); Stock Ownership: Globus Medical (<1%), Vertical Spine (<1%); Consulting: Globus Medical (B), Vertical Spine (A), LDR (B); Speaking and/or Teaching Arrangements: Globus Medical (A); Trips/Travel: Globus Medical, (A).

McGirt, Matthew J.: Consulting: Stryker Spine (D); Relationships Outside the One-Year Requirement: Biomet-Zimmer (Scientific Advisory Board, B).

McGuire, Kevin J.: Consulting: Orthopedic Data Solutions Health Trust (B).

McClellan, John W.: Royalties: Custom Spine (D); Stock Ownership: Custom Spine (<1%); Other Office: Spine (Reviewer).

McKee, David J.: Consulting: Global Spine (<1%).

Mertli, Gino: Consulting: Bristol-Myers Squibb (None), Johnson & Johnson (None), Sanofi-Aventis (None); Research Support - Staff and/or Materials: Bristol-Myers Squibb (A, Paid directly to institution/employer), Sanofi-Aventis (A, Paid directly to institution/employer), Johnson & Johnson (A, Paid directly to institution/employer), Janssen Scientific Affairs (A, Paid directly to institution/employer), Portola (A); Grants: Bristol Myers Squibb (A, Paid directly to institution/employer), Johnson & Johnson (A), Sanofi-Aventis (A), Portola (A), Janssen Scientific Affairs (A).


Meyer, Bernhard: Consulting: Medtronic (B), Ulrich Medical (B); Speaking and/or Teaching Arrangements: Medtronic (B), Med Update (B); Trips/Travel: Relievant (A); Board of Directors: IGASS (Travel expenses), German Academy of Neurosurgery (Travel expenses), EANS (Travel expenses), University Hospital Technical University of Munich (Travel expenses); Scientific Advisory Board: Medtronic (Travel expenses); Research Support - Staff and/or Materials: Ulrich (E, Paid directly to institution/employer), Grants: Ulrich (D); Fellowship Support: IGASS (B, Paid directly to institution/employer), AOSSpine (B, Paid directly to institution/employer).

Mikael, Mark M.: Royalties: Oxford University Press (A); Consulting: DePuy/Synthes (B), Clarience Spine (A).

Milam, Robert A.: Royalties: Styrker Spine (B); Consulting: Styrker (B), K2M (B); Speaking and/or Teaching Arrangements: Spine Wave (B); Board of Directors: Cervical Spine Research Society (None); Research Support - Staff and/or Materials: Spinal Kinetics (D, Paid directly to institution/employer); Fellowship Support: AOSSpine (E, Paid directly to institution/employer).

Millhouse, Paul W.: Stock Ownership: Globus Medical (<1%); Consulting: Pacira (B).

Millner, Peter A.: Speaking and/or Teaching Arrangements: DePuy (Amount not disclosed), Stryker (B); Trips/Travel: K2M (A).

Mitchell, William: Private Investments: South Jersey CyberKnife (<1%); Speaking and/or Teaching Arrangements: NASS (B); Trips/Travel: NASS (Travel expenses).

Miz, George S.: Royalties: K2M (E), Nanovis (B); Stock Ownership: Nanovis (<1%); Private Investments: Nanovis (50000 Shares); Consulting: K2M (B); Scientific Advisory Board: K2M (B), Nanovis (B).

Moldavsky, Mark: Other Office: Globus Medical (Salary).
Moore, Camille: Consulting: Biomet Spine (E, Paid directly to institution/employer).
Moore, Jennifer A.: Other: K2M, Inc. (Salary).
Morrison, Thomas J.: Royalties: K2M (B); Consulting: DePuy (C); Scientific Advisory Board: K2M (B).
Mosnier, Thomas: Board of Directors: Medicirea International (Salary, Paid directly to institution/employer).
Moss, Isaac: Consulting: SpineArt (B); Speaking and/or Teaching Arrangements: NuVasive (B); Trips/Travel: NuVasive (B).
Mroz, Thomas E.: Stock Ownership: Pearl Diver (<1%); Consulting: Stryker Spine (B), CeramTec (B); Board of Directors: AOSpine North America (B).
Mullinix, Kenneth: Research Support - Investigator Salary: Globus Medical (E, Paid directly to institution/employer).
Mundis, Gregory M.: Royalties: NuVasive (E), K2M (B); Consulting: NuVasive (D), Misonix (A), K2M (B); Speaking and/or Teaching Arrangements: NuVasive (C); Fellowship Support: NuVasive (E, Paid directly to institution/employer).
Murgatroyd, Ashley: Research Support - Investigator Salary: Globus Medical (E, Paid directly to institution/employer).
Murphy, Donald R.: Stock Ownership: Primary Spine Provider Network (20%), Spine Care Partners (20%); Consulting: AllState (B), CRISP Education and Research (B); Speaking and/or Teaching Arrangements: CRISP Education and Research (B); Trips/Travel: New York Chiropractic College (A); Scientific Advisory Board: MedRisk (B).
Musacchio, Michael J.: Consulting: Paradigm Spine (B); Speaking and/or Teaching Arrangements: Paradigm (C), Medtronic (C); Scientific Advisory Board: Paradigm Spine (Physician Advisory Board).
Myer, Jacqueline: Other Office: Globus Medical (Salary).
Nachabe, Rami: Other: Employee of Philips Healthcare (Salary).
Naeff, Floreana: Royalties: DePuy (D); Consulting: DePuy Spine (D).
Nascone, Jason: Royalties: Synthes DePuy (A); Consulting: Smith Nephew (C); Speaking and/or Teaching Arrangements: AO (A); Other: IMDS (F).
Nassr, Ahmad N.: Speaking and/or Teaching Arrangements: Magnifi Group (Amount not disclosed); Research Support - Staff and/or Materials: Pfizer (E, Paid directly to institution/employer); Fellowship Support: AOSpine NA (E, Paid directly to institution/employer).
Nelson, Ewell L.: Consulting: Medtronic Navigation (A); Speaking and/or Teaching Arrangements: Medtronic Navigation (C); Trips/Travel: Medtronic Navigation (B).
Neuman, Brian J.: Grants: DePuy Synthes (C, Paid directly to institution/employer).
Nian, Hui: Consulting: Medtronic (D, Paid directly to institution/employer).
Nnadi, Colin: Trips/Travel: Medtronic (Amount not disclosed); Scientific Advisory Board: Nordic Health (None); Research Support - Staff and/or Materials: Ellison (A).
Noriega, David C.: Consulting: SpineArt (C, Paid directly to institution/employer); Medtronic (B), Vexim (C, Paid directly to institution/employer).
Nunley, Pierce D.: Royalties: Osprey Biomedical (B), LDR Spine (D), K2M (B); Stock Ownership: Amedica (<1%), SafeWire (<1%), Paradigm Spine (<1%); Spineology (<1%); Consulting: Vertiflex (D); Speaking and/or Teaching Arrangements: K2M (C), LDR Spine (C); Scientific Advisory Board: K2M (B).
Obeid, Ibrahim: Royalties: Alphatec Spine (A); Consulting: Medtronic (B); Speaking and/or Teaching Arrangements: DePuy Synthes Spine (B).
O’Brien, David R.: Speaking and/or Teaching Arrangements: North American Spine Society (B); Board of Directors: North American Spine Society (Health Policy Council Director); Trips/Travel: ISIS (Amount not disclosed); AAPMR (Amount not disclosed); Other Office: ISIS (Socioeconomic Council Vice-Chair), AAPMR (None).
O’Brien, Michael: Royalties: DePuy (F); Consulting: DePuy (D); Research Support - Staff and/or Materials: NuVasive (F, Paid directly to institution/employer); Seeger (F, Paid directly to institution/employer); DJO (E, Paid directly to institution/employer); DePuy (F, Paid directly to institution/employer); K2M (D, Paid directly to institution/employer).
Okonkwo, David O.: Royalties: Biomet (F, Paid directly to institution/employer); Speaking and/or Teaching Arrangements: AO (B).
Omeis, Ibrahim: Consulting: Stryker (Amount not disclosed); DePuy (Amount not disclosed); Speaking and/or Teaching Arrangements: Stryker (Amount not disclosed), DePuy (Amount not disclosed).
O’Neill, Conor: Stock Ownership: Relievant (<1%), Nocimed (<1%).
Oner, F. Cumhur: Consulting: DePuy Synthes (B, Paid directly to institution/employer); Speaking and/or Teaching Arrangements: AOSpine (Amount not disclosed, Paid directly to institution/employer); Other Office: AOSpine (Knowledge Forum Spinal Trauma Chairman Elect); Research Support - Investigator Salary: AOSpine (D, Paid directly to institution/employer); Research Support - Staff and/or Materials: Synthes (E, Paid directly to institution/employer); Fellowship Support: DePuy Synthes (G, Paid directly to institution/employer).
Ordway, Nathaniel R.: Grants: DePuy Spine (C, Paid directly to institution/employer); Relationships Outside the One-Year Requirement: Ouroboros (Grant, Dissolved 12/2013, C, Paid directly to institution/employer).
O’Toole, Robert V.: Consulting: Smith and Nephew (B); Grants: Synthes (B), Stryker (B).
Owens, R. Kirk: Speaking and/or Teaching Arrangements: Alphatec Spine (A).
Panchal, Ripul R.: Consulting: Precision Spine (A), Globus (B), Medtronic (C), Biomet (C), Mizuho Orthopedic Systems (B); Board of Directors: California Association of Neurological Surgeons (None); Other Office: North American Spine Society (Patient Safety Committee); Research Support - Investigator Salary: Baxter (B); Research Support - Staff and/or Materials: Globus Medical (E, Paid directly to institution/employer).
Parent, Stefan: Stock Ownership: Spinologics (30%); Private Investments: Spinologics (30%); Consulting: DePuy Synthes Spine (B); Speaking and/or Teaching Arrangements: DePuy Spine (B); Trips/Travel: Medtronic (None), EOS Imaging (B); Board of Directors: Scoliosis Research Society (A); Endowments: DePuy Spine (A, Paid directly to institution/employer); Research Support - Staff and/or Materials: DePuy Spine (C, Paid directly to institution/employer); EOS Imaging (E, Paid directly to institution/employer); Fellowship Support: DePuy Spine (D, Paid directly to institution/employer); Medtronic (D, Paid directly to institution/employer).
Park, Jong-Beom: Board of Directors: European Spine Journal (None), International Orthopaedics (None), Asian Spine Journal (None); Scientific Advisory Board: Cervical Spine Research Society Asia Pacific Session (None).
Park, Paul: Royalties: Globus Medical (B); Consulting: Globus Medical (B), Vertex (B), Medtronic (C), Biomet (C); Speaking and/or Teaching Arrangements: Globus Medical (C); Scientific Advisory Board: Neuralstem (A); Research Support - Investigator Salary: Blue Cross Blue Shield Foundation (A, Paid directly to institution/employer); Grants: Blue Cross Blue Shield (E, Paid directly to institution/employer).
Passias, Peter G.: Consulting: Medicrea (None).
Patel, Alpesh A.: Royalties: Amedica (B); Stock Ownership: Amedica (<1%), Cytoxins (<1%), Nocimed (<1%), Vitalis (<1%); Consulting: Amedica (None), Stryker (None), Biomet (C), DePuy (B); Board of Directors: Cervical Spine Research Society (None); Fellowship Support: OREF (A), Omega (B); Other: Amedica (<1%).
Patel, Chetan K.: Royalties: Globus (B); Stock Ownership: KB Medical (<1%); Consulting: Stryker (C); Trips/Travel: NASS (A); Scientific Advisory Board: Medtronic Navigation (B).

Patel, Vikas V.: Royalties: Aesculap (B, Paid directly to institution/employer), Biomet (B, Paid directly to institution/employer), Springer (A); Private Investments: Cerapedics (<1%); Consulting: Aesculap (B); SI-BONE (B, Paid directly to institution/employer); Speaking and/or Teaching Arrangements: Baxter Healthcare (B), Stryker (B); Scientific Advisory Board: Aesculap (B, Paid directly to institution/employer), AlloSource (B, Paid directly to institution/employer), Research Support - Staff and/or Materials: Synthes (D, Paid directly to institution/employer), Grants: Synthes (B, Paid directly to institution/employer), Medtronic (C, Paid directly to institution/employer), Aesculap (C, Paid directly to institution/employer), VertiFlex (C, Paid directly to institution/employer), Orthofix (C, Paid directly to institution/employer), Pfizer (D, Paid directly to institution/employer); Fellowship Support: Omega (B, Paid directly to institution/employer), Globus (E, Paid directly to institution/employer).

Patt, Joshua: Speaking and/or Teaching Arrangements: Synthes, DePuy (B).

Patterson, Patrick: Other Office: Arterioxyce (Salary, Paid directly to institution/employer).

Patwardhan, Avinash G.: Stock Ownership: Spinal Kinetics (<1%); Consulting: Spinal Kinetics (B), Speaking and/or Teaching Arrangements: Spinal Kinetics (B), Trips/Travel: Spinal Kinetics (B); Scientific Advisory Board: Ortho Kinematics (Amount not disclosed).

Paulino, Carl: Consulting: Ethicon (B); Speaking and/or Teaching Arrangements: DePuy/Johnson & Johnson (B); Trips/Travel: Ethicon (B).

Pelletier, Matthew H.: Trips/Travel: Invibio (Travel expenses).

Pelisse, Ferran: Consulting: DePuy Spine J&J (C), Biomet (B); Grants: DePuy Spine Synthes (F, Paid directly to institution/employer), Medtronic (C, Paid directly to institution/employer).

Perez-Grueso, Francisco J.: Consulting: K2M (A); Research Support - Investigator Salary: DePuy Sinters (D, Paid directly to institution/employer).

Petitine, Kenneth A.: Stock Ownership: Mesoblast (1%); Consulting: Paradigm (B); Speaking and/or Teaching Arrangements: Spine Smith/Celling Biosciences (Amount not disclosed), Trips/Travel: Spinal Motion (A); Research Support - Staff and/or Materials: ISTO (B), Globus (B), Paradigm (B), SpineMotion/Celling Biosciences, (B).

Pimenta, Luiz: Royalties: NuVasive (G); Consulting: NuVasive (Amount not disclosed), Zygta Tech (Amount not disclosed), MDT (Amount not disclosed), Board of Directors: ISASS (None), Scientific Advisory Board: LASAS (Scientific Reviewer).

Pincus, Tamar: Relationships Outside the One-Year Requirement: EuroSpine (Grant, Dissolved 06/2015), C, Paid directly to institution/employer), AR-UK (Grant, Dissolved 03/2014).

Poelstra, Kornelis A.: Consulting: DePuy Spine (D); Speaking and/or Teaching Arrangements: K2M (C); Trips/Travel: Mazor (B), Benvenue (B).

Polly, David W.: Trips/Travel: Scoliosis Research Society (B); Board of Directors: Scoliosis Research Society (None).


Prasad, Srinivas K.: Royalties: Stryker Spine (A); Consulting: Stryker Spine (D), Medtronic (B); Speaking and/or Teaching Arrangements: Stryker Spine (D), DePuy Synthes (B); Board of Directors: AKOS Health Systems (None); Fellowship Support: AOSpine (E, Paid directly to institution/employer), NREF (E, Paid directly to institution/employer).

Prather, Heidi: Speaking and/or Teaching Arrangements: PM&R (Amount not disclosed, Paid directly to institution/employer); Trips/Travel: North American Spine Society (Amount not disclosed, Paid directly to institution/employer); Board of Directors: North American Spine Society (Amount not disclosed, Paid directly to institution/employer).

Protopsaltis, Themistocles S.: Consulting: Medircia (B); Grants: Zimmer Spine (B, Paid directly to institution/employer).

Przybylski, Gregory J.: Stock Ownership: Cigna (<1%); Private Investments: South Jersey CK Leasing (<1%); Speaking and/or Teaching Arrangements: NASS (B), Decision Health (B), Eli Research (B); Trips/Travel: AMA (B); Other Office: Eli Research Advisory Editor (B), Board of Education, WHRHS (President), Cigna Healthcare (F).

Puttlitz, Christian M.: Consulting: Medtronic (Amount not disclosed); Grants: Medtronic (D, Paid directly to institution/employer).

Qureshi, Sheeraz A.: Royalties: Zimmer Spine (A); Consulting: Stryker Spine (B), Medtronic Spine (B), Orthofix (B); Speaking and/or Teaching Arrangements: Globus (B), Stryker (B), Medtronic (B); Board of Directors: MTF (B, Paid directly to institution/employer), Scientific Advisory Board: Orthofix (None), Zimmer (None); Other Office: CSRS (Program Committee), NASS (Value Committee), NASS (Evidence Based Guidelines Committee), CSRS (Survey Committee), AAOS (Evaluations Committee); Grants: CSRS (C, Paid directly to institution/employer), Fellowship Support: Global Medical (E, Paid directly to institution/employer).

Racadio, John: Consulting: Philips Healthcare (None).

Radcliff, Kris E.: Royalties: Globus Medical (B), Orthopedic Sciences (A), Altus Spine (A); Consulting: Globus Medical (None), Advance Medical (B), Medtronic Advanced Energy (D), DePuy Spine (B), LDR Spine (None); Board of Directors: Association for Collaborative Spinal Research (None); Scientific Advisory Board: 4 Web Medical (None); Grants: DePuy Synthes (B, Paid directly to institution/employer), Medtronic (B, Paid directly to institution/employer), Paradigm Spine (B, Paid directly to institution/employer).

Rahm, Mark D.: Royalties: SpineSmith (C); Consulting: Stryker (C).

Ramare, Stephane: Consulting: Federation Hospitailiere (A); Trips/travel: Federation Hospitaliere (A); Scientific Advisory Board: Federation Hospitaliere (A); Research Support (Staff and/or Materials): Federation Hospitaliere (None); Fellowship Support: Federation Hospitaliere (A).


Rappard, George: Stock Ownership: Southern California Injury Treatment Network (30%), Miracle Mile Outpatient Surgery Center (2%).

Rathjen, Karl E.: Stock Ownership: Mati Therapeutics (<1%); Consulting: K2M (None); Board of Directors: LLRS (None), POSNA (None), SRS (None). Other: CORR (None), JPO (None), Spine (None).

Ratliff, John: Royalties: Stryker Spine (B); Consulting: Stryker Spine (D); Scientific Advisory Board: NeuroPoint Alliance NZQOD (None); Other Office: AANS/CNS (None), Research Support - Staff and/or Materials: Orthopedic Research and Education Foundation (E, Paid directly to institution/employer); Grants: AHRQ (E, Paid directly to institution/employer).

Reigrut, Julie L.: Other Office: K2M (Salary).

Reiter, Mitchell F.: Private Investments: CreOss (4%).

Reitman, Charles A.: Board of Directors: North American Spine Society (Research Council Director); Trips/Travel: North American Spine Society (Amount not disclosed); Scientific Advisory Board: Clinical Orthopaedics and Related Research (Deputy Editor, B, Paid directly to institution/employer).

Repko, Martin: Speaking and/or Teaching Arrangements: Medtronic (Amount not disclosed, Paid directly to institution/employer), Zimmer Biomet (Amount not disclosed, Paid directly to institution/employer).


Rhee, John M.: Royalties: Biomet Spine (D); Stock Ownership: Phyxgen/Alphatec (<1%); Consulting: DePuy Synthes Spine (B); Speaking and/or Teaching Arrangements: Zimmer Spine (C); Board of Directors: CSRS (Research Committee Chairman); Other: Lippincott (B).
Rhines, Laurence D.: Speaking and/or Teaching Arrangements: Stryker (Amount not disclosed), Globus (Amount not disclosed).

Rhiney, Alfred L.: Royalties: Stryker (Paid directly to institution/employer); Consulting: Stryker (Amount not disclosed); Speaking and/or teaching arrangements: Stryker (Amount not disclosed); Trips/travel: Stryker (Amount not disclosed).

Ricart, Olivier: Royalties: Fournitures Hospitalières (B): Stock Ownership: Fournitures Hospitalières (1 share); Consulting: Fournitures Hospitalières (A); Speaking and/or teaching arrangements: Medicrea (A); Trips/travel: Zimmer Spine (A); Research Support (Investigator Salary): Fournitures Hospitalières (A).

Richardson, William J.: Consulting: DePuy/Sythes (A); Speaking and/or Teaching Arrangements: DePuy Spine (A, Paid directly to institution/employer), Spine Wave (A, Paid directly to institution/employer), Brainlab (B, Paid directly to institution/employer); Scientific Advisory Board: Spine Wave (A, Paid directly to institution/employer).

Riew, K. Daniel: Royalties: Biomet (F), Osprey (C), Medtronic Sofamor Danek (G), Medyssey (A); Stock Ownership: Osprey (<1%), Expanding Orthopedics (<1%), Spineology (<0.1%), Spinal Kinetics (<1%), Nexgen Spine (<1%), Amedica (<1%), Vertiflex (<1%), Benvenue (<1%), Paradigm Spine (<1%), PSD (<1%), Medyssey (None), Trips/Travel: Broad water (Amount not disclosed), Selby Spine (Amount not disclosed), Scoliosis Research Society (Amount not disclosed), North American Spine Society (Amount not disclosed), DePuy Synthes (Amount not disclosed), Board of Directors: Cervical Spine Research Society (Amount not disclosed), AO Spine (B, Paid directly to institution/employer), Spine Journal (Amount not disclosed); Research Support - Staff and/or Materials: AOSpine (B, Paid directly to institution/employer), Cerapedics (A, Paid directly to institution/employer); Fellowship Support: AO Spine (E, Paid directly to institution/employer); Other: Various entities (Financial, E).

Rihn, Jeffrey A.: Consulting: Pfizer (B).

Rose, Peter: Consulting: K2M (B); Trips/Travel: K2M (Travel expenses).

Rothman, David: Board of Directors: North American Spine Society (Ethnicist); Other Office: Hagens Berman (None), Farrise (None); Relationships Outside the One-Year Requirement: State of Texas/Sheller (Expert witness, Dissolved 03/2012, E).


Ryaby, James T.: Stock Ownership: Orthofix Inc. (<1%); Consulting: Chrysalis BioTherapeutics (Stock ownership); Speaking and/or teaching arrangements: Orthofix Inc. (Travel expenses); Trips/travel: Orthofix Inc. (Amount not disclosed); Scientific Advisory Board: Chrysalis BioTherapeutics (Stock Options).

Saiz, Paul: Royalties: Zimmer (A); Consulting: Zimmer (A), Medvest (A); Speaking and/or Teaching Arrangements: Zimmer (A); Trips/Travel: Zimmer (A); Board of Directors: Las Cruces Surgical Center (None).

Sakakeeny, Jarred: Stock Ownership: Johnson & Johnson (<1%).

Sama, Andrew A.: Royalties: Ortho Development Corporation (E).

DePuy (C): Stock Ownership: Paradigm Spine (<1%), Sonto (<1%); Consulting: Ortho Development (None), Clarience (B), Medtronic (None), DePuy (B); Speaking and/or Teaching Arrangements: DePuy Spine (D); Scientific Advisory Board: Clarience (B); Research Support - Staff and/or Materials: Spinal Kinetics (C, Paid directly to institution/employer), Mimedx (B, Paid directly to institution/employer), Aesculap (A, Paid directly to institution/employer); Fellowship Support: AOSpine (E, Paid directly to institution/employer).

Samdani, Amer F.: Consulting: DePuy Synthes Spine (D), Stryker (C), SpineGuard (B), Zimmer (D), Globus Medical (C).

Sandhu, Faheem: Royalties: K2M (C), Spineart (A), Globus (A), Precision Spine (B); Stock Ownership: Globus (450 shares); Consulting: K2M (B), Precision Spine (B), Facet Link (B), SpineGuard (B), VGI (B); Speaking and/or teaching arrangements: K2M (B), SpineGuard (C), SpineArt (B); Scientific Advisory Board: K2M (B), Aesculap (B).

Sankar, Srimat: Stock Ownership: Diffusion Inc. (1.5%); Other Office: Diffusion Inc. (Salary).

Sarwahi, Vishal: Consulting: DePuy Spine (None), Precision Spine (None), Medtronic (B, Paid directly to institution/employer).

Sasso, Rick C.: Royalties: Medtronic (I); Board of Directors: Cervical Spine Research Society (None), Research Support - Staff and/or Materials: Medtronic (B, Paid directly to institution/employer), Cerapedics (E, Paid directly to institution/employer), Smith and Nephew (D, Paid directly to institution/employer).

Savage, Jason W.: Consulting: Stryker Spine (B).

Schmidt, John A.: Stock Ownership: K2M (<1%); Trips/Travel: K2M (Amount not disclosed); Other Office: K2M (Amount not disclosed).

Schnake, Klaus J.: Consulting: Otto Bock Healthcare (B), Expanding Orthopedics (B), AOSpine International (C), Silomy Medical (B); Speaking and/or Teaching Arrangements: DePuy Synthes (B); Research Support - Staff and/or Materials: Otto Bock Healthcare (B, Paid directly to institution/employer).

Schoenfeld, Andrew J.: Scientific Advisory Board: The Spine Journal (None); Research Support - Staff and/or Materials: Robert Wood Johnson Foundation (C, Paid directly to institution/employer); Grants: Robert Wood Johnson Foundation Clinical Scholars Program (E, Paid directly to institution/employer); Other: American Academy of Orthopaedic Surgeons (Adult Spine Evaluation Committee).

Schofferman, Jerome: Board of Directors: North American Spine Society (Committee on Ethics & Professionalism Chair).

Schroeder, Gregory D.: Trips/Travel: Medtronic (Amount not disclosed), Paid directly to institution/employer).

Schroeder, Samuel R.: Consulting: NuVasive (B, Paid directly to institution/employer); Speaking and/or Teaching Arrangements: Mazor (B, Paid directly to institution/employer); Research Support - Staff and/or Materials: Mazor (B, Paid directly to institution/employer).

Schwab, Frank J.: Royalties: MSD (D); Stock Ownership: Nemaris (30%); Consulting: MSD (B), K2M (D), Medtronic (D), Zimmer Biomet (D), NuVasive (C); Trips/Travel: Nemaris (B), Medirec (B), NuVasive (K2M), Zimmer Biomet (B); Board of Directors: Nemaris (Amount not disclosed); Other Office: CMO (Amount not disclosed); Grants: DePuy Spine (H, Paid directly to institution/employer).

Schwarzkopf, Ran: Stock Ownership: Gaus (<1%); Consulting: Smith & Nephew (Amount not disclosed); Scientific Advisory Board: Intellijoint (Amount not disclosed).

Schwender, James D.: Royalties: Medtronic (F); Speaking and/or Teaching Arrangements: Medtronic (C); Fellowship Support: Synthes (F), Stryker (F), Medtronic (F).

Sciubba, Daniel M.: Consulting: Medtronic (C, Paid directly to institution/employer), Globus (B), DePuy-Synthes (B).

Sembrano, Jonathan N.: Board of Directors: Society of Lateral Access Surgeons (SOLAS (None), Philippine Minnesota Medical Association (PMMA) (None), University of the Philippines Alumni of Minnesota (UPAM) (None).

Sene, Steven J.: Consulting: K2M (B), Kspine (B).

Sengupta, Dilip K.: Royalties: Globus Medical (D); Stock Ownership: Globus Medical (<1%); Private Investments: International Spine and Orthopaedic Institute (<1%); Consulting: Globus Medical (None); Scientific Advisory Board: Globus Medical (None); Research Support - Staff and/or Materials: Globus Medical (A, Paid directly to institution/employer); Fellowship Support: Globus Medical (A, Paid directly to institution/employer); Other: Globus Medical (Amount not disclosed, Paid directly to institution/employer).

Serhan, Hassan A.: Consulting: DePuy Synthes Spine (Salary); Other Office: DePuy Synthes Spine (Salary).

Sestokas, Anthony K.: Stock Ownership: SpecialtyCare (<1%); Other Office: SpecialtyCare (F).

Shaffrey, Christopher I.: Royalties: Medtronic (F), NuVasive (F), Biomet (F); Stock Ownership: NuVasive (5000 Shares); Consulting: Biomet (B), NuVasive (B); Speaking and/or Teaching Arrangements: NuVasive (B); Trips/Travel: Medtronic (B); Board of Directors: American Board of Neurological Surgery (None), American Board of Neurological Surgeons (None), Cervical Spine Research Society (None);
Endowments: John A Jane Professor (E, Paid directly to institution/employer); Research Support - Investigator Salary: NIH (B, Paid directly to institution/employer); Grants: Department of Defense (F, Paid directly to institution/employer); Fellowship Support: AO (E, Paid directly to institution/employer), NREF (E, Paid directly to institution/employer).

Shah, Suken A.: Royalties: DePuy Spine (F); Stock Ownership: Globus Medical (<1%); Consulting: DePuy Spine (E); Speaking and/or Teaching Arrangements: DePuy Spine (B, Paid directly to institution/employer); Research Support - Staff and/or Materials: Setting Scoliosis Straight Foundation (E, Paid directly to institution/employer).

Shamie, A. Nick.: Royalties: SeaSpine (C); Stock Ownership: SI Bone (<1%); VertiFlex (<1%); Consulting: Medtronic (None), SeaSpine (None), SI Bone (B), VertiFlex (C); Speaking and/or Teaching Arrangements: Medtronic (None); Trips/Travel: Medtronic (None); Board of Directors: VertiFlex (Medical Director); Scientific Advisory Board: SI Bone (Medical Advisory Board).

Shanjil, Mohammed F.: Consulting: Medtronic (Amount not disclosed); Speaking and/or Teaching Arrangements: Medtronic (Amount not disclosed); Research Support - Staff and/or Materials: AOSpine NA (D, Paid directly to institution/employer); Grants: Canadian Pain Society (D, Paid directly to institution/employer).

Sharan, Alok D.: Consulting: Paradigm Spine (B); Other: Jaypee Brothers (A).

Shaw, Francis H.: Royalties: Elsevier (B), Globus Medical (D); Consulting: Medtronic (B), DePuy Synthes (B); Board of Directors: MTF (B); Scientific Advisory Board: Axsome (A); Other Office: AO Foundation (Grant Reviewer), CSRS (Executive Board); Fellowship Support: AO Foundation (D, Paid directly to institution/employer); Other: Spine Journal (Deputy Editor), European Spine Journal (Editor), SPINE (Editor).

Shetty, Teena: Scientific Advisory Board: GE NFL Medical Advisory Board (B); Research Support - Investigator Salary: GE (G, Paid directly to institution/employer); Research Support - Staff and/or Materials: Abbott (F, Paid directly to institution/employer); Grants: GE (G, Paid directly to institution/employer).

Shimer, Adam L.: Consulting: Medtronic (B), NuVasive (B); Speaking and/or Teaching Arrangements: Biomet (B).

Shri, Brian: Research Support - Staff and/or Materials: DePuy Synthes (A, Paid directly to institution/employer).

Singh, Kern: Royalties: Stryker (C), Jaypee Publishing (B), Thieme (C), Lippincott (C), Pioneer (B), Zimmer (B); Consulting: Stryker Spine (B), DePuy (B), Zimmer (C), Globus (C), Pioneer Surgical (B); Board of Directors: Vital S (Board Member), Indo-American Spine Alliance (Board Member), TruVue Surgical (Board Member), Avaz Surgical (Board Member); Other Office: J Contemporary Spine Surgery (Editor-in-Chief), Spine Surgery Today (Editorial Board), Journal of Orthopedics (Editorial Board).


Skalli, Wafa: Trips/Travel: EOS Imaging (Travel expenses); Grants: ParisTech Foundation (F, Paid directly to institution/employer).


Slosar, Paul J.: Royalties: Titan Spine (D); Stock Ownership: Titan Spine (<1%), DFine (<1%), Relievant (<1%); Consulting: Relevant (Amount not disclosed); Other Office: Medical Director Titan Spine (E).

Smith, Harvey E.: Consulting: Globus Spine (B), Pacira Pharmaceuticals (A); Trips/Travel: NuVasive (A); Other: DePuy Spine (None), Orthofix (None); Relationships Outside the One-Year Requirement: Stryker Spine (Trips/Travel, Dissolved 01/2010, A).

Smith, Justin S.: Royalties: Biomet (C); Consulting: Biomet (C), K2M (B), NuVasive (B), Cerapedics (B); Grants: DePuy Synthes (B, Paid directly to institution/employer); Fellowship Support: AO (E, Paid directly to institution/employer), NREF (E, Paid directly to institution/employer).


Smith, Nicholas L.: Grant: VA Research & Development (G, Paid directly to institution).

Smuck, Matthew: Stock Ownership: NuSpine (<1%), BlueJay Mobile-Health (<1%); Private Investments: Vivametrica / Sikoya (20%); Trips/Travel: Spine Intervention Society (B), North American Spine Society (B); Board of Directors: Vivametrica/Sikoya (None), Spine Intervention Society (None), North American Spine Society (At Large Member); Scientific Advisory Board: NuSpine (Amount not disclosed), Lumo Body Tech (Amount not disclosed), BlueJay Mobile-Health (Amount not disclosed); Other Office: The Spine Journal (Deputy Editor), Spine Intervention Society (Board of Directors), North American Spine Society (Board of Directors); Other: Expert Witness - State Farm (F), Expert Witness - Kaiser Permanente (C); Relationships Outside the One-Year Requirement: Cytonics (Research Support: Staff and/or Materials, Dissolved 12/2013, F).

Smucker, Joseph D.: Consulting: Theorem Clinical Research (None), Back Bay Life Science Advisors (A).

Snead, Darryl: Other: General Electric Healthcare (Amount not disclosed).

Söderman, Michael: Royalties: Neuravi (C); Stock Ownership: Blockade Medical (7500 stock options); Consulting: SLL (B).

Sowa, Gwendolyn A.: Royalties: UpToDate (A); Consulting: Advantage Healthcare (A); Board of Directors: Association of Academic Physiatrists (Member of Board of Trustees); Other Office: Association of Academic Physiatrists (Research Committee), American Academy of Physical Medicine and Rehabilitation (Evidence Based Practice Committee); Research Support - Investigator Salary: NIH (E, Paid directly to institution/employer), Foundation for PMR (E, Paid directly to institution/employer), The Pittsburgh Foundation (E, Paid directly to institution/employer), OREF (E, Paid directly to institution/employer); Research Support - Staff and/or Materials: Wings of Life Foundation (D).

Spiker, W. Ryan: Consulting: Amedica (A), NEXXT Orthopedics (B), Nexus (B); Fellowship Support: AOSpine/DePuy Synthes (E, Paid directly to institution/employer).


Spomol, Paul D.: Royalties: Globus Spine (B), DePuy Synthes Spine (E); Consulting: DePuy Spine (B); Speaking and/or Teaching Arrangements: DePuy Synthes Spine (B); Board of Directors: DePuy (B), Paid directly to institution/employer), PCORI (E, Paid directly to institution/employer), Foundation for PMR (E, Paid directly to institution/employer), The Pittsburgh Foundation (E, Paid directly to institution/employer), OREF (E, Paid directly to institution/employer); Research Support - Staff and/or Materials: Wings of Life Foundation (D).


Steib, Jean-Paul: Royalties: Alphatec (C), LDR (D), Medtronic (B, Paid directly to institution/employer); Consulting: Alphatec (B), Clariance (C); Speaking and/or Teaching Arrangements: Stryker (B, Paid directly to institution/employer), Alphatec (B, Paid directly to institution/employer), LDR (Amount not disclosed), Alphatec (Amount not disclosed), Clariance (Amount not disclosed); Trips/Travel: LDR (Amount not disclosed), Alphatec (Amount not disclosed), Clariance (Amount not disclosed); Scientific Advisory Board: Clariance (B); Endowments: Alphatec (B, Paid directly to institution/employer), Medtronic (B, Paid directly to institution/employer); Fellowship Support: Alphatec (B, Paid directly to institution/employer).

Steinmetz, Michael P.: Royalties: Biomet Spine (C); Consulting: Biomet Spine (A), Intellirod (None), DePuy Synthes (C), Stryker Spine (B); Speaking and/or Teaching Arrangements: Synthes Spine (A); Board of Directors: Congress of Neurological Surgeons (Ex Officio Member of the Executive Committee), Scientific Advisory Board: Intellirod (B); Relationships Outside the One-Year Requirement: Stryker Spine (Speaking and/or Teaching Arrangement, Dissolved 01/0110, B).
Stemper, Brian D.: Consulting: Spinal Stabilization Technologies (B); Trips/Travel: Spinal Stabilization Technologies (A); Research Support Investigator Salary: Beth Israel Deaconess Medical Center from Congressionally Directed Medical Research Funds (E, Paid directly to institution/employer); Research Support - Staff and/or Materials: Beth Israel Deaconess Medical Center from Congressionally Directed Medical Research Funds (A, Paid directly to institution/employer); Grants: NA (A, Paid directly to institution/employer).

Stone, Jeffrey A.: Relationships Outside the One-Year Requirement: Benvenue Medical (Research Support: Staff and/or Materials, Dissolved 07/2012, Coding Committee, Radiology Committee).

Stone, Marcus: Relationships Outside the One-Year Requirement: Medtronic (Consulting, Dissolved 08/2009).

Stout, Alison A.: Consulting: State Farm (Amount not disclosed); Speaking and/or Teaching Arrangements: SIS (B), AAPMU (B), AAPMR (Program Planning Committee); Board of Directors: McKenzie Institute USA (A).

Strenge, K. Brandon: Royalties: Zimmer Biomet (A); Private Investments: Vertera (<1%); Consulting: Zimmer Biomet (E); Speaking and/or Teaching Arrangements: Zimmer Biomet (B); Trips/Travel: Zimmer Biomet (B); Research Support - Staff and/or Materials: Zimmer Biomet (B).

Su, Brian W.: Device or Biologic Distributorship (Physician-Owned Distributorship): Stryker (C), Link (C), Medtronic (C), DePuy (B); Consulting: Gentis (C); Scientific Advisory Board: LINK (C); Research Support - Staff and/or Materials: Marin General Hospital Foundation (E).


Sullivan, William J.: Board of Directors: North American Spine Society (Secretary); Trips/Travel: North American Spine Society (B).

Suri, Pradeep: Consulting: Spaulding Rehabilitation Hospital (B); Grant: VA Research & Development (G, Paid directly to institution).

Swartz, Karin R.: Speaking and/or Teaching Arrangements: AANS/CNS (A), NASS (A).

Sweeney, Thomas M.: Royalties: AlphaBScr (A), Ortho Development (B), NuVasive (C), Alpine Spine (F); Stock Ownership: Celtic Biodevices (60%); Consulting: Mazer (C).

Takeishi, Katsushi: Speaking and/or Teaching Arrangements: Pfizer (B, Paid directly to institution/employer), Johnson & Johnson (B, Paid directly to institution/employer), Medtronic Sofamor Danek (B), Stryker (A, Paid directly to institution/employer).

Tallarico, Richard A.: Consulting: Stryker Spine (D); Research Support - Staff and/or Materials: DePuy Spine (C, Paid directly to institution/employer); Vertiflex (B, Paid directly to institution/employer).

Tay, Bobby: Royalties: Stryker (B); Consulting: Stryker (A); Trips/Travel: Stryker (A); Fellowship Support: NuVasive (D, Paid directly to institution/employer), Globus Medical (E, Paid directly to institution/employer), AOSpine (E, Paid directly to institution/employer).

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- Lawrence G. Lenke, MD
- Julie E. Levine, DO
- Don K. Moore, MD
- Heidi Prather, DO
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- Michael L. Reed, DPT, OCS
- Mitchell F. Reiter, MD, PC
- Daniel K. Resnick, MD, MS
- Matthew J. Smith, MD, EMHL
- Jeffrey T. Summers, MD
- Karin R. Swartz, MD
- Michael Y. Wang, MD
- David N. Woznicza, MD

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- James S. Bainbridge, MD
- Ray M. Baker, MD
- Christopher M. Bono, MD
- Tony Brown, RT
- David H. Chang, MD
- Saad B. Chaudhary, MD, MBA
- Kingsley R. Chin, MD
- Samuel K. Cho, MD
- Jos A. Cove, MD
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- Harlan B. Daubert, MD
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- Donald Dietze, MD
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- Douglas F. Geiger, MD
- John M. Gorup, MD
- Kush K. Goyal, MD
- Jordan C. Grabel, MD, FACS
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- Wellington K. Hsu, MD
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- Brian J. Ipsen, MD
- A. Jay Khanna, MD
- Reginald Q. Knight, MD MS
- Don A. Kovalsky, MD
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- Maneesh Bawa, MD
- Gerald J. Becker, MD
- Sigurd H. Berven, MD
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- Timothy R. Borman, DO
- Timothy M. Brophy, MBA
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- Sunday U. Ero, MD
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THANK YOU!

The North American Spine Society would like to express its sincere appreciation to the following companies for their support of the NASS 31st Annual Meeting.

- Benvenue Medical
- Medtronic
- SeaSpine
- DePuy Synthes (SPINE)
- NuVasive (Speed of Innovation)
- Titan (SPINE)
- joimax
- Orthofix
- Zavation
- Mazor Robotics
- rti surgical
- Zimmer Biomet

STAND WITH THE FUTURE
**TECHNICAL EXHIBITION HOURS**
Wednesday, October 26 .... 9:00 a.m.–5:00 p.m.
Thursday, October 27 .... 9:00 a.m.–5:00 p.m.
Friday, October 28 ........ 9:00 a.m.–1:30 p.m.

**SOLUTION SHOWCASE THEATER**
Wednesday, October 26
12:00: Richard Wolf
12:30: Zimmer Biomet

Thursday, October 27
12:00: Invibio Biomaterial Solutions
12:30: Medicrea USA

Friday, October 28
12:00: DJO Global
12:30: Misonix

**NASS BISTRO HOURS**
Wednesday, October 26 .... 11:00 a.m.–2:30 p.m.
Thursday, October 27 .... 11:00 a.m.–2:30 p.m.
Friday, October 28 ........ 11:00 a.m.–1:30 p.m.

**MEDICAL ATTENDEE LUNCH**
Complimentary box lunches 12:00–1:00 p.m.
for medical professionals.
### 3D Systems Healthcare
**Website:** [www.3dsystems.com/healthcare](http://www.3dsystems.com/healthcare)

3D Systems offers healthcare-centric 3D printing and 3D visualization technology. The company’s surgical tools include accurate 3D printed anatomical models, advanced virtual reality simulators, direct metal printing for implants and instrumentation, virtual surgical planning (VSP®) and personalized 3D printed surgical guides. 3DS is developing true patient-specific healthcare solutions, one by one or at scale, designed to change the future of personalized medicine.

### 4WEB Medical
**Website:** [www.4webmedical.com](http://www.4webmedical.com)

4WEB Medical is an orthopedic implant company based in Frisco, Texas. Thirty years of research in topological dimension theory led to the discovery of a novel geometry, the “4WEB”, which could be used as a building block to create high-strength, lightweight web structures. The company leveraged this breakthrough, along with cutting-edge 3D printing technology, to develop its proprietary truss implant platform. Over 10,000 of 4WEB’s truss implants have been utilized in surgery since 2013.

### 7D Surgical
**Website:** [www.7dsurgical.com](http://www.7dsurgical.com)

7D Surgical has solved problems that have existed for 20 years limiting the adoption of image guided surgery. The Envision 3D™ Image Guidance System has been designed from the ground up and incorporates state-of-the-art 3D patient digitization to provide superb surgical guidance accuracy without intraoperative radiation. This product is not cleared by the FDA for distribution in the United States. This product is intended to be used in the United States as described in the product’s labeling.

### AccelLAB Inc.
**Website:** [www.accelab.com](http://www.accelab.com)

AccelLAB is a preclinical CRO that conducts regulatory testing on product safety and efficacy for the evaluation of medical devices and biologics. Services include study designs, sophisticated surgical suites and imaging technology (incl. on-site CT-Scan, MRI, Radiography and μCT), blood assays, histology, histomorphometry, histopathology and report production by experienced full-staff pathologists. Fully AAALAC and CCAC accredited, AccelLAB was successfully audited by the FDA.

### Acuity Surgical
**Website:** [www.acuitiesurgical.com](http://www.acuitiesurgical.com)

Spine surgeons partner with Acuity for physician-designed implant technologies and solutions. Surgeons count on our unwavering commitment to design, develop, produce and support evidence-based lumbar, cervical and biologic solutions to deliver quality care to their patients. We’re looking for experienced sales execs with strong ties to the spine surgeon community. To join our highly rewarded team of business owners, call John 817-718-0538 or Bryan 214-405-2870. All calls are confidential.

### AEGIS SPINE, INC.
**Website:** [www.aegisspine.com](http://www.aegisspine.com)

Aegis Spine, Inc. was founded to bring about change and innovation to the medical industry. We endeavor to be the leading manufacturer in the medical devices market. Our first priority is to provide excellent service and support to our clients, who are regarded as family. The integral strategy of our company is to keep up with changes in the industry. Our staff is open to change, innovative ideas, and new technology.

### Aesculap Implant Systems
**Website:** [www.aesculapimplantsystems.com](http://www.aesculapimplantsystems.com)

Combining years of R&D along with modern technology, Aesculap Implant Systems offers a complete line of implant systems and instrumentation to Spine surgeons. Aesculap Implant Systems is committed to excellence in satisfying surgeon and patient needs through the delivery of innovative, cost-effective operative solutions.

### Afferent Provider Solutions
**Website:** [www.afferentsolutions.com](http://www.afferentsolutions.com)

Afferent Provider Solutions was founded by physicians to meet all the unique insurance, wealth management, financial, and career services needs of skilled medical professionals. Operated by industry experts in their respective fields, Afferent is focused on being the one place medical professionals can trust for all of their life and practice needs from training through retirement, saving time and money.

### AIS PainCare
**Website:** [www.aispaincare.com](http://www.aispaincare.com)

AIS is a compounding pharmacy specializing in intrathecal pump medications. We offer several unique programs such as direct billing of patients’ insurances. In addition, we maintain USP 797 compliance and use an independent, third party FDA registered lab to perform testing on our products for potency, pyrogen, pH, and sterility.

### Alevio
**Website:** [www.aleviospine.com](http://www.aleviospine.com)

Alevio, headquartered in Birmingham, Alabama, designs, manufactures and markets innovative SI-Fusion solutions. Working closely with surgeons to put patients first and maximize clinical results, Alevio is dedicated to successful patient outcomes. The Alevio SiCure system is the only self-harvesting SI-Fusion implant currently on the market.

### Allen Medical Systems
**Website:** [www.allenmedical.com](http://www.allenmedical.com)

The Allen Medical Spine portfolio offers innovative solutions to help with all of your patient positioning challenges in spine surgery. The Allen® Advance Table is a state of the art solution designed to provide a fully radiolucent patient platform and 180° rotational function. The table was built with improved safety features, a modern user interface, intuitive pendant controls, electronic floor locks and many other convenience features; all at a favorable cost.
AlloSource
www.allosource.org
AlloSource partners with healthcare leaders to help patients make a comeback. AlloSource is proud to offer a wide range of biologic products including advanced technologies like AlloStem® Cellular Bone Allograft, AlloWrap® Double Sided Amniotic Membrane and AlloFuse® Demineralized Bone Fibers (DBF™) and cost effective solutions like AlloFuse® DBM Pastes, Putties & Gels. Stop by our booth and learn about how our products can help treat your patient’s unique needs.

Alphatec Spine, Inc.
www.alphatecspine.com
Alphatec Spine, Inc., a wholly owned subsidiary of Alphatec Holdings, Inc., is a medical device company that designs, develops and markets spinal fusion technology products and solutions for the treatment of spinal disorders associated with disease and degeneration, congenital deformities and trauma. The Company’s mission is to improve lives by delivering advancements in spinal fusion technologies. Additional information can be found at www.alphatecspine.com.

Ambrä
www.ambrahealth.com
Ambra Health is a medical data and image management SaaS company. Intuitive, flexible, and highly interoperable, the Ambra cloud platform is designed to serve as the backbone of imaging innovation and progress for healthcare providers. It empowers some of the largest health systems such as the Mayo Clinic, and Memorial Hermann as well as radiology practices, subspecialty practices and clinical research organizations to dramatically improve imaging and collaborative care workflows.

Amedica Corporation
www.amedica.com
AMEDICA is the only company with the scientific know-how to produce medical grade Silicon Nitride - a patented platform technology for spinal applications. Silicon Nitride offers doctors and patients an alternative to PEEK and titanium that is osteopromotive, anti-infective and may result in faster fusion.

Amendia
www.amendia.com
Headquartered in a state of the art manufacturing facility in Marietta, GA, Amendia is a leading provider of innovative medical devices used during spinal surgical procedures. Founded in 2008, our Mission is to exceed surgeon & patient expectations by creating balanced solutions with disruptive technologies for medical devices paired with biologics & instrumentation. Amendia’s vertically-integrated strategy focuses on improving surgical outcomes & the lives of patients with spinal disorders.

Amniox Medical
www.amnioxmedical.com
AMNIOX® Medical is the leader in amnion restorative tissue technology and is the first to provide an umbilical cord/amniotic membrane matrix for transplantation. Our proprietary CRYOTEK® process is the result of 25 years of National Institute of Health-sponsored research into the unique regenerative biology of these tissues. This process has been proven to preserve the innate functional and structural integrity of the umbilical cord and amniotic membrane.

AOSpine International
www.aospine.org
AOSpine is an international community of spine surgeons generating, distributing, and exchanging knowledge to advance science and the spine care profession through research, education, and community development. With this collaborative approach AOSpine continues to advance spine care worldwide.

APS Materials, Inc.
www.apsbiomedical.com

Arcam
www.arcam.com
Arcam provides a cost-efficient Additive Manufacturing solution for production of metal components. Arcam’s EBM® technology offers freedom in design combined with excellent material properties and high productivity. Arcam is an innovative partner for manufacturing in the orthopedic implant and aerospace industries, where we deliver customer value through our competence and solution orientation.

Arcamed, LLC
www.arcamed.com
At Arcamed, we specialize in building surgical cases and trays for the spinal marketplace, and we believe each product should be as effective and ambitious as the instruments it holds. Fast and focused, our engineering, quality, and operations team’s speed and agility mean our clients can meet their critical deadlines on time, every time. Ultimately, we know there’s a patient out there whose well-being depends on those tools arriving not a minute later than expected.

Argovian Technologies
argovian.net
Argovian Technologies is a mechanical testing and engineering company with an experienced staff focused on meeting the needs of the spine industry. Our ISO 17025 compliant facility offers mechanical test rigs capable of meeting the ASTM standards required for FDA submittals. Our belief is that our clients are not just another customer, but a valued business partner. We offer excellent turnaround support at the most competitive prices.

Arteriocyte Medical Systems, Inc.
www.arteriocyte.com
Arteriocyte Medical Systems is dedicated to helping patients heal faster. The Magellan® Autologous Platelet Separator System is designed to be used in a clinical laboratory or intraoperatively at the point-of-care for safe and rapid preparation of platelet-rich plasma (PRP) using whole blood alone, or mixed with bone marrow aspirate. Arteriocyte Medical Systems continues to invest in platelet separation technology and is focused on the development of new surgical applications of PRP.
<table>
<thead>
<tr>
<th>Company Name</th>
<th>Booth Number</th>
<th>Website</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artisan Medical Displays</td>
<td>1242</td>
<td><a href="http://www.artismanmedicaldisplays.com">www.artismanmedicaldisplays.com</a></td>
<td>Building Customized Products, Models and Trainers as We Cultivate Relationships with Our Clients Through Our Commitment to Integrity, Excellence and Dedication</td>
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<td>Ascential</td>
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<td><a href="http://www.ascentialhealth.com">www.ascentialhealth.com</a></td>
<td>Ascential’s new approach to spine healthcare offers high quality products with increased operational efficiency and profitability for your outpatient center. Manufactured by Stryker.</td>
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<td><a href="http://www.aspenmp.com">www.aspenmp.com</a></td>
<td>Aspen Medical Products is a leader in the development of innovative spinal bracing for post-trauma stabilization, pre-and-post surgical stabilization, pain management and long-term patient care. Aspen Medical Products offers multiple orthotic options that provide unsurpassed motion restriction, superior comfort and an economic advantage, encouraging better patient compliance.</td>
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<td>Association of Spine Surgeons of India—ASSI</td>
<td>1766</td>
<td></td>
<td>ASSI promotes scientific spine care, both surgical and non-surgical, in India through the medium of national, regional and local meetings, symposia, CME and workshops. ASSI is also involved in advocacy and social work and research.</td>
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<td>Astura Medical</td>
<td>1757</td>
<td>asturamedical.com</td>
<td>Additional information can be found by visiting our website at <a href="http://www.asturamedical.com">www.asturamedical.com</a></td>
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<tr>
<td>Aurora Spine</td>
<td>1302</td>
<td><a href="http://www.auroraspine.us">www.auroraspine.us</a></td>
<td>Aurora Spine offers a rich and diverse product portfolio for both the “Screwless Procedure” and the more traditional spinal procedures. These products include ISP devices, titanium coated interbody cages, biologics, plates, pedicle screw systems, cervical stand-alone implant, and surgical instruments.</td>
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<td>Autocam Medical</td>
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<td>Autocam Medical is a contract manufacturer of precision-machined surgical drill bits, drivers, screws, plates, cutting tools and other complex, highly engineered medical parts. We offer a value-added approach to high-precision manufacturing, with specialties in CNC milling, turning and cutter grinding. State-of-the-art equipment and design for manufacturing engineering add value to the entire manufacturing process. ISO13485/ISO 9001, FDA Registered, VISA (Brazil).</td>
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<td>Avalign Technologies is the premier, full-service supplier of surgical implants, instruments, and delivery systems. Expertise in engineering, diverse manufacturing capabilities, and dedication to clients’ needs ensures our customers’ success from start to finish. Avalign brings the highest quality products to our OEM customers across multiple surgical specialties. The Avalign team’s passion provides an increased speed to market and maximized customer revenue, at the lowest total system cost.</td>
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<td>Axial Medical</td>
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<td>Axial Medical is a Lean, vertically integrated contract manufacturer that solves the three major purchasing dilemmas: Price, Delivery and Quality. Quick decisions and minimal outsourcing keep Lead-Times Short. Our VMi programs and Value Added Engineering keep costs low. Quality is the cornerstone at Axial. Partnering with customers allows us to specialize in the most complex implants on the market such as: Expandable Cages, Elaborate Plates and Intricate Connectors. Come learn more at Booth 866!</td>
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<td>Barrier Technologies is a USA manufacturer of Radiation Protection products. Our products protect healthcare professionals who work in fluoroscopic environments from the harmful effects of scatter radiation &amp; include our Leaded Eyewear, X-Ray Protective Aprons, (Lead &amp; Lead-Free) Secure Touch Sterile Radiation Protective Gloves, Scatter Reducing Pads &amp; Drapes, Mobile Barriers, &amp; X-ray Accessories. For more information please visit us in booth #1340 or at our web site <a href="http://www.barriertechnologies.com">www.barriertechnologies.com</a></td>
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<td>Bauerfeind USA</td>
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<td><a href="http://www.bauerfeind.com">www.bauerfeind.com</a></td>
<td>Bauerfeind blazed the trail in developing functional supports that truly provide pain relief for damaged or stressed joints. We set the bar more than 80 years ago and we’ve been raising it ever since. We partner with medical researchers and educators, consult with physicians, and gain insights from world-class athletes and their organizations: It’s all about engineering the most effective supports and braces for every joint group in the body. Take it from the Pros - and get to know us!</td>
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<td>Beijing Fule Science &amp; Technology Co., Ltd</td>
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<td><a href="http://www.fulekeji.com">www.fulekeji.com</a></td>
<td>Beijing Fule Science &amp; Technology Development Co., LTD was founded in 1996. We are the one of biggest orthopaedic manufacturer in Spine, Trauma and External Fixator with all instruments in China. We accept OEM orders as well. We have some of advanced machines and also have skillful workers to produce high quality products for you according to what you need. I am looking forward to cooperate with you in the near future.</td>
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Biomaterials, Inc. is an AATB accredited licensed Tissue Bank. Berkeley Advanced Biomaterials, Inc. manufactures high-quality and cost-effective skeletal repair resorbable biomaterials. Berkley Advanced Biomaterials, Inc. is an AATB accredited licensed Tissue Bank.

BFW, Inc. is a global technological leader in surgical headlights and headlight imaging systems. This year we’ve expanded our innovative Lighthouse™ LED Series by introducing Hatteras™ LED, a light source cleared for use with fiber optic headlights and endoscopes and our new AtoN™ fiber optic headlight. Our products are engineered and proudly built in the USA.

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Bioventus Surgical is driven to advance the science and surgical performance of orthobiologics with a comprehensive portfolio of clinically efficacious and cost effective solutions.

BiowavePENS is the only FDA cleared percutaneous electrical neurostimulator (PENS) that is indicated for the treatment of chronic, acute and postoperative pain. BiowavePENS provides instant, long lasting pain relief. A 30-minute treatment is performed in a pain or spine clinic setting under the supervision of a physician. Patients average a 50%-75% reduction in pain scores for up to 72 hours post treatment. Preauthorization services are included and reimbursement is available from many payers.

BOSS Instruments concentrates on the global development and distribution of specialty surgical instruments in disciplines such as: Neuro, Spine, Cardiovascular/Thoracic, Orthopedic, ENT, Ophthalmic and Ob/Gyn. Displayed will be high quality German-crafted stainless steel and titanium surgical instruments and retractor systems, such as kerrison rongeurs, curettes, micro scissors and needle holders, and cervical and lumbar retractors for open and minimally invasive procedures.

BPB MEDICA is a 100% Italian manufacturer Company. Our production line is completely carried out in house, from the design, to the final packaging. Our SPINE line includes: - KYPHOPLASTY KIT a) 12G Kyphoplasty kit, the least invasive in the market b) 11G Kyphoplasty kit, for FAST approach c) 8G Kyphoplasty kit, for CLASSIC approach - COMPLETE VERTEBROPLASTY SET - SCREW FIXATION SYSTEMS - BONE ACCESS NEEDLES - PERCUTANEOUS DISCECTOMY SYSTEMS Biopsybell’s products already got all the FDA and EC approvals.

Bradshaw Medical is a designer, developer and manufacturer of highly specialized OEM orthopedic and spinal instrumentation. We manufacture world class instruments to meet the most demanding requirements. Instruments are designed, machined, molded, and assembled in Bradshaw’s facility, enabling total control over the production process, and the ability to be nimble from concept through production, with customization in colors and branding. Quality. Innovation. Service.

Brainlab develops, manufactures and markets software-driven medical technology with the aim of optimizing patient treatments. Core products revolve around less-invasive image guided surgery technology, more accurate and effective radiation therapy, and integration through planning and collaboration systems that brings patient data and physicians together. www.brainlab.com
BRAMISS - Brazilian Minimally Invasive Spine Surgery Society

BRAMISS is an independent Society that has 350 members, manages a Fellowship Program with NASS and works with other medical entities in order to facilitate and standardize the MIS procedures along the private and public health care systems and also divulges MIS possibilities of treatment for patients trough regular media. BRAMISS organizes two main events: COMINCO and SIMINCO. The V COMINCO will be held on 2018 at Brazil and the XIV SIMINCO 2017 (AM with live surgeries).

Bremer Group Company

For 20+ years, you have trusted our clinically proven VertAlign® & ComfAlign® Spinal Supports for effective TLSO & LSO external spinal stabilization, from “immobilization through support” on your patients. Whether for post-surgical or trauma stabilization, pain relief, or conservative care, the VertAlign & ComfAlign systems provide unique, patented, “select and apply,” molded, rigid, gender-specific orthoses available at the point of patient care, which results in timely, effective spinal care.

Business Dynamics

Since 1998, Business Dynamics has emerged as the top full service spine coding and reimbursement firm in the country. Business Dynamics was developed specifically to serve spine practices, orthopedic and neurosurgical medical groups, facility spine programs, spine product manufacturers and numerous secondary organizations within the medical community. Business Dynamics’ corporate headquarters is located in New York and services clients nationwide.

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On turbulent seas of hi-tech companies Their ominous messages Of latest “truths”, or dire consequences For the wary and weary, prepare your defenses! Come find us to be an isle of tranquility Devices to prod, products to probe A clamp to do this, a hook to do that Exciting angulations, exotic articulations. Find civilized refinements to traditional instrument designs along with simple solutions to the plethora of problems still plaguing product performance in everyday surgeries of the spine.

C&A Tool Engineering, Inc

Contract Manufacturer of Spinal Implants and Instruments. Be sure to ask about our Laser Sintering capabilities for Rapid Prototyping.

Camber Spine Technologies

Camber Spine Technologies is dedicated to creating surgeon designed minimally invasive access solutions for the treatment of complex spinal pathology. Incorporating innovative design elements, state of the art manufacturing techniques and an acute sensitivity to patient anatomy, Camber Spine is making quantum leaps in the spinal fusion market. Combining the above with a focus on mechanical fusion properties of implants and bone biology, we are exploring the next level of implant design.

CAOS—Chinese Association of Orthopaedic Surgeons

Our commitment is to advance CME for over 100,000 Chinese orthopedic surgeons to achieve improved outcomes of the patient with musculoskeletal disorders. As a professional NPO endorsed by Chinese government, we dedicate ourselves to providing high quality resources as well as standardizing Chinese orthopedic CME system through implementing residency training program and launching clinical guidelines. Know us, welcome to Booth #1762.

Capital One Spark Business Card

Capital One Spark Business Card. Get unlimited 2% cash back with the Capital One Spark Business Card. Apply today at Booth 1823 and earn a one-time bonus of $500.00 after spending $4,500.00 on qualified purchases in the first 3 months.

Captiva Spine

Captive Spine supports spine surgeons, tenured distributors, and healthcare facilities in providing patients progressive care with an obsessive focus on quality. We strive to create and maintain sincere, honest, collaborative relationships. Valuing relationships, above all else, fosters the mutual trust and openness needed for Captiva Spine to be a conduit of high quality, smart, elegant, and intuitive patient solutions. Captiva Spine – Strength Through Connections.

CarboFix Orthopedics Ltd.

CarboFix Orthopedics Ltd. specializes in orthopedic implants made of, non-metal, continuous carbon fibers reinforced polymer (CFR-PEEK). In addition to trauma nails & plates, the company has developed the CarboClear™ Pedicle Screws & Rods made out of Carbon Fibers. The system advantages include minimal artifacts in CT & MRI, advantageous in radiation therapy (including proton therapy), superior fatigue strength & optimal modulus of elasticity.

Cardinal Spine, LLC

Cardinal Spine is dedicated to creating the safest spinal implants available for use in humans. Since Cardinal Spine’s inception, we have been granted numerous US patents and currently have three Food and Drug Administration approved devices. Cardinal Spine is in the business of manufacturing, distributing and selling spinal implants and devices for positioning spinal implants. Cardinal Spine has the first FDA 510(k) approved monoblock device for the Cervical Spine, the C-VBR.

Carl Zeiss Meditec, Inc.

Carl Zeiss Meditec (http://www.zeiss.com/meditec) is one of the world’s leading medical technology companies that is dedicated to helping healthcare professionals enhance patient care. The Company’s portfolio of innovative solutions includes a comprehensive line of OPMI® Surgical Microscopes and EyeMag® Surgical Loupes that optimize visualization during spine surgery.
**CellRight Technologies LLC**
www.cellrighttechnologies.com

CellRight Technologies is the leader in the development and manufacture of verified osteoinductive regenerative orthopedic matrices. The matrices provide a delivery vehicle for current and future cellular therapies such as PDGF, BMA, PRP, antimicrobial agents and other growth factors. CellRight Technologies is the manufacturer of MatrixCellect 100 DBM Putty, FlexiT, Matrix OI sponge-like collagen scaffold, ConCellrate 100 and Matrix IQ decellularized human dermis intended for homologous use.

**Ceramedics, Inc.**
www.cerapedics.com

Cerapedics is an orthobiologics company focused on developing and commercializing novel bone grafts that enhance and accelerate bone growth in a variety of orthopedic procedures. The company has developed a technology platform based on a synthetic small peptide, P-15, which has a novel mechanism of action designed to support safer and more predictable bone formation compared to commercially available growth factors. i-FACTOR™ Bone Graft is the company’s lead product.

**CERTAIN**
www.becertain.org

CERTAIN is Washington State’s learning healthcare system. Focused on evaluating the effectiveness and value of healthcare and keeping the patient’s voice central, CERTAIN is a revolutionary approach to improving quality through actionable research. In a learning healthcare system, clinicians are CERTAIN they deliver highest quality care, patients are CERTAIN they are getting the care they really need, and researchers are CERTAIN they are only using data that advances knowledge.

**CeramTec GmbH**
www.biolox.com

CeramTec is an international Manufacturer and Supplier of Technical Ceramics. CeramTec BIOLOX® bioceramics are used successfully in orthopedics and help maintain and increase quality of life with implant components for artificial hip Joints and knee replacements. Extensive specialized knowledge in development and production together with uncompromising quality management make BIOLOX® advanced ceramic implants the successful, clinically-proven standard for medical professionals worldwide.

**CEM Inc.**
www.cesplip.com

The Physicians Life Income Plan (PLIP) was created and service marked by CES in 2007 with AMA input. The purpose of the (PLIP) program is to help Spine Surgeons build net worth on a tax advantaged basis with creditor protection. Ask us about our Surgeon’s Income Preservation Planning approach. Please visit our booth #1707. For more information, please visit www.cesplip.com or contact: Bob Owen 484-367-0261 robert.owen@axa-advisors.com lan Rose 856-366-5156 lan.rose@axa-advisors.com

**Children’s Health**
www.childrens.com

More than 2.6 million children are treated each year for sports-related injuries. As the only pediatric orthopaedic institute of its kind in Texas, the Children’s Health℠ Andrews Institute aims to greatly reduce the number of children being side-lined from injuries. Dr. Andrews has a passion for not only getting young athletes back in the game but also giving them the right knowledge and skills to prevent injuries.

**ChoiceSpine**
www.choicespine.net

ChoiceSpine is a privately held spine company located in Knoxville, TN, that offers a breadth of innovative and surgeon focused systems that are designed to be safe, efficient, and easy-to-use. By working closely with physicians and maintaining service-focused distribution, we will continue to bring technically-superior spinal products to the market.

**Clariance**
www.clariance-spine.com

Founded in 2007 by Alain Tornier, Clariance is a spinal device company committed to designing, manufacturing and marketing innovative solutions for the treatment of spinal disorders. Driven by surgeon’s expertise, the company provides advanced surgical applications focused on fusion devices and minimally invasive spine surgery. Advancing patient outcomes is our fundamental and permanent concern.

**Collagen Matrix, Inc.**
www.collagenmatrix.com

Collagen Matrix Inc., the driving force in the design, development and manufacturing of collagen and mineral based medical devices for tissue repair and regeneration, will feature bone graft matrices including our new OssiMend® Conformable Putty as well as two premium additions to our DuraMatrix® line of collagen dural regeneration and repair portfolio of products. We are seeking U.S. and global independent distributors and partnerships/joint ventures with established medical device companies.

**ConvaTec**
www.convatec.com

ConvaTec is a leading developer and marketer of innovative medical technologies, including AQUACEL® Ag SURGICAL cover dressing. As the only cover dressing to incorporate unique patented Hydrofiber® Technology it helps improve outcomes by locking in fluid, including harmful bacteria, and releasing ionic silver to help reduce the risk of infection. Join us for a breakfast symposium: Risk Mitigation of Infection In Spine Surgery, Friday, Oct. 28, 6-7am, Westin Waterfront, Commonwealth Ballroom.
CoorsTek Medical
www.coorstekmedical.com
Combining materials knowledge and engineering expertise, CoorsTek is helping aid the evolution of the medical industry. CoorsTek consistently partners with customers to execute Contract Design & Manufacturing projects, provide Medical Device Components, improve efficiency in Pharmaceutical manufacturing, and pioneer new technologies in Implantable Components.

CoreLink
502, Suite 2073
www.corelinksurgical.com
CoreLink draws on 45 years of manufacturing expertise to offer its growing portfolio of premium quality implant systems. As one of the few spine companies to make its own products, CoreLink is able to exercise superior control over both quality and cost. Even more, its vertical integration provides for unparalleled responsiveness, customization, and breadth of options. CoreLink is committed to the continual improvement of the surgical treatment of the spine, from the occiput to the ilium.

Corentec America, Inc.
743
www.corentec.com
Get Moving with Corentec

COSMAN MEDICAL
1165
www.cosmanmedical.com
Cosman Medical facilitates the treatment of chronic back pain by providing physicians with a unique selection of advanced radiofrequency generators and electrodes. Our new and versatile G4 Version 3 generator simplifies RF treatment of spinal nerves while reducing treatment time and cost. Ideal for busy pain clinics.

CTE Solutions
1217
www.culverttool.com
CTE Solutions (Culver Tool & Engineering) has supplied spinal orthopedic OEM’s for over 30 years by building enduring partnerships with our customers. Our goal is to have a culture of excellence, based upon integrity. We specialize in spinal rods but also offer single-source solutions for other spinal implants and instruments ranging from prototypes to production quantities. CTE Solutions is ISO 13485 certified, FDA registered and accredited with Japan as a foreign medical device manufacturer.

CTL Medical Corporation
957
www.accelspine.com
AccelSPINE is a responsive, innovation-driven medical device manufacturing company that strives to develop exemplary products for surgeons and their need for optimal patient care. Current systems include implants and devices for the cervical, thoracic, and lumbar regions of the spine, in addition to the specialized custom instruments developed to tailor fit specific need of the surgeons.

DANCO ANODIZING
1611
www.danco.net
Danco provides anodizing of titanium implants and aluminum medical instruments and devices. Finishing capabilities include mechanical deburring, hand polishing, graining, blasting and electro polishing. Low Friction Chrome Coating (LFCC) provides cosmetic and functional improvement to surgical instruments. Marking methods incorporate laser, silk-screen and Full Color Deep Image (R) anodizing techniques. Danco maintains production facilities in Arcadia, CA and Warsaw, IN with R&D support in CA.

DeGen Medical, Inc.
1159
www.degenmedical.com
DeGen Medical is a dynamic medical device company dedicated to providing surgeons with innovative products engineered to improve quality of life for patients with complex spinal disorders. World-class quality implants, coupled with intuitively designed instrumentation, provide a complete package to promote superior surgical outcomes. Our passion to advance spine-care solutions is driven by clinical insights and feedback, sound research, and science-based design.

DePuy Synthes
815
www.depuyspine.com
DePuy Synthes Spine has one of the largest and most diverse portfolios of products and services in spine and is a global leader in traditional and minimally invasive treatment. We offer procedural solutions for the spectrum of spinal disorders including deformity, spinal stenosis, trauma and degenerative disc disease. DePuy Synthes Spine is part of DePuy Synthes Companies of Johnson & Johnson, the largest provider of orthopaedic and neurological solutions in the world. www.depuysynthes.com

Designs for Vision, Inc.
902
www.designsforvision.com
Just See It™ with Designs for Vision’s lightweight custom-made surgical Telescopes- available with Nike® frames. See It Even Better™ with the L.E.D. Daylite® or Twin Beam®, L.E.D. Daylite® providing the brightest and safest un-tethered illumination. Introducing the L.E.D. Daylite® Nano Cam HD document procedure and HD video from your prospective.

DG Medical Animations
768
dgmedicalanimations.com
DG Medical Animations creates high quality, cost efficient custom 3D medical animations for product marketing, patient and physician education, and patient engagement. Custom animations are priced per project. Patient education videos for spine are available on a subscription basis and include: Epidural injection, Discectomy, Laminectomy, TLIF, LLIF, and ACDF. NASS show specials are available. Come by booth #768 to see our demos.

Diffusion, Inc
1106
www.diffusiontech.com
DiffUSION Technologies, Inc. is an advanced biomaterials manufacturer located in Houston Texas. DiffUSION has developed multiple patent pending MITA Technologies (Metallic Ion Therapeutic Agents) for antimicrobial, cellular repair, tissue regeneration, bone growth, scaffold construction and increased angiogenesis. We have 2 current platform polymers for antimicrobial - CleanFuze and osteoconductive - ZFUZE fully developed and ready for market.
Precision, come see for yourself loupes and lights for your surgical needs. We specialize in surgical Eclipse loupes and products offers the highest quality, low cost surgical instrumentation for complete range of spine implant procedures. ECA collaborates with implant OEMs to develop customized single-use instruments as well as turnkey disposable and sterile packed prep, tightening and fixation trays and kits for complete range of spine implant procedures. ECA helps OEMs, hospitals & ASCs save over $1k per procedure.

Eclipse Loupes and Products 868
eclipseloupesandproducts.com
Eclipse loupes and products offers the highest quality, low cost surgical loupes and lights for your surgical needs. We specialize in surgical precision. Come see for yourself.

ECA Medical Instruments 1704
ecamedical.com
ECA Medical Instruments is the industry leading designer & manufacturer of precision single-use surgical torque-limiting, fixed driver and related procedural instruments and kits for the ortho/spine industry. ECA collaborates with implant OEMs to develop customized single-use instruments as well as turnkey disposable and sterile packed prep, tightening and fixation trays and kits for complete range of spine implant procedures. ECA helps OEMs, hospitals & ASCs save over $1k per procedure.

Electrolizing Corporation of OHIO 1831
www.electrohio.com
We have a great team of; product specialists, engineers, quality assurance, and more all committed to your success and complete satisfaction. A little bragging, Electrolizing Corporation of Ohio is one of the Top 50 Finishing Shops in the country for the 2nd year in a row, with 98% on time delivery, 0.25% rejection rate in addition to our Validated process we assure you that your parts will be done right the first time and shipped on time. ECO is registered to ISO 9001:2008

elliquence 1211
www.elliquence.com
elliquence, LLC manufactures patented Radiowave technology with innovative devices for orthopedic, neurosurgery, and pain management applications. Surgi-Max® Plus allows precision tissue preservation, non-adherent bipolar effects and surgical versatility. Cobbra™ Energized Cobb Elevator, and Disc-FX™ Discectomy System are examples of the surgical accessories offered for use with the Surgi-Max Plus energy source. elliquence focuses on sparing healthy tissue while precisely treating pathology.

Elsevier 1402
www.elsevier.com
ELSEVIER presents The Spine Journal, the official journal of the North American Spine Society. ELSEVIER is a leading publisher of health science publications, advancing medicine by delivering superior reference information and decision support tools to doctors, nurses health practitioners and students. With an extensive media spectrum - print, online and handheld, we are able to supply the information you need in the most convenient format.

Eminent Spine 964
www.eminentspine.com
Eminent Spine is a highly innovative, just-in-time, engineering, manufacturing and distribution company. Eminent Spine is a privately held company that was founded in June of 2008 by Dr. Steve Courtney and Dave Freehill. Dr. Courtney and Mr. Freehill began Eminent Spine with the idea of combining a spine surgeon’s expertise with an engineer’s experience to design, engineer, manufacture and distribute highly innovative specialty tools, implants, and implements specifically for spinal surgery.

Empirical Testing Corp. 1403
www.empiricaltesting.com
The Empirical family of companies can reduce your time to market by 20-30% and achieve a one-pass 510(k) submission. Empirical provides a comprehensive solution for consulting, testing, manufacturing and validation services. The Empirical team collaborates with you to deliver exceptional service, a regulatory plan, an efficient test plan and expertise at the highest level. Our commitment is to your success. We hold the largest scope of accreditation for medical device testing methods in the U.S.
Endovision Co., Ltd.
www.endovision.co.kr
Endovision Co., Ltd. is one of the leading medical device manufacturer & distributor in South Korea. Our major fields are laparoscopic, endoscopic products, hemostats, hemostatic agents & surgical sealants in E.N.T., OS, NS, GS, GI, OB/GYN and Urology parts during the past 15 years and we have established many associate doctors and well-organized dealer network to penetrate into all over the world.

Enova Illumination
www.enovaillumination.com
NEW! Enova XLT-225 is the world's brightest LED surgical headlight designed for deep cavity surgery including SPINE SURGERY. Adjustable spot and co-axial alignment. CRI-90 illumination for accurate color rendition of critical anatomy, and comfortable too. Up to 10 hrs battery life! 5 year warranty on LED and made in USA.

EOS
www.eos.info
EOS is the world’s leading technology and quality leader for high-end additive 3D printing and manufacturing (AM) solutions. We are pioneers and leaders in the area of direct metal laser sintering, and also a provider of a leading polymer technology. We provide a modular solutions portfolio that consists of systems, software, and materials. Customers are able to take advantage of lightweight structures, cost reductions, product customization and accelerated product development and production.

Esaote
www.esaoteusa.com
Esaote North America, located in Indianapolis, is part of the Esaote Group, a global leader in the research, production and marketing of medical diagnostic equipment. Esaote is among the largest manufacturers of imaging systems worldwide and prides itself in achieving superior price and performance over competitors. With determination, Esaote North America focuses on quality medical imaging within office-based MRI and ultrasound medical equipment. Visit us at www.esaoteusa.com

Evonik Corporation
www.evonik.com/vestakeep
Evonik, a global leader in specialty polymers, develops biomaterials for permanent implant and temporary contact devices for the orthopedic and spine markets. Evonik’s VESTAKEEP® PEEK (polyetheretherketone) products demonstrate exceptional biocompatibility and biostability and are used in a wide range of spinal implants and instrumentation. VESTAKEEP® PEEK has been referenced in numerous spine 510(k) clearances and is on file at the FDA with a comprehensive Master File.

Exactech, Inc.
www.exactechspine.com
Founded and led by a surgeon and a biomedical engineer in 1985, Exactech has a unique perspective on the challenges faced by clinicians, a clear understanding of the importance of surgeon education and a comprehensive spinal fusion line to treat the broad spectrum of spinal disorders. Surgeons count on Exactech Spine for reproducible minimally invasive solutions, intuitive instrumentation for a simplified open approach, orthobiological material and services that allow improved patient outcomes.

Fehling Surgical Instruments, Inc.
www.fehlingsurgical.com
Featuring the “CERAMO (r) Concept Classic’’ Punches, Fehling Surgical Instruments provides innovative surgical instrument designs using state-of-the-art materials combined with enhanced technology manufacturing techniques. Results are products like the “Fehling Ceramo (r) Surgical Instrument Line”. See AND feel the black ceramic instruments.

Future Health Concepts, Inc
www.fhcusa.com
Future Health Concepts, Inc., offers new and refurbished medical equipment and supplies including surgical tables, like our FHC1000S with remarkable C-arm access and a 1,000lb weight limit, Blanket/Fluid Warmers, Scrub Sinks, Processing Sinks, Sterilizers, Washers, Case Carts, Stretchers, Stainless Steel Instrument Tables, Mayo Stands, Work Tables, Etc, Operating Room Lights, Patient Monitors, Defibrillators, Medical Carts, ESU Units, Anesthesia Machines, along with 70 other product lines.

FzioMed, Inc.
www.fziomed.com
FzioMed develops and commercializes absorbable surgical biomaterials based on its patented polymer science, for use in many surgical applications including spine, orthopedics, tendon, peripheral nerve, gynecology and general surgery. • Oxiplex® Spine Gel helps reduce adhesion formation and related symptoms such as pain. CE marked and approved in over 70 countries.

G21
www.g-21.it
G21 is a leading developer and manufacturer of bone cements and acrylic resins with years experience in orthopedics, oncology orthopedics and minimal invasive spine surgery. We are proud to affirm our unique and complete range of products for spine minimally invasive procedure, in particular our high viscosity acrylic resin V-Steady developed for vertebroplasty and kyphoplasty and our minimal invasive kyphoplasty kit 11 Gauge.

Gauthier Biomedical Inc.
www.gauthierbiomedical.com
U.S. manufacturer of high-quality orthopedic instruments, offering contract manufacturing as well as our very own proprietary line of instruments -- including customized branded instrument sets. With our patented multi-color silicone over-molding process we can help brand your instrumentation so it stands out in the marketplace. We specialize in helping our OEM partners build their brand through instrumentation excellence. Come see us today!

GEMCITY Engineering and Manufacturing
www.gemcity.com
GEM is a leading contract manufacturer of medical implants and components focused on the orthopedic, spinal, trauma and extremity markets. GEM provides material procurement, Swiss turning, milling, testing, finishing, device assembly and shipping services to its customers. GEM is FDA Registered as well as ISO 13485 and ISO 9001 Certified.
Global Medical REIT
www.globalmedicalreit.com
Global Medical REIT has a team with extensive healthcare industry experience and unparalleled flexibility to deliver real estate monetization solutions to healthcare providers for their new and existing facilities. We help free up the capital you need to grow and invest in your contemporary clinical and critical care business. Our understanding of modern clinical business models empowers are dedicated focus as we support continuous delivery of quality care to widespread communities.

Globus Medical
www.globusmedical.com
Globus Medical, Inc. is a leading musculoskeletal implant company based in Audubon, PA. The company was founded in 2003 by an experienced team of professionals with a shared vision to create products that enable surgeons to promote healing in patients with musculoskeletal disorders.

GROUP FH ORTHO
www.fhorthopedics.com
FH Orthopedics has dedicated a specialized business unit to market its latest generation of disc replacement (lumbar and cervical). These disc replacements are monobloc and restore natural disc functions by allowing all natural movement.

GS Medical
www.gsmedicalusa.com
GS Medical LLC is a privately-held international medical device company offering a wide range of products for addressing many pathologies in spine surgery, including many minimally invasive options, treating cervical and thoracolumbar degenerative conditions. We are focused on and committed to developing and manufacturing quality devices that provide intraoperative efficiency for surgeons, cost-effectiveness for hospitals and healthcare systems, and proven outcomes for patients.

gSource, LLC
www.gsource.com
gSource—the Orthopedic and Spinal Source for Surgical Instruments—produces instruments used throughout the world by many leaders and innovators in spine and orthopedics. From custom designs to off-the-shelf patterns, gSource is committed to putting the finest instruments into the hands of surgeons and their teams.

Haag-Streit USA
haag-streit-usa.com
Surgical microscopes from Haag-Streit USA are the product of fusing Swiss optics and German engineering. Through years of experience, our new 5-1000 neurosurgical microscope system defines new standards in optics, movement, and ergonomics. Additionally, an integrated 3D video system displays spectacular 3D visualization and workflow capabilities.

Hans Biomed USA Inc
www.hansbiomed.com
HansBiomed is a leading bio-engineering company that manufactures different types of orthobiologics such as DBM, allograft and synthetic. HansBiomed has the biggest bio-engineering research institute in Asia, and received 510K approval of the DBM products. As the first tissue bank established in Korea, Hans has been developing variety biologic products and currently selling to more than 30 different countries.

Harvest Technologies
www.harvesttech.com
Harvest Technologies is the leading cellular therapy global manufacturer that develops point-of-care products to process and concentrate multiple biologics. These include high-density platelet rich plasma (APC++) marrow aspirate concentrate (BMAC®) and adipose tissue, all concentrated using the SmartPrep3 Multicellular Processing System.

Hawaiian Moon
www.aleocream.biz
Say Goodbye to Dry Skin with Hawaiian Moon Organic Aloe Cream!

Hensler Surgical Products
www.henslersurgical.com
Founded in May 2011, Hensler Surgical Products, LLC is a Wilmington, N.C.-based medical device company. Sean Hensler, a Neurosurgical Physician Assistant, and Dr. Thomas Melin, Neurosurgeon, formed Hensler Surgical as a way to conceive, develop and introduce leading surgical innovations into the medical field. Hensler Surgical’s first product to market is the Hensler Bone Press, an innovative device designed to harvest valuable autologous bone during surgical grafting procedures.

HT Medical, LLC
htspine.com
HT Medical, LLC, initiated by an experienced and diverse team of spine industry veterans, is dedicated to designing, patenting, and marketing best of class spinal fusion devices utilizing cutting edge material technologies, including products featuring proprietary 3D titanium technology. With several projects already underway, HT Medical has received its first 510(K) clearance with NeoFuse™ HA Enhanced PLIF/ TLIF interbody fusion system, featuring PEEK-OPTIMA® HA Enhanced polymer from Invibio®.

IHI Ionbond, Inc.
www.ionbond.com
Ionbond provides the highest performance PVD, CVD, and PACVD medical implant and surgical instrument coatings for the reduction of wear, ion release, galling, friction, and operating room light reflectivity. Ionbond ensures that the ISO 10993 certified coatings meet the specifications. In the demanding medical market, it is imperative to have the highest level of quality management and control throughout the coating process following ISO 13485 in 8 coating centers worldwide.
IMEDICOM CO., LTD. 1230
www.imedicom.co.kr
IMEDICOM Co., Ltd. is one of fast growing orthopaedic company that manufactures Balloon kyphoplasty system(510K cleared), Epidural catheter and Surgical power tools with Saw blades. All products of IMEDICOM are in compliance with CE, FDA regulations and ISO9001, ISO13485.

Implanet 1342
www.implanet.com
IMPLANET is a public company with a singular focus is to provide solutions to complex pathologies through the use of sublaminar band technology. The JAZZ Band hybrid approach has been shown to reduce implant volume in patients, decrease surgical cost, and reduce blood loss and OR time while demonstrating significant improvement in Sagittal Balance with a band-screw hybrid approach over all-screw constructs. Visit booth 1342 to see firsthand the latest advancements in band technology.

Infinity Massage Chairs 745
www.infinitymassagechairs.com
The Infinity Riage features the most advanced 3D massage technology on the market and an L-shaped roller track to deliver unmatched stress relief. Users can also control the chair from their Apple or Android devices with the Infinity Riage app. The 3D Infinity Riage provides the ultimate massage every time.

Inion, Inc. 1406
www.inion.com
Inion is a medical device company focused on the development and commercialization of innovative biodegradable and bioactive implants for Spinal, Specialty Orthopedic and Craniomaxillofacial applications. Inion’s proprietary blending technology enables application specific implants which have ‘custom fit’ capabilities for patients that do not interfere with imaging.

Innovasis 703
www.innovasis.com
Innovasis is committed to the constant innovation of Spinal Implants and other related products. We Innovate. We Involve. We Invent.

In'Tech Medical 1151
www.intech-medical.com
Founded in France in 2000, In'Tech Medical is a privately-held manufacturer of surgical instruments & implants committed to the orthopaedic industry. With its acquisitions of Turnor Medical in the USA & Ortho Solutions in Malaysia. In'Tech is a global leader in orthopaedic contract manufacturing. Powered by a diverse product portfolio, an ability to find solutions to complex engineering challenges and over 500 employees worldwide, In'Tech Medical is ideally positioned for growth & customer care.

Intelligent Implant Systems 1145
www.intelligentimplantsystems.com
Intelligent Implant Systems exhibits the Revolution™ Spinal System. This posterior lumbar fixation system utilizes pre-sterilized implants and one tray of single-use instruments. No more expensive, bulky instrument trays. The elegant implant is quick to implant, saving surgery time, and is designed for open, mini-open, and minimally invasive procedures. A fully cannulated system with no rod contouring or cutting needed, Revolution™ is the perfect answer for a fast and easy-to-use system.

International Instruments 426
www.myjjonline.com
JJ International Instruments is a leader in designing & manufacturing high quality Surgical Instruments in India since 1999. JJ has successfully launched their products in USA market at AAOS 2013 in Chicago. JJ takes great pride in their extensive range of instruments offered for General Orthopaedic, Spine, Hand, Micro surgeries along with Neuro, Uro, Cardio Thoracic and General Surgeries. Visit booth # 3136 and experience their innovative instruments with INTERNATIONAL QUALITY @ INDIAN PRICE!

International Musculoskeletal Society IMS 1764
www.neareastspine.org
We are Pleased to announce the Society for Progress & Innovation for the Near East (S.P.I.N.E.) is now the International Musculoskeletal Society (I.M.S.). The new name marks a significant step in our growth and evolution as a society. Since its foundation in 2008, S.P.I.N.E. has broadened its focus to incorporate all musculoskeletal disorders including general Orthopedics, Pain medicine and Rehabilitation, Spine Surgery, Trauma, Pediatric, Sports-related injury, and much more. On behalf of the entire faculty and the I.M.S. Society we invite you to the July 2017 course.

Invibio Biomaterial Solutions 831
www.invibio.com
Invibio continues to revolutionize spinal device design by offering the implantable polymer, PEEK-OPTIMA® HA Enhanced. As a proven partner to medical device manufacturers, we continue to pioneer spinal industry innovation driven by clinical need and our customers’ desire to improve patient outcomes. Our polymers, unsurpassed manufacturing and regulatory support, and deep device knowledge have enabled device companies around the world to bring innovative products to market for over 15 years.

Invivyt, Inc. 1102
www.invivyt.com
Invivyt’s patented Intelligent Photonics™ technology is integrated into sophisticated retractor systems, handheld devices and intracavity drop-in illuminators. Our proprietary waveguide technology directs and shapes light into broad, uniform illumination to provide enhanced visualization inside dark surgical cavities. In addition, it converts traditional thermally hot light output to thermally cool volumetric illumination throughout the entire surgical cavity.
ISTO Technologies 951, Suite 1955
www.istotech.com

ISTO is a pioneer in orthobiologics and cell therapies, committed to providing evidence-based biologic solutions for spine and orthopedics. Driven by integrity fueled by innovation, we leverage our scientific and clinical expertise to partner with physicians and help improve patient outcomes. Our novel portfolio of products for bone growth and repair includes InQu® Bone Graft Extender & Substitute, Influx® Trabecular Bone Graft, and CellPoint® Concentrated Bone Marrow Aspirate System.

Jade Precision Medical Components 1811
www.jademed.com

At JPMC, we do more than provide the medical device industry with the highest quality implants, instruments and components on time; we provide manufacturing solutions. JPMC develops strategic partnerships to meet our clients’ needs, such as prototyping for labs and testing, new product launches into the market and contracted capacity for full production requirements. JPMC is the manufacturing partner you need to launch your next big project.

JALEX Medical 1143
www.jalexmedical.com

Medical Device Design, Product Development & Regulatory Consulting: Accelerating From Concept to Market Medical device development and regulatory consulting firm servicing OEMs, start-ups, distributors, and surgeon entrepreneurs by accelerating ideas into market ready devices and solving regulatory/QA challenges.

Janco, Inc. 862
www.janco-inc.com

Janco, Inc. is a premier contract supplier of custom plastic foam, disposable thermoformed trays and medical packaging designed and manufactured to meet exacting specifications and standards for the Spinal and Biologic’s markets. Janco’s custom thermoformed medical tray manufacturing offers the flexibility to meet exacting medical specifications and quality standards for the most demanding medical tray applications.

The Japanese Society for Spine Surgery and Related Research (JSSR) 1667
www.congre.co.jp/jssr2017/

The 46th Annual Meeting of the Japanese Society for Spine Surgery and Related Research (JSSR2017) will be held in Sapporo, Japan, April 13-15, 2017. Our main theme is “The practice of spine surgery is an art, based on science.” Our goal for this annual meeting is to deepen our understanding of advanced clinical practices and the science that underlies them. We sincerely hope that many of you will be able to join us.

Jayon Implants Pvt Ltd 1569
www.jayonimplants.com

Established in 1999, Jayon Implants represents the next-generation orthopedic and spinal implants manufacturing company, delivering innovative technologies in the field of orthopedic and spine surgery. We aim to help people lead a more active, productive and pain-free life by restoring mobility through highly differentiated surgical products.

Jewel Precision 910
www.jewelprecision.com

Jewel Precision began manufacturing innovative custom sterilization case systems in 1984. Jewel Precision’s experience in sterilization case manufacturing gives us an edge in developing distinctive systems with a combination of material choices, finishes, and product housing features.

joimax 525
www.joimaxusa.com

joimax® is the leading developer and provider of complete systems for minimally invasive spine surgery. Our proven endoscopic methods allow surgeons to operate on herniated discs, spinal stenosis and other pathologies with minimal anatomical and surgical trauma, through a single, 8 mm incision, under local anesthetic and on an outpatient basis. The newest EndoLIF® and Percusys® systems give the surgeon the added option of an endoscopically-assisted, minimally invasive fusion for stabilization.

K2M Inc. 1615, Suite 1951
www.k2m.com

K2M Group Holdings, Inc. is a global medical device company focused on designing, developing and commercializing innovative complex spine and minimally invasive spine technologies and techniques used by spine surgeons to treat some of the most difficult and challenging spinal pathologies. K2M has leveraged these core competencies to bring to market an increasing number of products for patients suffering from degenerative spinal conditions.

KASIOS 1223
www.kasios.com

Kirwan Surgical Products LLC 1131
www.ksp.com

Kirwan Surgical Products is an industry leader in the development of electrosurgical and nonstick bipolar specialty products for microsurgical indications including neurosurgery, spine surgery, ophthalmology, otolaryngology, plastic and reconstructive surgery, and orthopaedic surgery. Visit www.ksp.com.

Knight Mechanical Testing 1007
www.knighttesting.com

Knight Mechanical Testing (KMT) is an ISO/IEC 17025 accredited laboratory specializing in static and dynamic mechanical testing for orthopedic implants and instruments. KMT provides world class testing facilities and superior guidance on the appropriate test methods for your device. With expertise in spine, extremities, sports medicine, trauma, large joint, dental, and cranial/maxillofacial repair, KMT has you covered from head to toe.

Koros USA, Inc. 1608
www.korosusa.com

Koros USA is a designing and distributing state of the art surgical instruments company. Our most popular best sellers include the Cervical Black Belt, Lumbar Super Slide and Lateral Retractors, along with our rotating Osteopunch & Ejector Punch Plus rongeurs and a variety of many more fine instruments. Koros specializes in cervical, spine, micro discectomy, lumbar and anterior fusion.
L3 Healthcare Design Architects

L3 is a national leader in the Design and Development of Spine Surgery Centers. Which now includes Finance for project. L3 has a proven strategy for success, unique qualifications and experience in developing Advanced Ambulatory Surgery Centers, that have performance and reliability as cornerstones of their innovative designs. L3 has the knowledge, experience and ability to deliver projects from concept through accreditation to opening day.

Lee Medical

Lee Medical markets the only truly disposable bone mill. Our patented, sterilized Bone Shark® is used in orthopedic procedures when autologous bone is required for an injury or a spinal procedure where new bone growth is needed. No additional costly auxiliary equipment is required. Lee Medical has a reputation for delivering high quality products to hospitals and distributors. We are a certified, woman-owned, small business that guarantees quality, efficiency, and customer satisfaction.

Leica Microsystems

Leica Microsystems introduces our latest microscope for spine surgery, the Leica M530 OH6. The microscope provides surgeons with market-leading 600 mm working distance for unobstructed access to the surgical area. Exclusive FusionOptics technology delivers an expanded depth of field and high resolution at the same time, and an independent fine focus adjustment helps the spine assistant ensure optimal visualization. Experience the ergonomic design and beautiful visualization at booth #1101.

LH Medical Corporation

LH Medical, an LH Industries Company. A worldwide leader of Medical Device Outsourcing Services specializing on Orthopedic, spine, extremity and total joints. LH provides Expertise to our Partners Manufacturing High Quality Implants and Instrumentation. From General Instruments to Complex Mechanical Assemblies. LH Machines all types of Metals, Plastics and Peek. LH Medical, a Competent Qualified forward thinking Contract Manufacture providing Answers and Solutions to our Client’s Needs.

Life Instrument Corporation

Life Instrument Corporation is dedicated to serving neurosurgeons and orthopedic surgeons with the highest quality surgical instruments. Over the years spine surgery has advanced with new procedures and approaches to the spine. Life Instrument Corporation is committed to meet the needs of spine surgeons for these new surgical techniques.

Life Spine Inc.

Life Spine is a full line spine company which develops and markets an innovative family of spinal implants and instruments to serve the orthopedic and neurosurgery communities. A comprehensive product portfolio, focused on fusion devices and minimally invasive spine surgery, has been created by Life Spine via strong strategic partnerships with surgeons.

Lifelink Tissue Bank

LifeLink Tissue Bank, the largest not-for-profit tissue bank in the Southeast, is an industry leader in providing allografts recovered and processed with the most stringent safety standards. LifeLink offers a complete range of traditional grafts, sports medicine grafts and milled LifeGraft spinal allografts.

LifeNet Health

LifeNet Health helps to save lives, restore health and give hope to thousands of patients each year. We are the world’s most trusted provider of transplant solutions, from organ procurement to new innovations in bio-implant technologies and cellular therapies—a leader in the field of regenerative medicine, while always honoring the donors and healthcare professionals that allow the healing process.

Lilly USA, LLC

Lilly is a global healthcare leader that unites caring with discovery to make life better for people around the world. We were founded in 1876 by Colonel Eli Lilly, a man committed to creating high-quality medicines that meet real needs, and today we remain true to that mission. To learn more, visit www.lilly.com.

LinkSPINE

LinkSPINE introduces “Midline Choice”, a comprehensive set of less invasive lumbar fixation options which are packaged in a single kit. Midline Choice includes Cortical Screws, Cancellous Screws, and our novel family of FacetLINK devices. Implants can be mixed and matched according to pathology, anatomy, and surgical requirements, offering the surgeon the intra-operative flexibility to choose the optimal fixation construct in support of the surgical goals. Visit us at Booth #1408 to learn more!

LISI Medical

LISI MEDICAL is a world-class contract manufacturer offering proactive and experienced project management, a complete range of manufacturing capabilities, state-of-the-art quality processes and superior customer service, all focused on meeting our customers’ goals. Please contact us at contactUS@lisi-medical.com regarding your outsourcing partnership needs.

Lowell, Inc.

Lowell is the premier partner for the development and production of technologically advanced, implantable medical devices. We capture design intent and convert it to manufacturability through communication, anticipation and the drive to meet and exceed your requirements.
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Lumitex MD
www.lumitexmd.com

The bright, cool and non-obtrusive lighting engineered by Lumitex Medical Devices can be an integral part of any system. Lumitex MD engineers work with Original Equipment Manufacturers to design lighting for various retractor systems. Our patented technologies can maximize flexibility or be designed to fit a single instrument with maximum light output and precise light direction. We apply more than 50 years’ experience to solve customers’ lighting challenges. www.lumitexmd.com 800-969-5483

Mallinckrodt Pharmaceuticals, Inc.
www.mallinckrodt.com

Mallinckrodt is a global business that develops, manufactures, markets and distributes specialty pharmaceutical and biopharmaceutical products and therapies, as well as nuclear imaging products. Mallinckrodt provides multimodal analgesia products for acute pain management and adjunctive hemostasis products for management of bleeding during surgery. Visit www.mallinckrodt.com.

Marrow Cellution
www.marrowcellution.com

The patent pending Marrow Cellution Bone Marrow Aspiration System overcomes the limitations of traditional bone marrow needles by allowing the user to aspirate in a measured and controlled manner over a large geography inside the marrow space, while restricting peripheral blood infiltration. For a product demonstration and to speak with a Marrow Cellution representative, please visit us at booth #762.

Mazor Robotics
www.mazorrobotics.com

Mazor Robotics believes in healing through innovation by developing and introducing revolutionary technologies and products aimed at redefining the gold standard of quality care. Mazor Robotics Guidance Systems enable surgeons to conduct spine and brain procedures in a precise manner. At NASS 2016, Mazor will be commercially launching its newest technology, the Mazor X™ system. Mazor X enhances spine surgery technology from trajectory guidance to an expanded spine surgery solution.

Medacta International
www.medacta.com

Medacta International is a Swiss company developing, manufacturing and distributing orthopaedic and neurosurgical medical devices worldwide. Founded in 1999 with a vision to create a better patient experience, Medacta is a leader in Hip Replacement due to AMIS, and in Knee Replacement via MyKnee. In 2014 Medacta MySpine has been awarded Best New Technology for posterior Spine care. Innovation, support and education are key to the company’s success.

Medical Component Specialists
www.medicalcomponentspecialists.com

MCS manufactures medical components for orthopedics applications including spinal tools, trocars, K-Wires, guidewires, A/O drills, drivers, countersinks, cannulated drills/tools. We are experts in Nitinol forming and grinding including implantable staples, drills, and guidewires. Our inline manufacturing processes, high precision grinding capabilities, and CNC machining provide quick, nimble, and responsive production. We offer high quality products at an exceptional value!

MEDICREA USA
www.medicrea.com

Solution Showcase Theater Presentation—Booth 573 Thursday, October 27, 12:30 p.m.

At Medicrea, creativity is our highest priority, because we believe in the inventive power of our engineers and surgeon partners working together. It extends from designing and manufacturing next-generation spinal implants, with enhanced functionalities and quality testing, to providing more effective and less invasive treatments for all spinal pathologies. Our extensive range of spinal implants addresses spinal pathologies at all levels, from cervical to lumbar and sacrum.

MEDIMIX SYSTEMS AG
www.medmix.ch

MEDIMIX SYSTEMS AG is an ISO 13485 certified company which is developing and manufacturing, delivery and application systems for multi-component biomaterial such as PMMA or calciumphosphate bonecement as well as fibriglue and tissue sealant. MEDIMIX is an OEM-manufacturer. The products do not contain any biomaterial and are delivered without CE mark. It is the responsibility of our customers to register the product with corresponding legal authorities.

Medovex Corporation
2159

DenerveX™ is a new treatment option for facet joint pain. The DenerveX™ treatment modality uses Rotablation™ technology, high heat and rotational capsular tissue shaving, in a minimally invasive posterior capsulectomy procedure. Note: DenerveX is not currently FDA approved, CE Marked or commercially available in the United States of America.
Medtech Surgical, Inc 1531
www.medtechsurgical.com

MEDTECH designs, develops and markets the latest generation of robotic assistance for minimally-invasive neurosurgery. ROSA® Spine is our brand new robotic platform for image guided minimally-invasive spinal procedures. It allows surgeons to safely and accurately guide pedicle screws using the navigation platform and tracking patients moves in real time. The ROSA® technology has already been successfully adopted by 48 leading hospitals around the world.

Medtronic 1015
www.medtronic.com

As a global leader in medical technology, services and solutions, Medtronic improves the lives and health of millions of people each year. We use our deep clinical, therapeutic, and economic expertise to address the complex challenges faced by healthcare systems today. Let’s take healthcare Further, Together. Visit booth #1015 to learn more about our innovative solutions.

Medyssey USA 537
www.medyssey.com

Medyssey designs, develops, manufactures and markets products for the surgical treatment of spine disorders through novel instrumentation and advanced orthobiologic solutions designed to improve spinal fusion rates, preservation of mobility and clinical outcomes.

Metal Craft and Riverside Machine & Engineering 740
www.metal-craft.com

Metal Craft and Riverside Machine & Engineering provide in-house medical device and implant manufacturing from start to finish. Specializing in close tolerance, contract manufacturing, their services include design for manufacturing assistance, prototyping, complex assembly, and short through long run production capabilities. We are ISO 13485, ISO 9001, & FDA registered. WBENC and WSOB certified.

Micro Machine Company 1069
www.micromachineco.com

For over 50 years, Micro Machine has been a supplier to Spine and Orthopedic industry OEMs. Our goal is to provide quality surgical instruments and implants that are made with pride in the United States to the Spine, Knee, Hip, Extremity, Trauma and additional markets. We are ISO 13485:2003 & ISO 9001:2008 Certified, FDA Registered and have two locations in Kalamazoo, MI and Warsaw, IN. We are charged up for the next 50 years to serve our customers.

Millstone Medical Outsourcing 451
www.millstonemedical.com

Millstone Medical, leading provider of customized solutions to the medical device industry, has over 15 years of experience in organizing the chaos of outsourced supply chains. Operating three environmentally controlled & strategically located facilities in the US, MMO offers clean room packaging, warehousing & distribution, loaner kit management, advanced inspection and after-market services. With an unparalleled focus on quality, MMO is the partner you can trust with your post-manufacturing needs.

MiMedx 543
www.mimedx.com

MiMedx® is an integrated developer, processor and marketer of patented protected biomaterial products and tissues. AmnioFix® dehydrated human amnion/chorion membrane (dHACM) allograft is uniquely processed through the Company’s patented PURION® Process, providing an easy to use, shelf-stable graft that modulates inflammation and offers barrier and surgical reconstructive properties for spinal procedures.

Minimus Spine, Inc. 1841
www.minimusspine.com

Minimus has CE-Mark for a non-surgical treatment for lumbar disc herniations. The product, Trijectation, creates and measures ozone gas in a sterile, single-use syringe. Ozone is injected into a herniated disc, which then flushes through the disc and may encourage resorption of the extruded material. Minimus is midway through a randomized, European study comparing Trijectation to discectomy. Trijectation is expected to enable approximately 80% of patients to avoid surgery with a single injection.

Misonix 1703
www.misonix.com/bonescalpel

Solution Showcase Theater Presentation—Booth 573 Friday, October 28, 12:30 p.m.

Misonix is a world leader in developing ultrasonic surgical devices for hard and soft tissue removal. The Misonix BoneScalpel is a unique ultrasonic osteotome for tissue-selective bone dissection that encourages en-bloc bone removal and refined osteotomies while sparing elastic soft tissue structures. Many leading surgeons have praised the BoneScalpel to be one of the most important advancements to enter spine surgery this decade.

Mizuho America, Inc. 1806
www.mizuho.com

**Mizuho OSI**

Mizuho OSI designs, manufactures, and markets Specialty Surgical Tables for spinal, orthopedic trauma and joint replacement procedures. Trios®, proAXIS®, INSITE®, and the STS provide four versatile options for spine. PROfx®, hana® & hanaSSXT® are designed for orthopedic trauma/fractures and AA THA. As a multi-procedural table, INSITE® provides a platform for imaging as does Allegro®. Mizuho OSI also offers ProneView®, patient care kits and our Tempur-Pedic® Medical pressure management products.

**Mobile Workforce**

For medical device manufacturers and distributors who require regulatory compliance, lower cost of sales, and greater profits. Mobile Workforce technologies transform Sales & Inventory Management systems by empowering companies and their stakeholders with up-to-date inventory management, communications and order fulfillment capabilities integral to enhancing efficiencies throughout the medical supply chain, from manufacturers to distributors, increasing sales revenues and profits.

**Mobitor**

TurnsLift is a cloud-based solution for medical device manufacturers. We drive real-time efficiency and transparency within the implantable supply chain, supporting sales, customer support, warehouse, inventory and finance teams. TurnsLift gives you real-time visibility into all field inventory movements, transfers, requests and usage. Accurately manage and reconcile hospital consignments, loaner requests, trunk stocks and returned kits through TurnsLift’s web-based interface.

**MO-SCI Corporation**

MO-SCI Corporation is a world leader in high quality precision glass technology specializing in bioglass, bioceramics, porous materials, and implant coatings. MO-SCI’s glass microspheres, fibers and frit are used worldwide and in various industries. For over 30 years, MO-SCI has taken great pride in partnering with its clients to provide custom solutions for their unique applications.

**MTS Systems Corporation**

Orthopaedic researchers and manufacturers worldwide depend on MTS to provide test systems that offer precision control for multiaxial test and simulation. MTS delivers innovative solutions for kinematics research, trauma studies, and biomaterial testing. By choosing MTS, you gain a partner who understands how to optimize test design and speed development.

**Musculoskeletal Clinical Regulatory Advisers, LLC**

Musculoskeletal Clinical Regulatory Advisers, LLC (MCRA) is a highly specialized, medical device consulting firm and CRO serving the worldwide orthopedic and spine industries. MCRA’s team of experts is committed to executing successful regulatory, clinical, quality assurance, healthcare compliance and reimbursement strategies. MCRA works with companies at all stages of development, whether they are single-product companies or companies with multiple technologies.

**Musculoskeletal Transplant Foundation**

MTF was founded by surgeons in 1987 with the goal of providing safe, high-quality tissue while advancing the science of tissue transplantation. MTF has distributed more than 5 million allografts from more than 90 thousand donors and has maintained an exemplary safety record while delivering a broad range of tissue forms.

**N2 Biomedical**

N2 Biomedical is a leading provider of surface modification services to orthopedic, spinal, and cardiovascular device manufacturers. Our specialty is in providing solutions to improve surface characteristics such as enhanced bone ingrowth and anti-microbial property, improved biocompatibility, thromboresistance, increased wear and scratch resistance, reduced friction, corrosion resistance, improved radiopacity, product differentiation, as well as enhanced electrical and optical properties.

**Nadia International, Inc.**

Nadia International will display educational/surgical bronze sculptures specifically for the spine surgeon. These museum quality limited editions are created by the late Ronadro. Ronadro has over 7000 surgeons in 77 countries collecting his fine works of art. They are displayed at the Smithsonian and various medical universities all over the world. The Ronadro Collection will be introducing a new bronze sculpture “Cervical Decompression”.

**Nanovis**

Nanovis’ mission is to lead our select markets with science-enhanced, life improving technologies. Nanovis has three advanced technology platforms, the FortiCore® implant family; a PEEK interbody system with a deeply porous titanium scaffold which has entered the U.S. market, and an advanced nanotechnology platform under development, and an innovative anti-colonization and antimicrobial implant platform also under development. Implant system and technology briefings are available at our booth.
Natus Neurology 1065
www.natus.com
Natus Neurology is a leading provider of instrumentation for diagnosis and monitoring of neurological conditions: epilepsy, sleep disorders, cerebral vascular disorders and stroke, neuropathies, neuromuscular diseases, myopathies; neurosurgical procedures; neurophysiologic research; and offers a complete line of supplies and accessories for use in settings from private practice to hospital.

NeuroEnterprises 503
www.neuroenterprises.com
NeuroEnterprises, LLC manufactures and sells innovative surgical instruments and disposable devices. Our flagship product is the ChicagoTip, a self cleaning disposable suction. We design new instruments and make functional improvements on exiting instruments to improve surgical techniques and enhance overall surgical outcomes. Our engineering and product design teams work directly with surgeons to improve on the design and functionality of instruments currently used daily in the operating rooms.

NeuroPro Spinal Jaxx, Inc. 2359
www.spinaljaxx.com
NeuroPro Spinal Jaxx, Inc. is a research and development company specializing in next generation expandable lumbar interbody fusion devices. The Spinal Jaxx patented technology is a leap forward from the technology of competing expandables available on the market today. www.spinaljaxx.com

NeuroStructures 1257
www.neurostructures.com
NeuroStructures is dedicated to advancing orthopedics and neurosurgery through the discovery and development of quality innovative implantable surgical solutions that restore patient quality of life. Our expertise in designing medical devices and ability to effectively collaborate with surgeons, allow us to develop products that are less invasive and provide optimal clinical results. Please visit us on our website at www.neurostructures.com or download the NeuroStructures App to discover more.

Next Orthosurgical, Inc. 1057
www.nextorthosurgical.com
Next Orthosurgical is an international medical device company focused on the rapid development and distribution of innovative quality products. We’re experienced professionals using proven, advanced design and manufacturing methods. We’re guided by our surgeon customers and their patients to deliver safe, repeatable, and life changing solutions. We have a robust operational infrastructure that supports product manufacture, delivery, and expert service to our surgeons and distribution team.

Nexxt Spine 408
www.nexxtspine.com
Nexxt Spine is a privately held medical device company dedicated to the treatment of painful and debilitating spinal pathologies. Through innovative product development, technologically advanced manufacturing platforms, and irreproachable quality standards, Nexxt Spine works toward increasing procedural efficiency and improving patient outcomes. All implant and instrument development, design, manufacturing, and distribution takes place within the company’s headquarters in Noblesville, Indiana.

Nordson MEDICAL 509
www.nordsonmicromedics.com
Nordson MEDICAL provides innovative components, devices and custom OEM solutions for the delivery of fluids and biomaterials. Nordson Medical product lines include: Value Plastics precision plastic fluid components, Micromedics biomaterial delivery devices, and Avalon Laboratories catheters and tubing, along with a wide range of services and customized OEM solutions

Norman Noble, Inc. 840
www.nnoble.com/index.htm
Norman Noble Inc. manufactures orthopedic devices and implants to customer specifications in compliance with FDA regulations and ISO 13485:2012. Full capabilities include seven-axis contour milling, Swiss machining, laser machining and welding, wire EDM, sinker EDM, turnkey Nitinol manufacturing, metal finishing and packaging. Prototype services are also available. Visit the company’s Web site for more information.

Novabone Products 1111
www.novabone.com
Novabone Products provides a best-in-class synthetic bone graft substitute. The unique bioactive grafting technology delivers an osteoconductive matrix while signaling and stimulating osteoblastic activity to the site. For ease of use and surgical convenience, NovaBone is available in a variety of forms and sizes along with multiple delivery options.

Novid Surgical, LLC 1137
www.novidsurgical.com
Novid Surgical, LLC is pleased to present the Swiss-Made FISSO line of Quick Fixation positioning arm systems. Available in numerous weight capacities and lengths, we can provide a stable mounting platform for a myriad of applications. These include endoscopes, instruments, and retractors among others. Due to modular design, numerous configurations are possible to meet your exact needs. OEM inquires are welcome.

NSI Health Systems 1506
www.nsi-healthsystems.com
NSI specializes in the development, manufacturing and distribution of innovative medical devices and technologies.
NuTech
www.nutechspine.com
NuTech is a leading regenerative medicine and medical device company providing an integrated portfolio of ground-breaking products. The NuTech product portfolio offers a wide range of allograft tissue products, a full line of spinal implants, and a complete line of state-of-the-art products that take advantage of the unique healing properties of the amniotic tissues and fluid. NuTech is dedicated to providing new technologies that will benefit surgeons, hospitals, and most importantly, patients.

NuVasive
www.nuvasive.com
NuVasive, Inc. is a world leader in minimally invasive, procedurally-integrated spine solutions. From complex spinal deformity to degenerative spinal conditions, NuVasive is transforming spine surgery with innovative technologies designed to deliver reproducible and clinically proven surgical outcomes. Highly differentiated solutions include access instruments, implantable hardware and software for surgical planning and reconciliation technology that centers on achieving spinal global alignment.

OPTEC USA
www.optecusa.com
OPTEC USA as a central fabricator/manufacturer of custom and prefab, spinal and lower limb orthosis, we’re available 24/7/365. For 16 years we have offered the highest level of quality and service available, from our EZ Step Leather Ankle Gauntlet to our newest line of Stealth Air and Venum braces.

Optum
www.optum.com
Optum is a leading health services and innovation company dedicated to helping make the health system work better for everyone. With more than 85,000 people collaborating worldwide, Optum combines technology, data and expertise to improve the delivery, quality and efficiency of health care.

Orchid Orthopedic Solutions
www.orchid-ortho.com
As a leader of medical device outsourcing services, Orchid has experience with both fusion and motion preserving technologies as well as standard open procedure instruments and complex, high precision, minimally invasive instrumentation. In addition to our design and manufacturing services, our proprietary coating technologies, including Titanium on PEEK and UHMWPe, set us apart.

Ortho Kinematics
www.orthokinematics.com
Ortho Kinematics, Inc. (OKI) is an imaging informatics company focused on spinal diagnostics. OKI's FDA cleared Vertebral Motion Analysis (VMA) system uses fluoroscopic imaging and proprietary analytical software to provide accurate and precise measurements in the detection of spinal instability. VMA Align, OKI's newest product, is a pre-surgical planning tool for accessing sagittal alignment.

Orthofix, Inc.
www.orthofix.com
Orthofix International N.V. is a diversified, global medical device company focused on improving patients’ lives by providing superior reconstructive and regenerative orthopedic and spine solutions to physicians worldwide. The company has four strategic business units: BioStim, Biologics, Extremity Fixation, and Spine Fixation and regularly collaborates on research and development activities with leading clinical organizations. For more information, please visit www.orthofix.com.

Orthomed Inc.
www.orthomedinc.com
The Surgical Instrument Specialists offering one of the largest selections of orthopedic and spinal instruments. We provide innovative instruments to aid surgeons in new and evolving surgical techniques. We work with surgeons to design, engineer and produce custom and specialty instruments for the industry.

Orthopaedic Solutions Center
www.my-osc.eu
OSC is membered by HTI & Forecreu of France and Sayan of Turkiye.HTI is professionalized in HA coating & ceramic component manufacturing whereas Sayan’s expertise is designing & manufacturing orthopedic and spinal instruments as well as implants on OEM/OBL bases. Forecreu is world leader in high speed & cannulated bars of SS & Ti for instruments and implants. With unified cooperation, OSC is glad to offer complete solution as a partner to all orthopedic and spinal implant manufacturers worldwide.

Orthopaedic Specialists of the Four States, LLC
ortho4states.com
Orthopaedic Specialists of the Four States (Ortho Four States) is the largest and most comprehensive neck-to-toe orthopedic and sports medicine care group and facility serving the Four State Area of Arkansas, Kansas, Missouri, and Oklahoma. Ortho Four States was founded and is operated by fellowship-trained and board-certified orthopedic surgeons focused on a mission to restore patients’ quality of life and offers a rewarding experience for the entire staff of doctors, PAs, NPs, and PTs.

OrthoPedicCare
www.orthopediccare.com
OrthoPedicCare Corp is a privately held global leader of orthopedic surgical systems focused exclusively on providing pediatric orthopedic surgeons quality and innovative products in children’s hospitals. The Company is the only end-to-end provider of pediatric surgical implants and instruments and has the only global pediatric sales and distribution system in the orthopedic industry.
ORTHORESEARCH
www.orthoresearch.com

ORTHORESEARCH is the publication for professionals with innovative treatment options for VCFs. Its singular mission is helping orthopaedic companies and individuals improve their performance. Highly specialized product offerings such as ORTHORESEARCH Membership, ORTHOWORLD®, BONEZONE® and OMTEC® empower industry participants to respond to challenges, maximize opportunities and more aggressively expand their orthopaedic businesses.

OSBONE Technologies, Inc.
www.osbontechnologies.com

OSBONE Technologies, Inc. specializes in bone regenerative technology. OsteoFab Technology accelerates the speed at which implants are designed, manufactured, and cleared for sale. The OsteoFab platform combines design, material, 3D printing, quality, and regulatory clearance into one streamlined process. The result is a faster and more predictable path to market. OPM has FDA clearances for the following products: Osseon Patient Specific Cranial Device OsteoFab Patient Specific Facial Device SpineFab VBR System.

Oxford Performance Materials, Inc.
www.oxfordpm.com

Oxford Performance Materials, Inc. specializes in bone regenerative technology. OsteoFab Technology accelerates the speed at which implants are designed, manufactured, and cleared for sale. The OsteoFab platform combines design, material, 3D printing, quality, and regulatory clearance into one streamlined process. The result is a faster and more predictable path to market. OPM has FDA clearances for the following products: Osseon Patient Specific Cranial Device OsteoFab Patient Specific Facial Device SpineFab VBR System.

Pan Medical
www.panmed.us

Pan Medical is a worldwide leader in Kyphoplasty Products and VCF technology. It is pleased to announce their launch during NASS 2016 their new and unique pre curved 11gauge Kyphoplasty balloon catheter, in addition to this we will have on our show the world’s smallest 13gauge Kyphoplasty balloon catheter and kit. With our manufacturing facility in the UK and US our products have full FDA clearance.

Paradigm Spine, LLC
www.paradigmspine.com

Paradigm Spine, LLC was founded in 2005 to be a leader in the field of non-fusion spinal implant technology. Paradigm Spine, LLC has successfully received FDA PMA approval of the coflex® interlaminar stabilization device in the United States in October of 2012. The coflex® technology has been implanted in more than 100,000 patients, and is selling in over 45 countries. The core market for coflex® is lumbar spinal stenosis patients.

Penn State Health
www.pennstatehershey.org

Penn State Health Milton S. Hershey Medical Center. Penn State College of Medicine and Penn State Hershey Children’s Hospital are committed to enhancing the quality of life through improved health, the professional preparation of those who will serve the health needs of others, and the discovery of knowledge that will benefit all.

OSSimTech
www.ossimtech.com

OSSimTech are creators of open surgery training simulators. Come and try the “Sim-Ortho”, a virtual reality training simulator for orthopedics featuring procedures in spinal surgery (discectomy, spinal fusion and lumbar laminectomy), knee arthroplasty and soon traumatology. The Sim-Ortho simulator is the best way to teach and train orthopedic surgery in a safe environment. Our simulators offer haptic feed-back (applied force and resistance) and allow handling and manipulation of multiple tools.

OsteoNovus
www.osteenovus.com

OsteoNovus Inc. is a start-up orthopedic medical device company focused on the development of biologic materials to support and regenerate bone. Our innovative calcium phosphate based technology will be available as moldable putty and an injectable cement for spine, trauma and orthopedic surgery for treatment of bone voids, various fractures and spinal disorders.

Orthopedic Design & Technology Magazine
www.odtmag.com

ODT is recognized as the industry-leading publication, widely recognized for its in-depth, high-quality coverage of the specialized field of orthopedic product development and manufacturing. Each issue, ODT offers readers comprehensive feature articles, industry news, trends and up-to-date market data on the ever-evolving orthopedic sector. With 7,500 subscribers ODT reaches key decision makers who look to ODT as their No. 1 source for information. Visit www.odtmag.com for more information.

ORTHOREBIRTH
www.orthorebirth.com

“ReBOSSIS” is the only Synthetic bone void filler with the consistency, mold ability and hydrophilic Characteristics of cotton. Composed of β-TCP, CaCO3, Silicone and PLLA, The interconnected networks of microporous fibers are created. ReBOSSIS has received FDA clearance to fill bony voids or gaps that are not intrinsic to the stability of the bone. The defects may be due to traumatic injury or surgically created defects.

OsteoNovus
www.osteenovus.com

OsteoNovus Inc. is a start-up orthopedic medical device company focused on the development of biologic materials to support and regenerate bone. Our innovative calcium phosphate based technology will be available as moldable putty and an injectable cement for spine, trauma and orthopedic surgery for treatment of bone voids, various fractures and spinal disorders.
At Pfizer, we apply science and our global resources to bring therapies to people that extend and significantly improve their lives. Every day, Pfizer colleagues work across developed and emerging markets to advance wellness, prevention, treatments and cures that challenge the most feared diseases of our time.

PHACON GmbH
www.phacon.de
PHACON from Germany develops and sells training systems and models as marketing tools for instrument and implant manufacturers as well as for hands on trainings in hospitals and training centres. Realistic anatomical models of bone like material, combined with various soft tissues, all structures and landmarks, based on real CT-data of patients. Use your common devices, instruments and implants, with realistic haptic and feel. Navigate within the included CT-data set of the related model.

Philips
www.healthcare.philips.com
About Royal Philips Royal Philips (NYSE: PHG, AEX: PHIA) is a diversified health and well-being company, focused on improving people’s lives through meaningful innovation in the areas of Healthcare, Consumer Lifestyle and Lighting. The company is a leader in cardiac care, acute care and home healthcare, energy efficient lighting solutions and new lighting applications, as well as male shaving and grooming and oral healthcare. News from Philips is located at www.philips.com/newscenter.

Philips Precision Medicraft, Inc.
www.philippemedicraft.com
Manufacturing engineers with hands-on machining experience are uniquely capable of ensuring an OEM’s complete vision. Functioning like a natural extension of your business, a team like this can solve manufacturing challenges quickly and cost effectively. PPM proudly offers this team to every OEM we serve.

Pinnacle Spine Group
www.pinnacle脊椎group.com
Pinnacle Spine Group was founded with the focused goal of developing innovative medical devices, conceived in the operating room, for surgical procedures of the spine. The objective for every device and instrument we develop is a better outcome for the patient, and a better experience for the surgeon and operating room staff. If you have your own innovative idea, bring it to us to help bring it to life.

Praxis Technology
www.praxisti.com
Praxis Powder Technology is an ISO-13485 certified contract manufacturing company that produces titanium components via powder metallurgy. Within the medical sector, Praxis specializes in porous titanium for orthopedic and spinal implants as well as titanium metal injection molding (MIM). Our porous titanium was developed specifically for bone in-growth applications and has multiple 510k approvals. Porous titanium is an ideal material for cervical and lumbar interbody fusion cages.

Precision Medical Technologies
www.premedtec.com
Precision Medical Technologies, Inc. is a contract manufacturer of orthopedic implants and instruments with a focus on spine, extremities, trauma and sports medicine. We are ISO 13485:2003 Certified. Our Implant and Instrument divisions have their own separate Quality Engineering, Production Engineering, and Operating Management. The Instrument Division operates out of the Warsaw and Rome City facilities, while the Implant Division is only located at the Warsaw facility.

Precision Spine Inc.
www.precisionspineinc.com
Discover the Difference at Precision Spine, makers of the Reform Pedicle Screw System, as we present our Made in the USA portfolio of innovative spine solutions. Discover the patented MD-Vue™ Lateral Retractor, Plate and Interbody Cage, Reli™ SP Plus Spinal Plating System, ShurFit® ACIF 2C Ti and HA Coated Cervical Cage, SureLOK™ MIS 3L Pedicle Screw System and the Reform® POCT System for Occipital Cervical Thoracic Fixation. We look forward to your visit to Booth 651.

Precium Technologies
preciumtech.com

Promimic AB
www.promimic.com
Promimic is a biomaterial company that sell HAnano Surface; a 20 nanometer thin coating that accelerates and improves osseointegration of implants. The coating can be used on all types of implant materials and applications, including complex geometries and porous structures. Presence of the HAnano Surface renders a super-hydrophilic implant surface and improves the anchoring strength of implants. The technology is cost efficient and can easily be adapted at the implant production line.

ProScan Reading Services
www.proscan.com
ProScan Reading Services: World Leader in MSK and Neuro MRI Interpretations. ProScan combines our unparalleled radiologic expertise; educational heritage and vast MRI center development to bring you the performance and responsiveness that breeds trust and satisfaction. Quality reads by board certified fellowship trained MSK and CAQ Radiologists. ProScan: Getting the quality and economics right!

Prosidyvan
www.prosidyan.com
Prosidiyan® was founded in 2009 to develop a family of synthetic bioactive bone graft substitutes based on microscopic fibers of bioactive glass. Prosidiyan®’s first product, FIBERGRAFT® BG Morsels was FDA cleared in March 2014 as a bone void filler and has since been successfully used in hundreds of surgeries. FIBERGRAFT® BG Putty is FIBERGRAFT® BG Morsels delivered through Prosidiyan®’s proprietary bioactive carrier OSSIGLIDE™.

PHACON from Germany develops and sells training systems and models as marketing tools for instrument and implant manufacturers as well as for hands on trainings in hospitals and training centres. Realistic anatomical models of bone like material, combined with various soft tissues, all structures and landmarks, based on real CT-data of patients. Use your common devices, instruments and implants, with realistic haptic and feel. Navigate within the included CT-data set of the related model.

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Praxis Technology
www.praxisti.com
Praxis Powder Technology is an ISO-13485 certified contract manufacturing company that produces titanium components via powder metallurgy. Within the medical sector, Praxis specializes in porous titanium for orthopedic and spinal implants as well as titanium metal injection molding (MIM). Our porous titanium was developed specifically for bone in-growth applications and has multiple 510k approvals. Porous titanium is an ideal material for cervical and lumbar interbody fusion cages.
The Company received FDA 510(k) clearance for the INTRACEPT System. INTRACEPT is a source of CLBP associated with degenerative VBs or VB endplates. It includes instruments, intervertebral cages, orthopedic bone screws, and a family of products designed for use in cervical fusion surgery. Products include instruments, intervertebral cages, orthopedic bone screws, and allograft bone.

PROVIDENCE MEDICAL TECHNOLOGY is a privately-held medical device company developing innovative solutions addressing the $2 billion worldwide cervical spine market. Providence technology fills critical gaps in the continuum of traditional cervical spine care. We offer a family of products designed for use in cervical fusion surgery. Products include instruments, intervertebral cages, orthopedic bone screws, and allograft bone.

Puracon is specialized in cleaning, packaging and sterilization of medical products. We offer a wide range of customized and standardized packaging solutions. We do worldwide logistics including customs handling. As an international operating company we are accredited by the Japanese Public Health Authority, registered with the FDA and certified to all European guidelines. Email: info@puracon.com Homepage: www.puracon.com

Pyrìdis serves all the segments of the market for custom sterilizable trays for surgical instruments and implants. Pyrìdis is the market leader in Europe and is active on a worldwide basis. With over 40 years of experience in metal and plastic design and manufacturing, Pyrìdis leads the way. Pyrìdis quality and expertise are our first intention.

Quinn Medical improves lives with the world’s finest non-invasive orthopedic products and programs designed to prevent injury, relieve pain, and restore function. Simply stated: we help people get Back in Motion™. Please join us at booth #1247 to learn more about Quinn Medical and our revolutionary SLEEQ™ Spinal Therapy System.

Relievant Medsystems, Inc. is a medical device company pioneering nerve ablation within vertebral bodies for the treatment of chronic low back pain. The Company’s INTRACEPT (R) Intracranial Spinal Nerve Ablation System provides a minimally invasive, implant-free procedure that uses RF energy to ablate the Basivertebral Nerve, whose role in afferent pain transmission is a source of CLBP associated with degenerative VBs or VB endplates. The Company received FDA 510(k) clearance for the INTRACEPT System.
SI-BONE, Inc.  1551
www.si-bone.com

SI-BONE, Inc. is the leading sacroiliac (SI) joint medical device company dedicated to the development of tools for diagnosing and treating patients with low back issues related to certain SI joint disorders. The company has developed, and is manufacturing and marketing, minimally invasive products for patients with these disorders. The iFuse Implant System was developed as a minimally invasive surgical option for patients who have failed non-surgical options.

SentryNeuro  1817
www.sentryneuro.net

Based in Houston, Texas, SentryNeuro began operations in 2007 to fulfill the need for reliable, high-quality intraoperative neuromonitoring (IONM). With a team of expert IONM surgical neurophysiologists supported by a strong administrative team, we have experienced notable growth to a national level due to our quality of services as well as the acceptance of IONM as a standard of care. SentryNeuro upholds elevated standards that come with earning the Joint Commission Gold Seal of Approval.

Showa Ika Kohgyo Co. Ltd.  1109
www.showaika.com

Showa Ika is Japan’s leading spinal device producer; creating innovative, safe, easy-to-use instruments and implants for use in spinal surgery. Our products are globally recognized by leading physicians for their outstanding quality and clinical efficacy. We offer our customers: • high quality, reliable and innovative spinal implants and instruments. • flexible, competitive pricing. • outstanding delivery and service. • access to our in-house research and development team.

SeaSpine  1631, Suite 1973
www.seaspine.com

SeaSpine is a global medical technology company focused on the design, development and commercialization of surgical solutions for the treatment of patients suffering from spinal disorders. SeaSpine has a comprehensive portfolio of orthobiologics and spinal fusion hardware solutions to meet the varying combinations of products that neurosurgeons and orthopedic spine surgeons need to perform fusion procedures on the lumbar, thoracic and cervical spine.

Sawbones/Pacific Research Labs  1405
www.sawbones.com

For over three decades, Sawbones, the originators of “hands on” workshop models continues to be the leader in anatomical models for medical education, new product demonstration, sales training, and patient awareness. In addition to over 2000 products, Sawbones offers complete product development to meet company and teaching institution custom specifications.

Shukla Medical  1833
www.shuklamedical.com

Shukla Medical, innovators of Xtract-All® and leading manufacturer of cutting-edge universal implant extraction systems is dedicated to meeting the needs of the medical industry. Our CTL Total Spine Implant Removal System is the first “truly” universal spine extraction system to encompass all the instruments needed to remove virtually all cervical, thoracic and lumbar locking nuts, screws and plates commonly used in today’s orthopedic/spine procedures.

SBH  1356
www.sbhsurgical.com

SBH is a medical device company focused on a streamlined supply chain and operational efficiency, offering a comprehensive line of premium surgical hand-held instruments for use in Neuro, Spine, Vascular and many other Surgeries. SBH offers also a wide range of surgical retractor systems such as abdominal, bariatric. At SBH, we pledge an uncompromising commitment to the excellence. For more information, visit us online at www.sbhsurgical.com.

Seabrook International  1320
seabrookinternational.com

Seabrook International is a leading contract manufacturer of highly-engineered precision instruments, implants, and other devices primarily for the orthopaedic implant industry. We have a strong technical staff to provide value-added engineering and design support services to complement our rapid manufacturing of prototypes, custom specials, instrument modification, and production-volume manufacturing services.

Safe Passage Neuromonitoring  506
www.safepassagehealth.com

SafePassage Health is a patient monitoring company committed to reliable, local, and professional care. With headquarters in New York City and deep roots in the Northeast, the company provides Intraoperative Neuromonitoring (IONM) to hospitals along the East Coast and a recent expansion to the Midwest. Their thoughtful approach to IONM ensures individualized patient care and the highest trained neurophysiologists in the field. Find out more by visiting www.SafePassageHealth.com.

Saudi Spine Society  1669
SaudiSpine.org/en

The Saudi Spine Society is a non-profit organization, which was established in 2015, to promote excellence in spine care by running efficient, transparent multidisciplinary society that nurtures a collaborative community of practice of spine practitioners who disseminate high-quality research, and conduct innovative educational activities for the public and the professionals.

RTI Surgical Inc.  843, Suite 2151
www.rtisurgical.com

RTI Surgical is a leading global surgical implant company providing surgeons with safe biologic, metal and synthetic implants. Committed to advancing science, safety and innovation, RTI’s implants are used in sports medicine, general surgery, spine, orthopedic, trauma and cardiothoracic procedures and are distributed in nearly 50 countries. RTI is headquartered in Alachua, Fla., and has four manufacturing facilities throughout the U.S. and Europe.

SeaSpine, Inc. is the leading sacroiliac (SI) joint medical device company dedicated to the development of tools for diagnosing and treating patients with low back issues related to certain SI joint disorders. The company has developed, and is manufacturing and marketing, minimally invasive products for patients with these disorders. The iFuse Implant System was developed as a minimally invasive surgical option for patients who have failed non-surgical options.
Siemens Healthineers 851
usa.siemens.com/Healthineers
Siemens Healthineers is committed to becoming the trusted partner of healthcare providers worldwide, enabling them to improve patient outcomes while reducing costs. Driven by our long legacy of engineering excellence and our pioneering approach to developing the latest advancements, we are a global leader in medical imaging, laboratory diagnostics, clinical IT, and services. usa.siemens.com/Healthineers

SIGNUS 1502
www.signus.com
SIGNUS has a worldwide reputation for developing innovative and safe solutions for the treatment of spinal disorders using cutting-edge technology. The extensive portfolio includes fusion cages, prosthesis, ACDR, fixation and deformity systems. SIGNUS is also spearheading treatment for the problematic indication of SI pain. With the ST Line™ product family, SIGNUS recently introduced porous structural titanium, a material designed to provide a 3-dimensional framework for spinal fusion.

Simplify Medical, Inc. 1503
www.simplifymedical.com
Simplify Medical, Inc. is developing the most advanced cervical artificial disc that enables MRI imaging, the preferred and most accurate modality for evaluating soft tissue in the spine. MRI imaging avoids the risks of ionizing radiation from CT scans. Simplify Medical is committed to providing artificial discs with advanced materials, MRI-imaging capability, kinematics, and lower heights to accommodate a wide range of patients.

Sintea Plustek 1245
www.sinteaplustek.com
Established in 1987 near Milano, Italy, Sintea Plustek develops several innovative spine systems for the treatment of a broad range of spinal disorders. Sintea Plustek’s engineering capabilities allow for advanced research and projects to meet the needs of patients and spine surgeons. Our product line includes Posterior Lumbar System, Dorsolumbar Somatic Cage, Anterior Cervical Plate, PLIF, TLIF, and Pedicle Cement Dispenser.

Solco Biomedical 1235
www.solco.co.kr
Solco Biomedical is a manufacturer and global supplier of spinal implants and instrumentation focused on developing innovative surgical solutions. We are dedicated to exploring cost-contained approaches and less-invasive surgical options that provide optimal outcomes for the surgeon and patient.

Solvay Specialty Polymers 844
www.SolvaySpecialtyPolymers.com
Solvay manufactures high-performance plastics and biomaterials. Zeniva® PEEK is offered for use in implantable devices. Radel® PPSU is a remarkably tough plastic able to withstand over 1,000 autoclave cycles without significant loss of mechanical properties. Ixef® PARA delivers very high strength and stiffness for replacing metal in single-use instruments.

Somethech Inc. 1662
www.sometech.com

South Denver Spine 1855
www.southdenverspine.com
South Denver Spine, a rapidly growing orthopedic spine practice, located in the southern edge of the Denver area, is looking for a new team member. We are looking for a fellowship training BE/BC orthopedic spine surgeon. Supported by an enthusiastic and highly rated team, come experience what “loving your job” feels like. You can live, work and play in the shadow of the beautiful Rocky Mountains. Just 90 minutes away from world class skiing, mountain bike trails and an abundance of outdoor activities. Excellent benefit package, CME coverage, malpractice insurance, partnership.

Southern Spine LLC 411
www.southernspine.net
Southern Spine features the StabiLink® MIS Interlaminar Spinal Fixation System along with the innovative, patented PG® Precision Guided Inserter/Compressor that redefines ease of use. The StabiLink® System is the new standard in minimally invasive spinal fusion providing the missing link between conservative therapy and more traditional invasive spinal fusion procedures. The StabiLink® Interlaminar System has the most anatomical selections and should be a part of every surgeon’s armamentarium.

SpecialtyCare 604
www.specialtycare.net
In the OR, you want real-time, critical information to make the best possible decisions for your patient. SpecialtyCare’s certified neurophysiologists and oversight physicians keep you informed immediately even in the most complex situations. And, because we’re committed to leading-edge research, you’ll have state-of-the-art knowledge at your disposal. When you want the certainty of clinical excellence, choose SpecialtyCare™. Visit us at booth 604 and online at www.specialtycare.net.

Spinal Balance 857
www.spinalbalance.us
Spinal Balance designs, develops, manufactures, markets and sells spinal fusion implant systems. Our first product is the LIBRA Pedicle Screw System. The salient features are an ergo-metric sterile package system and excellent mechanical strength of the screw plus screw and tulip interface. The system is fully UDI compliant.

Spinal Elements, Inc. 1341
www спиналеlements.com
Spinal Elements develops innovative surgical solutions for traditional and MIS procedures. We have a complete line of warranted Ti-Bond® (titanium coated PEEK interbody) devices in PLIF, TLIF, ALIF, and ACDF. The results from our Hero® Allograft are donated to charities benefiting children with life-threatening medical conditions. We have multiple no profile, stand-alone interbody options. We look forward to sharing our new innovations in lateral MIS access and expandable devices.
Spinal Kinetics
www.spinalkinetics.com
Spinal Kinetics develops, manufactures and markets innovative systems that treat degenerative spine diseases. The M6® artificial disc is the first motion preservation device intended to replicate the anatomic and biomechanical attributes of a natural disc, preserving the spine’s range and quality of motion.

Spinal Simplicity, LLC
www.spinalsimplicity.com
Spinal Simplicity is dedicated to the creation of innovative simple solutions to treat complex spinal and orthopedic conditions through three distinct product platforms: Minimally Invasive Lumbar Fusion, Cervical Fusion and Extremities The Minuteman®G3 MIS Fusion Plate, can be implanted through a Lateral MIS approach or a Posterior MIS approach, reducing the trauma to healthy tissue without compromising fixation. The Minuteman®G3 has FDA clearance and is now for sale in the United States.

Spinal Support Solutions
www.spinalsupportsolutions.com
With over 7 years of proven experience, we are an industry-leading DME management program. By focusing our attention on managing your DME business, we deliver controlled operating costs, a heightened patient experience, and an increase in your overall profitability. We can analyze your profit potential to show how we can significantly increase your ancillary net profits. Through our unique partnership, you are able to focus on patient care while also providing the highest quality orthotic care.

Spine Surgery Today & Healio.com by SLACK Inc.
www.healio.com/spine
SLACK Incorporated, delivering the best in health care information and education worldwide, invites you to booth #1103. Pick up a free issue of SPINE SURGERY TODAY, ORTHOPEDICS TODAY and ORTHOPEDICS. Sign up for the free news wire at Healio.com/spine.

Spine Universe, a Vertical Health Property
www.spineuniverse.com
SpineUniverse.com is the most comprehensive web resource in spine with over 6,000 articles dedicated to patient and physician education. SpineUniverse offers medical professionals a search-optimized practice listing, an extensive condition-based and searchable case library, news on the latest spine-related technologies, and more. Join our survey panel to participate in honorarium-compensated surveys—your opinions help shape the future of spine care.

Spine Wave
www.spinewave.com
Spine Wave innovates for spine surgeons and their patients. Our StaXx®, Leva® and Velocity™ expandable devices, our percutaneous Sniper® Spine System and Annex® Adjacent Level System, and our True Position® Pivoting Spacer System are examples of Spine Wave innovation. Spine Wave’s technologies help spine surgeons provide better care for their patients.

Spineart
www.spineart.com
Spineart is one of the fastest growing privately held spine companies, with a leading position in the European market and representation in more than 46 countries worldwide. Spineart established its US presence in 2009, providing to distributors, hospitals and surgeons a unique offer: Sterile-packed, barcoded implants and a compact set philosophy. Spineart introduced clinically validated technologies in Minimally Invasive Surgery, Motion Preservation, Fusion, Biologics, and Fractures Treatment.

SpineGuard Inc.
www.spineguard.com
SpineGuard provides the tools equipped with DSG™ (Dynamic Surgical Guidance) Technology to enhance spinal surgery. Devices built with DSG Technology give real-time audio and visual feedback to improve the accuracy of pedicle screw placement, without the need for ancillary equipment. These devices have assisted spine surgeons in accurately placing pedicle screws in approximately 40,000 spinal procedures around the world. Visit www.spineguard.com for more information.

SPINENDOS
www.spinendos.com
SPINENDOS is dedicated to the latest innovations in minimal invasive spinal surgical techniques, systems and methods. Close cooperation with surgeons enables us to catch up with the latest trends. Spinendos also attaches great importance to clinical needs and the special training program and education which is very important. As the aim of SPINENDOS “innovation of healthcare” we are dedicated to develop sustainable spinal endoscopic technology products and applications.

Spineology
spineology.com
Spineology, the innovator in anatomy-conserving™ spine surgery, develops spinal implants and instruments. Spineology surgical techniques conserve spinal bone, ligament and muscle tissue. Spineology is committed to increasing procedural efficiency, reducing surgical morbidity and accelerating patient recovery. Learn more at spineology.com.

SpineSearch
www.spine-search.com
SpineSearch is a premier recruitment company. We recruit all levels of staff, front desk to physician, both executive, clinical and administrative. Our primary clients are Orthopedic, Spine, and Neurosurgeons; Pain Management, and Rehabilitation Physicians. Founded in 2009 by Nicola Hawkins, DNP, RN, our staff brings two decades of expertise in the clinical and administrative side of Spine, creating a high-quality alternative to bulge bracket recruitment firms.
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<tr>
<th>Company</th>
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<td>SpineSource, Inc.</td>
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SpineSource introduces LVARLOCK Expandable Lumbar Cage. Made of titanium, LVARLOCK is the only expandable interbody cage providing in situ Hyperlordotic Sagittal Expansion: up to 7 mm and 24°, customized to any increment and angle in between. The open framework of LVARLOCK provides copious space for packing bone graft pre-and-post expansion, both in and around the cage. Since 2004, SpineSource has a rich history of introducing expandable technology to promote fusion and sagittal balance.

SpineVision® is a privately-owned integrated spinal technology company focused on the development and marketing of implants and instrumentation for spinal treatment. Since its foundation in 1999, the company has designed innovative products which offer key advantages to surgeons and benefits to patients. SpineVision’s current products offer solutions for approximately 90% of spinal pathologies i.e. lumbar degenerative disc diseases, deformities, cervical disorders, trauma and tumors.

Stryker is one of the world’s leading medical technology companies and together with our customers, we are driven to make healthcare better. The Company offers a diverse array of innovative medical technologies, including reconstructive, medical and surgical, and neurotechnology & spine products to help people lead more active and more satisfying lives. Stryker products and services are available in over 100 countries around the world. For more information, please visit www.stryker.com.

Surface Dynamics/Eurocoating are medical device coating companies with State-of-the-Art manufacturing facilities in Cincinnati, Memphis & Trento-Italy offering the best in coating technology. CP- Titanium, TiGrowth-C & Hydroxyapatite (HA) Coating, (Osprovit) are applied to any device including PEEK. We also supply Additive Manufacturing Technology – DMLS & E-Beam Sintering services with full service metallurgical laboratories. SD & EC are ISO 13485 Approved/21 CFR 820 Compliant.

SurGenTec is a privately owned medical device company based out of Boca Raton, FL that strives to bring the next level of technology to the spine and orthopedic industry. Our patented technologies deliver safe, cost effective and unique solutions which benefit healthcare providers as well as their patients. Our Products: -Graftgun™ Universal Graft Delivery System -ALARA™ Access Needle -AccuDepth™ Precision Guidewire.

Surgical Care Affiliates (SCA) is a leader in the outpatient surgery industry, strategically partners with health plans, medical groups and health systems across the country to develop and optimize surgical facilities. As of June 30, 2016, SCA operated 201 surgical facilities, including ambulatory surgery centers and surgical hospitals, in partnership with approximately 3,000 physicians. For more information on SCA, visit www.scasurgery.com.

SurgiTel’s mission is to offer customers the best in vision, comfort and ergonomics. Our patented lightweight optics and LEDs, coupled with Oakley frames, means all-day-comfort for the clinician. SurgiTel’s unmatched loupe declination angle means your body is in the correct ergonomic position, reducing pain and the risk of injury. Our loupe mounted SurgiCam Pro digital video camera and our PrismPro loupe line (5.5x-8.0x) can only be seen at SurgiTel.

Symmetry Surgical is dedicated to developing and delivering high-quality, innovative surgical instruments that meet clinicians’ needs and improve patients’ lives.

Synaptive is a medical device company based in Toronto, Canada, driven to develop innovative surgical tools that provide a seamless solution from pre-operative planning to post-operative care. Our BrightMatter™ Solutions support surgical procedures through advanced algorithms, robotics, and optical technologies designed to improve efficiencies while focusing on clinical outcomes.

Our 170,000 sq. ft. campus provides a ONE STOP SHOP for: Medical Coatings, Medical Surface Treatment, Titanium Anodize, HardCoat, Aluminum Anodize, Electro polish, Passivation, Chrome Plating, Precious metal Plating, PVD coatings: (Titanium Nitride, Diamond Like Coating), Hard Chrome replacement technology and tray color anodize imaging. Medical Coating Applications: implants/devices. R&D department can: develop/create coatings per customer needs. ISO-13485 & Nadcap. OEM and CM approvals.

The global capacity to deliver the most difficult challenges with unparalleled industry expertise and superior capabilities. Tecomet produces forged, cast and machined orthopedic implants, precision surgical instruments, sterilization cases/trays and photochemical etched products. Additional specialization exists through innovative product development, Tecomet Standard Products, LaunchQuick™ Development Center and our Total Solutions® approach where we manage the entire product launch cycle.
TECRES SPA
www.tecres.it
Tecres has got over thirty years of experience in orthopaedics and is also active in minimal invasive surgery. Mendec Spine HV System: the unique all in one closed mixing device for preparation of high density resin for vertebroplasty. Mendec Spine: our acrylic resin for filling vertebral cavities, it goes with a kit for vertebroplasty procedure in Mendec Spine Kit. Mendec Aqua: hydraulic delivery device that allows the surgeon to extrude high viscosity cement remaining distant from the x-ray beam.

TeDan Surgical Innovations
www.tedansurgical.com
TeDan Surgical Innovations (TSI) designs and manufactures specialty surgical products for use in orthopedic, neuro, thoracic and spine surgeries. All of our retractor systems have patented ergonomically designed blade locking mechanisms simplifying their use in surgery.

Tegra Medical
www.tegramedical.com
Tegra Medical: premium contract manufacturing from prototyping to production of finished medical devices, with full assembly, packaging, sterilization management. Ortho focus includes devices for spine, arthroscopy, trauma, joint & extremities reconstruction. 200,000 sq. ft. of modern manufacturing space in US and Costa Rica. ISO 13485 & FDA compliant.

Teknimed
www.teknimed.com
TEKNIMED is recognized as the reference in BIOMATERIALS devices for Orthopaedics and Spine. TEKNIMED designs, develops and manufactures a full range of medical devices: Synthetic & Resorbable Bone Substitutes, Orthopaedic-Cranioplasty Cements, Vertebroplasty & Kyphoplasty Cements, Biodegradable Polymers, Biodegradable Ligaments. TEKNIMED’s innovative and patented medical devices have provided numerous, scientifically proven, surgical solutions for Orthopaedics, Spinal, Dental-CMF and Trauma.

Thieme Medical Publishers
www.thieme.com
Thieme is an award-winning international medical and scientific publisher serving health professionals and students for over 125 years. Thieme promotes advancements in clinical practice, publishes the latest research, advocates medical education, and is known for the high quality and didactic nature of its books, journals, and electronic products. Thieme’s entire spine surgery library is now available on the searchable online platform Thieme eSpine. Stop by the booth for your free trial today!

Thompson Surgical Instruments, Inc.
thompsonsurgical.com
Thompson is a leader in spine exposure and the original manufacturer of the table-mounted retractor. We understand the value of exposure in surgery and are dedicated to providing innovative, high quality systems that deliver safe, versatile, and low-profile retraction. From MIS to open, we offer unlimited customization and safe, independent, retraction. Our table mounted retractors are ideal for Anterior Cervical, Anterior Lumbar, Posteriolumbar, and MIS Posterior Lumbar exposures.

TIDI Products
www.TIDIProducts.com
TIDI Products has been a leading manufacturer of clinically differentiated, single-use, infection-prevention products. Through a recent expansion, patient positioning products and Zero-Gravity™ Suspended Radiation Protection Systems are added to the international portfolio. Design and development services to OEMs and innovators in the medical field are also expanded.

Titan Spine
www.titanspine.com
STAND WITH THE FUTURE
Titan Spine, LLC is a surface technology company focused on the design and manufacture of interbody fusion devices that participate in the fusion process through nanotechnology. The company recently launched its next-generation nanoLOCK™ surface technology, the only nano-cleared technology for the spine. Titan Spine, located in Mequon, Wisconsin and Laichingen, Germany, markets a full line of Endoskeleton® interbody fusion devices. To learn more, visit www.titanspine.com.

TranS1
www.trans1.com
TranS1 is an innovative medical device company that is changing spine surgery with minimally disruptive surgical products and tissue sparing procedures that result in better patient outcomes. Using a unique combination of engineering, product development, and intellectual property expertise, TranS1 is changing the way we approach concept to market strategy for new products in spine surgery.

Triangle
www.trianglemfg.com
For 60 years Triangle has partnered with global OEMs to engineer and manufacture a wide range of medical devices and surgical implants for all facets of the orthopedic industry. From early-stage design, development and prototyping to pre-production and volume production, Triangle takes you from concept to launch with speed and economy while achieving precision machining to the tightest tolerances and meticulous finishing and assembly.

Tyber Medical, LLC
www.tybermedical.com
Tyber Medical, a private label original equipment manufacturer (OEM), is creating new pathways to regulatory approved implants and instruments for orthopaedic companies, distributors, and hospital organizations. Tyber Medical designs and develops class II orthopedic systems; verifies and validates those systems using a QSR and ISO 13485 certified quality system; and pursues and maintains both US (FDA 510(k)) and OUS (CE Mark) regulatory approvals. For more information, visit www.tybermedical.com
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<td><a href="http://www.youic.com">www.youic.com</a></td>
<td>Drive innovation, Drive success</td>
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<td>Vertera Spine</td>
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<td><a href="http://www.verteraspine.com">www.verteraspine.com</a></td>
<td>Vertera Spine is a privately-held medical device company working to address critical clinical needs in spine by developing and commercializing a portfolio of surgical solutions using its patented porous PEEK Interbody Fusion Device, the first porous all-PEEK fusion system.</td>
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<td><a href="http://www.verticalspine.com">www.verticalspine.com</a></td>
<td>Founded in late 2010, Vertical Spine LLC is a revenue generating spinoff from Cascade Medical Enterprises (CME) commercializing the FIBRINET® System technology which is a regenerative medical solution for lumbar fusion surgery. Two PRFM grafts and the Surgeon Defined Graft have been used successfully in a variety of spine applications and have demonstrated excellent fusion at 12 months in two separate studies. Please visit us at booth #842 to learn about the company and the technology.</td>
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<td>Vertiflex</td>
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<td><a href="http://www.vertiflexspine.com">www.vertiflexspine.com</a></td>
<td>At Vertiflex®, we are relentlessly focused on providing the most advanced, less invasive treatments for Lumbar Spinal Stenosis (LSS). We believe there is a gap in the continuum of care of long-term conservative management and traditional surgery. With the Superior® Indirect Decompression System, we are revolutionizing the treatment of LSS with a minimally invasive approach that puts patient comfort and safety first. Our commitment to excellence and efficacy has led us to conduct the most rigorous FDA clinical trial for LSS, proving Superior to be effective.</td>
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<td>VGI Medical</td>
<td>1330</td>
<td><a href="http://www.vgimedical.com">www.vgimedical.com</a></td>
<td>VGI Medical is focused on developing a broad range of spinal implants and surgical instrument systems through industry knowledge, creative thinking, and engineering expertise. VGI is extremely dedicated to research and development, focusing on spine biomechanics to address spinal disorders in ways that have been previously overlooked.</td>
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<td>Vikon</td>
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<td><a href="http://www.vikonsurgical.com">www.vikonsurgical.com</a></td>
<td>Vikon is committed to helping you improve your outcomes, whether you need bright illumination or reliable instruments. The proprietary LED technology in our tether-free headlight gives you a bright, white light for enhanced visual acuity. And our take-apart kerrisons are as easy to use as they are to clean.</td>
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<tr>
<td>VORZEIGEN MEDICAL</td>
<td>1469</td>
<td><a href="http://www.vorzeigen.com">www.vorzeigen.com</a></td>
<td>Vorzeigens is a supplier of world class Sterilization Cases, Surgical Instruments and Implantable components to orthopedic device companies worldwide. We design, develop and produce products for all segments of the medical device market.</td>
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<td>VQ OrthoCare</td>
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<td>Founded in 1989, based in Irvine, CA, VQ OrthoCare, a leading provider of noninvasive medical solutions focused on bone, joint and soft-tissue conditions. Including, in-home patient fitting of braces and medical devices, physician, payor and patient support. Our manufacturing facility in Vista, CA produces many of our products with brand names such as BioniCare®, OActive® 2, Catalyst-Propel™OA, Catalyst-Elite™, Avid™ IF, Eclipse® Cervical Collar.</td>
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<td>VTI—Vertebral Technologies, Inc.</td>
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<td><a href="http://www.vti-spine.com">www.vti-spine.com</a></td>
<td>Vertebral Technologies, Inc. (VTI) has provided superior interbody technology, anatomical restoration, and forward thinking since 2008. Our modular platform allows for maximal endplate coverage, virtually eliminating subsidence and migration. Assembled in the disc space, VTI’s InterFuse® line of devices can be implanted through open or MIS approaches.</td>
</tr>
<tr>
<td>Weigao Orthopaedic Device Co., Ltd.</td>
<td>416</td>
<td>wegortho.en.alibaba.com</td>
<td>WEIGAO ORTHOPAEDIC DEVICE CO., LTD is China's best spine products/ services supplier. As a leading medical company in China, we work with research institutions developing innovative technology, assist top hospitals offering effective treatment solutions, relieve suffering patients from their pains and restore their health. Dedicated to global medical and health course, engaged with top surgeons and companies worldwide, we’re now seeking for opportunities to work with partners all over the world.</td>
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<tr>
<td>Wenzel Spine</td>
<td>1238</td>
<td>wenzelspine.com</td>
<td>Wenzel Spine is a pioneer in minimally invasive technologies for use in spinal surgery; specifically, stand-alone, expandable interbody devices. We are dedicated to providing unique, minimally invasive solutions with superior long-term clinical outcomes to surgeons that reduce OR time, procedure cost, and patient recovery. Wenzel Spine seeks to improve patient quality of life by designing and producing high quality devices to support our clients in the care and treatment of their patients.</td>
</tr>
<tr>
<td>Whale Imaging Inc.</td>
<td>457</td>
<td>whaleimaging.com</td>
<td>Whale Imaging manufactures the unique G-Arm bi-plane surgical imaging system and Sigma series compact ultrasound systems. With extensive R&amp;D facilities in Boston, USA, Whale combines proprietary technology with advanced manufacturing to produce pioneering, cost-effective systems that can help our customers perform procedures with speed, ease, and safety. Our G-Arm and Ultrasound products are USA FDA 510(k) and European CE approved. Visit Whale Imaging at Booth #457 today!</td>
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Wolters Kluwer
www.lww.com
Wolters Kluwer Health is a global provider of information, business intelligence and point-of-care solutions for healthcare. Brands include Lippincott Williams & Wilkins, ProVation® Medical and Lippincott Solutions, a series of comprehensive, integrated software applications that includes workflow technology, current evidence-based clinical information, and professional development tools. Visit booth 1411 to review Spine, the most cited journal in the field of spinal deformity.

Zigg Design
www.ziggedesign.com
Zigg Design provides turn-key design and manufacturing solutions that meet the needs of a wide variety of clients ranging from the inventive health professional with a great idea to medical device OEMs and startups with outsource engineering and manufacturing needs. Visit our booth to discuss how you can leverage our team’s product development experience to help you bring the next generation of innovative, robust medical devices to market.

Xenco Medical
www.xenomedical.com
Headquartered in San Diego, CA, Xenco Medical is a global medical technology company committed to disruptive innovation for the purposes of creating safer, more efficient surgical environments. Through its line of sterile packaged, disposable spinal systems, Xenco Medical seeks to transform the standard of surgical care by eliminating the challenges of current surgical instrumentation processing.

Zimmer Biomet
www.zimmerbiomet.com
Zimmer Biomet was created to redefine musculoskeletal healthcare, and to help improve the lives of those we serve. Our singular goal is to help achieve exceptional outcomes for patients, healthcare professionals, investors, our Team Members, and the communities in which we work. With the recent acquisition of LDR and a majority interest in Medtech, Zimmer Biomet is uniquely positioned to accelerate the pace of innovation and to drive growth. This simple but powerful philosophy is summarized by our tagline, “Your progress. Our promise.” It reminds us that, together, we can achieve more when we work together in pursuit of our shared goals.

Xtant Medical
www.xtantmedical.com
Bacterin International and X-spine Systems have combined to form XTANT Medical, a comprehensive supplier of orthopedic and spine surgery products. Pairing the orthobiologics line-up of Bacterin with the hardware suite of X-spine, the union creates an extensive portfolio of highly complementary products that serve the needs of the orthopedic and neurosurgery markets, with minimal overlap.

Zavation
www.zavation.com

Z- Medical GmbH + Co. KG
www.z-medical.de/us/Home
Z-Medical GmbH + Co. KG is a privately held and financed medical device company that designs, develops, manufactures and markets innovative implants and surgical instruments in the section of spine, hand & foot and arthroscopy. The company’s U.S. subsidiary is based in Atlanta, Georgia. Z-Medical Implants stand for precision, are sterile packaged and ready for surgery.

Zyga
www.zyga.com
Zyga is dedicated to the research, development and commercialization of solutions that provide clinical and economic value in the treatment of under-served conditions of the spine. Zyga markets the Symmetry® Sacroiliac Joint Fusion System, an MIS system designed to provide a true arthrodesis of the SI Joint, including decortication, bone graft delivery and fixation.
As of September 15, 2016

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- AEGIS SPINE, INC.
- Alphatec Spine, Inc.
- Amedica Corporation
- Ascential
- Astura Medical
- Avalign Technologies
- Beijing Fule Science & Technology Co., Ltd.
- Benvenue Medical Inc.
- C&A Tool Engineering, Inc.
- Camber Spine Technologies
- Captiva Spine
- Centinel Spine
- Clarians
- CoreLink
- DePuy Synthes
- Eminent Spine
- Exactech, Inc.
- Globus Medical
- GS Medical
- HT Medical, LLC
- Innovasis
- LH Medical Corporation
- Life Spine Inc.
- Medacta International LLC
- Medisys USA
- Micro Machine Company
- N2 Biomedical
- Nanovis
- Next Orthosurgical, Inc.
- Next Spine
- Normand Noble, Inc.
- NuTech
- OrthoPedic.
- Paradigm BioDevices, Inc.
- Phillips Precision Medicraft, Inc.
- Renovis Surgical
- RTI Surgical Inc.
- Seabrook International
- SeaSpine
- Spinal Elements, Inc.
- Spine Wave
- SpineSource, Inc.
- Stryker
- Tegra Medical
- Titan Spine
- Vertera Spine
- VGI Medical
- Weigao Orthopaedic Device Co., Ltd.
- Xeno Medical
- Xrant Medical
- Zavation
- Zigg Design
- Zimmer Biomet

**Lengthening Components**

- Alphatec Spine, Inc.
- Amenda
- Astura Medical
- Avalign Technologies
- Beijing Fule Science & Technology Co., Ltd.
- BH Medical Corporation
- Life Spine Inc.
- LSI Medical
- M2 Biomedical
- Neurostructures
- Norman Noble, Inc.
- NuTech
- OrthoPediatric
- Paradigm BioDevices, Inc.
- Precision Spine Inc.
- rns Surgical
- RTI Surgical Inc.
- Seabrook International
- SeaSpine
- Stryker
- Triangle
- Zavation

**Lumbar Plate System**

- Alphatec Spine, Inc.
- Amedica
- Astura Medical
- Avalign Technologies
- Beijing Fule Science & Technology Co., Ltd.
- BH Medical Corporation
- Life Spine Inc.
- LSI Medical
- M2 Biomedical
- Neurostructures
- Norman Noble, Inc.
- NuTech
- OrthoPediatric
- Paradigm BioDevices, Inc.
- Precision Spine Inc.
- rns Surgical
- RTI Surgical Inc.
- Seabrook International
- SeaSpine
- Stryker
- Triangle
- Zavation

**Pedicle Screws**

- Acuray Surgical
- AEGIS SPINE, INC.
- Alphatec Spine, Inc.
- Amedica Corporation
- Amendia
- Astura Medical
- Avalign Technologies
- Beijing Fule Science & Technology Co., Ltd.
- BH Medical Corporation
- Life Spine Inc.
- LSI Medical
- M2 Biomedical
- Neurostructures
- Norman Noble, Inc.
- NuTech
- OrthoPediatric
- Paradigm BioDevices, Inc.
- Precision Spine Inc.
- rns Surgical
- RTI Surgical Inc.
- Seabrook International
- SeaSpine
- Stryker
- Triangle

**Rods**

- AEGIS SPINE, INC.
- Alphatec Spine, Inc.
- Amedica Corporation
- Amendia
- Astura Medical
- Beijing Fule Science & Technology Co., Ltd.
- BH Medical Corporation
- Life Spine Inc.
- LSI Medical
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- Norman Noble, Inc.
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| LH Medical Corporation .............. 1135 |
| LISI Medical ............................. 1004 |
| Lowell, Inc. ............................ 1324 |
| Medfix International, LLC .......... 762 |
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| Medsys USA ............................. 537 |
| MetalCraft and Riverside .......... 1847 |
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| ECA Medical Instruments ......... 1704 |
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| Tegra Medical ........................... 643 |
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| LISI Medical ............................. 1004 |
| Medical Component Specialists ... 1807 |
| Orthopedic Solutions Center .. 647 |
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| Phillips Precision Medicraft, Inc . 805 |
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| gSource, LLC .......................... 611 |
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| Janco, Inc. ............................. 862 |
| Marrow Cellution ...................... 762 |
| Orthopedic Solutions .................. 1214 |
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| InTech Medical ........................ 1151 |
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| Orthopedic Solutions .................. 1214 |
| Orthopedic Solutions Center .. 647 |
| PHACON GmbH .......................... 1468 |
| Phillips Precision Medicraft, Inc . 805 |
| Seabrook International .............. 1320 |
| Tecomet .................................. 608 |
| Tegra Medical ........................... 643 |
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| DANCO ANODIZING ....................... 1611 |
| IH Ionbond, Inc. ....................... 1509 |
| InTech Medical ........................ 1151 |
| Orthopedic Solutions .................. 1214 |
| Phillips Precision Medicraft, Inc . 805 |
| Promimic AB ............................. 1809 |
| Seabrook International .............. 1320 |
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| ECA Medical Instruments .......... 1704 |
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| Orthopedic Solutions .................. 1214 |
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| Phillips Precision Medicraft, Inc . 805 |
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### Annular Repair
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### Artificial Discs
- Alphatec Spine, Inc. 1523
- K2M Inc. 1615
- LDR Spine 1439
- Orthopaedic Solutions Center 647
- RTI Surgical Inc. 843
- SIGNUS 1502
- Simplify Medical, Inc. 1503
- Spinal Kinetics 1107
- Spineart 625
- Zimmer Biomet 1437

### Dynamic Stabilization
- Beijing Fule Science & Technology Co., Ltd. 968
- Exactech, Inc. 1051
- Orthofix, Inc. 615
- Orthopaedic Solutions Center 647
- Zigg Design 711
- Zimmer Biomet 1437

### Motion Preservation Technologies
- Alphatec Spine, Inc. 1523
- Clarience 744
- joimax 525
- MEDICREA USA 943
- Orthofix, Inc. 615
- Orthopaedic Solutions Center 647
- Paradigm Spine, LLC 1723
- Relevant Medsystems, Inc. 1365
- RTI Surgical Inc. 843
- Simplify Medical, Inc. 1503
- Spinal Kinetics 1107
- Spineart 625
- Zimmer Biomet 1437
- Zyga 1241

### Nucleus Replacement
- Clarience 744

### Operating Room (OR) Tables
- Allen Medical Systems 1351
- future Health Concepts, Inc. 1815
- Mizuho America, Inc. 1806
- Mizuho OSI 1623
- Philips 1431
- Siemens Healthineers 851
- TIDI Products 1169

### OR Table Accessories
- Allen Medical Systems 1351
- Future Health Concepts, Inc. 1815
- InTech Medical 1151
- Life Instrument Corporation 1603
- Mizuho America, Inc. 1806
- Novid Surgical, LLC 1157
- Thompson Surgical Instruments, Inc. 1125
- TIDI Products 1169

### Intraoperative Neurophysiologic Monitoring
- Safe Passage Neumonitoring 506
- specialtyCare 604

### Pain Management/Rehabilitation
- Minimis Spine, Inc. 1841

### Sterilization Equipment
- Align Technologies 1121
- Beijing Fule Science & Technology Co., Ltd. 968
- Future Health Concepts, Inc. 1815
- Kirwan Surgical Products LLC 1131
- puracon GmbH 1306
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### Suction
- BOSS Instruments, Ltd. 1303
- Future Health Concepts, Inc. 1815
- Kirwan Surgical Products LLC 1131

### Surgery Tables
- Allen Medical Systems 1351
- Future Health Concepts, Inc. 1815
- InTech Medical 1151
- Mizuho America, Inc. 1806
- Mizuho OSI 1623
- Philips 1431
- Siemens Healthineers 851
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### Surgical Illumination
- 7D Surgical 410
- BFW, Inc. 1358
- BOSS Instruments, Ltd. 1303
- Eclipse Loupes and Products 868
- Future Health Concepts, Inc. 1815
- InTech Medical 1151
- Invuity, Inc. 1102
- Lumitek MD 1133
- Rose Micro Solutions LLC 1504
- SBH 1356
- Thompson Surgical Instruments, Inc. 1125
- Vikon 1162

### Intravascular Injection
- Minimis Spine, Inc. 1841

### Pharmaceuticals
- AIS PainCare 1163
- Lilly USA, LLC 418
- Mallinckrodt Pharmaceuticals, Inc. 1565
- Pfizer 669

### Consulting Services
- Afherent Provider Solutions 1369
- Baurfeind USA 1105
- Business Dynamics 1465
- DANCO ANODIZING 1611
- Doctorinternet.com 742
- Empirical Testing Corp. 1403
- InTech Medical 1151
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- Knight Mechanical Testing 1007
- MobiTor 1067
- Musculoskeletal Clinical Regulatory Advisers, LLC 1244
- puracon GmbH 1306
- Spinal Support Solutions 1267
- Spine Universe, a Vertical Health Property 1664
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### Post-Manufacturing
- Safe Passage Neumonitoring 506
- Spinal Support Solutions 1267
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### Sterile Packaging
- Intelligent Implant Systems 1145
- Janco, Inc. 862
- Millstone Medical Outsourcing 451
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### Computer Hardware/Software
- Afherent Provider Solutions 1369
- MobiTor 1067
- PHACON GmbH 1468
- Wolters Kluwer 1411

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- Afferent Provider Solutions .......................... 1369

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#### Books
- Elsevier .................................................. 1402
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#### Scientific Journal
- Elsevier .................................................. 1402
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#### Strategic Intelligence
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- Barrier Technologies .............................. 1340
- Future Health Concepts, Inc. .................................................. 1815
- Protech Medical Inc. ........................................ 1215
- Rose Micro Solutions LLC. .................. 510, 1504
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#### Gloves
- Barrier Technologies .............................. 1340
- Future Health Concepts, Inc. .................................................. 1815
- Protech Medical Inc. ........................................ 1215

#### Miscellaneous Radiation Protection Devices
- Future Health Concepts, Inc. .................................................. 1815
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- Bremer Group Company ............................ 803
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- Minimus Spine, Inc. ................................. 1841
- Quinn Medical, Inc. .................................. 1247
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- Aspen Medical Products .......................... 1508
- Baurfeind USA ......................................... 1105
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#### Durable Medical Equipment
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- Biowave .................................................. 1265
- Spinal Support Solutions .......................... 1267
- VQ OrthoCare .......................................... 402

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### Laser Therapy Products
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- Biowave .................................................. 1265
- BPB MEDICA ............................................ 657
- G21 ......................................................... 1462
- Harvest Technologies .................................. 1115
- Hawaiian Moon ........................................ 1843
- Minimus Spine, Inc. .................................. 1841
- Relevant Medsystems, Inc. ........................ 1365
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### Muscle Stimulators
- Biowave .................................................. 1265
- DJO GLOBAL ............................................ 1604
- Spinal Support Solutions .......................... 1267
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- AIS PainCare .......................................... 1163
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#### Patient Tracking
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- Baurfeind USA ......................................... 1105
- Doctorsinternet.com .................................. 742
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#### Reporting/Scheduling
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- GS Medical ................................................ 1039
- joimax ..................................................... 525
- KZ Medical .............................................. 1615
- Medacta International ................................ 1651
- Medtronic ............................................... 1015
- NeuroEnterprises ....................................... 503
- NextSpine ............................................... 408
- Orthofix, Inc. .......................................... 615
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- Providence Medical Technology, Inc. ............ 1751
- Safe Passage Neuromonitoring ....................... 506
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- Synaptive Medical .................................... 1366
- Tyber Medical, LLC ................................... 507
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- Amendia . . . . . . . . . . . . . . . . . . . 437
- Ascential . . . . . . . . . . . . . . . . . . . 1511
- Berkeley Advanced Biomaterials, Inc. . . 1003
- Bioventus. . . . . . . . . . . . . . . . . . . 757
- CellRight Technologies LLC . . . . . . . . 641
- Hwang Biomed USA Inc. . . . . . . . . . . 1006
- Medtronic . . . . . . . . . . . . . . . . . . . 1015
- MO-SCI Corporation . . . . . . . . . . . . 1847
- Novabone Products . . . . . . . . . . . . 1111
- Prosdyon . . . . . . . . . . . . . . . . . . . 1802
- RTI Surgical Inc. . . . . . . . . . . . . . . 843
- SeaSpine . . . . . . . . . . . . . . . . . . . 1631
- Spinal Elements, Inc. . . . . . . . . . . . 1341
- Stryker . . . . . . . . . . . . . . . . . . . . 1415
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- VTI . . . . . . . . . . . . . . . . . . . . . . . . . 1119
- Xant Medical . . . . . . . . . . . . . . . . . 1202
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- AlloSource . . . . . . . . . . . . . . . . . . 1524
- Amendia . . . . . . . . . . . . . . . . . . . 437
- Biod, LLC . . . . . . . . . . . . . . . . . . . 1221
- Bioventus. . . . . . . . . . . . . . . . . . . 757
- CellRight Technologies LLC . . . . . . . . 641
- Hwang Biomed USA Inc. . . . . . . . . . . 1006
- Medtronic . . . . . . . . . . . . . . . . . . . 1015

### Bone Substitutes and Machined Bones

- AlloSource . . . . . . . . . . . . . . . . . . 1524
- Alphatec Spine, Inc. . . . . . . . . . . . . 1523
- Amendia . . . . . . . . . . . . . . . . . . . 437
- Ascential . . . . . . . . . . . . . . . . . . . 1511
- Berkeley Advanced Biomaterials, Inc. . . 1003
- Bioventus. . . . . . . . . . . . . . . . . . . 757
- Captiva Spine . . . . . . . . . . . . . . . . 708
- CellRight Technologies LLC . . . . . . . . 641
- Collagen Matrix, Inc. . . . . . . . . . . . 531
- CoreLink . . . . . . . . . . . . . . . . . . . 1052
- Exactech, Inc. . . . . . . . . . . . . . . . . . 1051
- Harvest Technologies . . . . . . . . . . . . 1115
- IOST Technologies . . . . . . . . . . . . . . 951
- K2M Inc. . . . . . . . . . . . . . . . . . . . 1615
- Life Spine Inc. . . . . . . . . . . . . . . . . 1031
- Medtronic . . . . . . . . . . . . . . . . . . . 1015
- MO-SCI Corporation . . . . . . . . . . . . 1847
- Novabone Products . . . . . . . . . . . . 1111
- Prosdyon . . . . . . . . . . . . . . . . . . . 1802
- RTI Surgical Inc. . . . . . . . . . . . . . . 843
- SeaSpine . . . . . . . . . . . . . . . . . . . 1631
- Spinal Elements, Inc. . . . . . . . . . . . 1341
- Stryker . . . . . . . . . . . . . . . . . . . . 1415
- Surface Dynamics . . . . . . . . . . . . . 705
- Teknimed . . . . . . . . . . . . . . . . . . . 741
- VGI Medical . . . . . . . . . . . . . . . . . 1330
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- Alphatec Spine, Inc. . . . . . . . . . . . . 1523
- Amendia . . . . . . . . . . . . . . . . . . . 437
- Minim Spine, Inc. . . . . . . . . . . . . . . 1841

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- Alphatec Spine, Inc. . . . . . . . . . . . . 1523
- Amendia . . . . . . . . . . . . . . . . . . . 437

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- Alphatec Spine, Inc. . . . . . . . . . . . . 1523
- Amendia . . . . . . . . . . . . . . . . . . . 437
- Minim Spine, Inc. . . . . . . . . . . . . . . 1841

### Joimax

- Alphatec Spine, Inc. . . . . . . . . . . . . 1523
- Amendia . . . . . . . . . . . . . . . . . . . 437
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- AlloSource .................................................. 1523
- Alphatec Spine, Inc. ...................................... 1523
- Amendia ..................................................... 437
- Arterioocyte Medical Systems, Inc. .................. 807
- Berkeley Advanced Biomaterials, Inc. ................. 1003
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- Alphatec Spine, Inc. ...................................... 1523
- Amendia ..................................................... 437
- Arterioocyte Medical Systems, Inc. .................. 807
- Berkeley Advanced Biomaterials, Inc. ................. 1003
- Bioventus .................................................. 757
- CellRight Technologies LLC ........................... 641
- CoreLink .................................................... 502
- Exactech, Inc ............................................ 1051
- Hans Biomed USA Inc .................................. 1006
- ISTO Technologies ........................................ 951
- K2M Inc .................................................... 1615
- LifeSpine ................................................... 1031
- LifeNet Health ............................................. 1331
- Medtronic .................................................. 1015
- Providence Medical Technology, Inc. ................ 1751
- RTI Surgical Inc .......................................... 843
- SeaSpine .................................................... 1631
- Spinal Elements, Inc ..................................... 1341
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- VGI Medical ............................................... 1330
- VTI ........................................................... 1119
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- Zimmer Biomet ........................................... 1437

##### Lumbar Fusion Devices
- AEGIS SPINE, INC. ...................................... 1657
- Aesculap Implant Systems ................................ 1023
- Alphatec Spine, Inc. ...................................... 1523
- Amendia ..................................................... 437
- Berkeley Advanced Biomaterials, Inc. ................. 1003
- Bioventus .................................................. 757
- CellRight Technologies LLC ........................... 641
- CoreLink .................................................... 502
- Exactech, Inc ............................................ 1051
- Hans Biomed USA Inc .................................. 1006
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- AEGIS SPINE, INC. ...................................... 1657
- Aesculap Implant Systems ................................ 1023
- Alphatec Spine, Inc. ...................................... 1523
- Amendia ..................................................... 437
- Berkeley Advanced Biomaterials, Inc. ................. 1003
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- CoreLink .................................................... 502
- Exactech, Inc ............................................ 1051
- Hans Biomed USA Inc .................................. 1006
- ISTO Technologies ........................................ 951
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- LifeSpine ................................................... 1031
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- Providence Medical Technology, Inc. ................ 1751
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- SeaSpine .................................................... 1631
- Spinal Elements, Inc ..................................... 1341
- Stryker ....................................................... 1415
- VGI Medical ............................................... 1330
- VTI ........................................................... 1119
- Xtant Medical ............................................. 1202
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##### Motion Preservation/Motion Limiters
- Aesculap Implant Systems ................................ 1023
- Alphatec Spine, Inc. ...................................... 1523
- Amendia ..................................................... 437
- Berkeley Advanced Biomaterials, Inc. ................. 1003
- Bioventus .................................................. 757
- CellRight Technologies LLC ........................... 641
- CoreLink .................................................... 502
- Exactech, Inc ............................................ 1051
- Hans Biomed USA Inc .................................. 1006
- ISTO Technologies ........................................ 951
- K2M Inc .................................................... 1615
- LifeSpine ................................................... 1031
- LifeNet Health ............................................. 1331
- Medtronic .................................................. 1015
- Providence Medical Technology, Inc. ................ 1751

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- AEGIS SPINE, INC. ...................................... 1657
- Aesculap Implant Systems ................................ 1023
- Alphatec Spine, Inc. ...................................... 1523
- Amendia ..................................................... 437
- Berkeley Advanced Biomaterials, Inc. ................. 1003
- Bioventus .................................................. 757
- CellRight Technologies LLC ........................... 641
- CoreLink .................................................... 502
- Exactech, Inc ............................................ 1051
- Hans Biomed USA Inc .................................. 1006
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- LifeSpine ................................................... 1031
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- Providence Medical Technology, Inc. ................ 1751
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ABOUT NASS

Administration and Development Council
The Administration and Development Council ensures that NASS’ internal governance processes follow best practice standards for associations, including processes which preserve NASS leadership’s role as stewards of the public trust and the trust of NASS membership, ensuring legal and ethical integrity, safekeeping ongoing revenue generation and financial viability, board continuity, an effective governance process, and compliance with the corporate charter and bylaws. Committees overseen by this council include but are not limited to: Governance Relations, Leadership Development, Professional Conduct & Ethics Committee (PCEC), the Professional Compliance Panel (PCP), the Conflict of Interest Review Committee (COIRP), the Committee on Ethics and Professionalism, Membership, Finance, Audit and Section Development.

Advocacy Council
The Advocacy Council acts as the principal conduit between NASS members, Congress and Administration officials for the purposes of influencing policymaking in Washington, DC. The Advocacy Council oversees operations in three main areas including: fostering relationships on Capitol Hill, educating and mobilizing grassroots advocates, and forging political alliances in support of NASS’ legislative agenda. The Advocacy Council also oversees NASS’ political action committee, SpinePAC, and approves political contributions to congressional candidates who champion issues that are important to spine specialists.

Education Council
The Education Council oversees all educational programming. The Annual Meeting attracts an international audience by offering symposia featuring world-renowned experts speaking on surgical, medical and interventional care; paper presentations announcing results of research on new techniques, treatments, devices and more; special interest group discussions; a technical exhibition; instructional courses and technique workshops; specialty tracks for allied health providers and other learning opportunities. Hands-on courses devoted to members’ needs focus on interventional injection techniques, surgical techniques and our allied health constituents. Online education offerings were reintroduced in 2009 and we continue to expand our online offerings each year. In addition to the Annual Meeting, NASS’ Education programs offer top-quality, relevant continuing medical education throughout the year.

Health Policy Council
The Health Policy Council promotes sound health care policies that ensure patient access to quality spine care. NASS works collaboratively with medical specialty societies, federal agencies and insurers to develop coding, coverage and reimbursement policy for spine care. NASS also monitors the practice environment to be a source of information to members and others about the state of spine care practice.

Research Council
The Research Council promotes high quality spine care and offers numerous clinical and research resources to spine care providers and their patients, including clinical guidelines, appropriate use criteria, performance measurement information, patient safety information and tools, and more. The Research Grant and Fellowship Program supports the best of spine research applications every year and has provided more than $3.7 million in research funding to date.

Spine Education and Research Center
NASS opened the state-of-the-art Spine Education and Research Center (SERC) outside Chicago in the spring of 2007. SERC houses the NASS headquarters, a 12 station bio-skills lab, classroom and center with videoconferencing and webcasting capabilities. Members receive special discounted registration fees for all NASS-sponsored educational programs.
National Association of Spine Specialists
To pursue its advocacy agenda, NASS established the National Association of Spine Specialists, a trade that unites spine care providers and patients in the fight for sound health policy. Through awareness campaigns, legislative updates, action alerts, events and partnerships with other medical specialties, NASS Advocacy helps members understand the issues shaping health care policy and provides opportunities for members to advocate for change at the state and federal levels.

Spine Foundation
The Spine Foundation is a non-profit organization established to end spine-related disability, the #1 cause of suffering, through research, education and advocacy. The Spine Foundation is reaching out to companies large and small, spine care providers, patients, and the general public in the effort to end spine-related disability. To eliminate spine-related disability, everyone must join the effort. To for further information or to contribute to the Spine Foundation, visit www.spine.foundation.

Education Publishing
The Education Publishing program is responsible for several periodicals, publications, online resources, and public affairs and media relations activities. NASS members enjoy free or discounted access to everything produced under the NASS imprint, including:

- The Spine Journal, the official scientific journal of NASS, is an international, multidisciplinary journal that publishes original, peer-reviewed articles on research and treatment related to the spine and spine care, including basic science and clinical investigations. Published online and printed monthly by Elsevier, Inc., The Spine Journal holds the highest Impact Factor among spine publications in the world. NASS adheres to a policy of editorial independence for the journal’s editorial board, which follows guidelines of the International Committee of Medical Journal Editors, Committee on Publication Ethics and other best editorial practices.
- SpineLine, the clinical and news magazine of NASS, features relevant cutting-edge invited reviews along with pertinent discussions of controversial cases, interesting images and other clinical content. SpineLine examines current concepts in spine care, medical socioeconomics, ethics, advocacy, regulatory and reimbursement issues, and provides information about NASS’ programs and activities.
- NASS publishes guidelines, reference materials and other resources developed by leading spine experts. These include Evidence-Based Clinical Guidelines, Common Coding Scenarios for Comprehensive Spine Care, Compendium of Outcome Instruments for Assessment and Research of Spinal Disorders and other titles. NASS also collaborates with AAOS to produce spine-specific resources such as Orthopaedic Knowledge Update: Spine, Instructional Course Lectures Spine and Advanced Reconstruction: Spine.
- In addition to providing resources to members and spine providers, NASS offers comprehensive patient education information developed by physician experts. Credible, unbiased information on spine conditions, treatments, procedures, exercise and wellness is available online at www.KnowYourBack.org and in print.
- Public affairs efforts support NASS’ mission through web site content, promotional campaigns, and other print, electronic or broadcast opportunities. NASS also serves as a resource to the media on spine care topics, advocacy initiatives and related issues in the news.
MEMBERSHIP

In the late 1970s, spine care pioneers made the observation that a scientific society including all members of the spine community regardless of specialty or locale was essential to the advancement of care, and in 1984, this vision was realized through the creation of the North American Spine Society (NASS).

30 years later, these same ideas inspire a new generation of members as NASS becomes the premier multidisciplinary medical organization representing the field of spine care. With more than 8,000 members worldwide, NASS provides our members with many professional opportunities, events and initiatives designed to advance their careers, support the field, and define the future of spine care.

NASS members receive access to critical benefits of membership in the areas of education, research, health policy, reimbursement, practice management, networking, career development and philanthropy. Visit the membership booth in the lobby near registration for more information about membership, to renew your membership for 2017, or to apply to become a member. You can also learn more or apply online at www.spine.org.

CATEGORIES OF MEMBERSHIP

Active members are Board-certified MDs and DOs, PhDs, or international equivalents (as determined by the Board of Directors) who devote at least 50% of their professional activities to spine.

Annual Dues: $625.00
Includes print and online subscriptions to The Spine Journal (TSJ) and SpineLine

Associate members are Board-eligible MDs and DOs or individuals who have completed a substantially equivalent program (as determined by the Board of Directors) who devote at least 50% of their professional activities to spine.

Annual Dues: $625.00
Includes print and online subscriptions to TSJ and SpineLine

Affiliate members are physicians or PhDs who devote less than 50% of their professional activities to spine, nurse practitioners, registered nurses, physician assistants, chiropractors, physical therapists, researchers, practice managers, coders, technical professionals or other health care professionals with an interest in spine.

Annual Dues: $325.00
Includes print and online subscriptions to TSJ and SpineLine

International members are health care professionals not residing in the United States with an interest in spine.

Annual Dues: $275.00
Includes print and online subscription to TSJ and online subscription to SpineLine

In-training members are physicians, medical students, graduate students or other individuals of the medical profession, basic sciences or allied services who are enrolled in a full-time, accredited program related to spine care.

Annual Dues: Complimentary
Includes online subscriptions to TSJ and SpineLine

Honorary membership is bestowed by the Board of Directors to recognized leaders in the field of spine care.

Annual Dues: Complimentary
Includes print and online subscriptions to TSJ and SpineLine

Emeritus members are individuals who have been Active members for at least fifteen years and have retired from the practice of medicine.

Annual Dues: Complimentary
Includes online subscriptions to TSJ and SpineLine. Discounted print subscriptions to TSJ and SpineLine are available.
APPLICATION FOR MEMBERSHIP

Full Name (including degrees): ____________________________

Date of Birth (mm/dd/yy): ____________________  Gender: □ Male  □ Female

Preferred Mailing Address: □ Professional  □ Home

Professional Address (as it should be listed in the Find a Specialist directory)

Company Name: ____________________________

Address: ______________________________________

City: ___________________  State/Province: _______  Postal Code: _______  Country: ______________

Phone: _______________  Fax: _______________  Email: ____________________________

Office Manager Email (to contact regarding membership information): __________________________________________

Home Address

Address: ______________________________________

City: ___________________  State/Province: _______  Postal Code: _______  Country: ______________

Mobile Phone: _______________  Email: ____________________________

Professional Information

Specialty: ____________________________

MDs and DOs (or international equivalent): Are you board certified?  □ Yes  □ No

Name of Board providing your certification (required if applying for Active or Associate membership):

Percentage of professional activities dedicated to spine: □ Less than 50%  □ 50% or Greater

My professional activities are primarily (choose one): □ Clinical  □ Academic/Teaching  □ Research  □ Business

Primary Employer: □ Hospital  □ Private Practice  □ Academic Institution  □ Other: ____________________________

Have you ever had a license to practice medicine revoked or suspended in any jurisdiction, past or present? □ No  □ Yes

(If yes, please attach an explanation)

Have you ever been censured/sanctioned by another professional medical association or organization? □ No  □ Yes

(If yes, please attach an explanation of the circumstances and specify the sanction enforced)

Application Requirements

Curriculum Vitae/Résumé

Please submit a copy of your most recent curriculum vitae (CV) or résumé with this application. Your membership will remain inactive until a copy of this document is received.

Please provide your primary reason for applying for membership.

□ Recommendation from colleague (optional, provide colleague name: ____________________________)

□ Career development, CME, or to receive updates on spine care issues

□ To take advantage of membership discounts on educational offerings

□ To access journals and publications

□ To network with colleagues

□ To support and contribute to the field

□ Other: ____________________________

Go Green! □ Opt out of receiving printed copies of SpineLine

The NASS Professional Compliance Panel (PCP) exists to ensure member compliance with the NASS ethics policies as well as any other rules or regulations incumbent upon a healthcare professional. By applying, you acknowledge that you are required to comply with such policies, rules and regulations, and further agree to promptly comply with all requests to provide documentation concerning PCP investigations, when it is within your legal ability to do so.
MEMBERSHIP MILESTONES

Congratulations to the following members who, according to our records, reached their 10-year, 20-year or 30-year anniversary with NASS in 2016! Members attending the meeting who are included on these lists are encouraged to stop by the Membership Services booth in the lobby to receive a special anniversary ribbon for your badge.

30-Year Anniversaries

James Elbaor, MD—Dallas, TX
Reed Fogg, MD—Murray, UT
Richard Guyer, MD—Plano, TX
Oliver Jones, MD—Lake Worth, FL
Stanley Jones, MD—Houston, TX
Casey Lee, MD—Livingston, NJ
Thomas Lehmann, MD—Prospect, KY
Paul Lin, MD—Warminster, PA
Raymond Linovitz, MD—Rancho Santa Fe, CA
Joseph Lombardi, MD—Edison, NJ
Richard Long, MD—Carson City, NV
Ross Lynch, MD—Brevard, NC
Gabriel Ma, MD—Honolulu, HI
Joel Mack, MD—Bakersfield, CA
Calvin Mackay, MD—Provo, UT
Ali Maknoon, MD—Gibsonia, PA
Marc Malberg, MD—Somerset, NJ
Tom Mayer, MD—Dallas, TX
Bernie McCaskill, MD, PA—Dallas, TX
Richard McCollum, MD—Mercer Island, WA
Michael McCutcheon, MD—Ephraim, WI
Thomas McNeill, MD—Lake Geneva, WI
John Mendes, MD—San Antonio, TX
Christopher Michelsen, MD—New York, NY
Mohinder Mital, MD, PC—Los Ranchos, NM
Glenn Mombarger, MD—Lindon, UT
H. Morgan, MD—Nashville, TN
Peter Morrison, MD
Robert Morrow, MD—Layton, UT
Richard Nasca, MD—Wilmington, NC
Arvo Neidre, MD—San Antonio, TX
Russell Nelson, MD—Wilmington, NC
Eugene Nordby, MD—Madison, WI
A. P. Papadopoulos, MD—Bonita Springs, FL
Kenneth Polivy, MD—Newton Lower Falls, MA
Frank Pollock, MD—Winston Salem, NC
Ira Porter, MD—Lancaster, PA
Graham Purcell, MD—Studio City, CA
Walter Rabhan, MD—Richmond, VA
Ralph Rashbaum, MD—Plano, TX
James Reynolds, MD—Daly City, CA
Max Riddick, MD—Gulf Breeze, FL
Thomas Riese, MD—Stillwater, MN
Bernard Rineberg, MD—Little Silver, NJ
David Roye, MD—New York, NY
Garth Russell, MD—Palm Beach Gardens, FL
Jeffrey Saal, MD, FACP—Redwood City, CA
Barton Sachs, MD, MBA—Charleston, SC

Richard Salib, MD—Eden Prairie, MN
Edward Sandall, MD—West Palm Beach, FL
Arthur Sarris, MD—Dallas, TX
Gary Schneiderman, MD—Sacramento, CA
George Schoedinger, MD—Saint Louis, MO
Robert Schutt, MD—Lubbock, TX
Elian Shepherd, MD—Merrillville, IN
Barry Silver, MD
Buel Smith, MD—Akron, OH
Norman Smith, MD—Macon, GA
Michael Sommer, MD—Sonoma, CA
Curtis Spencer, MD—Long Beach, CA
Dan Spengler, MD—Nashville, TN
Richard Surgent, MD—Jacksonville, TX
Susan Swank, MD—Rancho Palos Verdes, CA
Ralph Sweeney, MD—Annapolis, MD
William Taylor, MD—Austin, TX
John Toohey, MD—San Antonio, TX
Jordan Traifimow, MD—Elmhurst, IL
Henry Urbania, MD—Warren, RI
Sidney Wallace, MD—Knoxville, TN
Robert Watkins, MD—Marina Del Rey, CA
Jesse Weinger, MD—Palm Desert, CA
James Weinstein, DO—Lebanon, NH
Newton White, MD—Saint Louis, MO
Sam Wiesler, MD—Washington, DC
John Williams, MD—Philadelphia, PA
George Wood, MD—Edgemont, AR
H. Randal Woodward, MD—Omaha, NE
Alexander Wright, MD—Brookline, MA
Ken Yong-Hing, MD—Saskatoon, SK Canada
Hansan Yuan, MD—Naples, FL
Eric Yuhl, MD—Santa Monica, CA
Jack Zadick, MD—Plano, TX
Michael Zindrick, MD—Hinsdale, IL

20-Year Anniversaries

Gabriel Abella, MD—North Franklin, CT
William Adams, MD—Columbus, GA
Otmar Albrand, MD—Denison, TX
Daniel Albright, MD—Raleigh, NC
Emory Alexander, MD—Columbus, GA
Corey Anden, MD—Ogden, UT
Thomas Andreeshak, MD—Sylvania, OH
Philip Anson, MD—Scarborough, ME
Michael Arata, MD—Fort Wayne, IN
William Barrick, MD—Poughkeepsie, NY
Mark Beckner, MD—Orlando, FL
Harry Bell, MD—Ashland, KY
R. Dale Bernauer, MD—Lake Charles, LA
Darrel Brodke, MD—Salt Lake City, UT
William Bruck, MD—Dallas, TX
Donald Bryan, MD—Ogden, UT
James Burgess, MD—Pittsburgh, PA
Glenn Buttermann, MD—Mahtomedi, MN
Robert Buza, MD—Salem, MA
John Campa, MD—Albuquerque, NM
Michael Chapman, MD—Dubuque, IA
James Chima, MD—Pensacola, FL
Lawrence Clark, MD—Riverside, CA
Jeffrey Cochran, DO—Massillon, OH
Dan Cohen, MD—Miami Beach, FL
NASS INFORMATION

Wesley Coker, MD—Nashville, TN
R. Cowan, MD—Springfield, MA
Jeffrey Cozzens, MD—Springfield, IL
Alvin Crawford, MD, FACS—Cincinnati, OH
Aleksandar Curcin, MD, MBA—Coos Bay, OR
Stephen Curtin, MD—Tucson, AZ
R. Stephen Curtis, MD—Dallas, TX
Joseph Cusick, MD—Milwaukee, WI
William Deardorff, PhD—Beverly Hills, CA
Hugh Deen, MD—Jacksonville, FL
Mark Dekutoski, MD—Peoria, AZ
Jeffrey Dick, MD—Wayzata, MN
Donald Dietze, MD—Johnson City, TN
Marcel Dvorak, MD, FRCSC—Vancouver, BC Canada
James Dwyer, MD—Bedminster, NJ
James Ecklund, MD—Falls Church, VA
Ronald Faille, MD—Fredericksburg, VA
Ira Fedder, MD—Baltimore, MD
Robert Feldman, MD—Santa Fe, NM
Bret Ferree, MD—Cincinnati, OH
Howard Finkel, MD—Houston, TX
John Finkenberg, MD—San Diego, CA
Steven Fiore, MD—Midlothian, VA
Leonard Forrest, MD—Mount Pleasant, SC
Clay Frank, MD—Wauwatosa, WI
Evan Frank, MD, PhD—Narberth, PA
Michael Furman, MD, MS—York, PA
Timothy Garvey, MD—Minneapolis, MN
Carl Giordano, MD—Morristown, NJ
Marc Goldman, MD—Columbia, GA
Bradly Goodman, MD—Birmingham, AL
Anthony Guanciale, MD—Cincinnati, OH
Donald Hales, MD—Flagstaff, AZ
John Hart, DO—Vancouver, WA
Carol Hartigan, MD—Wellesley, MA
Mark Hartman, MD—Charlotte, NC
Toru Hasegawa, MD, PhD—Japan
Michael Hasz, MD—Reston, VA
Barbara Heller, DO—Chicago, IL
Peter Holliday, MD—Macon, GA
James Hollowell, MD—Brookfield, WI
Richard Holt, MD—Louisville, KY
Timothy Holt, MD—Montgomery, AL
Zen Hrynkiw, MD—Birmingham, AL
Cameron Huckell, MD—Buffalo, NY
Steven Hughes, MD—Vienna, VA
Dale Johns, MD—Fort Walton Beach, FL
Christopher Kain, MD—Hutchinson, KS
Joel Kallan, MD—Corail Gables, FL
James Kang, MD—Boston, MA
Richard Karr, MD—Grafton, WI
Mark Kerner, MD—Portsmouth, VA
P. Arjen Keuskamp, MD—Smithtown, NY
Hong-Tae Kim, MD—South Korea
Jeffrey Knapp, MD—Hickory, NC
Kenneth Kopacz, MD—Livingston, NJ
Joseph Krzeminski, MD—York, PA
William Kuhn, MD—Daytona Beach, FL
Michael LaGrone, MD—Amarillo, TX
Melvin Law, MD—Brentwood, TN
Jacob Lehman, MD—Boca Raton, FL
Vincent Leone, MD—Great Neck, NY
Clifford Levy, MD—Concord, NH
Jon Levy, MD—Pittsburgh, PA
Isador Lieberman, MD, FRCSC, MBA—Plano, TX
Robert Lifeso, MD—Buffalo, NY
John Little, MD—Naples, FL
John Logan, MD—Lacombe, LA
Dean Lohse, MD—Jacksonville, FL
Kenneth Louis, MD—Tampa, FL
Silas Lucas, MD—Greenville, SC
Carl Maguire, MD—Del Mar, CA
James Marino, MD—San Diego, CA
Howard Martin, MD—Mattapoissett, MA
Andrew Maser, DO—Palm Harbor, FL
Robert Mauthe, MD—Center Valley, PA
Gregory Mavian, DO—Columbus, OH
Scott McCloskey, MD—Hickory, NC
Jeffrey McConnell, MD—Allentown, PA
Alan McGee, MD, MD—Garrett, IN
Monica Mehta, MD—Watchung, NJ
Paul Meyer, MD—Valparaiso, IN
Robert Milas, MD, FACS—Rock Island, IL
Tim Milla, MD—Bettendorf, IA
Christoper Miller, MD—Eugene, OR
David Miller, MD—Tarboro, NC
John Mitamura, MD, PhD—Dobb’s Ferry, NY
Alan Moellerken, MD—Santa Barbara, CA
Kenneth Murray, MD, PhD—Towson, MD
Victor Nakkache, MD—Wilkies Barre, PA
Barry Nelms, MD—Spicewood, TX
John Newall, MD
Robert Nucci, MD—Tampa, FL
Larry Parker, MD—Huntsville, AL
Jack Perlmutter, MD—Barrington, IL
Edward Pratt, MD, MBA—Memphis, TN
Richard Rabinowitz, MD—Schaumburg, IL
Michael Radley, MD—Hagerstown, MD
Kevin Rahn, MD—Fort Wayne, IN
David Raskas, MD—Saint Louis, MO
Michael Reed, DPT, OCS—Palm Beach Gardens, FL
Michael Regan, MD—Cumberland, ME
Steven Reich, MD—North Brunswick, NJ
Gregory Ricca, MD, FACS—Searcy, AR
James Ricciardi, MD—New Orleans, LA
James Rice, MD—Southern Pines, NC
David Roberts, MD—San Antonio, TX
John Roberts, MD—Cincinnati, OH
David Robson, MD—Saint Louis, MO
Leonard Rudolf, MD, MD—Garrett, IN
Mark Ruoff, MD—Fair Lawn, NJ
L. David Rutberg, MD—Temecula, CA
Gene Salkind, MD—Huntingdon Valley, PA
Guy Sava, MD—Bronston, KY
Michael Schafer, MD—Chicago, IL
Rand Schlesener, MD—Rapid City, SD
Robert Schultz, MD—Belleville, IL
Steven Schwartz, MD—Los Angeles, CA
Daniel Scodary, MD—Bridgton, MO
David Shapiro, MD
D. Hal Silcox, MD—Atlanta, GA
Christopher Skurka, DC—Islip, NY
Jamie Skurka, DC—Islip, NY  
Barry Smith, MD—Houston, TX  
Hillel Sommers, MD—Winnipeg, MB Canada  
Susan Stephens, MD—Painesville, OH  
Ross Stone, MD—Atlantis, FL  
Bjorn Strömqvist, MD, PhD—Sweden  
Hillel Sommer, MD—Winnipeg, MB Canada  
Lashman Soriya, MD, FACS—Temecula, CA  
Jamie Edwars, MD—Franklin, WI  
Jeffrey Carlson, MD—Fort Wayne, IN  
Larry Carson, MD—Pinehurst, NC  
Ty Carter, MD—Aiken, SC  
Suzanne Casana, NP—Fairfax, VA  
George Charuk, DO—Oak Lawn, IL  
John Chase, MD, FACS—Incline Village, NV  
Alexander Chasnis, MD—Charlotte, NC  
Benjamin Chasnis, DO—Burlington, NC  
Anthony Chiourco, MD—Princeton, NJ  
David Clifford, MD—Virginia Beach, VA  
Michael Connelly, MD—Lawrence, MA  
Donald Corenman, MD, DC—Vail, CO  
Anthony Cucchi, DO—Shelby Township, MI  
Steven Cyr, MD—San Antonio, TX  
Michael Dabbah, MD—Woodstock, MD  
Jeffrey Carlson, MD—Fort Myers, FL  
Lawrence Deutsch, MD—Mount Laurel, NJ  
Hargovind DeWitt, MD—Commack, NY  
Mark DeWitt, MD—Appleton, WI  
Thomas Dimmig, MD—Durham, NC  
Carrie Diulus, MD—Akron, OH  
Richard Easton, MD—Rochester Hills, MI  
Jeff Pearl, MD—Hermitage, TN  
Jamie Edwards, MD—Franklin, WI  
Hossein Elghafi, MD, FRCS, FRCS—Holland, OH  
Stephen Enguidanos, MD—Niceville, FL  
Gary Fantini, MD—New York, NY  
Geraldo Ferreira, MD—Brazil  
James Flagg, CSA—Rockville, MD  
Paul Francis, MD, FACS—Scottsdale, AZ  
Shelley Freimark, MD—Grand Haven, MI  
Brian Ganwerker, MD—Santa Monica, CA  
Jose Garcia-Corrada, MD—Atlanta, GA  
Paul Geibel, MD—San Antonio, TX  
Allain Giroud, MD—St Augustine, FL  
David Gloystein, MD—Evans, GA  
Vijay Goel, MD—Toledo, OH  
Mruthyunjaya Gonzalez, MD—Frederick, MD  
Jon Greenfield, MD—San Diego, CA  
Josef Grohs, MD—Austria  
Adrian Hamburger, MD—Westbury, RI  
Michael Hammer, MD—Eliot, ME  
Stephen Hansen, MD—Pocatello, ID  
Mary Jo Hart, PA-C—Austin, TX  
Rogier Hartl, MD—New York, NY  
Daniel Hely, MD—Carlisle, PA  
Virany Hillard, MD—Hawthorne, NY  
Alicia Hillman, MD—Leawood, KS  
Suehun Ho, MD—Wexford, PA  
W. Scott Huneycutt, MD—Pocatello, ID  
Kade Huntsman, MD—Salt Lake City, UT  
Andrew Hutter, MD—West Orange, NJ  
Jay Jolley, MD—Chattanooga, TN  
D. Bradley Jones, MD—Redding, CA  
Justin Keller, PT, OCS—Coppell, TX  
Saad Khan, MD—Indianapolis, IN  
Safdar Khan, MD—Columbus, OH  
Harry Khastigian, MD—Sacramento, CA  
Daniel Kim, MD—Allen, TX  
Eric Klineberg, MD—Sacramento, CA  
Angela Kozinski—Chicago Heights, IL  

10-Year Anniversaries

Steven Abram, MD, FACS—Nashville, TN  
Suhail Afzal, MD, FRCS—India  
Bradley Ahlgren, MD—Rochester Hills, MI  
Carol Albanese, MD—Sacramento, CA  
Gary Alegre, MD—Stockton, CA  
James Antinnes, MD—Hattiesburg, MS  
John Arbuckle, MD—Indianapolis, IN  
Ian Armstrong, DO—Culver City, CA  
Jahangir Asghar, MD—Coral Gables, FL  
Joshua Auerbach, MD—Chappaqua, NY  
Bruce Baird, MD—Watertown, NY  
Jason Banks, MD—Huntsville, AL  
Steven Barna, MD—Temple Terrace, FL  
Eduardo Barreto, MD—Brazil  
Jennie-Corinne Baublitzen-Brenenborg, DO—York, PA  
Gregory Bedynok, DO—Country Club, MO  
Frank Bender, MD—Indianapolis, IN  
Benoy Benny, MD—Sugar Land, TX  
William Beringer, DO—Boise, ID  
Kenneth Berliner, MD—Houston, TX  
Shay Bess, MD—Denver, CO  
Rajesh Bindal, MD—Sugar Land, TX  
R. Dale Blasier, MD, FRCS, MBA—Little Rock, AR  
Matthew Bonin, PA-C—Saint Augustine, FL  
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13th Annual Evidence & Technology Spine Summit
February 22-25, 2017, Park City, UT

Summer Spine Meeting
July 26-29, 2017, San Diego, CA

32nd Annual Meeting
October 25-28, 2017, Orlando, FL

2018 Spine Across the Sea
Dates TBD, Hawaii location TBD

2018 33rd Annual Meeting
September 26–29, Los Angeles, CA

2019 34th Annual Meeting
September 25–28, Chicago, IL

2020 35th Annual Meeting
October 7–10, San Diego, CA

2021 36th Annual Meeting
September 29–October 2, Boston, MA

2022 37th Annual Meeting
October 12–15, Chicago, Illinois

2023 38th Annual Meeting
October 18–21, Los Angeles, California

2024 39th Annual Meeting
October 9–12, Boston, MA
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- Full Account Access & Transparency
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