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**QUESTIONS?**

**Educational Programming:** education@spine.org  
**Registration:** registration@spine.org  
**Housing:** meetingservices@spine.org  
**Exhibits:** exhibits@spine.org  
**Membership:** membership@spine.org
This year’s annual meeting encompasses education, technology and collaboration. It brings together attendees from different disciplines to discuss how to advance spine care and research. Organized networking opportunities and the mobile app make it easier to connect with colleagues on a global scale.

Surgeons, medical/interventional physicians, scientists and other spine specialists present the evidence, debate, and discuss controversial topics during symposia, concurrent and collaborative concepts sessions. Focused discussions provide an open forum to discuss the day’s most relevant topics, and current issues in spine care. Presentation of the 21 top-rated papers, from more than 1,000 abstracts submitted, will address the latest research from the field.

The Global Spine Forum highlights the state of spine care around the world featuring presentations from AOSpine, Association of Spine Surgeons of India, Brazilian Spine Society, Chinese Association of Spine and Spinal Cord, Chinese Association of Orthopaedic Surgeons, Chinese Orthopaedic Association and EuroSpine.

Presidential guest speaker J. Craig Venter, PhD, is one of the leading scientists of the 21st century for his numerous invaluable contributions to genomic research. His presentation, Life at the Speed of Light, addresses the new field of synthetic genomics together with the impact of human genomics on the future of medicine.

Experience the industry’s largest display of spine care devices, systems, and technologies during the Technical Exhibition. Surgical Showcase sessions offer product and equipment hands-on demonstrations offered by vendors using specimens in the laboratories. Additionally, there are Solution Showcase sessions to gain more insight about specific products and services through industry presentations during lunch.

Stop by the inaugural Career Fair to speak with employers face-to-face about opportunities in their organizations.

Maximize your meeting experience by downloading the interactive mobile event app. From creating an itinerary and connecting with colleagues to locating exhibitors, the app is a comprehensive tool for navigating the meeting.

Make the most of San Francisco. The diverse array of activities, restaurants and cultures provide the perfect setting for the 29th Annual Meeting.

Be sure to attend the Welcome Reception, a great networking event to connect with friends and colleagues in a casual, relaxed setting. The International Reception, at the conclusion of Friday’s sessions, is another great venue to meet with colleagues from around the world.

William C. Watters III, MD
President

Michael L. Reed, DPT, OCS
Charles A. Reitman, MD
2014 Program Co-chairs

Simon Dagenais, DC, PhD
Committee Liaison
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.

CONTINUING MEDICAL EDUCATION (CME) CREDIT

This activity has been planned and implemented in accordance with the Essentials and Standards of the Accreditation Council for Continuing Medical Education (ACCME). The North American Spine Society is accredited by the ACCME 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 27.75 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. who participate in this CME activity are eligible for AMA PRA Category 1 Credits™.

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.

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:

Chiropractors: NASS has received approval from the Canadian Memorial Chiropractic College to offer continuing education credits to Chiropractors. The Canadian Memorial Chiropractic College is recognized by the PACE program of the Federation of Chiropractic Licensing Boards.

Nurses: Accreditation varies for every state certification agency. Retain this Final Program and your CE certificate for use when completing the recertification process.

Nurse Practitioners: This program is approved by the American Association of Nurse Practitioners. This program was planned in accordance with AANP CE Standards and Policies and AANP Commercial Support Standards. Please look for more information at www.nassannualmeeting.org.

Each state has different requirements for nurses, physical therapists and other nonphysician providers; please contact your credit granting organization for their requirements.

EVALUATION AND EDUCATIONAL CERTIFICATES

Visit www.spine.org/cme to claim education credit and print your CME certificate. Contact education@spine.org with questions.
SECTION ON ALLIED HEALTH: COLLABORATIVE CONCEPTS IN SPINE CARE SESSIONS

Multidisciplinary specialty educational tracks are offered to allied health professionals, including physician assistants, nurse practitioners, nurses, chiropractors, physical and occupational therapists, and rehabilitation professionals.

Featured topics include:
- The Aging Spine: Do the Guidelines Apply?
- Directional Preference: An Interdisciplinary Guide to Decision-Making
- Radiculopathy: A Key in Spinal Management, Outcome and Expense
- Axial Pain in Late Adolescence and Early Adulthood: An Emerging Demographic
- Case Conference: Differential Diagnosis

The North American Spine Society thanks the following individuals for their invaluable contributions in creating the allied health educational tracks at this year’s meeting:

Scott Haldeman, MD, PhD, DC
Evan K. Johnson, PT, DPT, OCS
Rick J. Placide, MD, PT
Ryan A. Tauzell, MA, PT, Cert. MDT
Sherri Weiser, PhD
Gregory L. Whitcomb, DC

DISCLAIMER

The material presented at the 29th 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 October 8, 2014. Any further changes from the published Final Program will be announced at the beginning of each session.

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. Type www.spine.org/mobile into your phone’s browser, search “NASS 2014” in your app store or scan the QR code.
TECHNICAL EXHIBITION

CONNECT.... AT THE TECHNICAL EXHIBITION DURING THE ANNUAL MEETING

Connect with education, your fellow attendees, new career opportunities and the latest products and services in spine during the Technical Exhibition. More than 300 spine care companies are displaying thousands of the latest products, supplies and services for spine care. New to the Exhibition is the Career Fair, with recruiters onsite ready to meet with those seeking new positions. Looking for more education? View presentations from the Practice Management Committee and Solution Showcase at the theater (Booth 2504). View the ePosters, engage in experiential education in the Exercise Demonstration or go to surgical product demonstrations at the Surgical Showcase.

Technical Exhibition hours:
- Wednesday, November 12: 9:00 a.m.–5:00 p.m.
- Thursday, November 13: 9:00 a.m.–5:00 p.m.
- Friday, November 14: 9:00 a.m.–1:30 p.m.

DINING OPTIONS

Connect with past colleagues or make new connections over lunch. For registered medical attendees, complimentary box lunches are available in the exhibit area from 12:00–1:00 p.m. Wednesday, Thursday and Friday. Concessions are available for purchase in Halls A and C of the Technical Exhibition.

NETWORKING BREAKS

Grab a beverage and have a conversation during the Networking Breaks. Located in the Technical Exhibiton (except where noted), the breaks are scheduled:
- Wednesday: 10:00–10:30 a.m.; 3:05–3:35 p.m.
- Thursday: 9:10–9:40 a.m.; 3:10–3:40 p.m.
- Friday: 10:00–10:30 a.m.; 2:30–3:00 p.m.*
- Saturday: 9:30–10:00 a.m.*

*Located in Esplanade Ballroom Lobby

How do you find exactly what interests you?
Use the mobile app and do a keyword search to find what you are looking for.

NASS EDUCATION CENTER

Booth 2405

Designed for those who would like an alternative to sitting in a lecture hall, the Education Center features areas for experiential and independent learning.

View any of the hundreds of ePosters; viewing stations are located in the Technical Exhibition. ePosters also will be provided in the meeting’s mobile app and with the OnDemand meeting recordings, if purchased.

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

Want to get hands on? Come and see the Exercise Booth, Popular Exercises for Low Back Pain: Myths, Facts and Advice for Your Patient. Developed by the Exercise Committee, this updated interactive booth showcases popular exercises for low back pain including yoga, Pilates, running, walking, biking and swimming. Interact with colleagues, Exercise Committee members and physical therapists, and learn from ongoing live demonstrations for a chance to win a FitBit.
LUNCH AND LEARN AT THE SOLUTION SHOWCASE
Booth 2504

Learn more about specific products and services through industry presentations at the Solution Showcase theater during lunch. Located in booth 2504, enjoy a box lunch at the theater while listening to presentations from Invibio, SI-BONE, Misonix and OPM Oxford Performance Materials. Solution Showcase sessions are presented from 12:00–12:20 p.m. and 12:30–12:50 p.m. on Wednesday, Thursday and Friday.

PRACTICAL THEATER AND ICD-10
Booth 2504

Connect with specific topics of interest to you and your practice. Presentations will be spread throughout the day during the breaks on different topics including:
- Navigating CMS Quality Initiatives (PQRS and Value-based Modifier): How to Successfully Report and Avoid Payment Adjustments;
- Aligning PQRS and Meaningful Use Reporting Requirements: How to Save Time and Maximize Your Medicare Reimbursement;
- ICD-10

SURGICAL SHOWCASE
Rooms 105 & 106

The Surgical Showcase offers hands-on demonstrations of products and equipment in two surgical laboratories. The demonstrations are offered by vendors using specimens in the laboratories.

The Surgical Showcase has demonstrations 9:00 a.m.–12:00 p.m. and 1:00–4:00 p.m. on Wednesday, Thursday and Friday. Workshops will be offered 5:00–8:00 p.m. on Wednesday and Thursday.

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SOLUTION SHOWCASE/PRACTICAL THEATER SCHEDULE
Booth 2504

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<tr>
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<tr>
<td>10:00–10:30 a.m.</td>
<td>Navigating CMS Quality Initiatives (PQRS and Value-based Modifier): How to Successfully Report and Avoid Payment Adjustments</td>
<td>NASS Performance Measurement Committee</td>
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<tr>
<td>12:00–12:25 p.m.</td>
<td>PEEK-OPTIMA HA-Enhanced Polymer for Spinal Fusion&lt;br&gt;&lt;em&gt;Professor Bill Walsh, PhD&lt;/em&gt;</td>
<td>Invibio</td>
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<tr>
<td>12:30-1:00 p.m.</td>
<td>Long Term Outcomes With the iFuse Implant System for SI Joint Fusion&lt;br&gt;&lt;em&gt;Leonard Rudolf, MD&lt;/em&gt;</td>
<td>SI-BONE</td>
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<td>3:05-4:20 p.m.</td>
<td>ICD-10</td>
<td>NASS</td>
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<th>Thursday</th>
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<tr>
<td>9:10–9:40 a.m.</td>
<td>Aligning PQRS and Meaningful Use Reporting Requirements: How to Save Time and Maximize Your Medicare Reimbursement</td>
<td>NASS Performance Measurement Committee</td>
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<tr>
<td>12:00–12:25 p.m.</td>
<td>Long Term Outcomes with the iFuse Implant System for SI Joint Fusion&lt;br&gt;&lt;em&gt;Peter Whang, MD&lt;/em&gt;</td>
<td>SI-BONE</td>
</tr>
<tr>
<td>12:30-1:00 p.m.</td>
<td>Misonix BoneScalpel™—Current Concepts in Ultrasonic Bone Cutting in Spine Surgery&lt;br&gt;- Principles of Ultrasonic Bone Dissection and Clinical Experience&lt;br&gt;- Isador Lieberman, MD, MBA&lt;br&gt;- Our Experience in Adopting the Ultrasonic BoneScalpel in our Spine Program&lt;br&gt;&lt;em&gt;Shane Burch, MD&lt;/em&gt;</td>
<td>Misonix</td>
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<tr>
<td>3:10-3:40 p.m.</td>
<td>Navigating CMS Quality Initiatives (PQRS and Value-based Modifier): How to Successfully Report and Avoid Payment Adjustments</td>
<td>NASS Performance Measurement Committee</td>
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<th>Friday</th>
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<tr>
<td>10:00–10:30 a.m.</td>
<td>Aligning PQRS and Meaningful Use Reporting Requirements: How to Save Time and Maximize Your Medicare Reimbursement</td>
<td>NASS Performance Measurement Committee</td>
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<tr>
<td>12:00–12:25 p.m.</td>
<td>OsteoFab*: An Advanced 3D Printed Platform for Spinal Reconstruction&lt;br&gt;&lt;em&gt;Dr. S. Adam Hacking, PhD, Chief Scientific Officer&lt;/em&gt;</td>
<td>OPM Oxford Performance Materials</td>
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- Practical Theater Presentation
- Solution Showcase Presentation
NASS CAREER FAIR
Room 101

Wednesday, November 12 . . . . . . 11:00 a.m.–5:00 p.m.
Thursday, November 13 . . . . . . . 9:00 a.m.–5:00 p.m.

Stop by the new 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 for an online package can stop by the Career Fair. Visit the registration area outside of the Career Fair for more information.

COMPLETE WEBSITE SOLUTION BY PRONTO MARKETING
Booth 2207

This new service through Pronto Marketing allows spine care providers and related companies to create and manage a professional, modern website. Spend less time managing your website and more time managing your business with programs specifically designed for spine care providers. Pronto bundles your website, social media, newsletters, search engine optimization and other key elements of your internet presence into one simple, inexpensive package. It’s a breeze to get going, simple to manage, and it gets results! You pick a plan, and Pronto does the rest. For further information, visit www.spine.org/pronto.

SPINE EDUCATION & RESEARCH CENTER
Booth 2306

Located within the NASS headquarters outside of Chicago, the Spine Education & Research Center (SERC) houses a 3,800 square foot bio-skills lab, an auditorium with tiered-seating to accommodate 112 guests, spacious meeting rooms and state-of-the-art technology. SERC is utilized by NASS for hands-on courses and is regularly rented by companies or other societies. Staff is available to answer questions about the facility and to schedule courses and tours.
**TUESDAY, NOVEMBER 11**

**WELCOME RECEPTION**
6:00–7:30 p.m.
San Francisco Marriott Marquis,
Yerba Buena Ballroom Salon 7

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 sessions conclude so you have time to grab a bite and chat before heading off to dinner. *Your meeting badge is required for entry.*

**WEDNESDAY, NOVEMBER 12**

**FELLOWSHIP AND PROGRAM DIRECTORS MEETING**
12:00–1:00 p.m.
Room 300

The response to the Spine Fellowship Match continues to be positive with more than 70 programs currently enrolled. In an effort to maintain the enthusiasm, there is a meeting of Fellowship Directors during the 29th Annual Meeting. This is an open discussion, and lunch is provided.

**ICD-10 WEBINAR VIEWING IN THE PRACTICAL THEATER**
3:05–4:20 p.m.
Technical Exhibition, Booth 2504

Stop by to view NASS’ webinar on ICD-10 implementation presented by NASS volunteers with coding expertise. The webinar explains basic changes to the code structure, specificity and function, new documentation requirements, and how the changes will affect spine practices. ICD-10 is now scheduled to be implemented October 1, 2015.

**SPINEPAC RECEPTION**
6:00–7:00 p.m.
San Francisco Marriott Marquis, Pacific H

The reception is open to all NASS members who have donated to SpinePAC in 2014.
PRESIDENTIAL GUEST SPEAKER:
J. CRAIG VENTER, PhD
10:10–11:00 a.m.
Gateway Ballroom 103/104

J. Craig Venter, PhD, is regarded as one of the leading scientists of the 21st century for his numerous invaluable contributions to genomic research. He is Founder, Chairman and CEO of the J. Craig Venter Institute (JCVI), a not-for-profit research organization with approximately 300 scientists and staff dedicated to human, microbial, plant, synthetic and environmental genomic research, and the exploration of social and ethical issues in genomics.

Dr. Venter is also Founder and CEO of Synthetic Genomics Inc. (SGI), a privately held company dedicated to commercializing genomic-driven solutions to address global needs such as new sources of energy, new food and nutritional products, and next generation vaccines.

His presentation, *Life at the Speed of Light*, will address the origins, current challenges and controversies about synthetic genomics, and the impact on human existence.

Dr. Venter began his formal education after a tour of duty as a Navy Corpsman in Vietnam from 1967 to 1968. After earning both a Bachelor’s degree in Biochemistry and a PhD in Physiology and Pharmacology from the University of California at San Diego, he was appointed professor at the State University of New York at Buffalo and the Roswell Park Cancer Institute. In 1984, he moved to the National Institutes of Health campus where he developed Expressed Sequence Tags or ESTs, a revolutionary new strategy for rapid gene discovery. In 1992, Dr. Venter founded The Institute for Genomic Research (TIGR, now part of JCVI), a not-for-profit research institute, where in 1995 he and his team decoded the genome of the first free-living organism, the bacterium Haemophilus influenzae, using his new whole genome shotgun technique.

In 1998, Dr. Venter founded Celera Genomics to sequence the human genome using new tools and techniques he and his team developed. This research culminated with the February 2001 publication of the human genome in the journal, *Science*. He and his team at Celera also sequenced the fruit fly, mouse and rat genomes.

Dr. Venter is one of the most frequently cited scientists and the author of more than 250 research articles. He is also the recipient of numerous honorary degrees, public honors and scientific awards, including the 2008 United States National Medal of Science, the 2002 Gairdner Foundation International Award, the 2001 Paul Ehrlich and Ludwig Darmstaedter Prize and the King Faisal International Award for Science. Dr. Venter is a member of numerous prestigious scientific organizations including the National Academy of Sciences, the American Academy of Arts and Sciences and the American Society for Microbiology.
FRIDAY, NOVEMBER 14

GLOBAL SPINE FORUM: ADVANCING SPINE CARE WORLDWIDE
8:00 a.m.–5:00 p.m.
Room 304


RESEARCH GRANT AND FELLOWSHIP AWARDS PRESENTATION
10:30–10:55 a.m.
Gateway Ballroom 103/104

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 2011 and 2012 also will present their research findings.

RECOGNITION AWARDS PRESENTATION
10:55–11:00 a.m.
Gateway Ballroom 103/104

The Recognition Awards are presented to outstanding society members.

VALUE ABSTRACT AWARDS PRESENTATIONS
3:05–3:35 p.m.
Gateway Ballroom 103/104

Value Abstract Awards foster and recognize efforts to define value in spine care.

INTERNATIONAL RECEPTION
4:45–5:45 p.m.
Esplanade Ballroom Lobby

Network with colleagues after the sessions have concluded. This reception is open to all attendees.

2014 LEON WILTSE AWARD
Ziya L. Gokaslan, MD, FACS, FAANS

Ziya L. Gokaslan, MD, FACS, FAANS is a world-renowned expert in the surgical treatment of spinal column, spinal cord and sacral tumors. He has made numerous contributions to the understanding of biology of these neoplasms and developed novel surgical resection and reconstruction techniques resulting in significant improvement in the outcome and survival of these patients. He has helped define spinal oncology as a distinct subspecialty within spinal surgery. He can be best described as one of the most influential spinal tumor surgeons and clinical researchers in the world.

Nominated by Henry Brem, MD

2014 DAVID SELBY AWARD
Raj D. Rao, MD

As a NASS committee member and chair and former Board member, Raj D. Rao, MD has worked hard to improve the North American Spine Society and care of patients. His work in advocacy and international education has had a major and lasting impact on NASS. During his time as the Advocacy Committee Chairman, NASS’ influence grew among members of Congress and staff on Capitol Hill. Dr. Rao chaired the Alliance of Specialty Medicine’s Physician Advisory Council, spearheaded the development of several issue papers that were used to educate Congress on NASS’ key issues, and developed strong personal relationships with prominent lawmakers such as Rep. Paul Ryan on behalf of NASS.

Nominated by Charles A. Mick, MD

2014 HENRY FARFAN AWARD
Michael H. Heggeness, MD, PhD

Michael Heggeness, MD, PhD is an outstanding clinician, educator and scientist. He has authored more than 80 reviewed papers, holds numerous patents, and has received prestigious extramural funding from many agencies, including the Department of Defense. A NASS Past President and former Chair of Orthopedic Surgery at Baylor College of Medicine, Dr. Heggeness is currently Professor and Chair of the Department of Orthopedic Surgery at the University of Kansas Wichita. It is a great honor to bestow upon him the 2014 Farfan Award for his leadership and outstanding contributions to basic science in bone healing, neuroanatomy and physiology.

Nominated by F. Todd Wetzel, MD
ATTENDEE RESOURCES

REGISTRATION
South Lobby

Hours:
Monday, November 10, 6:30 a.m.–5:00 p.m.
Tuesday, November 11, 6:30 a.m.–5:00 p.m.
Wednesday, November 12, 6:30 a.m.–5:30 p.m.
Thursday, November 13, 6:30 a.m.–5:30 p.m.
Friday, November 14, 7:00 a.m.–5:00 p.m.
Saturday, November 15, 7:30 a.m.–12:00 p.m.

COAT AND LUGGAGE CHECK
Upper South Lobby

The Coat and Luggage Check is available for your convenience. The cost is $3.00 per luggage item and $2.00 per coat. 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:
Tuesday, November 11, 6:30 a.m.–5:30 p.m.
Wednesday, November 12, 7:00 a.m.–6:30 p.m.
Thursday, November 13, 7:00 a.m.–7:30 p.m.
Friday, November 14, 7:00 a.m.–6:15 p.m.
Saturday, November 15, 7:30 a.m.–12:30 p.m.

DINING

Medical Attendee Food Service: Technical Exhibition
Box lunches are available for registered medical attendees in the Technical Exhibition from 12:00–1:00 p.m. Wednesday through Friday.

Networking Breaks
Beverage services also are held in the Technical Exhibition Wednesday–Friday morning. Friday afternoon and Saturday morning breaks will be held in the Esplanade Ballroom Lobby.

SAN FRANCISCO INFORMATION COUNTER
South Lobby

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 to assist with suggestions and reservations.

HOUSING BUREAU
South Lobby

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 2015 Annual Meeting in Chicago.

CHOOSE CHICAGO
South Lobby

Stop by the Information Desk to review exciting material for your trip to the Chicago area, site of the 2015 Annual Meeting.

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).

PHOTOGRAPHY ORDERS

Looking for photos from the Annual Meeting? Visit https://nass4photos.shutterfly.com to view and order photos of the general sessions, symposia, Technical Exhibition, special events and more.
Visit the NASS Attendee Resources in the **South Lobby** to see all that NASS has to offer spine care professionals.

**Hours:**
- Tuesday, November 11: 1:00–5:00 p.m.
- Wednesday, November 12: 6:30 a.m.–5:30 p.m.
- Thursday, November 13: 6:30 a.m.–5:30 p.m.
- Friday, November 14: 7:00 a.m.–5:00 p.m.
- Saturday, November 15: 7:30 a.m.–12:00 p.m.

**MEMBERSHIP SERVICES**

All meeting attendees are encouraged to visit Membership Services to take advantage of several meeting-only membership offers. Current members can pay their 2015 dues or update their contact information, and individuals who are not members can learn more about membership benefits or complete an application to join during the meeting. Attendees also can renew or join through the following links:

**Renew:** www.spine.org/renew  
**Join:** www.spine.org/join

**NASS STORE**

NASS publishes or co-publishes several fundamental educational resources for spine care providers. These staple publications can be purchased at a discount for members at the Store throughout the meeting. Free shipping is available on orders of $300 or more (see a Store representative for details). Publications available include *Clinical Guidelines*, preorders of *Common Coding Scenarios for Comprehensive Spine Care 2015*, patient education brochures, *Orthopaedic Knowledge Update: Spine* 4, logo merchandise and more.

**SPINECONNECT**

All meeting attendees are automatically subscribed to a private, secure community on the NASS engagement site, SpineConnect, where they can communicate before, during and after the Annual Meeting. Faculty and attendees can post questions on this community and connect with others to meet socially throughout the meeting.

Stop by the SpineConnect booth to browse through the site, post questions or update your profile.

**COMPLIMENTARY HEADSHOTS**

A professional photographer will be available during the times below at the SpineConnect booth to take headshots for the site and for your practice website or social media profiles.

- Tuesday, November 11: 1:00–5:00 p.m.
- Wednesday–Friday, November 12–14: 9:00 a.m.–1:00 p.m.
- Saturday, November 15: 9:00 a.m.–12:00 p.m.
INTERNATIONAL CERTIFICATE PRINTING

Visit the certificate printing station to print your certificate of meeting attendance in the Membership Services area.

PUBLICATIONS

**SpineLine**
Comment on SpineLine content, click through a short reader survey and offer suggestions for upcoming issues. Help yourself to complimentary copies of the recent issue and find information about digital and mobile SpineLine.

**The Spine Journal**
The Spine Journal (TSJ) welcomes authors, readers and reviewers. Visit the Publications kiosk 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.

NASS Channels
NASS’ online, print and social media content:
- Knowyourback.org: NASS’ quality, credible patient education site
- NASS Blog: spineline.wordpress.com
- The Back Story Blog: knowyourback.wordpress.com
- Twitter.com/NASSspine
- Facebook.com/NASS.Spine
- 9 for Spine: View NASS’ public awareness video on simple tips for preventing back pain and get information about how you can link directly or refer patients to this engaging content.

Patient Education
Suggest ideas for brochure topics, as well as web articles, series or videos that would benefit spine patients. Members with a current disclosure also can sign up to author pieces for the website and blog.

ADVOCACY AND SPINEPAC

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. Advocacy staff provide demonstrations so that members can learn how to make a difference in the public policy process. The NASS Legislative Action Center, an online advocacy tool, lets members tell lawmakers how they feel about physician reimbursement under Medicare.

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.

RESEARCH

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 is new from these groups working on your behalf and pick up information about:
- NASS’ registry efforts
- New clinical guidelines
- Appropriate use criteria and mobile app
- Patient safety alerts
- 2015 research grant application
- Clinical tools and more!
SPAKER INFORMATION CENTER
South Lobby

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 on site. 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 South Lobby, near the registration area. Speakers are not permitted to use their own laptops for their presentations. **No exceptions will be made.**

**Hours:**
Monday, November 10 .......................... 12:00–5:00 p.m.
Tuesday–Friday, November 11-14 .......................... 6:30 a.m.–5:00 p.m.
Saturday, November 15 .......................... 7:00–11:00 a.m.

PRESS ROOM
Room 228

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, November 12 .......................... 7:30 a.m.–5:00 p.m.
Thursday, November 13 .......................... 7:00 a.m.–5:00 p.m.
Friday, November 14 .......................... 7:00 a.m.–5:00 p.m.
Saturday, November 15 .......................... 7:30–11:00 a.m.
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Complimentary shuttle service is provided between Moscone Center and the hotels listed below.

<table>
<thead>
<tr>
<th>Hotel</th>
<th>Route</th>
<th>Shuttle Boarding Location at Hotel</th>
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<tbody>
<tr>
<td>Courtyard San Francisco Downtown</td>
<td>N/A</td>
<td>Walk to Moscone Center</td>
</tr>
<tr>
<td>Grand Hyatt San Francisco</td>
<td>1</td>
<td>Walk 1 block to Westin St. Francis - Post Street Entrance</td>
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<tr>
<td>Hotel Abri</td>
<td>2</td>
<td>Walk to Parc 55 - Curbside on Cyril Magnin Street</td>
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<tr>
<td>Hotel Monaco</td>
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<td>Walk to Serrano Hotel - Yellow Curb - Across Street on Taylor</td>
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<tr>
<td>Hotel Palomar San Francisco</td>
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<td>Walk to Moscone Center</td>
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<td>InterContinental San Francisco</td>
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<td>Marriott Marquis</td>
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<td>Walk to Moscone Center</td>
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<tr>
<td>Palace Hotel, San Francisco</td>
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<td>Curbside - Front Entrance - Montgomery Street</td>
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<td>Parc 55 Union Square Hotel</td>
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<td>Curbside on Cyril Magnin Street</td>
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<td>Prescott Hotel</td>
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<td>Walk 1 block to Westin St. Francis - Post Street Entrance</td>
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<tr>
<td>San Francisco Marriott Union Square</td>
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<td>Walk 1 block to Westin St. Francis - Post Street Entrance</td>
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<td>Serrano Hotel</td>
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<td>Yellow Curb - Across Street on Taylor</td>
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<tr>
<td>Sir Francis Drake Hotel</td>
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<td>Walk 0.5 block to Westin St. Francis - Post Street Entrance</td>
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<tr>
<td>St. Regis San Francisco</td>
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<td>Westin San Francisco Market Street</td>
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<td>Walk to Moscone Center</td>
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<tr>
<td>Westin St. Francis</td>
<td>1</td>
<td>Post Street Entrance</td>
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</tbody>
</table>

Monday, November 10

| Shuttle Service                  | 6:00 a.m. – 5:00 p.m. | Every 30 minutes |

Tuesday, November 11

| Shuttle Service                  | 6:00 a.m. – 5:30 p.m. | Every 30 minutes |
| Welcome Reception Shuttle        | 5:30 p.m. – 8:00 p.m.  | Every 15-20 minutes |

Wednesday, November 12

| Shuttle Service                  | 6:00 a.m. – 2:00 p.m. | Every 15-20 minutes |
|                                 | 2:00 p.m. – 4:00 p.m. | Every 30 minutes * |
|                                 | 4:00 p.m. – 5:45 p.m. | Every 15-20 minutes |

Thursday, November 13

| Shuttle Service                  | 6:00 a.m. – 10:30 a.m. | Every 15-20 minutes |
|                                 | 10:30 a.m. – 1:30 p.m. | Every 30 minutes * |
|                                 | 1:30 p.m. – 6:00 p.m.  | Every 15-20 minutes |

Friday, November 14

| Shuttle Service                  | 6:00 a.m. – 10:30 a.m. | Every 15-20 minutes |
|                                 | 10:30 a.m. – 1:30 p.m. | Every 30 minutes * |
|                                 | 1:30 p.m. – 6:00 p.m.  | Every 15-20 minutes |

Saturday, November 15

| Shuttle Service                  | 7:00 a.m. – 12:30 p.m. | Every 30 minutes * |

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

Note: This is a preliminary shuttle schedule and is subject to change. Please check the signage in your hotel lobby for the most current information.
1. **Courtyard by Marriott San Francisco**  
   299 Second St. (.4 mi)

2. **Grand Hyatt San Francisco**  
   345 Stockton St. (.8 mi)

3. **Hotel Abri**  
   127 Ellis St. (.6 mi)

4. **Hotel Monaco**  
   501 Geary St. (.8 mi)

5. **Hotel Palomar**  
   12 Fourth St. (.4 mi)

6. **Intercontinental San Francisco**  
   888 Howard St. (.2 mi)

7. **Marriott Marquis**  
   780 Mission St. (.2 mi)

8. **Palace Hotel**  
   Two New Montgomery St. (.4 mi)

9. **Parc 55 Union Square Hotel**  
   55 Cyril Magnin St. (.7 mi)

10. **Prescott Hotel**  
    545 Post St. (.8 mi)

11. **San Francisco Marriott Union Square**  
    480 Sutter St. (.7 mi)

12. **Serrano Hotel**  
    405 Taylor St. (.8 mi)

13. **Sir Francis Drake Hotel**  
    450 Powell St. (.7 mi)

14. **St. Regis San Francisco**  
    125 Third St. (.2 mi)

15. **W San Francisco**  
    181 Third St. (.1 mi)

16. **Westin San Francisco Market Street**  
    50 Third St. (.3 mi)

17. **Westin St. Francis**  
    335 Powell St. (.6 mi)
The neighborhoods of San Francisco are as diverse as they are fascinating. In addition to its history of rebellion, one of the great hallmarks of San Francisco is its remarkable diversity. Each neighborhood has its own vibe and personality that makes exploring the city an intriguing adventure. Following are highlights of some of the neighborhoods around Moscone Center South.

**FINANCIAL DISTRICT/UNION SQUARE:** This area is a primary shopping hub. Department stores and many designer shops are abundant in places such as Embarcadero Center, the Ferry Building and Crocker Galleria around Union Square in the Financial District. But there’s more than shopping here. Stop in for a drink at the Gold Dust Lounge, step out to Ruby Skye or visit the many art galleries. If you want to catch a theatre production, stop at the booth at Union Square to see what’s playing half off.

**SOMA:** South of Market (SoMa) with the Yerba Buena District at its core, has a large concentration of museums, centers for the arts and nightclubs, and is home to the San Francisco Giants. This neighborhood’s industrial, warehouse environment houses hipster clubs and bars like 1015 Folsom and the infamous End Up as well as gay bars like the Eagle and the Stud. For shoppers there are discount stores that sell cheap fabrics, designer labels and furniture.

**CHINATOWN:** San Francisco’s Chinatown is the largest outside of Asia. The jade-roofed Chinatown Gate at Grant Avenue and Bush Street marks the entry to Chinatown. On the beautifully renovated Waverly Place, you’ll find three Chinese temples. Stockton Street (1000 to 1200) is lined with grocers, fishmongers, tea sellers, herbalists, noodle parlors and restaurants. Here, too, is the Buddhist Kong Chow Temple, at no. 855, above the Chinatown post office. Also check out Ross Alley where there is a fortune cooking factory that is worth seeing.

**NORTH BEACH/TELEGRAPH HILL:** North Beach is one of the city’s oldest neighborhoods with a colorful past—from its scandalous Barbary Coast days, the birthplace of the Beat generation in the 1950s to its Italian heritage. The area, also known as Little Italy, is where you can find great Italian restaurants as well as pastry and coffee shops. You will find the Beat Museum, Vesuvio and City Lights Bookstore. Explore the hairpin turns of Lombard Street, the stores on Grant Street and take the short hike up to Coit Tower on Telegraph Hill.
**FISHERMAN’S WHARF:** This long shopping and entertainment mecca stretches from Ghirardelli Square at the west end to Pier 39 at the east. Among the most popular sites are the Ripley’s Believe It or Not! Museum, Madame Tussauds Wax Museum, The San Francisco Dungeon, the Aquatic Park, Maritime Museum, the street performers who convene and the sea lions who are hanging out and observing. Even if you only drop by the neighborhood to see it, make sure to check out the convivial seafood street vendors who dish out piles of fresh Dungeness crab and sourdough bread bowls full of clam chowder.

**RUSSIAN HILL:** Just west of North Beach is Russian Hill, an upscale neighborhood with an artistic vibe. It has magnificent views, winding staircases and charming cafes. Popular bars and restaurants include Bacchus Wine Bar, Rouge/Nick’s Crispy Tacos, Frascati, La Folie and Sushi Groove.

**HAYES VALLEY:** It’s a place with several art galleries and clothing boutiques selling apparel from independent designers. There’s a small park with some sculptural art, and lots of great restaurants and bars such as Absinthe, the Hayes Street Grill. Patxi’s Pizza, Suppenkuche and Zuni Café.

**PACIFIC HEIGHTS:** One of San Francisco’s more exclusive neighborhoods, Pacific Heights houses more than its share of mansions and gorgeous parks, with sweeping views of the marina and Bay below. On Fillmore Street, Pacific Heights neighborhood visitors will find upmarket shops and boutiques, like Kiehl’s, Betsey Johnson and Rachel Ashwell’s Shabby Chic. Some casual yet classy restaurants include the Elite Café, Jackson Fillmore, Vivandi Porta Via, Fishbowl and Godzilla Sushi.

**NOB HILL:** Some of the most luxurious San Francisco hotels—the InterContinental Mark Hopkins, the Stanford Court, the Huntington Hotel and the Fairmont—are perched atop Nob Hill as well as the spectacular Grace Cathedral. Walk through the Fairmont lobby to step back in time. Stroll around delightful Huntington Park with its cherubic fountain and visit the Cable Car Museum.

**JAPANTOWN:** Between Van Ness Avenue and Fillmore Street is the site of Japantown. Notable sights include the Buddhist Church of San Francisco; the Konko-Kyo Church of San Francisco; the Sokoji–Soto Zen Buddhist Temple; Nihonmachi Mall, with two steel fountains by Ruth Asawa; and the Japan Center, a shopping mall occupying 3 square blocks bounded by Post, Geary, Laguna and Fillmore streets. At the mall’s center is the five-tiered Peace Pagoda, designed by Japanese architect Yoshiro Taniguchi. Sing karaoke at one of the bars, get some sushi and relax at the Kabuki Springs & Spa.

**MISSION DISTRICT:** This lively, cultural neighborhood gets its name from the oldest building in San Francisco, the haunting Mission Dolores. The two main streets worth exploring are Mission Street and Valencia Street between 16th Street and 24th Street. Here you’ll find lots of great restaurants, hipster bars, several bookstores, taquerias and a variety of artsy shops. While the area is gentrifying, the neighborhood can still be a little sketchy at night, especially around BART stations located at 16th and 24th streets.
<table>
<thead>
<tr>
<th><strong>MONDAY, NOVEMBER 10</strong></th>
<th><strong>TUESDAY, NOVEMBER 11</strong></th>
</tr>
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<tbody>
<tr>
<td>6:30 a.m.– 5:00 p.m.</td>
<td>Attendee Registration</td>
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<tr>
<td>7:00–11:00 a.m.</td>
<td>South Lobby</td>
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<tr>
<td><strong>Ticketed Session:</strong></td>
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<tr>
<td>7:30 a.m.– 4:30 p.m.</td>
<td>Minimally Invasive</td>
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<td>Surgery</td>
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<td><em>International Physicians Only—Session 1</em></td>
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<td>Room 301</td>
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<tr>
<td>8:00 a.m.– 6:00 p.m.</td>
<td>Exhibitor Registration</td>
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<td>12:00–4:00 p.m.</td>
<td>South Lobby</td>
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<td><strong>Ticketed Session:</strong></td>
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<tr>
<td>5:00–9:00 p.m.</td>
<td>Minimally Invasive</td>
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<td>Surgery</td>
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<td><em>International Physicians Only—Session 3</em></td>
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<td>Room 301</td>
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<tr>
<td>6:30 a.m.– 5:00 p.m.</td>
<td>Ticketed Instructional Course:</td>
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<tr>
<td>7:00 a.m.– 4:00 p.m.</td>
<td>Fundamentals of Evidence-based Medicine</td>
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<tr>
<td>7:30 a.m.– 3:30 p.m.</td>
<td>Coding Update 2014 (Continued)</td>
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<tr>
<td>7:30 a.m.– 4:30 p.m.</td>
<td>Minimally Invasive</td>
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<td>Surgery</td>
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<td><em>International Physicians Only—Session 2</em></td>
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<td>Room 301</td>
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<tr>
<td>8:00 a.m.– 12:00 p.m.</td>
<td>Ticketed Technique Workshop:</td>
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<td>Fundamentals of Spine Deformity</td>
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<tr>
<td>8:00 a.m.– 6:00 p.m.</td>
<td>Room 304</td>
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<tr>
<td>1:00–5:00 p.m.</td>
<td>Ticketed Instructional Course:</td>
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<td>Leadership Development and Training</td>
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<td>Room 301</td>
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<td></td>
<td>Section on RIMS: Taking the “Non” Out of Non-specific Back Pain</td>
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<td>Room 306</td>
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<tr>
<td>6:00–7:30 p.m.</td>
<td>Welcome Reception</td>
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<td>San Francisco Marriott Marquis, Yerba Buena Ballroom Salon 7</td>
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<td>Time</td>
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<tr>
<td>6:30–8:00 a.m.</td>
<td>Continental Breakfast&lt;br&gt;Gateway Ballroom Lobby</td>
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<tr>
<td>6:30 a.m.–5:30 p.m.</td>
<td>Attendee Registration&lt;br&gt;South Lobby</td>
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<tr>
<td>7:00 a.m.–5:00 p.m.</td>
<td>Exhibitor Registration&lt;br&gt;South Lobby</td>
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<tr>
<td>7:20–7:30 a.m.</td>
<td>Welcome Remarks&lt;br&gt;Gateway Ballroom 103/104</td>
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<tr>
<td>7:30–8:30 a.m.</td>
<td>Best Papers&lt;br&gt;Gateway Ballroom 103/104</td>
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<tr>
<td>8:30–8:35 a.m.</td>
<td>NASS Working for You: NASS Appropriate Use Criteria&lt;br&gt;Gateway Ballroom 103/104</td>
</tr>
<tr>
<td>8:35–10:00 a.m.</td>
<td>Symposium: Lateral Approach to the Lumbar Spine&lt;br&gt;Gateway Ballroom 103/104</td>
</tr>
<tr>
<td>9:00 a.m.–5:00 p.m.</td>
<td>Technical Exhibition&lt;br&gt;Technical Exhibition&lt;br&gt;ePosters&lt;br&gt;Education Resource Center</td>
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<tr>
<td>10:00–10:30 a.m.</td>
<td>Networking Break—Beverage Service&lt;br&gt;Technical Exhibition, Aisles 800 and 1900</td>
</tr>
<tr>
<td>10:00 a.m.–12:00 p.m.</td>
<td>Section on Allied Health: Collaborative Concepts in Spine Care: Directional Preference: An Interdisciplinary Guide to Decision Making&lt;br&gt;Room 305</td>
</tr>
<tr>
<td>10:30–10:35 a.m.</td>
<td>NASS Working for You: Update on Sections&lt;br&gt;Gateway Ballroom 103/104</td>
</tr>
<tr>
<td>10:35 a.m.–12:00 p.m.</td>
<td>Symposium: Implementing Accountable Care in Spine Surgery to Promote Sustainable Health Care&lt;br&gt;Gateway Ballroom 103/104</td>
</tr>
<tr>
<td>11:00 a.m.–5:00 p.m.</td>
<td>Career Fair&lt;br&gt;Room 101</td>
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<tr>
<td>12:00–1:00 p.m.</td>
<td>Complimentary Box Lunch&lt;br&gt;&lt;i&gt;Medical Attendees Only&lt;/i&gt;&lt;br&gt;Technical Exhibition, Halls A and C</td>
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<tr>
<td></td>
<td>Resident, Fellow and Program Directors Meeting&lt;br&gt;Room 300</td>
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<td></td>
<td>Solution Showcase&lt;br&gt;Technical Exhibition, Booth 2504</td>
</tr>
</tbody>
</table>

1:00–2:00 p.m. Concurrent Sessions:
- Spine Trauma<br>Gateway Ballroom 103/104
- Diagnostic Imaging in Spine Care<br>Gateway Ballroom 102
- Surgical Management of Cervical Myelopathy<br>Room 302
- Biomechanics in Spine Care<br>Room 303
- Outcomes in Deformity Surgery<br>Room 304

Focused Discussion: Best Practices Update: Diagnosis and Treatment of Degenerative Lumbar Spondylolisthesis<br>Room 301

1:00–3:10 p.m. Section on Allied Health: Collaborative Concepts in Spine Care: Radiculopathy: A Key in Spinal Management, Outcome and Expense<br>Room 305

2:05–3:05 p.m. Concurrent Sessions:
- Cervical Disc Arthroplasty<br>Gateway Ballroom 103/104
- Socioeconomics<br>Gateway Ballroom 102
- Injections<br>Room 302
- Surgical Outcomes<br>Room 303
- Proximal Findings Following Deformity Surgery<br>Room 304

Focused Discussion: Best Practices Update: Diagnosis and Treatment of Adult Isthmic Spondylolisthesis<br>Room 301

3:05–3:35 p.m. Networking Break—Beverage Service<br>Technical Exhibition, Aisles 800 and 1900

3:05–4:30 p.m. Committee Orientation Program Meeting<br>Room 300

3:35–3:40 p.m. NASS Working for You: SpineWeek<br>Gateway Ballroom 103/104

3:40–5:10 p.m. Symposium: Section on Radiology: Controversies in Spine Imaging<br>Gateway Ballroom 103/104

4:00–5:00 p.m. Focused Discussion: Advocacy Update<br>Room 301

6:00–7:00 p.m. SpinePAC Reception<br>San Francisco Marriott Marquis, Pacific H
NASS 2014 CAREER FAIR

Moscone Center South

Wednesday, Nov. 12  
11:00 a.m. – 5:00 p.m.  

Thursday, Nov. 13  
9:00 a.m. – 5:00 p.m.

Connect with Top Employers Looking to Hire You

Head to Room 101 to check out the First NASS Career Fair being held in conjunction with the 29th Annual Meeting. The NASS Career Fair connects you directly with employers that have open career opportunities in the field of spine care.

As an attendee you will have the opportunity to engage with employers that want to hire talent, learn about the specific opportunities available, and gather additional information about each hiring organization.
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
</table>
| 6:30–8:00 a.m.   | Continental Breakfast  
                           Gateway Ballroom Lobby                                                   |
| 6:30 a.m.–5:30 p.m. | Attendee Registration  
                           South Lobby                                                                 |
| 7:00 a.m.–5:00 p.m. | Exhibitor Registration  
                           South Lobby                                                                 |
| 7:25–7:30 a.m.   | Announcements  
                           Gateway Ballroom 103/104                                                  |
| 7:30–7:35 a.m.   | NASS Working for You: Advocacy Update  
                           Gateway Ballroom 103/104                                                  |
| 7:35–9:10 a.m.   | Symposium: Section on Robotics and Navigation: Computer Assisted Surgery: Which Tools and Techniques Are Ready for Adoption in Your Operating Room?  
                           Gateway Ballroom 103/104                                                  |
| 9:00 a.m.–5:00 p.m. | Technical Exhibition  
                           Technical Exhibition  
                              ePosters  
                           Education Resource Center  
                              Career Fair  
                           Room 101                                                                    |
| 9:10–9:40 a.m.   | Networking Break—Beverage Service  
                           Technical Exhibition, Aisles 800 and 1900                               |
|                  | Practical Theater: Aligning PQRS and Meaningful Use Reporting Requirements: How to Save Time and Maximize Your Medicare Reimbursement  
                           Technical Exhibition, Booth 2504                                          |
| 9:40–10:10 a.m.  | Presidential Address:  
                           William C. Watters III, MD  
                           Gateway Ballroom 103/104                                                  |
| 10:10–11:00 a.m. | Presidential Guest Speaker:  
                           J. Craig Venter, PhD  
                           Gateway Ballroom 103/104                                                  |
| 11:00 a.m.–12:00 p.m. | The Spine Journal Outstanding Paper Awards  
                           Gateway Ballroom 103/104                                                  |
| 12:00–1:00 p.m.  | Complimentary Box Lunch  
                           Medical Attendees Only  
                              Technical Exhibition, Halls A and C                                    |
| 1:00–1:05 p.m.   | Solution Showcase  
                           Technical Exhibition, Booth 2504                                          |
| 1:00–3:40 p.m.   | Spine Safety Update  
                           Gateway Ballroom 103/104                                                  |
| 1:05–2:05 p.m.   | Section on Allied Health: Collaborative Concepts in Spine Care: Axial Pain in Late Adolescence and Early Adulthood: An Emerging Demographic  
                           Rooms 305                                                                   |
| 2:10–3:10 p.m.   | Concurrent Sessions:  
                           • Surgical Management of the Cervical Spine  
                           Gateway Ballroom 103/104                                                  |
|                  | • Physical Activity and Rehabilitation  
                           Gateway Ballroom 102                                                      |
|                  | • Epidemiology of Spinal Conditions and Care  
                           Room 302                                                                   |
|                  | • Comparative Effectiveness in Spine Surgery  
                           Room 303                                                                   |
|                  | • Outcomes in Deformity Surgery  
                           Room 304                                                                   |
| 3:10–3:40 p.m.   | Focused Discussion: Section on Biologics and Basic Science: Wonder Medicine for the Spine: Hope or Hype? (Disc)  
                           Room 301                                                                   |
| 3:40–3:45 p.m.   | NASS Working for You: Multispecialty Pain Workgroup Update  
                           Gateway Ballroom 103/104                                                  |
| 3:45–5:15 p.m.   | Symposium: Compression Fracture: Bone Augmentation and Management  
                           Gateway Ballroom 103/104                                                  |
| 5:00–6:00 p.m.   | Resident, Fellow and Program Directors Reception  
                           Esplanade Ballroom Lobby                                                   |
| 5:00–6:30 p.m.   | Allied Health Reception  
                           Room 300                                                                   |
# MEETING-AT-A-GLANCE

## FRIDAY, NOVEMBER 14

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
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<tbody>
<tr>
<td>6:30–8:00 a.m.</td>
<td>Continental Breakfast&lt;br&gt;Gateway Ballroom Lobby</td>
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<tr>
<td>7:00 a.m.–5:00 p.m.</td>
<td>Attendee Registration&lt;br&gt;South Lobby</td>
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<tr>
<td>7:25–7:30 a.m.</td>
<td>Announcements&lt;br&gt;Gateway Ballroom 103/104</td>
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<tr>
<td>7:30–8:30 a.m.</td>
<td>Best Papers&lt;br&gt;Gateway Ballroom 103/104</td>
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<tr>
<td>8:00–9:00 a.m.</td>
<td>Exhibitor Open Forum&lt;br&gt;Room 220/222</td>
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<td></td>
<td>Global Spine Forum: Chinese Association of Spine and Spinal Cord&lt;br&gt;Room 304</td>
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<tr>
<td>8:00 a.m.–1:00 p.m.</td>
<td>Exhibitor Registration&lt;br&gt;South Lobby</td>
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<tr>
<td>8:30–8:35 a.m.</td>
<td>NASS Working for You: Coding Update&lt;br&gt;Gateway Ballroom 103/104</td>
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<tr>
<td>8:35–10:00 a.m.</td>
<td>Symposium: Beyond the Imaging Findings: Predictors of Treatment and Outcomes for Spine Patients&lt;br&gt;Gateway Ballroom 103/104</td>
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<tr>
<td>9:00–10:00 a.m.</td>
<td>Global Spine Forum: Chinese Association of Orthopedic Surgeons&lt;br&gt;Room 304</td>
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<tr>
<td>9:00 a.m.–1:30 p.m.</td>
<td>Technical Exhibition&lt;br&gt;Technical Exhibition</td>
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<td>ePosters&lt;br&gt;Education Resource Center</td>
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<tr>
<td>10:00–10:30 a.m.</td>
<td>Networking Break—Beverage Service&lt;br&gt;Technical Exhibition, Aisles 800 and 1900</td>
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<td></td>
<td>Practical Theater: Aligning PQRS and Meaningful Use Reporting Requirements: How to Save Time and Maximize Your Medicare Reimbursement&lt;br&gt;Technical Exhibition, Booth 2504</td>
<td></td>
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<tr>
<td>10:30–11:00 a.m.</td>
<td>NASS Awards&lt;br&gt;Gateway Ballroom 103/104</td>
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<td>10:30–10:55: Research Grant and Fellowship Awards Presentation</td>
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<td>10:55–11:00: NASS Recognition Awards Presentation</td>
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<td></td>
<td>Global Spine Forum: World Spine Care Update&lt;br&gt;Room 304</td>
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<tr>
<td>10:45 a.m.–12:00 p.m.</td>
<td>Focused Discussion: BMP Use in Spine Surgery: The Post-YODA Era&lt;br&gt;Room 301</td>
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</tbody>
</table>

**Concurrent Sessions:**

- Minimally Invasive Procedures
  - Gateway Ballroom 103/104
- Predictors of Surgical Outcomes
  - Gateway Ballroom 102
- Complications Following Spine Surgery
  - Room 302
- Sagittal Alignment for Deformity Correction
  - Room 303
- Global Spine Forum: EuroSpine
  - Room 304
  - Room 305

**Solution Showcase**

- Complimentary Box Lunch<br>Medical Attendees Only<br>Technical Exhibition, Halls A and C
- Technical Exhibition, Booth 2504
- NASS Working for You: Coverage and Payer Policy Update<br>Gateway Ballroom 103/104
- Global Spine Forum: Brazilian Spine Society<br>Room 304
- Young Spine Surgeons Forum<br>Room 305
- Symposium: “Own the Bone:” The Spine Practitioner Taking Ownership of the Bone<br>Gateway Ballroom 103/104
- Global Spine Forum: Association of Spine Surgeons of India<br>Room 304
- Networking Break—Beverage Service<br>Esplanade Ballroom Lobby
- Spine Safety Update<br>Gateway Ballroom 103/104
- Global Spine Forum: AOSpine<br>Room 304
- Value Abstract Awards Presentations<br>Gateway Ballroom 103/104

Continued on next page
### FRIDAY, NOVEMBER 14 (Continued)

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<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>3:40–4:40 p.m.</td>
<td>Concurrent Sessions:</td>
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<tr>
<td></td>
<td>• Deformity</td>
<td>Gateway Ballroom 103/104</td>
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<tr>
<td></td>
<td>• Complications of Lumbar Surgery</td>
<td>Gateway Ballroom 102</td>
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<tr>
<td></td>
<td>• Basic Science</td>
<td>Room 302</td>
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<td>• Prognostic Indicators of Outcomes</td>
<td>Room 303</td>
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<td></td>
<td>Focused Discussion: Reducing the Risk of Surgical Site Infection</td>
<td>Room 301</td>
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<tr>
<td>4:00–5:00 p.m.</td>
<td>Global Spine Forum: Chinese Orthopaedic Association</td>
<td>Room 304</td>
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<tr>
<td>4:45–5:45 p.m.</td>
<td>International Reception</td>
<td>Esplanade Ballroom Lobby</td>
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### SATURDAY, NOVEMBER 15

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>7:30–9:00 a.m.</td>
<td>Continental Breakfast</td>
<td>Esplanade Ballroom Lobby</td>
</tr>
<tr>
<td>7:30 a.m.–12:00 p.m.</td>
<td>Attendee Registration</td>
<td>South Lobby</td>
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<tr>
<td>7:55–8:00 a.m.</td>
<td>Announcements</td>
<td>Room 305</td>
</tr>
<tr>
<td>8:00–9:30 a.m.</td>
<td>Symposium: Section on Minimally Invasive Procedures: Minimally Invasive Surgical Management of Degenerative Lumbar Scoliosis: The Good, the Bad and the Ugly</td>
<td>Room 305</td>
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<tr>
<td>9:30–10:00 a.m.</td>
<td>Networking Break—Beverage Service</td>
<td>Esplanade Ballroom Lobby</td>
</tr>
<tr>
<td>10:00–11:00 a.m.</td>
<td>Concurrent Sessions:</td>
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<tr>
<td></td>
<td>• Surgical Complications</td>
<td>Room 303</td>
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<td></td>
<td>• Outcomes in Spine Care</td>
<td>Room 304</td>
</tr>
<tr>
<td></td>
<td>• Deformity</td>
<td>Room 305</td>
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<tr>
<td>11:00 a.m.–12:00 p.m.</td>
<td>Focused Discussion: Management of Complex Problems in Lumbar Spinal Stenosis</td>
<td>Room 305</td>
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<tr>
<td>12:00 p.m.</td>
<td>Meeting Adjourns</td>
<td></td>
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</tbody>
</table>

### What is SpineConnect?

See what everyone’s talking about. Stop by the SpineConnect booth in the South Lobby to learn more and for your chance to win an iPad mini or a moto360 watch!

Or go to connect.spine.org to get connected now.
The Minimally Invasive Surgery international course features renowned faculty, lectures and a hands-on lab utilizing state-of-the-art minimally invasive instrumentation.

Designed specifically for both neuro and orthopedic spine surgeons, this course has been developed for those surgeons who want to extend their surgical skills into complex areas of the spine, whereby understanding the unique anatomic and clinical aspects of the spine at important points in performing surgery.

The first hour of each session is a lecture given by experienced faculty on how they utilize MIS procedures to treat various spine conditions such as degenerative disc disease, low-grade spondylolisthesis and spinal stenosis. A three-hour lab follows the lecture, during which surgeon faculty and corporate personnel assist each participant in learning MIS techniques that will help them on their next case.

Participants learn retractor placement to maximize visualization of the spine to treat specific spinal conditions. Participants gain valuable experience from their surgeon colleagues and learn how to handle fusion procedures such as ALIF, TLIF and PLIF. In addition, participants learn how to insert specific cages (PEEK or Titanium) directly into the disc space which is critical in fusing vertebrae. Learning important techniques, such as removing the lamia and properly cleaning out disc space to allow the cage to be easily inserted, can make most outcomes successful.

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

- Articulate that patient selection is very important in the utilization of MIS techniques;
- Appreciate that X-rays explain the patient’s condition;
- Explain indications and contraindications of various MIS approaches;
- Distinguish techniques for accessing the spine to treat patients’ conditions;
- Gain comfort with instrumentation so that each case goes smoothly.

This non-CME event has been designed exclusively for international surgeons. A certificate of attendance will be awarded to each participant upon completion of the course.

Corporate support for the Minimally Invasive Surgery workshops was provided by Amendia, DePuy Synthes, Joimax, NuVasive and Protech Radiation Safety.
Correct coding is the key to appropriate and timely reimbursement. This interactive, comprehensive coding/reimbursement course covers pertinent issues in ICD-9, ICD-10 and CPT-4 coding, payer reimbursement rules, and the complex nuances of Evaluation and Management, and Operative, Nonoperative and Radiology coding. 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 network with others in the same Medicare region to apply appropriate coding techniques to both simple and complex clinical examples. Implications and effects of proper coding and contract negotiation techniques for appropriate reimbursement and compliance are discussed.

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

- Recognize new procedure codes for 2014 and their proper usage;
- Discuss the importance of correct coding on practice reimbursement;
- Properly use and document Evaluation and Management and Procedure Codes;
- Use modifiers and add-ons effectively;
- Review coding for injections and neurologic testing;
- Gain insight into payer reimbursement rules.

The North American Spine Society designates this live activity for a maximum of 12.75 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

The 11th Annual Evidence & Technology Spine Summit is the only winter meeting of its kind, providing both surgical and medical/interventional perspectives on spine care.

www.spinesummit.org
7:30 a.m.–3:30 p.m.
Ticketed Instructional Course:
Coding Update 2014: Essentials and Controversies of Spine Care Coding (Continued)
Room 300

7:30 a.m.–4:30 p.m.
Ticketed Hands-on Course:
Minimally Invasive Spine Surgery
Didactic: Room 303
Lab: Room 106
Course Chairs: Michael Y. Wang, MD and Raja Y. Rampersaud, MD, FRCSC

This hands-on course reviews basic and advanced techniques of minimally invasive spine surgery (MISS) as currently applied to the lumbar spine and microsurgical anatomy and provides a hands-on opportunity to perform minimally invasive approaches for lumbar decompression, pedicle screw instrumentation, lateral approaches and interbody access/fusion. In addition, endoscopic transformaminal decompressive techniques are demonstrated.

Upon completion of this course, participants should gain strategies to:
• Review the microsurgical anatomy of the lumbar spine, specifically as it relates to minimally invasive surgery;
• Practice accessing the lumbar spinal canal and intervertebral disc space through tubular access portals, posteriorly and laterally;
• Place pedicle screws in the lumbar spine using percutaneous and minimally invasive techniques;
• Develop facility with the lateral trans-psoas approach to the lumbar spine;
• Obtain hands-on experience with endoscopic far lateral decompressive procedures;
• Discuss pearls and pitfalls of complication avoidance.

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.
8:00 a.m.–12:00 p.m.
Ticketed Technique Workshop: Fundamentals of Spine Deformity
Room 304
Course Chair: Michael D. Daubs, MD

This workshop focuses on didactic discussions including: sagittal and coronal balance, clinical applications of pelvic parameters, osteotomy techniques, iliolumbar fixation techniques and anatomy techniques utilizing thoracic pedicle screws.

Through expert lectures, moderated case discussions and hands-on practice on sawbones, spine surgeons gain practical knowledge and technical skills to improve the care they provide to their spinal deformity patients.

Upon completion of this workshop, participants should gain strategies to:
- Recognize various forms of cervical deformity, patient presentations, symptoms, evaluation and surgical treatment;
- Identify issues involved with optimal spinal balance, pelvic parameters, and principles and techniques of revision spinal reconstruction;
- Differentiate between the options for various osteotomy techniques, their indications, results, possible complications, and where these are potentially headed in the future.

The North American Spine Society designates this live activity for a maximum of 3.75 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

8:00 a.m.–12:00 p.m.
Ticketed Instructional Course: Leadership Development and Training
Room 301
Course Chair: 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 or the strength of a committee or an entire organization, look to the NASS Leadership Development Course 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.

Upon completion of this course, 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 plan to create a greater impact in the organization;
- Institute a system of self-evaluation and improvement;
- Apply skills on how to run an effective meeting;
- Acquire skills to become successful in an environment that utilizes ACO’s.

The North American Spine Society designates this live activity for a maximum of 3.75 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.
Non-specific back pain is a term that has its historical roots in the ‘art’ of medicine. While clinical and academic science has continued to progress, it has not made its way into day-to-day clinical practice. Current literature suggests that all patients SHOULD NOT be treated equally and that multidisciplinary management techniques may be helpful in treatment methods that adapt more appropriately to the individual patient. This course focuses on current scientific and clinical literature brought together as it should inform day to day practice in the management and treatment of the presenting so called “non-specific” back pain patient. The course includes the latest information from international expert researchers with regards to muscle function and injury, neuromuscular control and education, measurements to assess exercise and its role in treating LBP and explanations of neurobehavioral mechanisms that allow some people to continue to experience pain despite appropriate treatment. Following the international research expert panel presentations, clinicians from multiple disciplines discuss their own evidence-based approach to specific symptom case scenarios occurring in patients with LBP. In the end, participants will be able to dismiss some of the “non” in non-specific LBP.

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

- Discuss the diagnostic dilemma—where we have been;
- Recognize why evidence-based medicine is critical—where we are;
- Comprehend why outcomes and transparency are critical in the changing healthcare horizon—where we are going;
- Explain the importance of patient-reported and clinician-based outcomes;
- Assess the importance of multidisciplinary cross-pollination.

*The North American Spine Society designates this live activity for a maximum of 3.75 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.*
There has been a renewed interest in spinal image guidance secondary to the development of more user-friendly technology and a growing concern for radiation exposure in the operating room. This instructional course teaches the fundamentals of image-guided spinal surgery. The caveats and pitfalls of this technology are discussed, in addition to the operating room setup. Participants learn the applications of image guidance to cervical, thoracic, lumbar, minimally invasive, revision and deformity spinal surgery procedures. During a breakout session, the participants are given the opportunity to gain hands-on experience with a variety of the image-guided systems currently available. A review of the published literature on spinal image guidance and operating room radiation exposure is presented. At the conclusion of the course, cases are presented and discussed.

**Upon completion of this course, participants should gain strategies to:**
- Demonstrate the proper setup in the operating room for image-guided spinal surgery;
- Identify and perform different registration techniques used in image-guided spinal surgery;
- Describe methods to maintain navigation accuracy in image-guided spinal fusion procedures;
- Compare different image guidance technologies that are available and understand CPT codes for spinal image guidance;
- Review the most common pitfalls of spinal image guidance that can add time and frustration to the procedure and identify methods to avoid these pitfalls.

The North American Spine Society designates this live activity for a maximum of 3.75 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.
Low back pain and neurological symptoms from spinal disorders are among the most common musculoskeletal conditions resulting in physician visits and surgery in patients over the age of 65. Outcomes in elderly patients receiving treatment for spinal disorders are often impacted by comorbidities and sociobehavioral factors that may go unrecognized. With a rapidly aging population and shifting paradigms in the delivery of health care, it is increasingly important that spinal care providers offer comprehensive, effective and evidence-based management of the elderly suffering with spine related pain syndromes and disability.

This session reviews the etiology, clinical presentation and management of spinal disorders seen in the elderly population. Spinal disorders covered include: lumbar spondylosis, spinal stenosis, osteoporosis, and acquired scoliosis and spinal deformity. A multidisciplinary faculty presents indications for commonly utilized clinical examination techniques, conservative care and operative treatments in elderly patients with these spinal disorders. The impact of common comorbidities and behavioral factors on patient prognosis and the course of treatment in the elderly are presented with special attention given to the role of comprehensive, evidence-based management of these patients.

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

- Recognize distinctive characteristics of the history, behavioral and physical examination of elderly individuals who present with pain and disability arising from lumbar spine disorders;
- Identify the advantages and disadvantages of specific clinical examination, physical and behavioral treatment techniques for elderly individuals who present with pain and disability arising from lumbar spine pathology;
- Enhance the use of best practice examination and treatment techniques of individuals with degenerative lumbar spine conditions, based on the most current evidence;
- Integrate current evidence and clinical findings to facilitate optimal triage of elderly patients with pain and disability arising from lumbar spine disorders in a manner consistent with best practice.
6:30–8:00 a.m.
Continental Breakfast
Gateway Ballroom Lobby

6:30 a.m.–5:30 p.m.
Attendee Registration
South Lobby

7:00 a.m.–5:00 p.m.
Exhibitor Registration
South Lobby

7:20–7:30 a.m.
Welcome Remarks
Gateway Ballroom 103/104

7:30–8:30 a.m.
Best Papers
Gateway Ballroom 103/104
Moderator: Jeffrey C. Wang, MD

7:30–7:36 a.m.
1. Outcomes of Operative and Nonoperative Treatment for Adult Spinal Deformity (ASD): A Prospective, Multicenter Matched and Unmatched Cohort Assessment with Minimum Two-Year Follow-Up
International Spine Study Group; Justin S. Smith, MD, PhD; Virginie Lafage, PhD; Christopher I. Shaffrey, MD; Frank J. Schwab, MD; Richard A. Hostin, MD; Oheneba Boachie-Adjei, MD; Behrooz A. Akbarnia, MD; Eric O. Klineberg, MD; Munish C. Gupta, MD; Kai-Ming G. Fu, MD, PhD; Han Jo Kim, MD; Alexandre Soroceanu, MD, MPH; Vedat Deviren, MD; Robert A. Hart, MD; Douglas C. Burton, MD; Shay Bess, MD; Christopher P. Ames, MD

7:36–7:42 a.m.
2. Comparison of Best Versus Worst Clinical Outcomes for Adult Spinal Deformity (ASD) Surgery: A Prospective, Multicenter Assessment With Minimum Two-Year Follow-Up
International Spine Study Group; Justin S. Smith, MD, PhD; Virginie Lafage, PhD; Christopher I. Shaffrey, MD; Frank J. Schwab, MD; Themistocles S. Protopsaltis, MD; Eric O. Klineberg, MD; Munish C. Gupta, MD; Kai-Ming G. Fu, MD, PhD; Han Jo Kim, MD; Alexandre Soroceanu, MD, MPH; Vedat Deviren, MD; Robert A. Hart, MD; Douglas C. Burton, MD; Shay Bess, MD; Christopher P. Ames, MD

7:42–7:48 a.m.
3. Correlation of Cervical Sagittal Alignment Parameters on Full-Length Spine Sadiographs Compared With Dedicated Cervical Radiographs
Casey L. Smith, MD; Leah Y. Carreon, MD, MSc; John R. Dimar II, MD; Farah Ammous; Steven D. Glassman, MD

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

7:47–7:53 a.m.
Casey L. Smith, MD; Leah Y. Carreon, MD, MSc; John R. Dimar II, MD

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

WEDNESDAY, NOVEMBER 12
7:48–7:54 a.m.
4. Does Intrawound Application of Vancomycin Influence Bone Regeneration in Spinal Fusion?
Claudia Eder, MD; Stefan Schenk, MD; Jana Trifinopoulou; Sabrina Schildboeck; Melanie Kienzl; Michael Ogon, MD
1Orthopädisches Hospital Speising, Austria; 2Vienna, Austria; 3Orthopaedisches Spital Speising GmbH, Wien, Austria
FDA Device/Drug Status: Vancomycin (Investigational/Not approved).

7:54–8:00 a.m.
5. Operative Treatment of Adult Spinal Deformity (ASD) Improves Disease State and Physical Function Regardless of Age and Deformity Type, While Nonoperative Treatment Has No Impact: A Two-Year Prospective Analysis
International Spine Study Group; Kai-Ming G. Fu, MD, PhD; Shay Bess, MD; Virginie Lafage, PhD; Christopher P. Ames, MD; Behrooz A. Akbarnia, MD; Oheneba Boachie-Adjei, MD; Douglas C. Burton, MD; Vedat Deviren, MDS; Robert A. Hart, MD; Munish C. Gupta, MD; Eric O. Klineberg, MD; Thomas J. Errico, MD; Gregory M. Mundis Jr., MD; Richard A. Hostin, MD; Michael F. O’Brien, MD; Khaled M. Kebaish, MD; Frank J. Schwab, MD; Christopher I. Shaffrey, MD; Justin S. Smith, MD, PhD
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

8:00–8:06 a.m.
6. Discrepancies in Preoperative Planning and Operative Execution in the Correction of Sagittal Spinal Deformities
Shian Liu, BS; Bertrand Moal, MS; Virginie Lafage, PhD; Stephen P. Maier II, BA; Vincent Challier, MD; Wafa Skalli; Themistocles S. Protopsisalis, MD; Thomas J. Errico, MD; Frank J. Schwab, MD
1New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 2New York, NY, US; 3Spine Research Institute, New York, NY, US; 4LBM, Biomechanics Laboratory, Paris, France; 5New York University Langone Medical Center, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

8:06–8:12 a.m.
7. Benchmarking the Outcome of Lumbar Spine Surgery Using a Spine Register Database
Björn Strömquist, MD; Peter Fritzell, MD, PhD; Olle Hagg, MD, PhD; Bo Jonsson, MD; Bengt Sanden, MD
1Lund, Sweden; 2Falun Hospital, Falun, Sweden; 3Spine Center Göteborg, Vastra Frolunda, Sweden; 4Lund University Hospital, Lund, Sweden; 5Sweden
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

8:12–8:30 a.m.
Discussion

8:30–8:35 a.m.
NASS Working for You:
NASS Appropriate Use Criteria
Gateway Ballroom 103/104
Moderator: Charles Reitman, MD

8:35–10:00 a.m.
Symposium:
Lateral Approach to the Lumbar Spine
Gateway Ballroom 103/104
Moderators: Josh E. Schroeder, MD and Andrew A. Sama, MD

Over the last eight years, the lateral approach to the lumbar spine has become an option for anterior column realignment, support and fusion procedures. Despite more wide spread acceptance of this approach there are still many concerns regarding the applicability, safety and value in the context of minimally invasive approaches to the spine for single level pathology or as an adjunct in deformity surgery. This session gives an overview on the indications, techniques and potential complications associated with the lateral approach. In addition, lectures are given on future developments for the lateral approach disc replacement, anterior release and the L5-S1 interspace. A talk is given on deformity correction—an all posterior versus a combined lateral posterior approach—risks and benefits. Case presentations and open discussion conclude the symposium.

Upon completion of this session, participants should gain strategies to:
• Comprehend the indication for lateral spine surgery;
• Describe risks and pitfalls with the lateral approach;
• Appreciate the future of the lateral approach;
• Recognize the role of lateral surgery in deformity correction;
• Review and discuss techniques for lateral surgery.
Agenda

Indications for Lateral Spine Surgery
Andrew A. Sama, MD

Techniques for Lateral Surgery
Federico P. Girardi, MD

Lateral Surgery in Deformity Correction
Alexander P. Hughes, MD

Risks and Pitfalls with the Lateral Approach
Joseph M. Zavatsky, MD

The Future of Lateral Surgery
Frank P. Cammisa Jr., MD

Discussion, Questions and Answer
All Faculty

FDA Device/Drug Status:
Frank P. Cammisa, Jr., MD: This presentation does not discuss or include any applicable devices or drugs.
Federico P. Girardi, MD: This presentation does not discuss or include any applicable devices or drugs.
Alexander P. Hughes, MD: This presentation does not discuss or include any applicable devices or drugs.
Andrew A. Sama, MD: This presentation does not discuss or include any applicable devices or drugs.
Joseph M. Zavatsky, MD: Lateral cages (Not approved for this indication).

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

ePosters
Education Resource Center

Career Fair
Room 101

10:00 a.m.–10:30 a.m.
Networking Break—Beverage Service
Technical Exhibition, Aisles 800 and 1900

Practical Theater:
Navigating CMS Quality Initiatives (PQRS and Value-based Modifier): How to Successfully Report and Avoid Payment Adjustments
Technical Exhibition, Booth 2504

10:00 a.m.–12:00 p.m.
Section on Allied Health:
Room 305
Moderator: Ryan A. Tauzell, MA, PT, Cert. MDT

There is no more important topic in spine care than decision-making, specifically deciding the best treatment for each individual patient. Determining if a patient's spinal disorder has a directional preference (DP) is of immense value in surgical decision-making, selecting predictably effective nonsurgical treatment and optimizing postsurgical outcomes. This interdisciplinary, comprehensive overview offers clinical perspectives from a spectrum of spine clinicians on the value and use of DP in any spine practice.

Upon completion of this session, participants should gain strategies to:
- Recognize the main characteristics and evidence base of directional preference;
- Identify how directional preference and centralization can influence the care of patients;
- Describe how a spine surgeon uses directional preference for patient planning;
- Determine how directional movement can alter disc mechanics;
- Evaluate a case study for effective service utilization decision-making;
- Summarize and compare the effectiveness of Directional Preference exercise training with other exercises, therapies and medical approaches for the management of low back pain.

Agenda

Welcome and Introduction
Ryan A. Tauzell, MA, PT, Cert. MDT

Directional Preference Guides Reduction of a Disc Herniation? An MRI Case Study
Ezequiel Ghercovici, PT, Dip. MDT

Directional Preference: An Overview
Ryan A. Tauzell, MA, PT, Cert. MDT

The Disc Model and Symptom Behavior Patterns
Daniel Perry, MPT, Dip. MDT

Comparative Effectiveness: How Does Directional Preference Stack Up?
John M. Mayer, DC, PhD, CCRP

How Does Directional Preference Influence Care Decisions?
Ron Donelson, MD, MS

How Does A Spine Surgeon Utilize Directional Preference?
Stephen Grubb, MD

Panel Case Study and Discussion
Faculty Panel
**FDA Device/Drug Status:**
All presenters: These presentations do not discuss or include any applicable devices or drugs.

**10:30–10:35 a.m.**
**NASS Working for You:**
**Update on Sections**
Gateway Ballroom 103/104
Moderator: William Mitchell, MD

The costs associated with spinal conditions are large and there is concern that the current cost of spine care is not sustainable. This symposium highlights some of the initiatives that may impact the practice, coverage and reimbursement of spine surgery in the changing health care system in the United States.

**Upon completion of this session, participants should gain strategies to:**
- Review variations in the costs of spine surgery;
- Recognize recent and proposed changes in the reimbursement of spine surgery;
- Discuss managed care programs aimed at spine surgery;
- Measure the quality of care in spine surgery;
- Estimate the cost of an episode of care that includes spine surgery;
- Manage the costs of spine surgery for large employers.

**Agenda**
**Introduction: Cost Containment in Spine Surgery**
Simon Dagenais, DC, PhD

**Utilization, Trends and Variations in Nonoperative and Operative Care**
Andrew Schoenfeld, MD

**The Perioperative Surgical Home**
S. Samuel Bederman, MD, PhD, FRCSC

**Payment Models: Shift from Fee for Service to Pay for Performance**
Stephen Bartol, MD, MBA, FRCSC

**Transfer of Risk from Payer to Physician**
John A. Bendo, MD

**Questions**
Faculty Panel

**Payer Perspective: Value-based Benefits Design**
Andrew A. Bonin, MD

**10:35 a.m.–12:00 p.m.**
**Symposium:**
**Implementing Accountable Care in Spine Surgery to Promote Sustainable Health Care**
Gateway Ballroom 103/104
Moderators: Sigurd H. Berven, MD, Simon Dagenais, DC, PhD and Emily K. Karlen, MPT

**12:00–1:00 p.m.**
**Complimentary Box Lunch**
*Medical Attendees Only*
Technical Exhibition, Halls A and C

**Fellowship and Program Directors Meeting**
Room 300

**Solution Showcase**
Technical Exhibition, Booth 2504

**12:00 p.m.: Invibio**
PEEK-OPTIMA HA-Enhanced Polymer for Spinal Fusion
*Professor Bill Walsh, PhD*

**12:30 p.m.: SI-BONE**
Long Term Outcomes With the iFuse Implant System for SI Joint Fusion
*Leonard Rudolf, MD*

**1:00–2:00 p.m.**
**Concurrent Session:**
**Spine Trauma**
Gateway Ballroom 103/104
Moderator: Carlo Bellabarba, MD

**1:00–1:06 p.m.**
**8. Comparative Study for Treatment Outcomes of Osteoporotic Compression Fracture Without Neurologic Injury Using Rigid Brace, Soft Brace and No Brace: A Prospective Randomized Controlled Non-Inferiority Trial**
Ho-Joong Kim, MD, PhD
Seoul, South Korea

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

Farhaan Altaf, MD, FRCS; Lise Belanger, RN; Juan Ronco, MD; Nicolas Dea, MD, FRCS; Scott J. Paquette, MD; Michael Boyd, MD; John Street, PhD, MD; Charles G. Fisher, MD; Marcel F. Dvorak, MD, FRCS; Brian K. Kwon, MD, PhD, FRCS

Vancouver, BC, Canada; Quebec, QC, Canada; University of Toronto Spine Program, Toronto, ON, Canada; FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.


Brian M. Drew, FRCS, PT; Michael G. Fehlings, MD, PhD, FRCS; Jerome Paquet, MD, FRCS; Henry Ahn, MD, PhD, FRCS; Najmedden Attabib, FRCS; Christopher S. Bailey, MD, FRCS; Sean D. Christie, MD; Neil Duggal, MD, FRCS; Joel A. Finkelstein, MD; Daryl R. Fourney V, MD, FRCS; R. John Hurlbert, MD, PhD; Michael G. Johnson, MD, FRCS; Brian K. Kwon, MD, PhD, FRCS; Stefan Parent, MD; Eve C. Tsai, MD; Marcel F. Dvorak, MD, FRCS; Vanessa K. Noonan, PT; Carly S. Rivers, PhD, MSc, BS

Hamilton, ON, Canada; Toronto Western Hospital, Toronto, ON, Canada; Quebec, QC, Canada; University of Toronto Spine Program, Toronto, ON, Canada; Saint John, NB, Canada; University of Western Ontario, London Health Sciences Centre, London, ON, Canada; QE II Health Sciences Centre, Halifax, NS, Canada; University of Western Ontario, London, ON, Canada; Sunnybrook Health Sciences Centre, Toronto, ON, Canada; Royal University Hospital, Saskatoon, SK, Canada; University of Calgary Spine Program, Calgary, AB, Canada; Health Sciences Centre Winnipeg Spine Program, Winnipeg, MB, Canada; Blusson Spinal Cord Centre, Vancouver, BC, Canada; C2 Neurosciences Unit, Ottawa, ON, Canada; Vancouver, BC, Canada; Rick Hansen Institute, Vancouver, BC, Canada

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

11. The Relation Between Depression, PTSD and the Likelihood of Returning to Work After Spine Trauma

Alexander C. Ching, MD; Lauren Wessler; Sabina R. Blizzard, BA; Natalie L. Zusman; Jung U. Yoo, MD

Portland, OR, US; Oregon Health and Science University, Portland, OR, US

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

12. Subaxial Injury Classification (SLIC) Scoring System Treatment Recommendations for Cervical Spine Trauma: Retrospective Review of 193 Patients

Sumant Samuel, MBBS, MS; Jiun-lih J. Lin, MBBS; Margaret M. Smith, PhD; Nathan Hartin, MD; Andrew Cree, MD, FRCS; Con Vasili, FACS; Randolph Gray, FRACS

Christian Medical College, Vellore, India; Royal North Shore Hospital, St. Leonards, Australia; Kolling Institute, St. Leonards, Australia; Twin Cities Spine Centre, Minneapolis, MN, US; The Children's Hospital at Westmead and Westmead Hospital, Westmead, NSW, Australia; Sydney, Australia

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

13. Incidence and Cost of Treating Axis Fractures in the United States from 2000 to 2010

Alan Daniels, MD; Sean M. Esomende, MD; Mark A. Palumbo, MD

Warren Alpert School of Medicine at Brown University, Providence, RI, US

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

14. The Importance of “Time to Surgery” for Traumatic Spinal Cord Injured Patients: Results from an Ambispective Canadian Cohort of 949 Patients

Carly S. Rivers, PhD, MSc, BS; Marcel F. Dvorak, MD, FRCS; Charles G. Fisher, MD; Brian K. Kwon, MD, PhD, FRCS; Brian M. Drew, FRCS, PT; Michael G. Fehlings, MD, PhD, FRCS; Jerome Paquet, MD, FRCS; Henry Ahn, MD, PhD, FRCS; Najmedden Attabib, FRCS; Christopher S. Bailey, MD, FRCS; Sean D. Christie, MD; Neil Duggal, MD, FRCS; Joel A. Finkelstein, MD; Daryl R. Fourney V, MD, FRCS; R. John Hurlbert, MD, PhD; Michael G. Johnson, MD, FRCS; Jean-Marc Mac-Thiong, MD, PhD; Stefan Parent, MD; Eve C. Tsai, MD; Vanessa K. Noonan, PT; Nader Fallah, PhD

Rick Hansen Institute, Vancouver, BC, Canada; Blusson Spinal Cord Centre, Vancouver, BC, Canada; Vancouver General Hospital, Vancouver, BC, Canada; Hamilton, ON, Canada; Toronto Western Hospital, Toronto, ON, Canada; Quebec, QC, Canada; University of Toronto Spine Program, Toronto, ON, Canada; Saint John, NB, Canada; University of Western Ontario, London Health Sciences Centre, London, ON, Canada; QE II Health Sciences Centre, Halifax, NS, Canada; University of Western Ontario, London, ON, Canada; Sunnybrook Health Sciences Centre, Toronto, ON, Canada; Royal University Hospital, Saskatoon, SK, Canada; Royal Hospital, St. Leonards, Australia; University of Calgary Spine Program, Calgary, AB, Canada; Health Sciences Centre Winnipeg Spine Program, Winnipeg, MB, Canada; Hospital du Sacre-Coeur de Montreal, Montreal, QC, Canada; C2 Neurosciences Unit, Ottawa, ON, Canada; Vancouver, BC, Canada

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
1:00–2:00 p.m.
Concurrent Session: Diagnostic Imaging in Spine Care
Gateway Ballroom 102
Moderator: Charles H. Cho, MD, MBA

1:00–1:06 p.m.
15. Lumbar Degenerative Disc MODIC 1 and 2 Are Not Associated With Low-Grade Infection: A Prospective Study by Anterior Retroperitoneal Approach
Thomas Thelen, MBBS1; Julien Rigal, MD, Arnaud Cogniet, MBBS1; Hugues Demezon, MD1; Jean-Charles Le Huec, MD2
1CHU de Bordeaux, Bordeaux, France; 2Bordeaux, France
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:06–1:12 p.m.
16. Intramedullary Signal Intensity and Other Prognostic Factors for Surgical Outcome in Spinal Cord Injury Associated With Ossification of the Posterior Longitudinal Ligament (OPLL)
Jun-Jae Shin, MD, PhD
Seoul, South Korea
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:12–1:18 p.m.
17. Association of Vertebral Bone Marrow Edema With Low Back Pain in Degenerative Lumbar Scoliosis in the Elderly: A Cross-Sectional Observational Study
Kiyotaka Yamada, MD, PhD1; Yoshinori Fujimoto, MD, PhD2; Toshio Nakamae, MD3; Masaki Matsuura4
1Hiroshima University General Hospital, Hatsuakai, Japan; 2JA Hiroshima General Hospital, Hatsuakai, Japan; 3Hiroshima University, Hiroshima, Japan
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:18–1:24 p.m.
18. Validation of Multisociety Combined Task Force Definitions of Abnormal Disc Morphology
Charles H. Cho, MD, MBA1; Liangge Hsu, MD, Marco Ferrone, MD2; Mitchell Harris, MD, FACS3; Amir A. Zaman4; Christopher M. Bono, MD5
1Brigham and Women’s Hospital Department of Radiology, Harvard Medical School, Boston, MA, US; 2Brigham and Women’s Hospital Department of Orthopedic Surgery, Harvard Medical School, Boston, MA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:24–1:30 p.m.
19. Oblique Magnetic Resonance Imaging of the Lumbar Neuroforamina Improves Precision When Diagnosing Nerve Root Impingement: A Prospective Study
David B. Bumpass, MD1; Jacob M. Buchowski, MD, MS2; Michael P. Kelly, MD3; Michelle Miller-Thomas, MD4
1St. Louis, MO, US; 2Washington University in St. Louis, St. Louis, MO, 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.

1:30–1:36 p.m.
20. Retroperitoneal Oblique Corridor to the L2-S1 Intervertebral Discs: An MRI Study
Daniel A. Fung, MD1; Diana M. Molinares, MD2; Timothy T. Davis, MD3
1Hawthorne, CA, US; 2Orthopedic Pain Specialists, Santa Monica, CA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:36–1:42 p.m.
21. The Prevalence of Sacroiliac Joint Degeneration in Asymptomatic Adults: A Review of 500 CT Scans
Jonathan-James Eno, MD1; Michael Bellino, MD2; Julius Bishop, MD3
1Providence, RI, US; 2Redwood City, CA, US; 3Palo Alto, CA, 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.
Concurrent Session: Surgical Management of Cervical Myelopathy
Room 302
Moderator: Alan S. Hilibrand, MD

1:00–1:06 p.m.
22. Clinical and Surgical Predictors of Perioperative Complications in Patients with Degenerative Cervical Myelopathy: Results from the Multicenter, Prospective AOSpine International Study on 479 Patients
Michael G. Fehlings, MD, PhD, FRCS1; Lindsay Tetreault2; Nabeel Alshafai, MBBS3, FRCS, FEANS4; Pierre Côté5, DPT, PhD6; Branko Kopjar, MD, PhD7; Helton Luiz A. Defino, MD, PhD8; Shashank Kale, MD9; Giuseppe Babbaragallo, MD10; Ronald Bartels, MD11; Qiang Zhou, MD12; Paul M. Arnold, MD13; Mehmet Zileli, MD14; Gamaliel Tan, MD15; Yasutsugu Yukawa, MD16; Osmar J. Moraes, MD17; Massimo Scerrati, MD, PhD18; Masato Tanaka, MD19; Tomoaki Toyone, MD, PhD20; Ciaran Bolger, FRCS, PhD21; Manuel Alvarado, MD22
1:06–1:12 p.m.  

**Michael G. Fehlings, MD, PhD, FRCSC**; Branko Kopjar, MD, PhD; Helton Luiz A. Defino, MD, PhD; Shashank Kale, MD; Giuseppe Barbagallo, MD, MD; Ronald Bartels, MD, PhD; Qiang Zhou, MD; Paul M. Arnold, MD; Mehmet Zileli, MD; Gamaliet Tan, MD; Yasutsgu Yukawa, MD; Osmar J. Moraes, MD; Massimo Scerrati, MD; Masato Tanaka, MD; Tomoaki Toyone, MD, PhD; Claran Bolger, FRCS, PhD; Manuel Alvarado, MD

1:12–1:18 p.m.  
**24. Regional Differences in Outcomes of Surgical Treatment for Cervical Spondylotic Myelopathy (CSM): Outcomes of the AOSpine Multicenter Prospective CSM-I Study**

**Michael G. Fehlings, MD, PhD, FRCSC**; Branko Kopjar, MD, PhD; Helton Luiz A. Defino, MD, PhD; Shashank Kale, MD; Giuseppe Barbagallo, MD, MD; Ronald Bartels, MD, PhD; Qiang Zhou, MD; Paul M. Arnold, MD; Mehmet Zileli, MD; Gamaliet Tan, MD; Yasutsgu Yukawa, MD; Osmar J. Moraes, MD; Massimo Scerrati, MD; Masato Tanaka, MD; Tomoaki Toyone, MD, PhD; Claran Bolger, FRCS, PhD; Manuel Alvarado, MD

1:18–1:24 p.m.  
**25. Laminoplasty Versus Laminectomy and Fusion to Treat Cervical Spondylotic Myelopathy: Outcomes of the Prospective Multicenter AOSpine International CSM Study**

**Michael G. Fehlings, MD, PhD, FRCSC**; Branko Kopjar, MD, PhD; Helton Luiz A. Defino, MD, PhD; Shashank Kale, MD; Giuseppe Barbagallo, MD, MD; Ronald Bartels, MD, PhD; Qiang Zhou, MD; Paul M. Arnold, MD; Mehmet Zileli, MD; Gamaliet Tan, MD; Yasutsgu Yukawa, MD; Osmar J. Moraes, MD; Massimo Scerrati, MD; Masato Tanaka, MD; Tomoaki Toyone, MD, PhD; Claran Bolger, FRCS, PhD; Manuel Alvarado, MD

1:24–1:30 p.m.  
**26. Surgical Management of Non-Ambulatory Patients With Cervical Spondylotic Myelopathy**

**Christopher G. Furey, MD**; Katherine Sadowski, BS; Jung U. Yoo, MD; Nicholas U. Ahn, MD; Sanford E. Emery, MD, MBA

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.
1:30–1:36 p.m.

27. Perioperative Outcomes After Cervical Laminoplasty Versus Posterior Decompression and Fusion: Analysis of 779 Patients in the ACS-NSQIP Database

Arya G. Varthi, MD1; Bryce Basques2; Daniel D. Bohl, MPH1; Jonathan N. Grauer, MD1

1Yale University School of Medicine, New Haven, CT, US; 2New Haven, CT, US

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

1:36–1:42 p.m.


Lindsay Tetreault1; Branko Kopjar, MD, PhD2; Pierre Côté, DPT, PhD2; Paul M. Arnold, MD2; Michael G. Fehlings, MD, PhD, FRCSC3

1University Health Network, Toronto, ON, Canada; 2Mercer Island, WA, US; 3Toronto Western Research Institute, Toronto, ON, Canada; 4University of Kansas Medical Center Department of Neurosurgery, Kansas City, KS, US; 5Toronto Western Hospital, Toronto, ON, Canada

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 p.m.–2:00 p.m.

Concurrent Session:
Biomechanics in Spine Care
Room 303
Moderator: Avinash G. Patwardhan, PhD

1:00–1:06 p.m.

29. Probing, Tapping, Toggling: Are We Inserting Screws Correctly?

John A. Schmidt, PhD1; Vishal Prasad, FRCS, MBBS2

1K2M, Leesburg, VA, US; 2Surrey, UK

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

1:06–1:12 p.m.

30. In Vitro Endplate Strength After Iatrogenic Trauma Resulting from Lateral Interbody Spacer Implantation: Static Spacer Compared to Expandable Spacer

William D. Hunter Sr., MD1; Mark Moldavsky, MS2; Kanaan G. Salloum, BS3; Brandon Bucklen, PhD4

1Gaston Memorial Hospital, Gastonia, NC, US; 2Globus Medical Inc., Audubon, PA, US

FDA Device/Drug Status: CoRoent (Approved for this indication), CALIBER-L (Approved for this indication).

1:12–1:18 p.m.

31. Can Orthopaedic Surgeons Be Trained to Accurately Gauge Tapping Insertional Torque?

Daniel G. Kang, MD1; Ronald A. Lehman Jr., MD2; Adam Bevevino, MD1; John P. Cody, MD3; Robert W. Tracey, MD1; Rachel E. Gaume, BS2; Scott Wagner, MD1; Paul A. Anderson, MD6


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

1:18–1:24 p.m.

32. Biomechanical Effect of Increasing Magnitudes of Internal Annular Disruption

Brian D. Stemper, PhD1; William H. Curry, DC1; Jason Przybylo, MD1; Kristen Kiehl1; Narayan Yoganandan, PhD2; Barry S. Shender, PhD2; Dennis J. Maiman, MD1

1Medical College of Wisconsin, Milwaukee, WI, US; 2NAWCAD, Patuxent River, MD, US; 3Medical College of Wisconsin Department of Neurosurgery, Milwaukee, WI, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
1:24–1:30 p.m.
33. Pfirrmann Grade as a Predictor of Range of Motion, Angular Stiffness and Relative Size of High-Flexibility Zone in the Lumbar Spine
Muturi Muriuki, PhD; Robert M. Havey, BS; Leonard I. Voronov, MD, PhD; Gerard Carandang; Laurie Lomasney, MD; Avinash G. Patwardhan, PhD
1Edward Hines Jr. VA Hospital, Hines, IL, US; 2Hines, IL, US; 3Willowbrook, IL, US; 4Loyola University Medical Center, Maywood, IL, US; 5Loyola 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.

1:30–1:36 p.m.
34. Lumbosacral Transitional Vertebrae Torsional Biomechanics
Hidetoshi Nojiri, PhD, MD; Alejandro Espinoza Orias, PhD; Howard S. An, MD; Gunnar B. Andersson, MD, PhD; Nozomu Inoue, MD, PhD
Department of Orthopedic Surgery, Rush University Medical Center, Chicago, IL, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:36–1:42 p.m.
35. Integrity of “Damage Control” Posterior Spinal Fixation Constructs for Polytrauma Patients in the ICU Setting: A Biomechanical Investigation
Murat Pekmezci, MD; Safa Herfat, PhD; Alexander A. Theologis, MD; Paul Viscogliosi; Robert T. McClellan, MD; Christopher P. Ames, MD
1University of California San Francisco Department of Orthopedic Surgery, San Francisco, CA, US; 2University of California San Francisco, San Francisco, CA, US; 3UHSF/SFGH Orthopaedic Trauma Institute, San Francisco, CA, US; 4Orthopaedic Trauma Institute, San Francisco, CA, US
FDA Device/Drug Status: Stryker Mantis posterior instrumentation system (Approved for this indication).

1:42–2:00 p.m.
Discussion

1:00–2:00 p.m.
Concurrent Session: Outcomes in Deformity Surgery
Room 304
Moderator: Sigurd H. Berven, MD

1:00–1:06 p.m.
36. The Minimum Clinically Important Difference (MCID) in SRS-22R Appearance, Activity and Pain Domains After Surgical Treatment of Adult Spinal Deformity
Charles H. Crawford III, MD; Steven D. Glassman, MD; Keith H. Bridwell, MD; Sigurd H. Berven, MD; Leah Y. Carreon, MD, MSc
1Louisville, KY, US; 2Norton Leatherman Spine Center, Louisville, KY, US; 3Washington University in St. Louis School of Medicine, St. Louis, MO, US; 4University of California San Francisco Department of Orthopaedic Surgery, San Francisco, CA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:06–1:12 p.m.
37. SRS Appearance Domain Correlates the Most with Patient Satisfaction After Adult Deformity Surgery to the Sacrum at Five-Year Follow-Up
Jeffrey L. Gum, MD; Leah Y. Carreon, MD, MSc; Patrick A. Sugrue, MD; David B. Bumpass, MD; Isaac O. Karikari, MD; Lawrence G. Lenke, MD; Keith H. Bridwell, MD
1Louisville, KY, US; 2Norton Leatherman Spine Center, Louisville, KY, US; 3Northwestern University Medical School, Chicago, IL, US; 4St. Louis, MO, US; 5Durham, NC, US; 6Washington University Medical Center Department of Orthopedic Surgery, St. Louis, MO, US; 7Washington University in St. Louis School of Medicine, St. Louis, MO, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

1:12–1:18 p.m.
Christopher P. Ames, MD; International Spine Study Group; Morio Matsumoto, MD; Naobumi Hosogane; Justin S. Smith, MD, PhD; Themistocles S. Protopsaltis, MD; Yu Yamato, MD, PhD; Yukihiro Matsuyma, MD, PhD; Hiroshi Taneichi, MD; Renaud Lafage; Emmanuelle Ferrero, MD; Christopher I. Shaffrey, MD; Frank J. Schwab, MD; Virginie Lafage, PhD
1University of California San Francisco, San Francisco, CA, US; 2Brighton, CO, US; 3Keio University School of Medicine, Tokyo, Japan; 4Saitama, Japan; 5University of Virginia Health System, Charlottesville, VA, US; 6New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 7Hamamatsu University School of Medicine, Department of Orthopaedic Surgery, Hamamatsu, Japan; 8Hamamatsu University School of Medicine, Hamamatsu, Japan; 9Mibu, Japan; 10New York, NY, US; 11University of Virginia Department of Neurosurgery, Charlottesville, VA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
39. Elderly Patients Over 75 Years Undergoing Reconstructive Spinal Deformity Surgery Have Significantly Improved Health-Related Quality of Life Measures Versus Those Managed Nonoperatively Despite High Surgical Complication Rate

International Spine Study Group; Daniel M. Sciubba, MD; Justin K. Scheer, BS; Justin S. Smith, MD, PhD; Eric O. Klineberg, MD; Munish C. Gupta, MD; Gregory M. Mundis Jr., MD; Themistocles S. Protopsaltis, MD; Virginie Lafage, PhD; Han Jo Kim, MD; Tyler R. Koski, MD; Christopher I. Shaffrey, MD; Khaled M. Kebaish, MD; Shay Bess, MD; Robert A. Hart, MD; Frank J. Schwab, MD; Christopher P. Ames, MD


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

1:24–1:30 p.m.

40. Predictors of Revision Surgery in Adult Spinal Deformity and Impact on Patient-Reported Outcomes and Satisfaction: Two-Year Follow-Up

International Spine Study Group; Peter G. Passias, MD; Sun Yang, BA; Alexandra Soroceanu, MD, MPH; Justin S. Smith, MD, PhD; Christopher I. Shaffrey, MD; Oheena Boachie-Adjei, MD; Gregory M. Mundis Jr., MD; Christopher P. Ames, MD; Douglas C. Burton, MD; Shay Bess, MD; Eric O. Klineberg, MD; Robert A. Hart, MD; Frank J. Schwab, MD; Virginie Lafage, PhD


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
Focused Discussion:
Best Practices Update: Diagnosis and Treatment of Degenerative Lumbar Spondylolisthesis
Room 301
Moderator: Paul Matz, MD

Join Paul Matz, MD, Co-chair of the NASS Evidence-Based Guideline Development Committee, and key members of the Diagnosis and Treatment of Degenerative Lumbar Spondylolisthesis Guideline Work Group, including William Tontz, Jr., MD and R.J. Meagher, MD, in a discussion of the key recommendations made within the guideline. Discover the current state of the evidence and share your thoughts related to diagnosis/imaging, medical/interventional treatment, surgical treatment, and treatment cost-effectiveness of degenerative lumbar spondylolisthesis.

1:00–3:10 p.m.
Section on Allied Health:
Collaborative Concepts in Spine Care:
Radiculopathy: A Key in Spinal Management, Outcome and Expense
Room 305
Moderator: Gregory L. Whitcomb, DC

Spinal root compromise may be the most significant driver in clinical decision-making and patient outcome in spine practice. The probability for advanced diagnostic testing, extensive and/or interventional nonoperative treatment and surgery is elevated in patients presenting with radicular-type syndromes.

Early recognition or exclusion of radiculopathy is therefore critical to optimal patient care and resource utilization. Conversely, misdiagnosis can result in inappropriate or delayed care with significant ramifications for patients, clinicians and payers. Adding to this complexity are multiple other causes for the radiating symptoms frequently mimicking radiculopathy.

Given the importance of timely, coordinated and cost-effective patient care, this session is intended to augment the attendee’s ability to differentiate radicular from pseudoradicular syndromes and to enhance an understanding of best-evidence treatment options in the evaluation and care of patients with axial radicular syndromes.

Upon completion of this session, participants should gain strategies to:
• Incorporate neuroanatomy and neurophysiology relevant to axial radicular syndromes;
• Effectively examine and differentially diagnose patients with axial radicular syndromes;
• Coordinate diagnostic testing for axial radicular syndromes;
• Integrate nonoperative care for patients with axial radicular syndromes;
• Access appropriate care for chronic radicular syndromes in nonoperative or postoperative settings.

Agenda
Anatomical and Differential Diagnosis
Anatomy and Physiology of the Spinal Nerve Root and DRG: A Refresher
Rick J. Placide, MD, PT

Differential Diagnosis of Radicular Type Symptoms: An Overview
John Metzler, MD

Physical Examination in the Differential of Radiculopathy
Gregory L. Whitcomb, DC

Appropriate Imaging Choices in the Differential of Radiculopathy
John Kamysz, MD

Electrodiagnostic Testing in the Differential of Radiculopathy: Who and When?
John Metzler, MD

Management Considerations
Nonoperative Medical Options: The Role of Medications and Injections in the Management of Radiculopathy
E. Kano Mayer, MD

Active Rehabilitative Considerations for the Patient with Radiculopathy
Ryan A. Tauzell, MA, PT, Cert. MDT

Surgical Consultation: When is it Time to Consider Decompression?
Rick J. Placide, MD, PT

Discussion
FDA Device/Drug Status:
All presenters: These presentations do not discuss or include any applicable devices or drugs.
Concurrent Session: Cervical Disc Arthroplasty
Gateway Ballroom 103/104
Moderator: Scott L. Blumenthal, MD

2:05–2:11 p.m.
43. Subsequent Surgery Rates After Treatment with TDR or ACDF at One or Two Levels: Results from an IDE Clinical Trial With Five-Years Follow-Up
Robert J. Jackson, MD, FACS; Hyun W. Bae, MD; Reginald J. Davis, MD, FACS; Michael S. Hisey, MD; Kee D. Kim, MD; Pierce D. Nunley, MD
FDA Device/Drug Status: Mobi-C (Approved for this indication), SLIM LOC™ Anterior Cervical Plate System, ATLANTIS™ or ATLANTIS™ VISION Anterior Cervical Plate (Approved for this indication).

2:11–2:17 p.m.
44. Long-Term Societal Costs of Anterior Cervical Discectomy and Fusion Versus Cervical Disc Arthroplasty for the Treatment of Single-Level Cervical Disc Disease
Ahmer K. Ghorai, MD; Christopher M. Bono, MD
1Cambridge, MA, US; 2Brigham and Women’s Hospital Department of Orthopedic Surgery, Boston, MA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:17–2:23 p.m.
45. Radiographic Adjacent Segment Pathology After Treatment With TDR or ACDF at One or Two Levels at Five Years
Pierce D. Nunley, MD; David A. Cavanaugh, MD; Eubulus J. Kerr III, MD; Andrew Utter, MD; Marcus Stone, PhD
Spine Institute of Louisiana, Shreveport, LA, US
FDA Device/Drug Status: Mobi-C artificial disc (Approved for this indication).

2:23–2:29 p.m.
46. Two-Level Treatment With Total Disc Replacement Versus ACDF: Results from a Prospective Randomized Clinical Trial With Five-Years Follow-Up
Reginald J. Davis, MD, FACS; Hyun W. Bae, MD; Michael S. Hisey, MD; Kee D. Kim, MD; Pierce D. Nunley, MD; Robert J. Jackson, MD, FACS
FDA Device/Drug Status: Mobi-C (Approved for this indication), SLIM LOC™ Anterior Cervical Plate System, ATLANTIS™ or ATLANTIS™ VISION Anterior Cervical Plate (Approved for this indication).

2:29–2:35 p.m.
47. Outcomes Following Cervical Disc Arthroplasty: A Retrospective Review
Daniel G. Kang, MD; Ronald A. Lehman Jr., MD; John P. Cody, MD; Robert W. Tracey, MD; Scott Wagner, MD
FDA Device/Drug Status: Cervical disc arthroplasty (multi-level; hybrid constructs) (Not approved for this indication).

2:35–2:41 p.m.
48. One-Level Treatment With Total Disc Replacement and ACDF: Five-Year Results from a Prospective Randomized Clinical Trial
Michael S. Hisey, MD; Reginald J. Davis, MD, FACS; Pierce D. Nunley, MD; Kee D. Kim, MD; Hyun W. Bae, MD; Robert J. Jackson, MD, FACS
1Texas Back Institute, Denton, TX, US; 2Greater Baltimore Neurosurgical Assoc., Baltimore, MD, US; 3Spine Institute of Louisiana, Shreveport, LA, US; 4University of California Davis School of Medicine, Sacramento, CA, US; 5Spine Institute St. John’s Health Center, Los Angeles, CA, US; 6Orange County Neurosurgical Associates, Laguna Hills, CA, US
FDA Device/Drug Status: Mobi-C (Approved for this indication), SLIM LOC™ Anterior Cervical Plate System, ATLANTIS™ or ATLANTIS™ VISION Anterior Cervical Plate (Approved for this indication).

2:41–2:47 p.m.
49. Cervical Posterior Foraminotomy’s Effect on Segmental Range of Motion in the Setting of Total Disc Arthroplasty
Daniel G. Kang, MD; Adam Bevevino, MD; Ronald A. Lehman Jr., MD; Rachel E. Gaume, BS; Scott Wagner, MD
1Bethesda, MD, US; 2Potomac, MD, US; 3Walter Reed National Military Medical Center, Bethesda, MD, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
2:05–3:05 p.m.  
Concurrent Session: Socioeconomics  
Gateway Ballroom 102  
Moderator: Simon Dagenais, DC, PhD

2:05–2:11 p.m.  
50. Cell Saver Utilization is Not Cost-Effective for Patients Receiving Blood Products When Undergoing Lumbar Laminectomy and Fusion (≤3 levels)  
Stephen K. Mendenhall1; Patrick D. Kelly2; Priya Sivasubramaniam3; Jesse E. Bible, MD4; David N. Shau, BS5; Matthew J. McGirt, MD5; Clinton J. Devlin, MD5  
1Vanderbilt University, Nashville, TN, US; 2Vanderbilt University Medical Center, Nashville, TN, US; 3Vanderbilt University Medical Center Department of Neurosurgery and Spine Associates, Charlotte, NC, US; 4Vanderbilt University Medical Center Department of Neurosurgery, Nashville, TN, US; 5Carolina Neurosurgery and Spine Associates, Charlotte, NC, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:11–2:17 p.m.  
51. Patient Activation Among Those Presenting for Surgical Evaluation: Differences by Race and Ethnicity  
Richard L. Skolasky Jr., ScD1; Roland J. Thorpe, PhD1; Stephen Wegener, PhD1; Lee H. Riley III, MD1  
1Johns Hopkins University, Baltimore, MD, US; 2Johns Hopkins Outpatient Center Department of Orthopedic Surgery, Baltimore, MD, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:17–2:23 p.m.  
52. Do Patient Demographics and Patient Reported Outcomes Predict 12-Month Loss to Follow-Up After Spine Surgery  
Scott L. Parker, MD1; Saniya S. Godil, MD2; Joseph S. Cheng, MD, MS2; Matthew J. McGirt, MD2; Clinton J. Devin, MD2  
1Vanderbilt University, Nashville, TN, US; 2Vanderbilt University Medical Center, Nashville, TN, US; 3Vanderbilt University Medical Center Department of Neurosurgery, Nashville, TN, US; 4Carolina Neurosurgery and Spine Associates, Charlotte, NC, US; 5Nashville, TN, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:23–2:29 p.m.  
53. The Impact of Preoperative Depression on Quality of Life Outcomes Following Lumbar Surgery  
Jacob Miller, BS1; Adeeb Derakhshani2; Daniel Lubelski, BA1; Matthew Alvin1; Matthew J. McGirt, MD1; Edward C. Benzel, MD1; Thomas E. Mroz, MD3  
1Cleveland Clinic Foundation, Cleveland, OH, US; 2Cleveland Heights, OH, US; 3Cleveland, OH, US; 4Carolina Neurosurgery and Spine Associates, Charlotte, NC, 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.

2:29–2:35 p.m.  
54. Lean Principles to Optimize Instrument Utilization for Spine Surgery in an Academic Medical Center: An Opportunity to Standardize, Cut Costs and Build a Culture of Improvement  
Kevin J. McGuire, MD1; David Lunardini, BS, MD2; Elena G. Canacari, RN, CNOR3; Katiri Wagner, BS1  
1Beth Israel Deaconess Medical Center, Boston, MA, US; 2Cambridge, MA, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:35–2:41 p.m.  
55. Clinical Outcomes of Minimally Invasive Versus Open Single Level TLIF: A Propensity Matched Cohort Study  
Miaden Djurasovic, MD1; David P. Rouben, MD2; Steven D. Glassman, MD1; Michael Casnellie, MD3; Leah Y. Carreon, MD, MSc1  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:41–2:47 p.m.  
56. Relative Benefit of TLIF Versus PSF at Five-Year Follow-Up Stratified by Diagnostic Indication  
Calvin Kuo, MD1; Leah Y. Carreon, MD, MSc2; Benjamin Schell, MS3; Steven D. Glassman, MD1  
1Louisville, KY, US; 2Norton Leatherman Spine Center, Louisville, KY, US; 3University of Louisville School of Medicine, Louisville, KY, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:47–3:05 p.m.  
Discussion
2:05–2:11 p.m.

57. Single Injection Epidural Analgesia With Local Anaesthetic for Pain Relief Following Spinal Surgery: A Prospective Randomized Study
Douglas Wardlaw, MD, FRCS
Aberdeen, United Kingdom

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

2:11–2:17 p.m.

58. Cost Effectiveness of Lumbar Epidural Steroid Injections
Leah Y. Carreon, MD, MSc1; Kelly R. Bratcher, RN2; Farah Ammous3; Steven D. Glassman, MD1

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

2:17–2:23 p.m.

59. Efficacy and Safety of Condoliase in Patient with Lumbar Disc Herniation: A Multicenter, Randomized, Double-Blind, Placebo-Controlled Trial
Kazuhiro Chiba, MD, PhD1; Yukihiro Matsuyama, MD, PhD; Yoshiaki Toyama, MD, PhD1
1Keio University, Tokyo, Japan; 2Hamamatsu University School of Medicine, Hamamatsu, Japan; 3Keio University Department of Orthopedic Surgery, Tokyo, Japan

FDA Device/Drug Status: Condoliase (Investigational/Not approved).

2:23–2:29 p.m.

60. Autogenous Point of Care Bone Marrow Concentrate (BMC) for the Treatment of Lumbar Degenerative Disc Disease: IRB Controlled Prospective Study
Kenneth A. Pettine, MD
Rocky Mountain Associates in Orthopedic Medicine, Johnstown, CO, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
Concurrent Session: Surgical Outcomes
Room 303
Moderator: Donna D. Ohnmeiss, PhD

2:05–2:11 p.m.
64. Effect of Zoledronic Acid on Bone Fusion After Lumbar Surgery for Osteoporotic Patients
Zhehao Dai, PhD
Department of Spine Surgery, The 2nd Xiangya Hospital of Central South University, Changsha, China
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:11–2:17 p.m.
65. Does Instrumentation Improve Outcomes in Posterolateral Lumbar Fusions for a Decompressive Facetectomy: 21-Year Follow-Up
Sina Pourtaheri, MD1; Arash Emami, MD2; Kimona Issa, MD3; Ki S. Hwang, MD4; Charles R. Billings, MD5
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:17–2:23 p.m.
66. Measures of Surgical Effectiveness One Year After Lumbar Spine Surgery Accurately Predict Two-Year Outcomes
Owoicho Adogwa, MD, MPH1; Terence Verla, MPH2; Parastou Fatemi3; Joseph S. Cheng, MD, MS4; Oren N. Gottfried, MD5; Daniel B. Loriaux, BS6; Carlos A. Bagley, MD7; Robert E. Isaacs, MD8
1Durham, NC, US; 2Vanderbilt University Medical Center Department of Neurosurgery, Nashville, TN, US; 3Chapel Hill, NC, US; 4Duke University Medical Center, Durham, NC, US; 5Duke University, Durham, NC, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:23–2:29 p.m.
67. Do Results from the Degenerative Spondylolisthesis Arm of the SPORT Trial Generalize? A Comparison of 372 Patients Undergoing Decompression for Degenerative Spondylolisthesis from SPORT With 1,035 from the ACS NSQIP Database
Nicholas Golinvaux1; Bryce Basques2; Daniel D. Bohl, MPH3; Jonathan N. Grauer, MD4
1Yale University School of Medicine, New Haven, CT, US; 2New Haven, CT, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:29–2:35 p.m.
68. Extrapolating the Discectomy Arm of the SPORT Trial: 243 Surgical Discectomy Patients from SPORT Compared to 8,350 Discectomy Patients from ACS NSQIP
Nicholas Golinvaux1; Daniel D. Bohl, MPH2; Bryce Basques3; Jonathan N. Grauer, MD4
1Yale University School of Medicine, New Haven, CT, US; 2New Haven, CT, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:35–2:41 p.m.
69. Clinical Outcomes Ten Years After Lumbar Fusion for Degenerative Spondylolisthesis
Andrew Cordiale, DO1; Steven D. Glassman, MD2; Erin Adams, BS3; Leah Y. Carreon, MD4
1Norton Leatherman Spine Center, Louisville, KY, US; 2Louisville, KY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:41–2:47 p.m.
70. Effective in Adolescent Idiopathic Scoliosis Surgery: Reptilase, Tranexamic Acid or Combination: A Prospective, Randomized, Double-Blind, Placebo-Controlled Study
Xie En, MD
Hong Hui Hospital, Xi’an Jiaotong University College of Medicine, Xi’an, Shan Xi, China
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.
Concurrent Session: Proximal Findings Following Deformity Surgery
Room 304
Moderator: Serena S. Hu, MD

2:05–2:11 p.m.
71. Minimum 20-Year Radiographic Outcomes for Treatment of Adolescent Idiopathic Scoliosis: Preliminary Results from a Novel Cohort of US Patients
Charles Gerald T. Ledonio, MD; A. Noelle Larson, MD; David W. Polly Jr., MD; Michael J. Yaszemski, MD, PhD


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

2:11–2:17 p.m.
72. Cervical Malalignment Persists Following Adult Thoracic Deformity Correction: A Multicenter Experience of 81 Patients With Two-Year Follow-Up
International Spine Study Group; Christopher P. Ames, MD; Virginie Lafage, PhD; Taemin Oh; Justin K. Scheer, BS; Robert K. Eastlack, MD; Michael P. Kelly, MD; Eric O. Klineberg, MD; Richard A. Hostin, MD; Vedat Deviren, MD; Ian McCarthy, PhD; Frank J. Schwab, MD; Shay Bess, MD; Christopher I. Shaffrey, MD; Justin S. Smith, MD, PhD

1Brighton, CO, US; 2University of California San Francisco, San Francisco, CA, US; 3New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 4Northwestern University School of Medicine, Chicago, IL, US; 5University of California San Diego, San Diego, CA, US; 6Scripps Clinic, San Diego, CA, US; 7University of Virginia Department of Neurosurgery, Charlottesville, VA, US; 8Hospital for Special Surgery, New York, NY, US; 9San Diego Center for Spinal Disorders, La Jolla, CA, US; 10University of California Davis Orthopaedic Surgery, Sacramento, CA, US; 11University of California Davis School of Medicine, Sacramento, CA, US

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

2:17–2:23 p.m.
73. Cervical Spine Compensation in Adolescent Idiopathic Scoliosis
Elizabeth P. Norheim, MD; Leah Y. Carreon, MD, MSc; Daniel J.Sucato, MD; Lawrence G. Lenke, MD; Aygul B. Dankowski, BA, PhD; Steven D. Glassman, MD

1Norton Leatherman Spine Center, Louisville, KY, US; 2Texas Scottish Rite Hospital for Children, Dallas, TX, US; 3Washington University Medical Center Department of Orthopedic Surgery, St. Louis, MO, US; 4Norton Healthcare, Inc., Louisville, KY, US

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

2:23–2:29 p.m.
74. The Presence of Preoperative Cervical Deformity in Adult Spinal Deformity Patients is a Strong Predictor of Inferior Outcomes and Failure to Reach MCID at Two-Year Follow-Up: Analysis of 235 Patients
International Spine Study Group; Christopher P. Ames, MD; Peter G. Passias, MD; Alexandra Soroceanu, MD, MPH; Anthony J. Boniello, BS; Justin K. Scheer, BS; Frank J. Schwab, MD; Christopher I. Shaffrey, MD; Han Jo Kim, MD; Themistocles S. Protopsaltis, MD; Gregory M. Mundis Jr., MD; Munish C. Gupta, MD; Eric O. Klineberg, MD; Virginie Lafage, PhD

1Brighton, CO, US; 2University of California San Francisco, San Francisco, CA, US; 3New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 4Dalhousie University, Halifax, NS, Canada; 5New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 6University of California San Diego, San Diego, CA, US; 7University of Virginia Department of Neurosurgery, Charlottesville, VA, US; 8Hospital for Special Surgery, New York, NY, US; 9San Diego Center for Spinal Disorders, La Jolla, CA, US; 10University of California Davis Orthopaedic Surgery, Sacramento, CA, US; 11University of California Davis School of Medicine, Sacramento, CA, US

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

2:29–2:35 p.m.
75. Postoperative Cervical Deformity in 215 Thoracolumbar Adult Spinal Deformity Patients: Prevalence, Risk Factors and Impact on Patient-Reported Outcome and Satisfaction at Two-Year Follow-Up
International Spine Study Group; Peter G. Passias, MD; Justin S. Smith, MD, PhD; Alexandra Soroceanu, MD, MPH; Anthony J. Boniello, BS; Justin K. Scheer, BS; Frank J. Schwab, MD; Christopher I. Shaffrey, MD; Han Jo Kim, MD; Themistocles S. Protopsaltis, MD; Gregory M. Mundis Jr., MD; Munish C. Gupta, MD; Eric O. Klineberg, MD; Virginie Lafage, PhD; Christopher P. Ames, MD

1Brighton, CO, US; 2Brooklyn, NY, US; 3Dalhousie University, Halifax, NS, Canada; 4New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 5University of California San Diego, San Diego, CA, US; 6Scripps Clinic, San Diego, CA, US; 7University of Virginia Department of Neurosurgery, Charlottesville, VA, US; 8Hospital for Special Surgery, New York, NY, US; 9San Diego Center for Spinal Disorders, La Jolla, CA, US; 10University of California Davis Orthopaedic Surgery, Sacramento, CA, US; 11University of California Davis School of Medicine, Sacramento, CA, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
2:35–2:41 p.m.
76. High Postoperative C2-7 SVA is Associated With Proximal Juxtanuclear Kyphosis

International Spine Study Group1; Han Jo Kim, MD2; Stacie Nguyen, MPH3; Matthew E. Cunningham, MD, PhD4; Virginie Lafage, PhD5; Justin S. Smith, MD, PhD6; Christopher I. Shaffrey, MD7; Frank J. Schwab, MD8; Gregory M. Mundis Jr., MD9; Eric O. Klineberg, MD10; Munish C. Gupta, MD11; Robert A. Hart, MD12; Douglas C. Burton, MD13; Shay Bess, MD14; Christopher P. Ames, MD15


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

2:41–2:47 p.m.
77. Radiographic Parameters Associated with Revision Surgery for Proximal Juxtanuclear Kyphosis

Fred Nicholls, MD, MA, FRCSC1; Murat S. Eksi, MD; Christopher P. Ames, MD2; Sigurd H. Berven, MD; Shane Burch, MD; Dean Chou, MD; Gokhan Demirkiran4; Murat Pekmezci, MD; Bobby Tay, MD; Vedat Deviren, MD


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.
Focused Discussion: Best Practices Update: Diagnosis and Treatment of Adult Isthmic Spondylolisthesis

Room 301
Moderator: D. Scott Kreiner, MD

Join D. Scott Kreiner, MD, Co-chair of the NASS Evidence-Based Guideline Development Committee, and key members of the Diagnosis and Treatment of Adult Isthmic Spondylolisthesis Guideline Work Group, including Jamie Baisden, MD, Rakesh Patel, MD and Shay Bess, MD, in a discussion of the key recommendations made within the guideline. Discover the current state of the evidence and share your thoughts related to diagnosis/imaging, medical/interventional treatment, surgical treatment, and treatment cost-effectiveness of adult isthmic spondylolisthesis.

FDA Device/Drug Status: All presenters: These presentations do not discuss or include any applicable devices or drugs.

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

Technical Exhibition, Aisles 800 and 1900

3:05–4:20 p.m.
ICD-10 Webinar Viewing in the Practical Theater

Technical Exhibition, Booth 2504

Stop by to view NASS’ webinar on ICD-10 implementation presented by NASS volunteers with coding expertise. The webinar explains basic changes to the code structure, specificity and function, new documentation requirements, and how the changes will affect spine practices. ICD-10 is now scheduled to be implemented October 1, 2015.

3:30–4:30 p.m.
Committee Orientation Program Meeting

Room 300

The Committee Orientation Program meeting is a valuable meeting for new committee members to assist them in their early committee involvement at NASS. This meeting is an opportunity to review the goals of NASS, to discuss the importance of committee work and to become familiar with the NASS Committee Evaluation and Improvement Project. There is time during the session to ask questions regarding committees.
3:35–3:40 p.m.
**NASS Working for You:**
*SpineWeek*
Gateway Ballroom 103/104
Moderator: Robert Gunzburg, MD, PhD

3:40–5:10 p.m.
**Symposium:**
*Section on Radiology: Controversies in Spine Imaging*
Gateway Ballroom 103/104
Moderator: Daniel M. Sciubba, MD

Although imaging can provide the clinician with substantial information to guide decision making, there are numerous clinical scenarios in which imaging can be confusing or controversial. Such dilemmas may delay treatment or conversely suggest aggressive intervention. Subsequent decisions may thus have significant impact on patient care and medicolegal liability. In this symposium, radiological reviews of controversial imaging clinical scenarios are reviewed to provide guidance for practicing clinicians during these challenging scenarios.

Upon completion of this session, participants should gain strategies to:
- Review clinical scenarios in which radiographic modalities may not clearly delineate pathological versus non-pathological conditions;
- Expose participants to radiographic techniques to help clarify controversial spinal imaging scenarios;
- Integrate best care with current state-of-the-art imaging modalities.

**Agenda**

**Radiographic-Clinical Controversies**
Daniel M. Sciubba, MD

**A Systematic Approach to the Review of Spine Imaging Studies**
A. Jay Khanna, MD

**Lumbar Discectomy: Fibrosis Versus Recurrent Disc Herniation**
Walter S. Bartynski, MD

**Spinal Cord Signal Change: Inflammation Versus Tumor**
Daniel M. Sciubba, MD

**Vertebral Lesions: Benign Hemangiomas Versus Malignancy**
John A. Carrino, MD, MPH

**Evaluation of Instrumented Spine: MRI Versus CT Myelogram**
Mark Mikhael, MD

**Spondylosis: What is Normal Age-related Degeneration?**
Joseph P. Gjolaj, MD

**Postoperative Collection: Infection Versus Seroma**
John A. Carrino, MD, MPH

**Discussion**

**FDA Device/Drug Status:**
*All presenters*: These presentations do not discuss or include any applicable devices or drugs.

4:00–5:00 p.m.
**Focused Discussion:**
*Advocacy Update*
Room 301
Moderator: John Finkenberg, MD

This focused discussion reviews the political landscape in the aftermath of the 2014 mid-term elections. Our guest speaker addresses how the new Congress may function as both parties gear up for the 2016 presidential election.

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

6:00–7:00 p.m.
**SpinePAC Reception**
San Francisco Marriott Marquis, Pacific H
...but not quite enough funding to go around—yet!

64 OMeGA spine grants in 7 years* is a great accomplishment—and the amount of funding for this sub-specialty continues to grow. Yet NASS and OMeGA Medical Grants Association are not resting on our laurels and we’re working harder than ever to provide more conflict-free support for spine fellowship programs.

We won’t be satisfied until all meritorious programs are fully*** funded

It’s an audacious goal, but the future of our profession depends on it. Pitch in and suggest your industry colleagues support OMeGA and orthopaedic GME.

And please join us

Thank the following donors that make OMeGA spine fellowship grants possible:

**Gold supporters**
Zimmer,** founding supporter
DePuy Synthes

**Silver supporters**
Biomet Orthopedics
Medtronic**
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**Additional donor**
K2M

*Spine and pediatric spine grants
**Additional thanks for advance commitment of 2015-2016 academic year support
*** Full OMeGA fellowship grants are $75,000
6:30–8:00 a.m.
Continental Breakfast
Gateway Ballroom Lobby

6:30 a.m.–5:30 p.m.
Attendee Registration
South Lobby

7:00 a.m.–5:00 p.m.
Exhibitor Registration
South Lobby

7:25–7:30 a.m.
Announcements
Gateway Ballroom 103/104

7:30–7:35 a.m.
NASS Working for You: Advocacy Update
Gateway Ballroom 103/104
Moderator: John Finkenberg, MD

7:35–9:10 a.m.
Symposium:
Section on Robotics and Navigation: Computer Assisted Surgery: Which Tools and Techniques Are Ready for Adoption in Your Operating Room?
Gateway Ballroom 103/104
Moderator: Chetan Patel, MD

This symposium provides an overview and critical analysis of the currently available image guidance, navigation, robotics, and other automating technologies for the operating room.

Upon completion of this session, participants should gain strategies to:
- Recognize the similarities and difference between the different imaging options in the operating room;
- Compare and contrast the similarities and differences between the currently available navigation systems;
- Present critical analysis of the outcomes of image guided surgery;
- Discuss the currently available options and outcomes of robot guided spine surgery;
- Gain insight into the currently available options and outcomes for powered instruments and other automating technologies in spine surgery.

Agenda
History of Computer Assisted Surgery
Russell H. Taylor, MD

Current Options for Image Guided Surgery in Your Operating Room
Michael Mac Millan, MD

Analysis of Outcomes of Image Guided Surgery
Srinivas K. Prasad, MD

Cost-effectiveness of Image Guided Surgery
Eric W. Nottmeier, MD

Current Options and Outcomes of Robot Guided Spine Surgery
Bawarjan Schatlo, MD

Current Options and Outcomes of Powered Instruments and Other Automating Technologies in Spine Surgery
Eric Potts, MD

Questions and Discussion
Faculty Panel

FDA Device/Drug Status:
Russell H. Taylor, MD: This presentation does not discuss or include any applicable devices or drugs.
Michael Mac Millan, MD: This presentation does not discuss or include any applicable devices or drugs.
Srinivas K. Prasad, MD: BrainLAB, Medtronic, Stryker, Mazor Intraoperative Imaging and Navigation Systems (Approved for this indication).
Eric W. Nottmeier, MD: This presentation does not discuss or include any applicable devices or drugs.
Bawarjan Schatlo, MD: This presentation does not discuss or include any applicable devices or drugs.
Eric Potts, MD: This presentation does not discuss or include any applicable devices or drugs.

9:00 a.m.–5:00 p.m.
Technical Exhibition
Technical Exhibition
ePosters
Education Resource Center
9:10–9:40 a.m.
Networking Break—Beverage Service
Technical Exhibition, Aisles 800 and 1900

**Practical Theater:**
**Aligning PQRS and Meaningful Use Reporting Requirements:** How to Save Time and Maximize Your Medicare Reimbursement
Technical Exhibition, Booth 2504

9:40–10:10 a.m.
**Presidential Address:**
William C. Watters III, MD
Gateway Ballroom 103/104

10:10–11:00 a.m.
**Presidential Guest Speaker:**
J. Craig Venter, PhD
Gateway Ballroom 103/104

11:00 a.m.–12:00 p.m.
**The Spine Journal Outstanding Paper Awards**
Gateway Ballroom 103/104
Moderator: Eugene J. Carragee, MD

11:00–11:08 a.m.
**Introduction from Eugene J. Carragee, MD**
Editor in Chief, *The Spine Journal*

11:08–11:18 a.m.
**Outstanding Paper: Surgical Science**
**A Clinical Prediction Model to Assess Surgical Outcome in Patients With Cervical Spondylotic Myelopathy: Internal and External Validation using the Prospective Multicenter AOspine North American and International Datasets of 743 Patients**
Lindsay A. Tetreault, BSc1; Pierre Côté, DC, PhD2; Branko Kopjar, MD, PhD2; Paul Arnold, MD, MD2; Michael G. Fehlings, MD, PhD, FRSC2
1Toronto Western Hospital, University Health Network, Toronto, ON, Canada; 2University of Ontario Institute of Technology, Toronto, ON, Canada; 3University of Washington, Seattle, WA, US; 4University of Kansas, Kansas City, KS, US
**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

11:18–11:28 a.m.
**Outstanding Paper: Surgical Science**
**Cervical Spine Clearance Protocols in Level I, II and III Trauma Centers in California**
Murat Pekmezci, MD3; Alexander A. Theologis, MD3; Robert Dionisio, BS1; Robert Mackersie, MD3; R. Trigg McClellan, MD3
1Department of Orthopaedic surgery, Orthopaedic Trauma Institute, University of California–San Francisco/San Francisco General Hospital, San Francisco, CA, US; 3Department of General Surgery, UCSF, SFGH, San Francisco, CA, US
**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

11:28–11:38 a.m.
**Outstanding Paper: Basic Science**
**A Multiscale Structural Investigation of the Annulus-Endplate Anchorage System and Its Mechanisms of Failure**
Samantha A. Rodrigues, BE; Ashvin Thambyah, PhD; Neil D. Broom, PhD
University of Auckland, New Zealand
**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.

11:38 a.m.–12:00 p.m.
**Discussion**

11:00 a.m.–12:00 p.m.
**Focused Discussion:**
Section on Biologics and Basic Science: Wonder Medicine for the Spine: Hope or Hype? (Bone)
Room 304
Moderator: Christopher Chaput, MD

Patients now have access to more information on emerging and experimental spine technologies than ever before and often ask their providers about them. This panel discussion is focused on emerging biologic therapeutics for spinal disorders and whether or not they are likely to replace or change the current treatment regimens. Each presentation will critically analyze current clinical evidence for techniques to improve bone healing in the spine. This session is intended for practitioners who want to learn more about promising biologic therapies for common clinical ailments as well as researchers with an interest in biologic therapy for spinal pathology.
Upon completion of this session, participants should gain strategies to:

- Discuss scientific rationale for biologic therapies for disc degeneration and the current evidence for these therapies;
- Review the evidence for the currently available bone graft options for spinal fusion;
- Engage and educate patients who have questions about the use of autogenous cells, allogenic cells, and advanced surface engineering for the purpose of improving bone healing;
- Assess the possible risks, benefits and cost of these technologies.

### Agenda

**Culture-expanded Allogeneic Cell Therapy**  
Hyun Bae, MD

**Advances in Surface Engineering to Improve Healing**  
Carl Laryssem, MD

**Cellular Allograft**  
Franco E. Vigna, MD, MPH

**Bone Marrow Aspirate and Concentrated Bone Marrow Aspirate**  
Christopher Chaput, MD

**Questions and Answers**  
Faculty Panel

**FDA Device/Drug Status:**  
All presenters: Not available at time of publication.

### 11:00 a.m.–12:00 p.m.

**Focused Discussion:**  
Advancements in the Management of Postoperative Pain With or Without Opioids

Room 301  
Moderator: Michael Y. Wang, MD

There are nearly 1 million elective spine surgery procedures each year in the United States, and surveys have reported that a vast majority of patients experience substantial postoperative pain, which may delay recovery and impact long-term outcomes. Although there have been many advancements in spine surgery procedures in recent decades, relatively little has changed in the management of postoperative pain, which continues to be centered on the administration of opioid analgesics, often using patient controlled analgesia (PCA) devices.

However, PCA devices are prone to tampering, programming errors, and mechanical errors, and require time-consuming sterile preparations refills, with monitoring by clinical staff. And while effective to manage short-term moderate to severe pain, opioids are associated with numerous opioid related adverse events (ORAEs), including nausea, vomiting, dizziness, drowsiness, constipation, ileus and respiratory depression, which may delay ambulation, recovery and length of stay.

This session discusses various approaches used to manage postoperative pain following spine surgery without opioids, including peridural corticosteroids, elastometric pumps with local anesthetics, intravenous non-opioid analgesics (e.g. Ofirmev®), IV or oral non-steroidal anti-inflammatory drugs or adjunctive analgesics (e.g. pregabalin, gabapentin), and local infiltration with long-acting local anesthetics (e.g. Exparel®).

The evidence supporting each of these approaches is discussed to provide an overview of their efficacy, effectiveness, safety, costs and cost-effectiveness.

### Agenda

**Epidemiology of Postoperative Pain and ERAS Protocol for Spine**  
Daniel K. Resnick, MD, MS

**Clinical Practice Guideline Recommendations on Management of Postoperative Pain**  
Michael Steinmetz, MD

**Use of Adjunctive Analgesics/Opioids to Manage Postoperative Pain**

**Use of Non-opioid Analgesics to Manage Postoperative Pain**  
Karthik Madhavan, MD

**Use of Minimally Invasive Surgical Techniques to Minimize Postoperative Pain**  
Choll W. Kim, MD, PhD

**Pain Management Following Discharge from Spine Surgery**

**FDA Device/Drug Status:**  
Daniel K. Resnick, MD, MS: Not available at time of publication.  
Michael Steinmetz, MD: This presentation does not discuss or include any applicable devices or drugs.  
Karthik Madhavan, MD: EXPARAL, Corticosteroids, Percocet, Duramorph (Approved for this indication).  
Choll W. Kim, MD: Not available at time of publication.
Over the past decade the importance of having an effective, up-to-date and accurate internet presence for medical practices has gone from a nice to have to a business imperative. Practices can no longer leave public perceptions to chance. Healthcare consumers go to the web first, what they see and how they experience a practice may be inaccurate or even unfair, but their perceptions, formed in moments, is critical in their decision making process.

This session provides meeting attendees with a greater understanding of the current landscape, the paths prospective patients choose in making healthcare decisions, and how to best position a practice to take advantage of its online presence.

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

- Appreciate the growing importance of websites and online presence in building a healthy practice;
- Describe the elements of internet presence management and their connected roles in driving practice growth;
- Gain insight into the marketing roadmap and process in developing an effective web presence;
- Develop strategies that are applicable to specific practice challenges and objectives.

**Faculty**

**Derek Brown**
Derek Brown is a co-founder of Pronto Marketing, which provides internet presence management services to over 1,000 small businesses and professionals in 13 countries. Pronto developed an innovative business model of pay-as-you-go, comprehensive internet presence services from web to SEO to content and more in an all-you-can-eat service model.

Prior to founding Pronto Marketing, Brown was Marketing Director of Microsoft (Thailand) Limited and was responsible for a full range of business planning and strategy, marketing communications, events and product management for the Thai subsidiary for more than three years.

Previously, Brown held positions as Director of Worldwide Product Management Server Division and Director of Marketing Communications for the Mobile Devices Division at Microsoft Corporation and oversaw all marketing disciplines including advertising, branding, internet marketing and public relations on global efforts. Brown also lead nontraditional marketing efforts, including evangelizing to technology enthusiasts and has extensive experience in viral or community-based marketing.

Brown is an active speaker and community leader in entrepreneurship, start-ups, digital marketing, Agile and Kanban process methodologies and more.

**Jeffery Segal, MD, JD**
Dr. Segal is a board certified neurosurgeon who was educated at the University of Texas and the Baylor College of Medicine, earning Phi Beta Kappa and AOA Medical Honor Society recognition. He completed his neurosurgical residency at Baylor College of Medicine and continued as a Spinal Surgery Fellow at University of South Florida School of Medicine.

Dr. Segal graduated from Concord Law School with highest honors. He is a Fellow of the American College of Surgeons and American College of Legal Medicine. He is a fellow of the American Association of Neurological Surgeons and member of North American Spine Society. Dr. Segal was a founder and served as CEO of DarPharma, Inc, a biotechnology company in Chapel Hill, NC, focused on discovering and developing first of class pharmaceuticals for a variety of neuro-psychiatric disorders.

Dr. Segal initially conceived of Medical Justice in 1998 and worked to expand Medical Justice from an idea to a business. Medical Justice is a physician based organization focused on keeping doctors from being sued for frivolous reasons and conflicts from escalating. The organization pays for countersuits against those that come after doctors inappropriately. Medical Justice also prevents doctors from being defamed on the Internet.

Dr. Segal currently serves as CEO of Medical Justice. In 2008, Medical Justice added Dental Justice to protect dentists. In 2011, Medical Justice launched eMerit to help doctors control their online medical identity. Medical Justice works with approximately 3,500 doctors.

**FDA Device/Drug Status:**
All presenters: These presentations do not discuss or include any applicable devices or drugs.
12:00–1:00 p.m.
Complimentary Box Lunch
Medical Attendees Only
Technical Exhibition, Halls A and C

Solution Showcase
Technical Exhibition, Booth 2504

12:00 p.m.: SI-BONE
Long Term Outcomes with the iFuse Implant System for SI Joint Fusion
Peter Whang, MD

12:30 p.m.: Misonix
Misonix BoneScalpel™—Current Concepts in Ultrasonic Bone Cutting in Spine Surgery
  • Principles of Ultrasonic Bone Dissection and Clinical Experience
    Isador Lieberman, MD, MBA
  • Our Experience in Adopting the Ultrasonic BoneScalpel in our Spine Program
    Shane Burch, MD

1:00–1:05 p.m.
Spine Safety Update
Gateway Ballroom 103/104

1:00–3:40 p.m.
Section on Allied Health:
Collaborative Concepts in Spine Care: Axial Pain in Late Adolescence and Early Adulthood: An Emerging Demographic
Room 305
Moderators: Gregory L. Whitcomb, DC and Evan K. Johnson, PT, DPT, OCS

Axial pain ranks as one of the most costly of all health conditions with an extensive impact of quality-of-life and productivity. It is well established that the relatively small percentage of patients with chronic spinal pain are more resistant to treatment and account for disproportionately high health-care utilization and expense. Despite advances in medical technologies and treatment, the personal and socioeconomic effects of axial pain syndromes remain epidemic. Additive to this dilemma is mounting research confirming that lifestyle and psychosocial factors are inextricably linked to the spine pain experience.

Epidemiological data now show that nonspecific axial pain is relatively common by early adulthood and that spine pain in adolescence is a strong predictor (odds ratio greater than 4 fold) for chronic back pain later in life. Compounding the clinical differential is a statistically higher probability of serious spine pathology in the younger pediatric population.

Research shows either limited or no benefit for many common spinal treatments and that a sedentary lifestyle is associated with negative health effects and higher utilization of other health care resources. By clear contrast, the prognosis for most axial pain patients is improved with active care strategies and informed emphasis on remaining normally active.

In light of shifts in cultural attitudes, the impact of social media, increased access to information, higher rates of participation in competitive sports, an increased trend toward a sedentary work life and impending changes in healthcare reimbursement, it appears likely that young people may be accessing health care for back and musculoskeletal pain earlier than their precedent generation.

From a public health perspective, early screening, education, evidence-sensitive patient care and well-informed pediatric health management strategies may have substantial ramifications for patient quality-of-life and rising societal costs related to axial pain and inactivity related disease.

Upon completion of this session, participants should gain strategies to:
  • Gain insight into the latest data on epidemiology into an evidence-sensitive approach to the diagnostic evaluation and biopsychosocial management of patients presenting with axial pain in adolescence and early adulthood;
  • Assess the potential health policy and cost-benefit impact of effective early management of spinal disorders in adolescence and early adulthood.

Agenda
The Epidemiology of Early Axial Pain: What Does the Data Tell Us?
Linda Carroll, PhD

Radiological Assessment of the Younger Patient: Who, What and When?
John Kamysz, MD

Common Spine Injuries in Young Athletes: The Role of Organized Sports
John Metzler, MD

Structural and Serious Pediatric Spine Pathology: A Surgical Perspective
Nalin Gupta, MD

Mechanical Pain and Postural Syndromes: A Therapist’s View on the iPhone Generation
Evan K. Johnson, PT, DPT, OCS

Axial Pain and Psychosocial Distress: Is There a Role for Early Mental Health Screening and Intervention?
Sherri Weiser, PhD

Early Onset Nonspecific Axial Pain: Is There a Role for Education and Prevention
Julie Fritz, PT, PhD
Health Policy and Societal Implications: Is There a Potential Value for Early Spine Care?
Donna D. Ohnmeiss, PhD

Discussion
Faculty Panel

FDA Device/Drug Status:
All presenters: These presentations do not discuss or include any applicable devices or drugs.

1:05–2:05 p.m.
Best Papers
Gateway Ballroom 103/104
Moderator: Charles A. Reitman, MD

1:05–1:11 p.m.
78. Preliminary Report from the Ontario Interprofessional Spine Assessment and Education Clinics (ISAEC)
Raja Y. Rampersaud, MD, FRCSC; Andrew Bidos, DC; Caroline L. Fanti, PT; Barry W. Young, DC; Brian M. Drew, FRCSC, PT; David A. Puskas, MD, FRCSC, MS
1Toronto Western Hospital, Toronto, ON, Canada; 2Toronto Western Hospital University Health Network, Toronto, ON, Canada; 3Thunder Bay Regional Health Sciences Centre, Thunder Bay, ON, Canada; 4Absolute Chiropractic, Hamilton, ON, Canada; 5Hamilton, ON, Canada; 6Big Thunder Orthopaedics, Thunder Bay, ON, Canada

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

1:11–1:17 p.m.
79. Variations in Medicare Payments for Episodes of Spine Surgery
Andrew J. Schoenfeld, MD; Mitchel Harris, MD, FACS; John Birkmeyer, MD
1Ann Arbor, MI, US; 2Brigham and Women’s Hospital, Boston, MA, US

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

1:17–1:23 p.m.
80. Cervical Total Disc Replacement and Anterior Cervical Discectomy and Fusion: A Comparison of One- and Two-Level Treatment
Hyun W. Bae, MD; Reginald J. Davis, MD, FACS; Michael S. Hisey, MD; Kee Kim, MD; Pierce D. Nunley, MD; Robert J. Jackson, MD, FACS

FDA Device/Drug Status: Mobi-C (Approved for this indication), SLIM LOC™ Anterior Cervical Plate System, ATLANTIS™ or ATLANTIS™ VISION Anterior Cervical Plate (Approved for this indication).
Concurrent Session: Surgical Management of the Cervical Spine
Gateway Ballroom 103/104
Moderator: Paul A. Anderson, MD

2:10–2:16 p.m.
85. The Effect of Esophageal Contents on Postoperative Dysphagia Following Primary Anterior Cervical Discectomy and Fusion Surgery: A Prospective Randomized Trial
Daniel Huttman, MD; Warren D. Yu, MD; Joseph R. O’Brien, MD, MPH
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:16–2:22 p.m.
86. Preoperative Spinal Cord Rotation as a Predictor of Postoperative C5 Palsy in Posterior Cervical Procedures
Arunit J. Chugh; Jeremy J. Gebhart, MD; Jason D. Eubanks, MD
1 Cleveland Heights, OH, US; 2 Cleveland, OH, US; 3 Waite Hill, OH, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:22–2:28 p.m.
87. Fusion Rates in One- and Two-Level Anterior Cervical Discectomy and Fusion Using a Mesenchymal Stem Cell Allograft
Branko Skovrlj, MD; Steven J. McAnany, MD; Samuel C. Overley, MD; Nomaan Ashraf, MD, MBA; Sheeraz A. Qureshi, MD, MBA
1 Mount Sinai School of Medicine Department of Neurosurgery, New York, NY, US; 2 New York, NY, US; 3 Mount Sinai School of Medicine, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:28–2:34 p.m.
88. A Simple Preoperative Evaluation to Avoid Postoperative C2 Nerve Dysfunction Related With C1 Lateral Mass Screw
Dageng Huang, MD; Dingjun Hao, MD; Baorong He, MD; Liang Yan, PhD, MD; Yuchen Zhang, MD
1 Department of Spine Surgery, Honghui Hospital, Xi’an Jiaotong University Health Science Center, Xi’an, Shaanxi, China; 2 Xi’an Jiaotong University Health Science Center, Xi’an, Shaanxi, China
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:34–2:40 p.m.
89. Anterior Approach for Cervical Surgery is Associated With Decreased Surgical Morbidity Compared to Posterior Approach: Analysis of 9,698 patients from NSQIP Database
Scott L. Parker, MD; Saniya S. Godil, MD; Joseph S. Cheng, MD, MS; Clinton J. Devlin, MD; Matthew J. McGirt, MD
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:40–2:46 p.m.
90. Comparison of Subsidence Rates Between Large and Small Footprint Cages in Anterior Cervical Interbody Fusion
Sharon C. Yson, MD; Jonathan N. Sembrano, MD; Edward Rainier G. Santos, MD
1 University of Minnesota, Minneapolis, MN, US; 2 Rosemount, MN, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:46–2:52 p.m.
91. Outcomes and Complications in Patients With Uncontrolled Diabetes Undergoing Cervical Spine Surgery
Javier Guzman, BS; Branko Skovrlj, MD; Andrew Hecht, MD; Sheeraz A. Qureshi, MD, MBA; Samuel K. Cho, MD
1 Mount Sinai School of Medicine, New York, NY, US; 2 Mount Sinai School of Medicine Department of Neurosurgery, New York, NY, US; 3 New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:52–3:10 p.m.
Discussion
2:10–2:16 p.m.  
**92. Health Behavior Change Counseling: Can a Brief Intervention Increase Patient Activation in Persons Undergoing Spine Surgery?**  
Richard L. Skolasky Jr., ScD1; Lee H. Riley III, MD2; Stephen Wegener, PhD3  
1Johns Hopkins University, Baltimore, MD, US; 2Johns Hopkins Outpatient Center Department of Orthopedic Surgery, Baltimore, MD, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:16–2:22 p.m.  
**93. A Comparison of Spinal Manipulation Methods and Usual Medical Care for Low Back Pain: A Randomized Clinical Trial**  
Michael J. Schneider, DC, PhD1; Mitchell Haas, DC2; Ronald M. Glick, MD3; Joel M. Stovans, DC4; Douglas Landsittel, PhD5  
1Pittsburgh, PA, US; 2University of Western States, Portland, OR, US; 3University of Pittsburgh Medical Center, Pittsburgh, PA, US; 4University of Pittsburgh, Pittsburgh, PA, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:22–2:28 p.m.  
**94. Effect of Lumbar Spine Fusion and Postoperative Exercise Therapy on Physical Activity and Kinesiophobia: A Randomized Controlled Trial**  
Marko Neva, MD, PhD1; Outi E. Ilves, MSc2; PtT; Liisa T. Pekkanen, MD2; Joost Dekker3; Ilkka H. Marttinen, MD2; Arja Hakkinen4  
1Tampere University Hospital Department of Orthopaedic and Trauma Surgery, Tampere, Finland; 2Jyväskylä University Department of Health Sciences, Jyväskylä, Finland; 3Jyväskylä Central Hospital Department of Orthopaedic and Trauma Surgery, Jyväskylä, Finland; 4VU University Medical Center, Amsterdam, Netherlands  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:28–2:34 p.m.  
**95. Effect of Lumbar Extensor Progressive Resistance Exercise Versus Core Stability Exercise on Lumbar Extension Muscular Strength and Core Muscular Endurance in Soldiers**  
John M. Mayer, PhD, DC1; John Childs2; Jennifer Libous, MS, BS3; Henian Chen, MD, PhD4; William S. Quillen, DPT5  
1University of South Florida College of Medicine, Tampa, FL, US; 2Shertz, TX, US; 3University of South Florida, Tampa, FL, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:34–2:40 p.m.  
**96. Level of Play: Return to Sports Following Surgery for Adolescent Idiopathic Scoliosis**  
Baron S. Lonner, MD1; Yuan Ren, PhD, MSc2; Mark Rieger, MD3; Anthony Petrizzo, DO4; Patrick Rogers, BS5; Courtney Toombs, BA6  
1Mount Sinai Beth Israel Medical Center, New York, NY, US; 2The Orthopedic Center, Cedar Knolls, NJ, US; 3New York University Hospital for Joint Diseases, New York, NY, US; 4New York University Medical Center, New York, NY, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:40–2:46 p.m.  
**97. Depression Predicts worse Quality of Life Outcomes Following Nonoperative Treatment for Lumbar Stenosis**  
Daniel Lubelski, BA7; Nicolas Thompson, MS8; Sachin K. Bansal, MD9; Thomas E. Mroz, MD10; Daniel J. Mazanec, MD11; Edward C. Benzel, MD12; Tagreed M. Khalaf, MD13  
1Cleveland, OH, US; 2Cleveland Clinic Foundation, Cleveland, OH, US; 3Lincoln at the Park, Naperville, IL, US; 4Cleveland Clinic Foundation Departments of Orthopaedic and Neurological Surgery, Cleveland, OH, US; 5Cleveland Clinic Spine Institute, Cleveland, OH, US; 6Cleveland Clinic Center for Spine Health, Cleveland, OH, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:46–2:52 p.m.  
**98. Dynamic Motion Characteristics of the Lower Lumbar Spine During Weight-Lifting Extension: Implication to Lumbar Pathology and Surgical Treatment**  
Minfei Wu, MD1; Shaobai Wang, MD2; Sean J. Driscoll2; Thomas D. Cha, MD, MBA2; Kirkham B. Wood, MD3; Guoan Li, MD4  
1Changchun, China; 2Massachusetts General Hospital, Boston, MA, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:52–3:10 p.m.  
Discussion
2:10–2:16 p.m.  
99. Oswestry Disability Index: A Psychometric Analysis With 1610 Patients  
Darrel S. Brodke, MD; Prokopis Annis, MD; Brandon D. Lawrence, MD; W. Ryan Spiker, MD; Ashley Neese; Man Hung, PhD  
University of Utah Department of Orthopaedics, Salt Lake City, UT, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:16–2:22 p.m.  
100. Converting ODI or SF-36 Physical Function Domain Scores to a PROMIS PF Score  
Darrel S. Brodke, MD; Brandon D. Lawrence, MD; W. Ryan Spiker, MD; Ashley Neese; Man Hung, PhD  
University of Utah Department of Orthopaedics, Salt Lake City, UT, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:22–2:28 p.m.  
101. Sacroiliac Joint Pain: Burden of Disease  
Daniel J. Cher, MD1; David W. Polly Jr., MD2; Sigurd H. Berven, MD3  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:28–2:34 p.m.  
102. Evidence of an Inherited Predisposition for Spinal Cord Tumors  
W. Ryan Spiker, MD1; Brandon D. Lawrence, MD1; Prokopis Annis, MD1; Darrel S. Brodke, MD1; Lisa Cannon-Albright6  
1University of Utah Department of Orthopaedics, Salt Lake City, UT, US; 6University of Utah Hospital, Salt Lake City, UT, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:34–2:40 p.m.  
103. Limitations of Administrative Databases in Spine Research: A Study in Obesity  
Nicholas Golinvaux1; Daniel D. Bohl, MPH2; Bryce Basques2; Michael Fu3; Elizabeth C. Gardner, MD3; Jonathan N. Grauer, MD1  
1Yale University School of Medicine, New Haven, CT, US; 2New Haven, CT, US  
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:10–2:16 p.m.  
106. Comparison Between Instrumented and Uninstrumented Posterolateral Fusion for Lumbar Spinal Stenosis and Spondylolisthesis  
Alexander Richter, MD, MS1; Stelios A. Koutsoumbelis, MD2; David A. Essig, MD2; Jeff S. Silber, MD, DC3  
FDA Device/Drug Status: Pedicle Screw Instrumentation (Approved for this indication).
2:16–2:22 p.m.
107. Comparison Between Laminectomy and Interspinous Devices for Treatment of Lumbar Spinal Stenosis
Alexander Richter, MD, MS; Stelios A. Koutsoumbelis, MD; David A. Essig, MD; Jeff S. Silber, MD, DC
FDA Device/Drug Status: Interspinous Device (Approved for this indication).

2:22–2:28 p.m.
108. Comparative Effectiveness of Open Versus Minimally Invasive Sacroiliac Joint Fusion
Charles Gerald T. Ledonio, MD; David W. Polly Jr., MD; Marc Swiontkowski, MD; John T. Cummings, MD
1Minneapolis, MN, US; 2University of Minnesota Physicians, Minneapolis, MN, US; 3University of Minnesota Department of Orthopaedic Surgery, Minneapolis, MN, US; 4Indiana Center for Neurosurgery, Indianapolis, IN, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:28–2:34 p.m.
Gregory M. Malham, MBChB, MD, FRACS; Rhiannon M. Parker, PhD; Carl M. Blecher, MD; Ned C. Tapley, MBBS, MSc; Kevin A. Seex, MB, FACS, FRACS
1Epworth Hospital Neuroscience Institute, Melbourne, VIC, Australia; 2Melbourne, VIC, Australia; 3Epworth Hospital Radiology Department, Melbourne, VIC, Australia; 4Hillongdon Hospital Orthopaedics/Geriatrics, Uxbridge, Middlesex, United Kingdom; 5Macquarie University Neurosurgery Department, Sydney, NSW, Australia
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:34–2:40 p.m.
110. A Comparison Between Unilateral Transverse Process-Pedicle and Bilateral Puncture Techniques in Percutaneous Kyphoplasty
Liang Yan, PhD, MD; Baorong He, MD; Dingjun Hao, MD
Xi’an, China
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:40–2:46 p.m.
111. Impact of Surgical Approach on Clinical Outcomes in the Treatment of Lumbar Pseudarthrosis
Roger K. Owens II, MD; Mladen Djurasovic, MD; Charles H. Crawford III, MD; Steven D. Glassman, MD; John R. Dimar II, MD; Leah Y. Carreon, MD, MSc
1Louisville, KY, US; 2Norton Leatherman Spine Center, Louisville, KY, US; 3Spine Institute, Louisville, KY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:46–2:52 p.m.
112. Balloon Kyphoplasty Versus KIVA Vertebral Augmentation: Comparison of Two Techniques for Osteoporotic Vertebral Body Fractures: A Prospective Randomized Study
Panagiotis Korovessis, MD, PhD; Thomas Repantis, MD; Konstantinos Vardakastanis, MSc; Vasilios Vitsas, MD
Patras, Greece
FDA Device/Drug Status: Kiva VCF (Investigational/Not approved).

2:52–3:10 p.m.
Discussion

2:10–3:10 p.m.
Concurrent Session: Outcomes in Deformity Surgery
Room 304
Moderator: Michael D. Daubs, MD

2:10–2:16 p.m.
113. Revision Rate in Adult Spinal Deformity Surgery
Steven D. Glassman, MD; Leah Y. Carreon, MD, MSc; John R. Dimar II, MD
1Norton Leatherman Spine Center, Louisville, KY, US; 2Spine Institute, Louisville, KY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:16–2:22 p.m.
114. Factors Associated With Improved Long-Term Outcomes Following Three-Column Osteotomies
Kevin O’Neill, MD; Lawrence G. Lenke, MD; Keith H. Bridwell, MD; Brian J. Neuman, MD; Han Jo Kim, MD; Kristin Archer, PhD, DPT
1Vanderbilt University Medical Center Department of Orthopaedics, Nashville, TN, US; 2Washington University Medical Center Department of Orthopedic Surgery, St. Louis, MO, US; 3Washington University in St. Louis School of Medicine, St. Louis, MO, US; 4Baltimore, MD, US; 5Hospital for Special Surgery, New York, NY, US; 6Vanderbilt University Medical Center, Nashville, TN, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
2:22–2:28 p.m.
115. Intercenter Variability in Adult Spinal Deformity Outcomes at Two Years Post-Treatment: A Retrospective Analysis from Six Surgical Centers

International Spine Study Group1; Stephen P. Maier II, BA2; Kristina Blanco, BA2; Justin S. Smith, MD, PhD2; Eric O. Klineberg, MD2; Christopher I. Shaffrey, MD2; Oheneba Boachie-Adjei, MD2; Gregory M. Mundis Jr., MD2; Christopher P. Ames, MD2; Douglas C. Burton, MD2; Shay Bess, MD2; Robert A. Hart, MD2; Themistocles S. Protopsaltis, MD2; Frank J. Schwab, MD2; Virginie Lafage, PhD2
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:28–2:34 p.m.

International Spine Study Group1; Ian McCarthy, PhD1; Michael F. O’Brien, MD1; Cheesie Robinson, MA1; Munish C. Gupta, MD1; Christopher P. Ames, MD1; Virginie Lafage, PhD1; Robert A. Hart, MD1; Douglas C. Burton, MD1; Shay Bess, MD1; Christopher I. Shaffrey, MD1; Gregory M. Mundis Jr., MD1; Frank J. Schwab, MD1; Khaled M. Kebaish, MD1; Justin S. Smith, MD, PhD1; Eric O. Klineberg, MD1; Richard A. Hostin, MD1
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:34–2:40 p.m.
117. The Effect of Patient Age on Recovery Kinetics in 149 Adult Spinal Deformity Patients With Two-Year Follow-Up: A Novel Area Under the Curve Analysis

International Spine Study Group1; Christopher P. Ames, MD2; Justin K. Scheer, BS2; Gregory M. Mundis Jr., MD2; Eric O. Klineberg, MD2; Robert A. Hart, MD2; Michael P. Kelly, MD2; Vedat Deviren, MD2; Stacie Nguyen, MPH2; Ian McCarthy, PhD2; Shay Bess, MD2; Frank J. Schwab, MD2; Christopher I. Shaffrey, MD2; Virginie Lafage, PhD2; Justin S. Smith, MD, PhD2
1Brighton, CO, US; 2New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 3San Diego Center for Spinal Disorders, La Jolla, CA, US; 4University of California Davis School of Medicine, Sacramento, CA, US; 5Oregon Health and Science University, Portland, OR, US; 6St. Louis, MO, US; 7San Diego Spine Foundation, La Jolla, CA, US; 8Baylor Health Care System, Dallas, TX, US; 9Rocky Mountain Scoliosis and Spine, Denver, CO, US; 10New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 11University of Virginia Department of Neurosurgery, Charlottesville, VA, US; 12University of Virginia Health System, Charlottesville, VA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:40–2:46 p.m.
118. Time Course Changes of Health Related Quality of Life After Three Column Osteotomies in Adult Spinal Deformity

Haruki Funao, MD1; Floreana Naef, MD1; Virginie Lafage, PhD1; Frank J. Schwab, MD1; Robert A. Hart, MD1; Richard A. Hostin, MD1; Gregory M. Mundis Jr., MD1; Justin S. Smith, MD, PhD1; Shay Bess, MD1; Christopher P. Ames, MD1; Khaled M. Kebaish, MD1
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:46–2:52 p.m.
119. The Fate of L5-S1 With Low Dose BMP-2 and Pelvic Fixation in Adult Deformity Surgery

Prokopis Annis, MD1; W. Ryan Spiker, MD1; Brandon D. Lawrence, MD1; Michael D. Daubs, MD1; Darrel S. Brodke, MD1
1University of Utah Department of Orthopaedics, Salt Lake City, UT, US; 2Las Vegas, NV, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

2:52–3:10 p.m.
Discussion
Patients now have access to more information on emerging and experimental spine technologies than ever before and often ask their providers about them. This session focuses on emerging biologic therapeutics for intervertebral disc degeneration and whether or not they are likely to replace or change the current treatment regimens. Each presentation critically analyzes the current clinical evidence for promising therapeutics, and the future utility of these therapies is discussed. This focused discussion is intended for practitioners who want to learn more about promising biologic therapies for IVD degeneration and researchers with an interest in biologic therapy for spinal pathology.

Upon completion of this session, participants should gain strategies to:
- Review the biochemical and biomechanical basis for disc degeneration;
- Assess novel modalities to diagnose painful intervertebral discs;
- Gain insight into the scientific rationale for biologic therapies for disc degeneration and the current evidence for these therapies;
- Engage and educate patients who have questions about these interventions.

**Agenda**

**The Biochemical and Biomechanical Basis for Disc Degeneration**
W. Mark Erwin, DC, PhD

**Can We Find the Painful Disc?**
Jeffrey C. Lotz, PhD

**The Efficacy of Growth Factor and Fibrin Injections for DDD**
Hyun Bae, MD

**The Efficacy of Stem Cells for DDD**
Domagoj Coric, MD

**Discussion: Intradiscal Therapy for DDD—Hope or Hype?**
Isaac Moss, MD

**Questions and Answers**
Faculty Panel

**FDA Device/Drug Status:**
All presenters: These presentations do not discuss or include any applicable devices or drugs.
Symposium:
Compression Fracture: Bone Augmentation and Management
Gateway Ballroom 103/104
Moderators: Charles H. Cho, MD, MBA and Allan L. Brook, MD

This symposium presents an overview of management of compression fracture and bone augmentation from experts in the field with experiences obtained over the past 25 years. It is comprehensive in covering the detailed knowledge including imaging analysis, patient management, new devices, literature review and economic/regulatory issues. Being involved from the very first treatments in this country and in the past two decades, speakers provide a unique perspective for the future and potential direction in the understanding of the disease process and treatment options.

Upon completion of this session, participants should gain strategies to:
- Treat compression fractures from osteoporosis and tumor infiltration;
- Manage patients before and after bone augmentation intervention;
- Review literature and evidence.

Agenda
Imaging for Fracture Analysis: The Nuances of Osteoporotic or Tumor Infiltration
A. Orlando Ortiz, MD, FACR

Literature Review 2014: Vertebral Augmentation
Allan L. Brook, MD

Devices with Unique, Applicable, Anatomic and Pathologic Applications
Sean Tutton, MD

Patient Selection and Key Insights
Fergus E. McKiernan, MD

Coding and Reimbursement Challenges
Jeffrey A. Stone, MD, FACR

Nonoperative Evidence-based Approach to Managing Pain and Disabilities of VCF
Clinton J. Devin, MD

Discussion, Questions and Answers
All Faculty

FDA Device/Drug Status:
All Presenters: These presentations do not discuss or include any applicable devices or drugs.
6:30–8:00 a.m.
Continental Breakfast
Gateway Ballroom Lobby

7:00 a.m.–5:00 p.m.
Attendee Registration
South Lobby

7:25–7:30 a.m.
Announcements
Gateway Ballroom 103/104

7:30–8:30 a.m.
Best Papers
Gateway Ballroom 103/104
Moderator: Michael L. Reed, DPT, OCS

7:30–7:36 a.m.
120. Functional Outcomes After Lumbar Spine Fusion Between Patients With Spondylolisthesis and Those With Degenerative Disc Disease: A Propensity Matched Prospective, Multi-Institutional Longitudinal Study of 1,741 Patients
Owoicho Adogwa, MD, MPH1; Terence Verla, MPH1; Parastou Fatemi1; Joseph S. Cheng, MD, MS2; Robert E. Isaacs, MD3
1Durham, NC, US; 2Vanderbilt University Medical Center Department of Neurosurgery, Nashville, TN, US; 3Duke University Medical Center, Durham, NC, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

7:36–7:42 a.m.
121. Surgical Interspinous Implant Versus Conventional Decompression for Lumbar Spinal Stenosis: A Randomized Controlled Trial Long-Term Results
Wouter A. Moojen, MD, MSc1; Wilco C. Jacobs, MS2; Carmen Vleggeert-Lankamp, MD, PhD2; Wilco C. Peul, MD, PhD3
1Leiden University Medical Center, Leiden, Netherlands; 2Netherlands; 3Leids Universitair Medisch Centrum, Leiden, Netherlands
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

7:42–7:48 a.m.
122. Effect of Superior Adjacent Segment Degeneration After Lumbar Posterolateral Fusion Using Two Different Pedicle Screw Insertion Positions With Nine-Year Minimum Follow-Up
Liang Yan, PhD, MD; Dingjun Hao, MD; Baorong He, MD
Xi’an, China
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

7:48–7:54 a.m.
123. Increased Incidence of Pseudarthrosis After Unilateral Instrumented Transforaminal Lumbar Interbody Fusion in Patients With Lumbar Spondylosis
Branko Skovrlj, MD1; Yakov Gologorsky, MD2; Jeremy Steinberger, MD3; Max Moore4; Alfred A. Steinberger, MD5; Frank Moore, MD6; Marc S. Arginteanu, MD7
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

7:54–8:00 a.m.
124. Moved to Value Abstract Awards Presentations
Friday, November 14, 3:05–3:35 p.m.

7:54–8:00 a.m.
126. Sensitivity of MRI in the Diagnosis of L4-5 Degenerative Spondylolisthesis
Benjamin Kuhns, MS; Shalen Kouk, BS; Colin C. Buchanan, MD; Daniel Lubelski, BA; Matthew D. Alvin, MA; Edward C. Benzel, MD; Thomas E. Mroz, MD; James E. Tozzi, MD
Cleveland Clinic Center for Spine Health, Cleveland Clinic, Cleveland, Ohio, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

8:00–8:30 a.m.
Discussion
PROGRAM SCHEDULE FRIDAY, NOVEMBER 14

8:00-9:00 a.m.
Exhibitor Open Forum
Room 220/222

8:00-9:00 a.m.
Global Spine Forum:
Chinese Association of Spine and Spinal Cord
Room 304
Moderator: Yong Hai, MD

Agenda
Introduction of CASSC
Yong Hai, MD, Beijing Chaoyang Hospital

Treatment of Vertebral Hemangiomas with Neurological Deficit
Liang Jiang, MD, Beijing University Third Hospital

MIS-TLIF: Basic and Advanced Practice
Yu Liang, MD, Shanghai Ruijin Hospital

Cervicothoracic Hemivertebra: Timing of Surgery
Xu Sun, MD, Nanjing Drum Tower Hospital

Hybrid Procedure for Multiple Lumbar Spine Stenosis
Yong Hai, MD, Beijing Chaoyang Hospital

Discussion

8:00 a.m.–1:00 p.m.
Exhibitor Registration
South Lobby

8:30–8:35 a.m.
NASS Working for You:
Coding Update
Gateway Ballroom 103/104
Moderator: R. Dale Blasier, MD, FRCSC, MBA

8:35–10:00 a.m.
Symposium:
Beyond the Imaging Findings: Predictors of Treatment and Outcomes for Spine Patients
Gateway Ballroom 103/104
Moderators: Heidi Prather, DO and Ted Dreisinger, PhD

Despite the well understood evidence that structural changes in the lumbar spine are not universally symptomatic or consistent with symptom presentation, pursuing the correction of structural disorders for patients with low back pain often becomes the focus of treatment. It has been demonstrated in the literature that routine radiography in isolation has no benefit in the management of low back pain UNLESS there is a reason based on physical exam that it will have diagnostic value, meaning its results directly inform treatment. It has been further argued that a good diagnostic work up and input from a strong multidisciplinary team that includes an assessment of movement, provocation and relieving activities in the setting of psychosocial beliefs and barriers can provide meaningful guidance for patient treatment.

This symposium focuses on how such a team can provide meaningful input to the treating physician that permit a more comprehensive and meaningful treatment plan.

Upon completion of this session, participants should gain strategies to:
• Identify muscle impairment markers;
• Recognize how motor control informs treatment;
• Define the importance coping mechanisms in patient care;
• Describe methods for better patient selection.

Agenda
Introduction of Topic and Speakers
Ted E. Dreisinger, PhD

Impaired Muscle Function Related to Risk in the Patient with Low Back and Neck Pain
Patricia Dolan, PhD

Role of Motor Control in the Management of Patients with Low Back and Neck Pain
Paul Hodges, PhD

The Importance of Coping Mechanisms in the Patient with Low Back and Neck Pain
Francis J. Keefe, PhD

Successful Patient Treatment Based on Risk Assessment
Nadine Foster, PhD

Integration of Clinical Input from the Healthcare Team
Heidi Prather, DO and Jeffrey C. Wang, MD

FDA Device/Drug Status:
All presenters: These presentations do not discuss or include any applicable devices or drugs.
### 9:00–10:00 a.m.
**Global Spine Forum:**
**Chinese Association of Orthopedic Surgeons**
Room 304
Moderator: Zhou Yue, MD

Biomechanical and Clinical Study of a Novel Minimally Invasive Pedicle Screw Fixation System  
Yue Zhou, MD

Brain Structural and Functional Reorganization in Patients With Spinal Cord Injury  
Tiansheng Sun, MD

Minimally Invasive Approach for Posterior C1-2 Fixation  
Huan Wang, MD

Clinical Feature of Thoracic Spinal Stenosis-Associated Myelopathy  
Dongwei Fan, MD

The Clinical Study of Lumbar Spinal Stenosis in Patients Above 65  
Hongbing Xu, MD

A Feasibility Research of Unilateral Incision Minimally Invasive Transforaminal Lumbar Interbody Fusion Using Pedicle Screws and a Translaminar Screw Hybrid Fixation  
Keya Mao, MD

Discussion  
Faculty

### 10:30–10:55 a.m.
**Research Grant and Fellowship Awards Presentation**
Gateway Ballroom 103/104
Moderator: Daniel K. Resnick, MD, MS

### 10:30–10:35 a.m.
**2011 Research Grant Award Winner**
**Transcranial Direct Current Stimulation (tDCS) in the Management of Acute Post-Spine Surgery Pain: A Prospective Randomized Controlled Trial**
Jeffrey J. Borckardt, PhD; John Glaser, MD; Scott Reeves, MD; Megan Hilbert, BS; Molly Hook, BS; Mark George, MD  
Medical University of South Carolina, Charleston, SC, US

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

### 10:35–10:40 a.m.
**2012 Research Grant Award Winner**
**Stem Cell-Based Intervertebral Disc Regeneration: Evaluation in Organ Culture**
Marianna Peroglio, PhD; Sibylle Grad, PhD; Mauro Alini, PhD  
AO Research Institute, Davos, Switzerland

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

### 10:40–10:45 a.m.
**2012 Research Grant Award Winner**
**Mechanistic Determination of Notochordal Cell-Induced Anti-Apoptotic Signaling in Human Nucleus Pulposus Cells**
Arne Mehrkens, MD1,2; M. Zia Karim, DVM, MSc (Hons), MPhil3; Ajay Matta, PhD4; Sarah Kim, BSc5; Raychel Hilario, BSc6; Michael G. Fehlings, MD PhD FRCS; W. Mark Erwin, DC, PhD1  
1Toronto Western Research Institute, University of Toronto, Toronto, Canada, 2Department of Orthopaedic Surgery, Spine Unit, Basel University Hospital, Basel, Switzerland

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

### 10:45–10:50 a.m.
Discussion/Questions

### 10:50–10:55 a.m.
**2014 Research Grants and Fellowship Awards Presentation**
NASS Recognition Awards Presentation
Gateway Ballroom 103/104

The Recognition Awards are presented to outstanding society members.

2014 Leon Wiltse Award: Ziya L. Gokaslan, MD, FACS
2014 David Selby Award: Raj D. Rao, MD
2014 Henry Farfan Award: Michael H. Heggeness, MD, PhD

Global Spine Forum: World Spine Care Update
Room 304
Moderator: Scott Haldeman, MD, PhD, DC

Since its FDA-approval for use in an anterior lumbar interbody cage, the use of bone morphogenetic protein in spine surgery has seen substantial changes. Throughout a decade of use, surgeons have become more aware of the potential complications and benefits from use of such a potent molecule. In June 2013, the Yale Open Data Access (YODA) Project was commissioned to study the available industry-sponsored data to answer some important questions regarding its use in clinical trials. Since then, more published data have contributed to our understanding of the implications from BMP-2 use. This session presents this recent data and discusses the role of BMP-2 in the post-YODA studies era.

Agenda

Does the Collective Data Suggest an Association Between BMP and Cancer?
Wellington Hsu, MD

How Has Usage of INFUSE Changed After YODA?
Scott D. Daffner, MD

Has the Incidence of Complications from BMP Use Changed in the Past Three Years?
Michael D. Daubs, MD

Discussion
Faculty Panel

FDA Device/Drug Status:
All presenters: These presentations do not discuss or include any applicable devices or drugs.

Concurrent Session: Minimally Invasive Procedures
Gateway Ballroom 103/104
Moderator: Raja Y. Rampersaud, MD, FRCSC

127. Comparative Analysis of Robotic-Guided Pedicle Screw Placement Accuracy and Freehand Controls in Percutaneous Adult Degenerative Spinal Instrumentation
Faissal Zahraawi, MD

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

128. Can Minimally Invasive Transforaminal Lumbar Interbody Fusions Be Safely Performed as an Outpatient Procedure?
Arash Emami, MD; Sina Pourtaheri, MD; Eiman Shafa, MD; Sujal Patel, MD; Kumar G. Sinha, MD; Kimona Issa, MD; Michael J. Faloone, MD; Ki S. Hwang, MD


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

129. Clinical Pedicle Screw Accuracy and Deviation from Planning in Robot-Guided Spine Surgery
Joris D. van Dijk, MSc; Norbert Hoess, MD

1Almelo, Netherlands; 2Muenster, Germany

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
11:18–11:24 a.m.
130. Minimally Invasive Decompression in Focal Lumbar Spinal Stenosis With or Without Stable Spondylolisthesis: Comparative Outcomes and Reoperation Rates at Two Years and Beyond
Raja Y. Rampersaud, MD, FRCSC1; Bedansh R. Chaudhary, MBBS, MSc, FRCSC2
1Toronto Western Hospital, Toronto, ON, Canada; 2Toronto, Ontario, Canada
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:24–11:30 a.m.
131. Reduction in Symptomatic Adjacent Segment Disease After MIS Versus Open Transforaminal Lumbar Interbody Fusion
Scott L. Parker, MD1; Tim E. Adamson, MD2; Mark D. Smith, MD3; Matthew J. McGirt, MD4
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:30–11:36 a.m.
132. Accuracy of Pedicle Screw Placement in Revision Spine Surgery Using Robotic Guidance
S. Samuel Bederman, MD, PhD, FRCSC1; Nick S. Jain, MD2; Spencer J. Woolwine, BA3; P D. Kiester, MD2; Nitin N. Bhatia, MD4
1University of California Irvine Department of Orthopaedic Surgery, Orange, CA, US; 2University of California Irvine, Orange, CA, US; 3Costa Mesa, CA, US; 4University of California Irvine Medical Center Department of Orthopaedic Surgery, Orange, CA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:36–11:42 a.m.
133. MIS-TLIF Reduces an Incidence of Adjacent Segment Disease in the Patient With Degenerative Spondylolisthesis: Comparative Study With Conventional TLIF
Ken Ishii, MD, PhD1; Tomohiro Hikata, MD, PhD2; Yuta Shiono, MD2; Yasuhito Kaneko, MD, PhD2; Naobumi Hosogane2; Nobuyuki Fujita, MD3; Kota Watanabe, MD4; Masaya Nakamura, MD, PhD4; Yoshiaki Toyama, MD, PhD4; Morio Matsumoto, MD4
1Keio University School of Medicine, Tokyo, Japan; 2Tokyo, Japan; 3International University of Health and Welfare Mita Hospital, Tokyo, Japan; 4Kawasaki Municipal Hospital, Kanagawa, Japan; 5Saitama, Japan; 6Keio University, Tokyo, Japan; 7Keio University School of Medicine Department of Physiology, Tokyo, Japan; 8Keio University Department of Orthopedic Surgery, Tokyo, Japan
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
11:18–11:24 a.m.
137. Impact of Sagittal Spinopelvic Alignment for Clinical Outcome After Decompression Surgery for Lumbar Spinal Canal Stenosis
Tomohiro Hikata, MD, PhD; Kota Watanabe, MD; Nobuyuki Fujita, MD; Akio Iwanami; Naobumi Hosogane; Ken Ishii, MD, PhD; Masaya Nakamura, MD, PhD; Yoshiaki Toyama, MD, PhD; Morio Matsumoto, MD
Tokyo, Japan; Keio University, Keio, Japan; Saitama, Japan; Keio University School of Medicine, Tokyo, Japan; Keio University School of Medicine Department of Physiology, Tokyo, Japan; Keio University Department of Orthopedic Surgery, Tokyo, Japan
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:24–11:30 a.m.
138. The Prognostic Value of Preoperative Participation in Activities of Daily Living on Postoperative Outcomes Following Lumbar Discectomy
Dana A. Leonard, BA; Rachel M. Deering, BS, MPH; Ravi Ramachandran, MD; Kathryn A. Hess; Mitchel Harris, MD, FACS; Christopher M. Bono, MD
Brigham and Women’s Hospital, Boston, MA, US; Boston, MA, US; Rubin Orthopaedics, Sacramento, CA, US; Massachusetts General Hospital, Boston, MA, US; Brigham and Women’s Hospital Department of Orthopedic Surgery, Boston, MA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:30–11:36 a.m.
139. Latent Trajectory Growth Analysis: Modeling Patient Recovery to Predict Two-Year Outcomes Following Elective Thoracolumbar Surgery for Degenerative Pathologies
Alana J. Green, BA; Neil A. Manson, MD, FRCS; Melissa D. McKeon, MSc; Joshua Murray, DO; Edward P. Abraham, MD
Saint John, NB, Canada; Saint John Regional Hospital, Saint John, NB, Canada; Canada East Spine Centre, Saint John, NB, Canada; Horizon NB, Moncont, NB, Canada
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:36–11:42 a.m.
140. Clinical Depression is a Strong Risk Factor for Poor Return to Work Rates Following Lumbar Fusion Surgery in a Workers’ Compensation Setting
Joshua T. Anderson, BS; Ryan J. Duff; Uri M. Ahn, MD; Nicholas U. Ahn, MD
University Hospitals Case Medical Center Department of Orthopaedic Surgery, Cleveland, OH, US; Case Western Reserve University School of Medicine, Cleveland, OH, US; University of Minnesota Twin Cities, Minneapolis, MN, US; New Hampshire Spine Institute, Bedford, NH, 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
11:12–11:18 a.m.
143. Preoperative Epidural Spinal Injections Increase the Risk of Surgical Wound Complications but Not Overall Complication Risk or Patient-Perceived Outcomes
Natalie L. Zusman1; Jacqueline Munch, MD2; Sam Moulton2; Alexander C. Ching, MD2; Robert A. Hart, MD2; Jung U. Yoo, MD2
1Oregon Health and Sciences University, Portland, OR, US; 2Portland, OR, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:18–11:24 a.m.
144. Symptomatic Vertebral Body Compression Fractures Requiring Intervention Following Single Fraction Stereotactic Radiosurgery for Spinal Metastases
Michael S. Virk, MD, PhD
New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:24–11:30 a.m.
145. Lumbar Fusion for Degenerative Disc Disease is Associated With Significantly Higher Rates of Failed Back Surgery Syndrome Compared to Fusion for Spondylolisthesis in a Workers’ Compensation Setting
Joshua T. Anderson, BS1; Ryan J. Duff2; Uri M. Ahn, MD4; Nicholas U. Ahn, MD3
1University Hospitals Case Medical Center Department of Orthopaedic Surgery, Cleveland, OH, US; 2Case Western Reserve University School of Medicine, Cleveland, OH, US; 3University of Minnesota Twin Cities, Minneapolis, MN, US; 4New Hampshire Spine Institute, Bedford, NH, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:36–11:42 a.m.
147. Risk Factors for Reoperation in Patients Treated Surgically for Degenerative Spondylolisthesis: A Subanalysis of the Eight-Year Data from the SPORT Trial
Michael C. Gerling, MD1; Dante M. Leven, DO, PT2; Virginie Lafage, PhD3; Peter G. Passias, MD2; Kristina Blanco, BA2; Alexandra A. Lee, BSN, CCRN2; Jon D. Lurie, MD2; Wenyan Zhao2; Kevin F. Spratt, PhD3; Thomas J. Errico, MD2
1Brooklyn, NY, US; 2New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 3Spine Research Center, New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 4Dartmouth College, Lebanon, NH, US; 5Hanover, NH, US; 6Department of Orthopaedics, Lebanon, NH, US; 7New York University Langone Medical Center, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:00 a.m.–12:00 p.m.
Concurrent Session: Sagittal Alignment for Deformity Correction
Room 303
Moderator: Virginie Lafage, PhD

11:00–11:06 a.m.
148. Spinal Pelvic Radiographic Thresholds for Regional Lumbar Disability Are Age Dependent: Analysis of Multicenter Database of 833 Patients
International Spine Study Group1; Justin S. Smith, MD, PhD2; Virginie Lafage, PhD3; Justin K. Scheer, BS4; Christopher I. Shaffrey, MD5; Renaud Lafage3; Eric O. Klineberg, MD6; Munish C. Gupta, MD7; Richard A. Hostin, MD8; Khaled M. Kebaish, MD9; Shay Bess, MD10; Frank J. Schwab, MD6; Christopher P. Ames, MD11
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

11:30–11:36 a.m.
146. Patient Characteristics Associated With Length of Stay and Readmission After Laminectomy for Lumbar Spinal Stenosis
Bryce Basques1; Arya G. Varthi, MD2; Nicholas Golinvaux3; Daniel D. Bohl, MPH2; Jonathan N. Grauer, MD2
1New Haven, CT, US; 2Yale University School of Medicine, New Haven, CT, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
11:06–11:12 a.m.

149. Fine-Tuned Surgical Planning in Adult Spinal Deformity: Determining the Lumbar Lordosis Necessary by Accounting for Both Thoracic Kyphosis and Pelvic Incidence

International Spine Study Group; Frank J. Schwab, MD; Bassel G. Diebo, MD; Justin S. Smith, MD, PhD; Richard A. Hostin, MD; Christopher I. Shaffrey, MD; Matthew E. Cunningham, MD, PhD; Gregory M. Mundis Jr., MD; Christopher P. Ames, MD; Douglas C. Burton, MD; Shay Bess, MD; Munish C. Gupta, MD; Robert A. Hart, MD; Themistocles S. Protopsaltis, MD; Virginie Lafage, PhD


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

11:12–11:18 a.m.

150. Full Body EOS Analysis of Spinal Deformity Patients: Considerations in Global Standing Alignment and Horizontal Gaze

Shian Liu, BS; Vincent Chaillier, MD; Renaud Lafage; Emmanuelle Ferrero, MD; Barthelemy Liabaud, MD; Bassel G. Diebo, MD; Jean-Marc Vital, MD; Wafa Skalli; Jean-Charles Le Huec, MD; Brice Ilarreborde; Themistocles S. Protopsaltis, MD; Thomas J. Errico, MD; Frank J. Schwab, MD; Virginie Lafage, PhD


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

11:18–11:24 a.m.

151. Chain of Compensation Related to PI-LL Mismatch: A Complete Standing Axis Investigation Including the Lower Extremities

Shian Liu, BS; Virginie Lafage, PhD; Emmanuelle Ferrero, MD; Renaud Lafage; Vincent Chaillier, MD; Barthelemy Liabaud, MD; Bassel G. Diebo, MD; Jean-Charles Le Huec, MD; Wafa Skalli; Jean-Marc Vital, MD; Keyvan Mazda, MD, PhD; Themistocles S. Protopsaltis, MD; Thomas J. Errico, MD; Frank J. Schwab, MD

1New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 2New York, NY, US; 3Spine Research Institute, New York, NY, US; 4New York University, New York, NY, US; 5Bordeaux, France; 6LBM, Biomechanics Laboratory, Paris, France; 7Hôpital Pellegrin Triode, Bordeaux, France; 8Robert Debre Hospital, Paris, France; 9New York University Langone Medical Center, New York, NY, US

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

11:24–11:30 a.m.

152. Are Established Targets for Spinal Deformity Correction Valid? Pre- to Postoperative Analysis Using the T1 Pelvic Angle (TPA): A Novel Radiographic Parameter of Sagittal Deformity

International Spine Study Group; Themistocles S. Protopsaltis, MD; Anthony J. Boniello, BS; Justin S. Smith, MD, PhD; Peter G. Passias, MD; Christopher I. Shaffrey, MD; Oheneba Boachie-Adjei, MD; Gregory M. Mundis Jr., MD; Christopher P. Ames, MD; Thomas J. Errico, MD; Shay Bess, MD; Munish C. Gupta, MD; Robert A. Hart, MD; Frank J. Schwab, MD; Virginie Lafage, PhD


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
11:30–11:36 a.m.
153. The Lumbar Pelvic Angle (LPA), the Lumbar Component of the Fan of Spinopelvic Alignment, Correlates With HRQOL and PI-LL Mismatch and Predicts Global Alignment

International Spine Study Group; Themistocles S. Protopsaltis, MD; Kristina Bianco, BA; Justin S. Smith, MD, PhD; Peter G. Passias, MD; Christopher I. Shaffrey, MD; Han Jo Kim, MD; Gregory M. Mundis Jr., MD; Christopher P. Ames, MD; Douglas C. Burton, MD; Shay Bess, MD; Eric O. Klineberg, MD; Robert A. Hart, MD; Frank J. Schwab, MD; Virginie Lafage, PhD


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

11:36–11:42 a.m.
154. How Much Lordosis Is Required for Sagittal Alignment in Patients With High or Low Pelvic Incidence?

International Spine Study Group; Barthélémy Liabaud, MD; Virginie Lafage, PhD; Frank J. Schwab, MD; Justin S. Smith, MD, PhD; D. Kojo Hamilton, MD; Jayme R. Hiratzka, MD; Vedat Deviren, MD; Christopher P. Ames, MD; Han Jo Kim, MD; Shay Bess, MD; Gregory M. Mundis Jr., MD; Eric O. Klineberg, MD; Serena S. Hu, MD


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

11:00 a.m.–12:00 p.m.
Global Spine Forum:
EuroSpine
Room 304
Moderator: Philip Sell, MD

An Unsystematic Review
Philip Sell, MD

The Impact of an Aging Spine Population on Trauma Treatment in Europe
Thomas Blattert, MD

Spinal Tuberculosis in Europe
Philip Sell, MD

Fads in Spinal Implant Development in Europe
Finn B. Cristensen, MD

Discussion

11:00 a.m.–12:00 p.m.
Section on Allied Health:
Room 305
Moderator: Scott Haldeman, MD, PhD, DC

Data indicate an increasing utilization of allied health services by patients seeking care for spine pain and related syndromes. The majority of individuals, however, continue to first seek medical care for spine troubles and there are well established limitations to nonoperative care, especially in the presence of serious spine pathology. Conversely, evidence is limited or lacking for many routine medical approaches and the risks and costs of interventional procedures are under increasing scrutiny in a resource-stressed health care market.

Empirical evidence suggests that appropriately coordinated patient care has the potential to impact costs and outcome in spine care. With the infusion of value-based parameters measures into health systems, it is clear that additional demands will be placed on administrators and providers to effectively collaborate and integrate patient care. While research has provided some foundation for best-practices, gaps in communication between medical and allied health providers have the potential to affect optimal patient selection, timely interprofessional referral and collaborative case management.

Upon completion of this session, participants should gain strategies to enhance clinical decision-making skills through a facilitated dialogue between medical, allied health and health systems administrative professionals with extensive experience in field of spine care.
**Agenda**

**Nonspecific Axial Pain**
**Radicular Syndromes**
**Serious Spinal Pathology (Identify Sub-Types)**

**Panelists:**
Simon Dagenais, DC, PhD
Evan K. Johnson, PT, DPT, OCS
Rick J. Placide, MD, PT
Joel M. Press, MD
Charles A. Reitman, MD
Sherri Weiser, PhD
Gregory L. Whitcomb, DC

**FDA Device/Drug Status:**
All presenters: These presentations do not discuss or include any applicable devices or drugs.

**12:00–1:00 p.m.**
**Complimentary Box Lunch**
**Medical Attendees Only**
Technical Exhibition, Halls A and C

**Solution Showcase**
Technical Exhibition, Booth 2504

12:00 p.m.: **OPM Oxford Performance Materials**
OsteoFab®: An Advanced 3D Printed Platform for Spinal Reconstruction
*Dr. S. Adam Hacking, PhD, Chief Scientific Officer*

**1:00–1:05 p.m.**
**NASS Working for You:**
**Coverage and Payer Policy Update**
Gateway Ballroom 103/104
Moderator: Christopher M. Bono, MD

**1:00–2:00 p.m.**
**Global Spine Forum:**
**Brazilian Spine Society**
Room 304

**Predictive Factors for Perioperative Blood Transfusion in Surgeries for Correction of Idiopathic, Neuromuscular or Congenital Scoliosis**
Paulo Alvim Borges, MD; **Olavo Biraghi Letaif, MD**: Raphael Martus Marcon, MD; Alexandre Fogaça Cristante, MD

**Evaluation of the Effect of Estrogen on Experimental Spinal Cord Injury in Rats**
Olavo Biraghi Letaif, MD: Alexandre Fogaça Cristante, MD; Raphael Martus Marcon, MD

**Roentgenographic Evaluation of the Spine in Patients With Osteogenesis Imperfecta**
Marcos Vaz de Lima, MD: Miguel Akkari, MD, PhD; Vanessa Ribeiro de Resende, MD; Claudio Santilli, MD, PhD

**Hyaluronic Acid, Collagen and Ionic Distribution: A Relation Study With Annulus Fibrosus Cells (Fibroblast-Like Cells)**
Delio Eulalio Martins, MD; V.P. Medeiros, MD; G.F. Demerov, MD; C.M. Accardo, MD; E.J. Paredes-Gamero, MD; Marcelo Wajchenberg, MD; R.D. Reginato, MD; H.B. Nader, MD; Eduardo Puertas, MD; Fávio Faloppa, MD

**Diffusion-weighted Magnetic Resonance (DW-MR) Neurography of the Lumbar Plexus in the Preoperative Planning of Lateral Access Lumbar Surgery**
Cristiano Magalhães Menezes, MD: Luciene Mota de Andrade, MD; Marcos Antônio Ferreira Jr., MD; Carlos Fernando P.S. Merrer, MD; Helton Luiz Aparecido Defino, MD; Willian Blake Rodgers e Marcello, MD; Henrique Nogueira-Barbosa, MD

**Thoracoplasty Reconstruction With Internal Osteosynthesis: A New Technique for the Treatment of Rib Hump Deformity (1º Trabalho)**
Luis Eduardo Carelli Teixeira da Silva*, MD; **Alderic Girao Campos de Barros, MD**: Gustavo Borges Laurindo de Azevedo, MD; Luís antônio Moliterno, MD; Renato Henrique Tavares, MD; Felipe Gomes Souza e Silva, MD

**Clinical and Radiological Analysis of Cervical Hemivertebra Resection in the Treatment of Cervical Congenital Scoliosis (2º Trabalho)**
Luis Eduardo Carelli Teixeira da Silva, MD; **Aldéric Girao Campos de Barros, MD**: Gustavo Borges Laurindo de Azevedo, MD; Bernardo José Moreira Chaves, MD

**Traumatic Atlanto-occipital Dislocation in Children Evaluation, Treatment and Outcomes**
Nelson Astur, MD; Paul Klimo Jr., MD, MPH; Jeffrey R. Sawyer, MD; Derek M. Kelly, MD; Michael S. Muhlbaier, MD; William C. Warner Jr., MD
1:00–3:40 p.m.
Young Spine Surgeons Forum
Room 305
Moderators: Saad B. Chaudhary, MD, MBA and Sheeraz Qureshi, MD, MBA

The transition from training to practice is a difficult time. With the best interests 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 review several critical topics, including Early Career Decision Making and Job Search; Practice Enhancement and Getting Involved. Distinguished speakers 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 are 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
Early Career Decision Making and Job Search
Moderator: Saad B. Chaudhary, MD, MBA
• Finding an Academic Job
  Kris Radcliff, MD
• Private Practice Perspectives
  Justin Hohl, MD
• Panel Discussion, Question and Answer

Practice Enhancement
Moderator: Rakesh D. Patel, MD
• Marketing in a Competitive Environment
  Han Jo Kim, MD
• Developing a Niche Practice
  Justin E. Bird, MD

Introduction to NASS Leadership
• Future of Spine Practice
  Heidi Prather, DO

How to Get Involved
Moderator: Michael C. Gerling, MD
• Getting Involved in Societies
  Alpesh A. Patel, MD, FACS
• Getting Involved in Policy
  Alok D. Sharan, MD
• Research/Intellectual Property Development
  Wellington Hsu, MD

Seasoned Career Path
Moderator: Sheeraz Qureshi, MD, MBA
• Career Path
• Panel Discussion, Questions and Answers

FDA Device/Drug Status:
All presenters: These presentations do not discuss or include any applicable devices or drugs.

1:05–2:30 p.m.
Symposium:
“Own the Bone:” The Spine Practitioner Taking Ownership of the Bone
Gateway Ballroom 103/104
Moderator: Paul A. Anderson, MD

Patients have an increased life expectancy but with that they have an increase in the frequency and severity of fragility fractures. Due to a lack of physician and patient awareness, osteoporosis and bone health have received inadequate attention, but over the last few years this is improving. The aging population will be exposed to further disability and the "burden of old age," while the healthcare systems will be stressed by the "economic burden" of fragility fracture care, if these issues are not addressed.

Orthopedic surgeons have increasingly been called upon to contribute team-based approaches in patients with hip fractures to ensure optimum patient management, both during hospitalization and in postoperative care settings. The spine community, who is caring for an increasing number of osteoporotic patients, has not adopted this.

Own the Bone® is a quality improvement program established by The American Orthopedic Association (AOA). The mission is to encourage orthopedic surgeons to become involved in management of patients having fragility fractures. This includes education to patients and practitioners, and methods to make systematic changes in the health care delivery such as development of fracture liaison services that co-manage osteoporosis with primary care physicians. These programs have shown significant improvement in patients getting appropriate testing and treatment of osteoporosis, and have been shown to reduce subsequent osteoporotic related fractures.
This symposium introduces Own the Bone® to the spine community to encourage spine practitioners caring for patients with osteoporosis to take ownership. The symposium emphasizes the use of diagnostic tests, initiating treatment, and providing leadership to develop fracture liaison programs. Further, the symposium reviews the pathophysiology of metabolic bone disease. The assessment of osteoporosis and the estimation of fracture risk are discussed. Although most spine practitioners will not provide pharmacologic management, the use of these agents and their effectiveness are reviewed so that patients may be appropriately advised whether they have optimal treatment. Nutritional and vitamin deficiencies are common in osteoporotic patients and can easily be addressed by spine practitioners.

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

- Motivate spine practitioners to diagnosis and begin medical management of patients with metabolic bone disease;
- Recognize the value to patients of fracture liaison services;
- Identify patients at fracture risk from osteoporosis;
- Advise patients regarding pharmacologic therapy to manage osteoporosis;
- Recommend nutritional supplementation and rehabilitation in patients with osteoporosis.

**Agenda**

**Own the Bone®: The AOA Initiative to Improve Bone Health—Understanding the Pathophysiology of Metabolic Bone Disease and Fracture Liaison Service**

Kyle J. Jeray, MD

**Assessment of Osteoporosis**

Charles A. Reitman, MD

**Medical Management of Osteoporosis**

Paul A. Anderson, MD

**Nutritional and Rehabilitation Considerations**

Robert A. Hart, MD

**Surgical Considerations in Osteoporotic Patients**

Serena S. Hu, MD

**Discussion, Questions and Answers**

All Faculty

**FDA Device/Drug Status:**

Paul A. Anderson, MD: This presentation does not discuss or include any applicable devices or drugs.

Robert A. Hart, MD: Alendronate, bisphosphates (Approved for this indication).

Serena S. Hu, MD: This presentation does not discuss or include any applicable devices or drugs.

Kyle J. Jeray, MD: This presentation does not discuss or include any applicable devices or drugs.

Charles A. Reitman, MD: This presentation does not discuss or include any applicable devices or drugs.

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**Global Spine Forum:**

**Association of Spine Surgeons of India**

Room 304

**Agenda**

**Complex Spinal Deformities: An Overview of Management**

Dr. Arvind Jayaswal, Ex-President—ASSI

**Lessons Learned Over Two Decades of High Grade Spondylolisthesis Surgery**

Dr. Ram Chaddha, President-Elect—ASSI

**Post-Tubercular Complex Spinal Deformities**

Dr. Samir Dalvie, Executive & Education Committee Member—ASSI

**Recent Advances Including Robotic Surgery in Management of Complex Spinal Deformities**

Dr. Sajan Hegde, President—ASSI

**Discussion**

All Faculty

**Networking Break—Beverage Service**

Esplanade Ballroom Lobby

**Spine Safety Update**

Gateway Ballroom 103/104
3:00–4:00 p.m.

Global Spine Forum: AOSpine
Room 304
Moderator: Michael Grevitt, MD

Thoracolumbar Trauma: New Insights into Old Problems; Introduction to AOSpine and Knowledge Forum
Michael Grevitt, MD

Case Presentation
Darrel Brodke, MD

The New AOSpine Thoracolumbar Fracture Classification: Utility and Advantages
Carlos Bellabarba, MD

Spinal Cord Injury: New Evidence Regarding the Timing of Surgery and Neurologic Outcomes
Michael G. Fehlings, MD, PhD, FRCSC

MRI Scans in Spinal Trauma: Friend or Foe?
Alpesh A. Patel, MD, FACS

Panel Discussion
Carlos Bellabarba, MD; Michael G. Fehlings, MD, PhD, FRCSC; Darrel Brodke, MD; Alpesh A. Patel, MD, FACS

Case Solution and Summary
Darrel Brodke, MD

3:05–3:35 p.m.

Value Abstract Awards Presentations
Gateway Ballroom 103/104
Moderator: Emily K. Karlen, MPT

3:05–3:11 p.m.

81. Improving Surgical Spine Outcomes Through a Targeted Postoperative Rehabilitation Approach
Kristin Archer, PhD, DPT; Susan Vanston; Tatsuki Koyama, PhD; Sharon Phillips; Oran S. Aaronson, MD; Joseph S. Cheng, MD, MS; Matthew J. McGirt, MD; Clinton J. Devin, MD; Stephen Wegener, PhD

Vanderbilt University Medical Center, Nashville, TN, US; Nashville, TN, US; Vanderbilt University Medical Center Department of Neurosurgery, Nashville, TN, US; Carolina Neurosurgery and Spine Associates, Charlotte, NC, US; Johns Hopkins, Baltimore, MD, US

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

3:11–3:17 p.m.

124. Lumbar Discectomy in the Ambulatory Care Setting: Defining Its Value Across the Acute and Post-Acute Care Episode
Scott L. Parker, MD; Anthony Asher, MD, FACS; E. H. Dyer, MD; Tim E. Adamson, MD; Clinton J. Devin, MD; Matthew J. McGirt, MD


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

3:17–3:23 p.m.

125. Interspinous Process Devices Versus Standard Conventional Surgical Decompression for Lumbar Spinal Stenosis: Cost Utility Analysis
Wouter A. Moojen, MD, MSc; Carmen Vliegeert-Lankamp, MD, PhD; Wilco C. Peul, MD, PhD

Leiden University Medical Center, Leiden, Netherlands; Netherlands; Leids Universitair Medisch Centrum, Leiden, Netherlands

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

3:23–3:35 p.m.

Discussion

3:40–4:40 p.m.

Concurrent Session: Deformity
Gateway Ballroom 103/104
Moderator: Christopher P. Ames, MD

3:40–3:46 p.m.

155. Effect of ROTEM-Guided Hemostatic Therapy in Adult Spine Deformity Surgery
Bhiken I. Naik, MbChB; Edward C. Nemergut, MD; Thomas N. Pajewski, MD, PhD; Christopher I. Shaffrey, MD; Justin S. Smith, MD, PhD; Zhiyi Zuo, MD, PhD; David L. Bogdonoff, MD; Pamela Clark, MD, JD; Marcel E. Durieux, MD, PhD

Charlottesville, VA, US; Department of Anesthesiology, Charlottesville, VA, US; University of Virginia Department of Neurosurgery, Charlottesville, VA, US; University of Virginia Health System, Charlottesville, VA, US; University of Virginia Health System, Charlottesville, VA, US

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

3:46–3:52 p.m.

156. The Comparison of Two Surgical Treatments for Lumbar Stenosis With Degenerative Scoliosis in Six-Year Minimum Follow-Up
Liang Yan, PhD, MD; Dingjun Hao, MD; Baorong He, MD

Xi’an, China

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
3:52–3:58 p.m.
157. Postoperative Blood Salvage and Autotransfusion Following Surgery for Adult Spinal Deformity: A Randomized Controlled Trial

Venu M. Nemani, MD, PhD; Han Jo Kim, MD; Curtis A. Mina, MD, MBA; Thomas Ross, RN, MS; Matthew E. Cunningham, MD, PhD; Bernard A. Rawlins, MD; Oheneba Boachie-Adjei, MD


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

3:58–4:04 p.m.
158. High Dose of Tranexamic Acid Reduces Intraoperative Blood Loss in Patients Undergoing Posterior Vertebral Column Resection: A Clinical Comparative Study of 89 Consecutive Patients

Jing-Ming Xie, MD; Tao Li, MD, PhD; Ying Zhang; Yingsong Wang; Leijie Chen; Zhou Liu; Zhiyue Shi; Zhi Zhao; Ni Bi

Department of Orthopedics, The 2nd Affiliated Hospital of Kunming Medical University, Yunnan Province, China

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

4:04–4:10 p.m.
159. Adult Spinal Deformity Treated With Minimally Invasive Techniques: Two-Year Multicenter Clinical and Radiographic Outcomes Study Comparing Circumferential MIS and Hybrid Surgery

International Spine Study Group; Gregory M. Mundis Jr., MD; Behrooz A. Akbarnia, MD; Adam S. Kanter, MD; David O. Onokowo, MD; Paul Park, MD; Juan S. Uribe, MD; Vedat Deviren, MD; Neel Anand, MD; Michael Y. Wang, MD; Frank La Marca, MD; Richard G. Fessler, MD, PhD; Stacie Nguyen, MPH; Barthelemy Liabaud, MD; Bassel G. Diebo, MD; Robert K. Eastlack, MD


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

4:10–4:16 p.m.
160. A Comparison of Four Different Surgical Approaches to Adult Spinal Deformity: Which Approach is Best?

International Spine Study Group; Han Jo Kim, MD; Michael P. Kelly, MD; Stacie Nguyen, MPH; Matthew E. Cunningham, MD, PhD; Virginie Lafage, PhD; Justin S. Smith, MD, PhD; Christopher I. Shaffrey, MD; Frank J. Schwab, MD; Gregory M. Mundis Jr., MD; Justin K. Scheer, BS; Munish C. Gupta, MD; Robert A. Hart, MD; Douglas C. Burton, MD; Shav Bess, MD; Christopher P. Ames, MD; Eric O. Klineberg, MD


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

4:16–4:22 p.m.
161. Reducing Radiation an Order of Magnitude During x-ray Intensive Spine Procedures Using a Standard Fluoroscope

Robert E. Isaacs, MD; Isaac O. Karikari, MD; D. Greg Anderson, MD

1Duke University Medical Center, Durham, NC, US; 2Duke University, Durham, NC, US; 3Rothman Institute, Philadelphia, PA, US

FDA Device/Drug Status: LessRay (Approved for this indication).

4:22–4:38 p.m.
Discussion
FRIDAY, NOVEMBER 14

PROGRAM SCHEDULE

3:40–4:40 p.m.
Concurrent Session: Complications of Lumbar Surgery
Gateway Ballroom 102
Moderator: Michael J. Vives, MD

3:40–3:46 p.m.
162. The Impact of Uncontrolled Diabetes in Patients Undergoing Degenerative Lumbar Spine Surgery
Javier Guzman, BS1; Branko Skovrlj, MD2; Andrew Hecht, MD3; Sheeraz A. Qureshi, MD, MBA1; Samuel K. Cho, MD1
1Mount Sinai School of Medicine, New York, NY, US; 2Mount Sinai School of Medicine Department of Neurosurgery, New York, NY, US; 3New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

3:46–3:52 p.m.
163. Hip Flexion Weakness After XLIF: The “Angry Psoas”
SOLAS Deformity Study Group1; Juan S. Uribe, MD2; Jim A. Youssef, MD2; Robert E. Isaacs, MD3; SOLAS Degenerative Study Group4
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

3:52–3:58 p.m.
164. Sympathetically Medicated Pain Syndrome (SMPS) as a Postoperative Complication of Anterior Lumbar Interbody Fusion Surgery
Peter F. Ullrich Jr., MD1; David C. DeWitt, MD2; Pam Verkuilen, NP3; Sherry Meyer, CST4; Rachel L. Ullrich5
1NeuroSpine Center of Wisconsin, Appleton, WI, US; 2Neenah, WI, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

3:58–4:04 p.m.
165. Is the Lateral Jack-Knife Position Responsible for Cases of Transient Neuropaxia?
Daniel A. Fung, MD1; Diana M. Molinares, MD2; Timothy T. Davis, MD2
1Hawthorne, CA, US; 2Orthopedic Pain Specialists, Santa Monica, CA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:04–4:10 p.m.
166. A Comparison of Early Clinical and Radiographic Complications of Iliac Screw Fixation Versus S2 Alar Iliac (S2AI) Fixation in the Adult and Pediatric Populations
Haariss Ilyas, BA1; Howard M. Place, MD2; Aki Puryear, MD3
1St. Louis University School of Medicine, St. Louis, MO, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:10–4:16 p.m.
167. Intraocular Pressure in Lumbar Spine Fusion Patients: A Prospective, Randomized Study
Sanford E. Emery, MD, MBA1; John C. France, MD2; Scott D. Daffner, MD1; Matthew Ellison, MD3; Brian W. Grose, MD4; Nina B. Clovis1
1West Virginia University Department of Orthopaedics, Morgantown, WV, US; 2West Virginia University Department of Anesthesiology, Morgantown, WV, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:16–4:22 p.m.
168. No Difference in Postoperative Complications, Pain and Functional Outcomes Up to Two Years After Incidental Durotomy in Lumbar Spinal Fusion: A Prospective, Multi-Institutional, Propensity Matched Analysis of 1,741 Patients
Owoicho Adogwa, MD, MPH1; Terence Verla, MPH2; Parastou Fatemi3; Oren N. Gottfried, MD4; Robert E. Isaacs, MD5
1Durham, NC, US; 2Chapel Hill, NC, US; 3Duke University Medical Center, Durham, NC, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:22–4:40 p.m.
Discussion
3:40–3:46 p.m.
169. Effect of Lumbar Intradiscal Injection of Tumor Necrosis Factor-Alpha and Nerve Growth Factor/Vascular Endothelial Growth Factor on Disc Degeneration, Pain Behavior and Neurovascular Ingrowth in an In Vivo Rat Model
Branko Skovrlj, MD; Devina Purmessur, PhD; Samuel K. Cho, MD; Andrew Hecht, MD; James C. Iatridis, PhD
1Mount Sinai School of Medicine Department of Neurosurgery, New York, NY, US; 2Mount Sinai Medical Center, New York, NY, US; 3Mount Sinai School of Medicine, New York, NY, US; 4New York, NY, US; 5University of Vermont, Burlington, VT, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

3:46–3:52 p.m.
170. Secreted Phosphoprotein 24 kD (Spp24) Inhibits Nerve Root Inflammation Induced by Bone Morphogenetic Protein-2
Haijun Tian, MD, PhD; Chenshuang Li, DDS; Trevor P. Scott, MD; Kevin Phan, BS; Scott R. Montgomery, MD; Lifeng Lao, MD, PhD; Yawei Li, MD, PhD; Tetsuo Hayashi, MD; Shinji Takahashi, MD; Raed Alobaidaan, MBBS; Monchai Ruangchainikom, MD; Jeffrey C. Wang, MD; Michael D. Daubs, MD
1Shanghai Changzheng Hospital Department of Orthopaedic Surgery, Shanghai, China; 2Peking University School and Hospital of Stomatology Department of Orthodontics, Beijing, China; 3University of California Los Angeles Department of Orthopaedic Surgery, Los Angeles, CA, US; 4Keck School of Medicine of USC Department of Orthopaedic Surgery, Los Angeles, CA, US; 5University of Nevada School of Medicine Division of Orthopaedic Surgery, Department of Surgery, Las Vegas, Nevada, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

3:52–3:58 p.m.
171. Accumulation of Advanced Glycation End-Products in Intervertebral Discs of Type 2 Diabetic Rodents Increases Susceptibility to Mechanical Damage
Simon Tang, PhD
Washington University, St. Louis, MO, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

3:58–4:04 p.m.
172. Disc Regeneration Using STRO-3+ Immunoselected Allogeneic Mesenchymal Precursor Cells Combined with Pentosan Polysulfate
David Oehme MBBS (Hons), PhD; Peter Ghosh DSc, PhD, FRSC; Tony Goldschlager MBBS, PhD, FRACS; Courtney McDonald, BSc (Hons), PhD; John M. Troupis, MBBS, FRANZCR; Jeffrey V. Rosenfeld MD, MS, FRACS; Graham Jenkin PhD
1The Ritchie Centre, Monash Institute of Medical Research (MIMR), Monash University Clayton Victoria, Australia; 2Proteobioactives Pty Ltd Research Laboratories Brookvale, NSW, Australia; 3Mesoblast Ltd, Melbourne, Australia; 4Diagnostic Imaging, Monash Health, Clayton, Victoria, Australia; 5Department of Surgery, Monash University, Clayton, Victoria, Australia; 6Alfred Hospital Department of Neurosurgery, Melbourne, Victoria, Australia
FDA Device/Drug Status: Mesenchymal precursor cell (Investigational/Not approved).

4:04–4:10 p.m.
173. Neuroprotective Effect of Prophylactic Intrathecal Methylprednisolone in Spinal Cord Injury in Rat Model
Thomas Cheriyan, MD; Hiroyuki Yoshihara, MD, PhD; Stephen P. Maier II, BA; Devon J. Ryan, BA; Jeffrey H. Weinreb, BS; Thomas J. Errico, MD
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

4:10–4:16 p.m.
174. Osteoblasts Secrete Pro-Inflammatory Cytokines on PEEK but Anti-Inflammatory Cytokines on Microstructured Titanium
Barbara D. Boyan, PhD; Rene Olives-Navarrete, PhD; Sharon L. Hyzy; Paul J. Slosar, MD; Peter F. Ullrich Jr., MD; Zvi Schwartz, PhD
1Virginia Commonwealth University School of Engineering, Richmond, VA, US; 2Georgia Institute of Technology, Atlanta, GA, US; 3Spine Care Institute of San Francisco, San Francisco, CA, US; 4Neuro Spine Center of Wisconsin, SC, Appleton, WI, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
4:16–4:22 p.m.
175. A Comparison of Commercially Available Demineralized Bone Matrix with and Without Human Mesenchymal Stem Cells in a Rodent Spinal Fusion Model
Tetsuo Hayashi, MD; Jeffrey C. Wang, MD; Elizabeth L. Lord, MD; Akinobu Suzuki, MD, PhD; Shinji Takahashi, MD; Trevor Scott, MD; Haijun Tian, MD, PhD; Kevin Phan, BS; Michael D. Daubs, MD
1Los Angeles, CA, US; 2USC Spine Center, Los Angeles, CA, US; 3Osaka City University, Osaka, Japan; 4University of California Los Angeles Department of Orthopedic Surgery, Santa Monica, CA, US; 5Las Vegas, NV, US

FDA Device/Drug Status: Trinity (Approved for this indication), Graphton (Approved for this indication), DBX (Approved for this indication).

4:22–4:40 p.m.
Discussion

3:46–3:52 p.m.
177. Long-Term Patient-Centered Clinical Outcomes of Lumbar Arthrodeses in Degenerative Disc Disease: A Systematic Review with Meta-Analysis
Andriy Noshchenko, PhD; Emily M. Lindley, PhD; Evalina L. Burger, MD; Christopher M. Cain, MD; Vikas V. Patel, MD
University of Colorado Anschutz Medical Campus, Department of Orthopedics, Aurora, CO, US

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

3:52–3:58 p.m.
178. Preoperative Opioid Usage and Anxiety are Associated with Increased Non-Surgeon Visits for Spine-Related Pain Within Postoperative Global Period
Jesse E. Bible, MD; David N. Shau, BS; Harrison F. Kay; Chi Zhang; Sheyan J. Armaghani, MD; Matthew J. McGirt, MD; Clinton J. Devlin, MD

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

3:58–4:04 p.m.
179. Post-Consultation Predictors of Willingness to Undergo Orthopedic Surgery
Raja Y. Rampersaud, MD, FRCSC; Anthony V. Perruccio, PhD; Rajiv Gandhi, MD
1Toronto Western Hospital, Toronto, ON, Canada; 2University of Toronto, University Health Network, Toronto, ON, Canada; 3University of Toronto, Toronto, ON, Canada

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

4:04–4:10 p.m.
180. Gender-Related Demographic Differences Among Patients Scheduled for Lumbar Disc Herniation Surgery
Björn Strömqvist, MD; Bo Jonsson, MD; Fredrik Stromqvist, MD
1Lund, Sweden; 2Lund University Hospital, Lund, Sweden

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
4:10–4:16 p.m.
181. Preexisting Lumbar Spine Diagnoses as a Predictor of Outcomes in National Football League Athletes

Gregory D. Schroeder, MD1; T. S. Lynch, MD2; Daniel B. Gibbs3; Ian Chow4; Mark LaBelle5; Alpesh A. Patel, MD, FACS6; Jason W. Savage, MD7; Wellington K. Hsu, MD8; Gordon W. Nuber, MD9

1Northwestern University, Chicago, IL, US; 2Cleveland Clinic, Cleveland, OH, US; 3Northwestern University School of Medicine, Chicago, IL, US; 4Northwestern Department of Orthopaedics, Chicago, IL, US; 5Chicago, IL, US; 6NorthShore University, Chicago, IL, US

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

4:16–4:22 p.m.
182. Impact of Lumbar Instrumented Circumferential Fusion on the Development of Adjacent Vertebral Compression Fracture

Shih-Chieh Yang, MD, PhD
E-Da Hospital, Kaohsiung, Taiwan

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

4:22–4:40 p.m.
Discussion

3:40–4:40 p.m.
Focused Discussion: Reducing the Risk of Surgical Site Infection
Room 301
Moderator: Jason W. Savage, MD

Despite an increase in physician and public awareness and advances in infection control practices, surgical site infection (SSI) remains one of the most common complications after an operation. SSIs have been shown to decrease health-related quality of life, double the risk of readmission, prolong the length of hospital stay, and increase hospital costs. Wound infections after spine surgery occur in 1-10 percent of patients, are often associated with significant morbidity, and can potentially lead to poor outcomes. Risk factors have been identified that are associated with an increased risk of developing postoperative wound infections, which include smoking, obesity, diabetes, long term steroid use, alcohol abuse, malnutrition, history of prior infection, and increased operative time and/or estimated blood loss.

Modifiable strategies aimed to reduce exposure and bacterial burden to the wound have been evaluated. Preoperative factors include optimization of medical conditions, screening for skin pathogens, decontamination using antiseptic showers or cloths, and the administration of intravenous antibiotics. At the time of surgery skin preparation with antiseptics, hand hygiene, the use of antibiotic irrigation and/or vancomycin powder, and antibiotic suture may decrease the risk of developing a SSI. Other modifiable factors include the timing of postoperative removal of wound drains and other catheters.

This focused discussion reviews the best available medical evidence of modifiable factors that can reduce the risk of developing a SSI in a patient undergoing spinal surgery.

Upon completion of this session, participants should gain strategies to:
• Review the pathophysiology of surgical site infections;
• Counsel patients on preoperative medical optimization;
• Apply guidelines and best available medical evidence to the use of preoperative, intraoperative and postoperative modifiable factors to reduce the risk of surgical site infections.

Agenda
Introduction and Objectives
Jason W. Savage, MD

Review Pathophysiology of SSI and the Importance of Medical Optimization
Jason W. Savage, MD

Preoperative Factors: Screening for Skin Pathogens, Decolonization Using Antiseptic Showers and/or Antiseptic Cloths, Skin Preparation
David H. Kim, MD

Surgical and Postoperative Factors: Intravenous Antibiotics, Antibiotic Irrigation, Vancomycin Powder, Closed Suction Drains and Antibiotic Suture
Paul A. Anderson, MD

Cost and Healthcare System Payments
Jason W. Savage, MD

Questions and Answers

FDA Device/Drug Status:
Jason W. Savage, MD: Mupirocin nasal ointment, DuraPre, ChloraPrep, Betadine, Hibiclens (Approved); Vancomycin powder (Not Approved).
David H. Kim, MD: Mupirocin (Not Approved for this indication).
Paul A. Anderson, MD: Not available at time of publication.
This Collaborative Concepts in Spine Care session is a highly interactive session utilizing case discussions. The purpose is to review differential diagnoses based on a patient’s presenting signs and symptoms. The emphasis is on appropriate interpretation of the history and physical exam to help narrow the differential and ultimately lead to the correct diagnosis.

Upon completion of this session, participants should gain strategies to:
Review and assess differential diagnoses for multiple spine conditions utilizing history and physical examination information to arrive at the correct diagnosis.

Agenda
Introduction/Welcome
Rick J. Placide, MD, PT

Case 1: Sacroiliac Joint
Ryan A. Tauzell, MA, PT, Cert. MDT

Case 2: Cervical Spine/Shoulder

Case 3: Lumbar Spine/Hip

Case 4: Back Pain/Visceral Organ

Discussion, Questions and Answers

FDA Device/Drug Status:
All presenters: These presentations do not discuss or include any applicable devices or drugs.

4:45–5:45 p.m.
International Reception
Esplanade Ballroom Lobby

Anterior Defect After VCR/PSO for Kyphoscoliosis: A “Neglected” Risk Factor for Loss of Correction and Mechanical Failure
Xu Sun, MD, Nan Jing Drum Tower Hospital

Disturbed ADAR1 Expression in Chordoma Tissues is Associated With Chordoma Pathogenesis by Reducing miR-125a and miR-10a Expression
Lei Kuang, MD, The Second Xiangya Hospital of Central South University

Global Spine Forum: Chinese Orthopaedic Association

Room 304
Moderator: Prof. Wei Tian, MD, PhD

Computer Assisted Minimally Invasive Posterior Screw Fixation for Atlantoaxial Instability
Prof. Wei Tian, MD, PhD, Beijing Jishuitan Hospital

Clinical Results of Artificial Cervical Disc Replacement or Hybrid Surgery for Multilevel Cervical Spondylosis
Prof. Hao Liu, MD, West China Hospital, Sichuan University

One-Stage Total En Bloc Spondylectomy for Lumbar Tumors via Posterior Approach
Prof. Jian Dong, PhD, Zhongshan Hospital Fudang University
Minimally invasive surgical (MIS) techniques and technologies have been increasingly introduced in spine surgery over the last decade. These techniques may be of particularly greatest value to more vulnerable populations such as the elderly requiring surgery for degenerative lumbar scoliosis. As a result of a relatively high degree of morbidity in this particular surgical population, the potential known benefits of less invasive surgery warrant serious consideration. However, these benefits need to be weighed against the ability to effectively achieve the often challenging anatomical complexities associated with surgical treatment of degenerative scoliosis (i.e. osteoporosis, sagittal and coronal imbalance and multilevel decompression). This symposium presents both a pragmatic and best evidence approach to the pros and cons of MIS management of degenerative lumbar scoliosis. Opinion leaders who currently perform conventional or MIS surgical techniques debate the pros and cons of adopting MIS surgical treatment in this challenging population. In addition, the panel and symposium participants openly discuss what clinical and/or radiographic factors are indicative of the ideal scenario for consideration of MIS techniques for the surgical management of lumbar degenerative scoliosis.

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

- Identify ideal patients for limited surgical procedures in degenerative scoliosis patients who have failed conservative treatment;
- Recognize ideal patients for a minimally invasive multilevel procedure for degenerative lumbar scoliosis;
- Enable informed decision making for or against the adoption of MIS techniques for the management of degenerative lumbar scoliosis in their practice.

**Agenda**

**Introduction and Case Presentation**
Raja Y. Rampersaud, MD, FRCSC

**Are Limited Surgical Procedures Effective?**
PRO: Raja Y. Rampersaud, MD, FRCSC
CON: Christopher I. Shaffrey, MD

**Can Effective Multilevel Decompression (Direct or Indirect) Be Achieved?**
PRO: Juan S. Uribe, MD
CON: David W. Polly, MD

**Can Effective Fixation Be Efficiently Achieved?**
PRO: Michael Y. Wang, MD
CON: David W. Polly, MD

**Can Effective Correction Be Achieved?**
PRO: Michael Y. Wang, MD
CON: Stephen J. Lewis, MD

**Open Panel and Participant Discussion: What Patient and Radiographic Factors are Most Favorable for the Adoption of MIS Surgical Management for Degenerative Lumbar Scoliosis?**

**FDA Device/Drug Status:**
Stephen J. Lewis, MD: This presentation does not discuss or include any applicable devices or drugs.
David W. Polly, MD: This presentation does not discuss or include any applicable devices or drugs.
Raja Y. Rampersaud, MD, FRCSC: This presentation does not discuss or include any applicable devices or drugs.
Christopher I. Shaffrey, MD: This presentation does not discuss or include any applicable devices or drugs.
Juan S. Uribe, MD: This presentation does not discuss or include any applicable devices or drugs.
Michael Y. Wang, MD: BMP (Not approved for this indication); Interbody devices and screws (Approved for this indication).
10:00–10:06 a.m.
184. Intermediate Dosing of Recombinant Human Bone Morphogenetic Protein-2 (rhBMP-2) Improves Fusion Rates With No Increase in Major Complications but Does Not Improve Health Related Quality of Life for Adult Spinal Deformity (ASD) at Minimum Two Years: A Prospective, Multicenter Analysis

International Spine Study Group; Shay Bess, MD; Breton Line; Virginie Lafage, PhD; Behrooz A. Akbarnia, MD; Christopher P. Ames, MD; Oheneba Boachie-Adjei, MD; Douglas C. Burton, MD; Vedat Deviren, MD; Kai-Ming G. Fu, MD, PhD; Robert A. Hart, MD; D. Kojo Hamilton, MD; Marilyn L. Gates, MD; Khaled M. Kebaish, MD; Eric O. Klineberg, MD; Munish C. Gupta, MD; Gregory M. Mundis Jr., MD; Richard A. Hostin, MD; Frank J. Schwab, MD; Christopher I. Shaffrey, MD; Justin S. Smith, MD, PhD


FDA Device/Drug Status: RhBMP-2 (Not approved for this indication).

10:06–10:12 a.m.
185. Prospective Analysis of Location of RhBMP-2 Use in Adult Spinal Deformity (ASD) Surgery Does Not Correlate with Site Specific Complications and Generates Greater Fusion Rates at Minimum Two-Year Follow-Up

International Spine Study Group; Shay Bess, MD; Breton Line; Virginie Lafage, PhD; Behrooz A. Akbarnia, MD; Christopher P. Ames, MD; Oheneba Boachie-Adjei, MD; Douglas C. Burton, MD; Vedat Deviren, MD; Kai-Ming G. Fu, MD, PhD; Robert A. Hart, MD; D. Kojo Hamilton, MD; Marilyn L. Gates, MD; Khaled M. Kebaish, MD; Eric O. Klineberg, MD; Munish C. Gupta, MD; Gregory M. Mundis Jr., MD; Richard A. Hostin, MD; Frank J. Schwab, MD; Christopher I. Shaffrey, MD; Justin S. Smith, MD, PhD


FDA Device/Drug Status: RhBMP-2 (Not approved for this indication).
10:00–11:00 a.m.
Concurrent Session: Outcomes in Spine Care
Room 304
Moderator: Christopher M. Bono, MD

10:00–10:06 a.m.
190. Preoperative Coagulation Profile Testing to Predict Blood Loss in Complex Spine Surgery: Identifying the Patient at Risk
Evalina L. Burger, MD1; Damian Illing2; Devin Razavi-Shearer, BA3; Nathen S. Weitzel1; Emily M. Lindley, PhD4; Christopher Kleck, MD5; Christopher M. Cain, MD, FRACS2; Leslie C. Jameson3; Vikas V. Patel, MD6
1University of Colorado Anschutz Medical Campus, Department of Orthopedics, Aurora, CO, US; 2University of Colorado Anschutz Medical Campus, Department of Anesthesiology, Aurora, CO, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:06–10:12 a.m.
191. The Type of Metal, Local Antibiotics or Prophylactic IV Antibiotics: What Influences Postoperative Spine Infections with MRSA the Most?
Sachin Gupta1; Kavita Gupta1; Sukanta Maitra, MD2; Maria D. Cabral Pereira, DVM, PhD, MPh3; Purnimal Wetprijaykul, MD; Blythe Durbin-Johnson, PhD4; Munish C. Gupta, MD5
FDA Device/Drug Status: Vancomycin (Not approved for this indication).

10:12–10:18 a.m.
192. Risk Factors for Reoperation in Patients Treated Surgically for Intervertebral Disc Herniations: A Subanalysis of the Eight-Year Data from the SPORT Trial
Dante M. Leven, DO, PT1; Peter G. Passias, MD2; Thomas J. Errico, MD2; Virginie Lafage, PhD3; Kristina Bianco, MD4; Alexandra A. Lee, BSN, CCRN5; Jon D. Lurie, MD6; Wenyan Zhao7; Kevin F. Spratt, PhD7; Michael C. Gerling, MD8
1Brooklyn, NY, US; 2New York University Langone Medical Center, New York, NY, US; 3New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 4Spine Research Center, New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 5Spine Research Center, New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 6Dartmouth College, Lebanon, NH, US; 7Hanover, NH, US; 8Department of Orthopaedics, Lebanon, NH, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
10:18–10:24 a.m.
193. Prospective, Randomized, Multicenter Study Comparing SiCaP Versus BMP-2 Bone Graft Substitutes in Patients Requiring Posterolateral Lumbar Fusion With Interbody Fusion
Alex E. Kahney
Niche Science and Technology, London, UK
FDA Device/Drug Status: Actifuse (Approved for this indication), Infuse (Not approved for this indication).

10:24–10:30 a.m.
194. XLIF Versus MAS TLIF for the Treatment of Degenerative Spondylolisthesis: Interim Results from an Ongoing Prospective Multicenter Comparative Study
SOLAS Deformity Study Group; Jonathan N. Sembrano, MD; Robert E. Isaacs, MD; Antoine Tohmeh, MD; SOLAS Deformity Study Group
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:30–10:36 a.m.
195. Outcome of Decompression With and Without Fusion in Spinal Stenosis With Degenerative Spondylolisthesis in Relation to Preoperative Pain Pattern: A Register Study of 1,362 Patients
Freyr G. Sigmundsson, MD; Bo Jonsson, MD; Björn Strömqvist, MD
Department of Orthopedic Surgery, Malmo, Skane University Hospital, Malmo, Sweden
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:36–10:42 a.m.
196. The Cause of Delayed Neurologic Deficits Following Osteoporotic Vertebral Pseudoarthrosis
Toshio Nakamae, MD; Yoshinori Fujimoto, MD, PhD; Kiyotaka Yamada, MD, PhD; Masaki Matsuura
1JA Hiroshima General Hospital, Hiroshima, Japan; 2Hiroshima General Hospital, Hatsuakiichi, Japan; 3Hiroshima University General Hospital, Hatsuakiichi, Japan
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:42–11:00 a.m.
Discussion

10:00–11:00 a.m.
Concurrent Session: Deformity
Room 305
Moderator: Justin S. Smith, MD, PhD

10:00–10:06 a.m.
197. Does Planned Staging for Posterior-Only Vertebral Column Resections in Spinal Deformity Surgery Increase Perioperative Complications?
Jeffrey L. Gum, MD; Lawrence G. Lenke, MD; Keith H. Bridwell, MD; Johnny Zhao, BA; David B. Bumpass, MD; Patrick A. Sugrue, MD; Isaac O. Karikari, MD; Leah Y. Carreon, MD, MSc
1Louisville, KY, US; 2Washington University Medical Center Department of Orthopedic Surgery, St. Louis, MO, US; 3Washington University in St. Louis School of Medicine, St. Louis, MO, US; 4St. Louis, MO, US; 5Northwestern University Medical School, Chicago, IL, US; 6Durham, NC, US; 7Norton Leatherman Spine Center, Louisville, KY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:06–10:12 a.m.
198. Unanticipated Revision Surgery in Adult Spinal Deformity: An Experience With 815 Cases
Hongda Bao, MD
Spine Surgery, Drum Tower Hospital, Nanjing University Medical School, Nanjing, China
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

10:12–10:18 a.m.
199. Prospective, Multicenter Assessment of Nonoperative Treatment Outcomes and Conversion to Operative Treatment for Adult Spinal Deformity: Minimum Two-Year Follow-Up
International Spine Study Group; Justin S. Smith, MD, PhD; Christopher I. Shaffrey, MD; Virginie Lafage, PhD; Frank J. Schwab, MD; Themistocles S. Protopsaltis, MD; Eric O. Klineberg, MD; Munish C. Gupta, MD; Justin K. Scheer, BS; Kai-Ming G. Fu, MD, PhD; Richard A. Hostin, MD; Vedat Deviren, MD; Robert A. Hart, MD; Douglas C. Burton, MD; Shay Bess, MD; Christopher P. Ames, MD
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
10:18–10:24 a.m.
200. Magnitude, Location and Factors Related to Regional and Global Correction Loss in Long Adult
Deformity Constructs: Report of 183 Patients with Two-Year Follow-Up

International Spine Study Group; Christopher P. Ames, MD; Virginie Lafage, PhD; Justin K. Scheer, BS; Michael P. Kelly, MD; Richard A. Hostin, MD; Robert A. Hart, MD; Eric O. Klineberg, MD; Themistocles S. Protopsaltis, MD; Vedat Deviren, MD; Daniel M. Scuibba, MD; Shay Bess, MD; Christopher I. Shaffrey, MD; Frank J. Schwab, MD; Justin S. Smith, MD, PhD.

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

10:24–10:30 a.m.
201. Adult Spinal Deformity Surgeons Are Unable to Accurately Predict Postoperative Spinal Alignment:
Initial Analysis of a Three-Phase Study

International Spine Study Group; Virginie Lafage, PhD; Frank J. Schwab, MD; Justin K. Scheer, BS; Eric O. Klineberg, MD; Daniel M. Scuibba, MD; Lukas P. Zebala, MD; Richard A. Hostin, MD; Ibrahim Obeid; Tyler R. Koski, MD; Michael P. Kelly, MD; Shay Bess, MD; Christopher I. Shaffrey, MD; Justin S. Smith, MD, PhD; Christopher P. Ames, MD.

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

10:30–10:36 a.m.
202. Scoliosis Posture Accompanied With Marked Trunk Shift: A Frequent Sign Secondary to Lumbar
Disc Herniation in Adolescents

Xu Sun

Drum Tower Hospital, Nanjing University Medical School, Nanjing, China

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

10:36–11:00 a.m.
Discussion

11:00 a.m.–12:00 p.m.
Focused Discussion:
Management of Complex Problems in Lumbar Spinal Stenosis

Room 305
Moderator: Christopher G. Furey, MD

Lumbar spinal stenosis is among the most commonly treated condition by spine practitioners. As our patient population expands and ages, the scope and complexity of treatment challenges will continue to increase.

This session focuses on the evaluation and management of patients with particularly complex and challenging cases of spinal stenosis. Included is discussion of the patient with recurrent or residual stenosis, stenosis and degenerative scoliosis, stenosis encompassing the thoracolumbar junction, and stenosis in the very elderly and medically-compromised.

A multidisciplinary faculty comprehensively reviews the clinical and radiographic presentations of complex patients and discusses strategies for appropriate nonsurgical and surgical management. Insight and opinions are offered based upon the most up-to-date, evidence-based clinical guidelines. Relevant case studies are widely used to guide discussion, so the attendee is able to relate to similar patients within their own practices. This focused discussion should appeal to all spine specialists who treat spinal stenosis, especially those whose practices include patients whose conditions are not always “garden-variety.”

Upon completion of this session, participants should gain strategies to:
- Review clinical presentations of patients with complex cases of spinal stenosis;
- Assess relevant radiographic features of patients with complex cases of spinal stenosis;
- Discuss strategies for formulating surgical and non-surgical treatment plans;
- Explain the latest literature and appropriate use criteria for management of complex cases of spinal stenosis;
- Expand knowledge base of complex cases of spinal stenosis to improve care in one’s practice.
Agenda

Introduction and Objectives
Christopher G. Furey, MD

Recurrent or Residual Spinal Stenosis

Spinal Stenosis and Degenerative Scoliosis
Sheeraz A. Qureshi, MD, MBA

Thoracolumbar Stenosis

Spinal Stenosis in the Elderly and Medically-Compromised Patient
Nicholas U. Ahn, MD

Case Discussions with Audience Questions and Answers

FDA Device/Drug Status:
Christopher G. Furey, MD: This presentation does not discuss or include any applicable devices or drugs.
Sheeraz A. Qureshi, MD, MBA: Not available at time of publication.
Nicholas U. Ahn, MD: Not available at time of publication.

12:00 p.m.
Meeting Adjourns

North American Spine Society 2015 Courses and Conferences

Lumbar Spinal Injections
January 23-24, Phoenix, AZ

Evaluation and Treatment of Adult Spinal Deformity:
Skull to Sacrum
February 6-7, Phoenix, AZ

11th Annual Evidence & Technology Spine Summit
February 26-28, Snowbird, UT

Coding Update 2015: Essentials and Controversies of Spine Care Coding
February 27-28, Snowbird, UT
July 9-10, Denver, CO
October 12-13, Chicago, IL

Advanced Interventional Spine Procedures
May 1-2, Burr Ridge, IL

Complication Avoidance and Management in Minimally Invasive Spine Surgery
May 29-30, Burr Ridge, IL

The Art and Science of the Physical Examination
June 26-27, Burr Ridge, IL

Spine Across the Sea
July 26-30, Kohala Coast, HI

Fundamentals of Spine Surgery and Interventional Pain Management
August 21-22, Long Beach, CA

30th Annual Meeting
October 14-17, Chicago, IL

Details at www.spine.org

Peter G. Passias, MD1; Bryan J. Marascalchi1; Vadim Goz, BA2; Jeffrey H. Weinreb, BS3; LiJin Joo2; Thomas J. Errico, MD3


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

P2. Comparative Analysis of Cauda Equina Syndrome (CES) Patients Treated With Fusion Versus Non-Fusion

Peter G. Passias, MD1; Bryan J. Marascalchi1; LiJin Joo2; Thomas J. Errico, MD3


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

P3. Current Evidence Regarding the Etiology, Prevalence, Natural History and Prognosis of Pediatric Lumbar Spondylolysis: A Report from the Scoliosis Research Society Evidence-Based Medicine Committee

Charles H. Crawford III, MD1; Charles Gerald T. Ledonio, MD2; Shay Bess, MD3; Jacob M. Buchowski, MD, MS4; Douglas C. Burton, MD5; Serena S. Hu, MD6; Baron S. Lonner, MD7; David W. Polly Jr., MD8; Justin S. Smith, MD, PhD9; James O. Sanders, MD10


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

P4. Degenerative Disc Disease is Associated With Poor Return to Work Rates Following Lumbar Fusion Surgery in a Workers’ Compensation Setting

Joshua T. Anderson, BS12; Mhamad Faour, MD3; Uri M. Ahn, MD3; Nicholas U. Ahn, MD3

1University Hospitals Case Medical Center Department of Orthopaedic Surgery, Cleveland, OH, US; 2Case Western Reserve University School of Medicine, Cleveland, OH, US; 3New Hampshire Spine Institute, Bedford, NH, US

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

P5. Presurgical Patient Evaluation With Lumbar Discography is Associated With Significantly More Days Absent from Work Following Lumbar Fusion in a Workers’ Compensation Setting

Joshua T. Anderson, BS12; Mhamad Faour, MD3; Uri M. Ahn, MD3; Nicholas U. Ahn, MD3

1University Hospitals Case Medical Center Department of Orthopaedic Surgery, Cleveland, OH, US; 2Case Western Reserve University School of Medicine, Cleveland, OH, US; 3New Hampshire Spine Institute, Bedford, NH, US

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

P6. Analysis of Internet Information on the Controversial X-Stop Device

Joshua T. Anderson, BS12; Mhamad Faour, MD3; Uri M. Ahn, MD3; Nicholas U. Ahn, MD3

1University Hospitals Case Medical Center Department of Orthopaedic Surgery, Cleveland, OH, US; 2Case Western Reserve University School of Medicine, Cleveland, OH, US; 3New Hampshire Spine Institute, Bedford, NH, US

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

P7. Determinants of Hospital Length of Stay in Patients Undergoing Lumbar Spinal Fusion

Mladen Djurasovic, MD1; Eric Kiskaddon2; Kelly R. Bratcher, RN3; Farah Ammous2; Steven D. Glassman, MD3; John R. Dimar II, MD3; Leah Y. Carreon, MD, MSc1


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

P8. Results of Surgery in Back Pain in 262 Patients With Two- to Nine-Years Follow-Up

Dick J. Zeilstra, MD, PhD5; Marc L. Schroder, MD, PhD5

1Bergman Clinics, Naarden, Netherlands; 2Amsterdam, Netherlands

FDA Device/Drug Status: Maverick (Approved for this indication), CA-Disc (Not approved for this indication), Axialif (Approved for this indication), Prodisc (Approved for this indication), Synfix (Approved for this indication).
Simon Dagenais, DC, PhD; O’Dane Brady, DC, MS; Scott Haldeman, MD, PhD, DC; Pranlal Manga, PhD
1Spine Research, Winchester, MA, US; 2Ocala, FL, US; 3Santa Ana, CA, US; 4Ottawa, ON, Canada
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P10. Are Dural Tears in Minimal Invasive Spine Surgery of the Lumbar Spine More Forgiving than in Open Spine Surgery?
Arvind G. Kulkarni, MD
Bombay Hospital, Mumbai, Maharashtra, India
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

Donald Kucharzyk, DO; Dushan Budimir, BS
1Orthopaedic, Pediatric and Spine Institute, Crown Point, IN, US; 2Downers Grove, IL, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P12. The Causes and Treatment Strategies for the Postoperative Complications of Occipitocervical Region: A 636 Cases Retrospective Analysis
Baorong He, MD; Dingjun Hao, MD; Liang Yan, PhD, MD
Xi’an, China
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P13. Traumatic Cauda Equina Herniation Occurring With Thoracolumbar and Lumbar Burst Fractures
Liang Yan, PhD, MD; Dingjun Hao, MD; Baorong He, MD
Xi’an, China
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

Benjamin T. Bjerke-Kroll, MD, MS; Daniel Zuchelli, BS; Venu M. Nemani, MD, PhD; Jennifer Ayamga; Ronald Emerson, MD; Oheneba Boachie-Adjei, MD
1Hospital for Special Surgery, New York, NY, US; 2New York, NY, US; 3FOCOS Orthopaedic Hospital, Accra, Ghana
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P15. Analysis of Perioperative Major Non-Neurologic Complications in 105 Posterior Vertebral Column Resection (PVCR) Procedures for Severe Rigid Deformities During Ten Years: Introspection on the Balance Between Patients’ Risk and Benefit
Jing-Ming Xie, MD; Yingsong Wang; Ying Zhang; Tao Li, MD, PhD; Zhi Zhao; Zhou Liu; Ni Bi; Leijie Chen; Zhiyue Shi
Department of Orthopedics, The 2nd Affiliated Hospital of Kunming Medical University, Yunnan Province, China
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P16. The Changes of SEP/MEP Following Ligating Spinal Cord Segmental Vessels in Applying Posterior Vertebral Column Resection (PVCR) to Treat Severe Rigid Spinal Deformity
Jing-Ming Xie, MD; Zhi Zhao; Ni Bi; Leijie Chen; Tao Li, MD, PhD; Yingsong Wang; Ying Zhang; Zhiyue Shi; Zhou Liu
Department of Orthopedics, The 2nd Affiliated Hospital of Kunming Medical University, Yunnan Province, China
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P17. Incidence and Risk Factors for Proximal Junctional Kyphosis (PJK) Following Posterior Vertebral Column Resection (PVCR) for Patients With Severe and Rigid Spinal Deformities: Minimum Two-Year Follow-Up
Jing-Ming Xie, MD; Ying Zhang; Ni Bi; Yingsong Wang; Tao Li, MD, PhD; Leijie Chen; Zhou Liu; Zhiyue Shi; Zhi Zhao
Department of Orthopedics, The 2nd Affiliated Hospital of Kunming Medical University, Yunnan Province, China
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P18. Distribution of Schmorl’s Nodes in the Lumbar Spine and Their Relationship With Lumbar Disc Degeneration and Range of Motion
Ruofeng Yin, MD; Jeffrey C. Wang, MD; Elizabeth L. Lord, MD; Jeremiah R. Cohen; Shinji Takahashi, MD
1Department of Orthopaedic Surgery, China-Japan Union Hospital, Jilin University, Changchun, China; 2USC Spine Center, Los Angeles, CA, US; 3Los Angeles, CA, US; 4Osaka City University, Osaka, Japan
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P19. Preoperative Halo-Gravity Traction for Severe Spinal Deformities at an SRS-GOP Site in West Africa: Protocols, Complications and Results

Venu M. Nemani, MD, PhD; Benjamin T. Bjerke-Kroll, MD, MS; Mitsuru Yagi, MD, PhD; Cristina Sacramento-Dominguez, MD, PhD; Harry Akoto, MD; Munish C. Gupta, MD; W. Fred Hess, MD; Elias C. Papadopoulos, MD; Francisco J. Perez-Grueso, MD; Ferran Pellise, MD, PhD; Bettye A. Wright, PA, RN; Irene Wulf; Han Jo Kim, MD; Jennifer Ayamga; Rufai Mahmud; Oheneba Boachie-Adjei, MD

1New York, NY, US; 2Hospital for Special Surgery, New York, NY, US; 3National Hospital Organization Murayama Medical Center, Tokyo, Japan; 4Hospital Ruber Internacional, Mirasierra, Spain; 5Korle Bu Teaching Hospital, Accra, Ghana; 6University of California Davis Orthopaedic Surgery, Sacramento, CA, US; 7Danville, PA, US; 8University of Athens School of Medicine, Athens, Greece; 9H. De La Paz, Madrid, Spain; 10Barcelona, Spain; 11FOCOS Orthopaedic Hospital, Accra, Ghana

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

P20. Is KIVA Implant Advantageous to Balloon Kyphoplasty in Treating Osteolytic Metastasis to the Spine? Comparison of Two Percutaneous MIS Techniques: A Prospective Randomized Controlled Short-Term Study

Panagiotis Korovessis, MD, PhD; Konstantinos Vardakastanis, MSc; Vasilios Vitsas, MD; Vasilios Syrimpeis, MD

Patras, Greece

FDA Device/Drug Status: KIVA VCF (Investigational/Not approved).

P21. Minimally Invasive Surgical Treatment of Spinal Metastases

Arthur L. Jenkins III, MD

Mt. Sinai School of Medicine, New York, NY, US

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

P22. Sacro-Pelvic Fixation Using the S2 Alar-Iliac (S2AI) Screws in Adult Deformity Patients: Experiences With O-Arm/Stealth Navigation Versus Robotic Guidance

Isador H. Lieberman, MD, FRCSC, MBA; Xiaobang Hu, PhD; Paul J. Holman, MD; Blake N. Staub, MD

1Scoliosis and Spine Tumor Center, Texas Back Institute, Texas Health Presbyterian Hospital Plano, Plano, TX, US; 2Houston Methodist Neurological Institute, Houston, TX, US

FDA Device/Drug Status: O-arm/Stealth navigation system (Approved for this indication), Renaissance™ robotic guidance system (Approved for this indication).

P23. Primary or Metastatic Spine Tumors With Back/Neck and/or Radicular Pain as Initial Presentation: Experience from a Scoliosis and Spine Tumor Center at a Community Hospital

Isador H. Lieberman, MD, FRCSC, 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.

P24. Initiation of Pharmacologic Treatment for Osteoporosis After Vertebral Osteoporotic Fractures: Do We Really Own the Bone?

Jeffrey L. Gum, MD; Leah Y. Carreon, MD, MSc; Steven D. Glassman, MD

1Louisville, KY, US; 2Norton Leatherman Spine Center, Louisville, KY, US

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


Alan Daniels, MD; Christopher P. Ames, MD; Justin S. Smith, MD, PhD; Robert A. Hart, MD

1Warren Alpert Medical School of BU/RI Hospital, Providence, RI, US; 2University of California San Francisco, San Francisco, CA, US; 3University of Virginia Health System, Charlottesville, VA, US; 4Oregon Health and Science University, Portland, OR, US

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

P26. Lumbopelvic Posture: Is Pelvic Incidence the Best Indicator for Lordosis?

Roger P. Jackson, MD; Anne C. McManus, RN


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

P27. A Brief Inventory to Assess Psychosocial Risk for Reduced Outcome of Spine Surgery

Andrew R. Block, PhD; Donna D. Ohnmeiss, PhD; Richard D. Guyer, MD

1Texas Back Institute, Plano, TX, US; 2Texas Back Institute Research Foundation, Plano, TX, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
**P28. Lumbosacral Transitional Vertebra and S1 Radiculopathy: The Value of Coronal MRI**

Fourie A. Bezuidenhout, MD; Jan W. Lotz, MD

University of Stellenbosch, Cape Town, South Africa

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

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**P29. Recurrent CSF Leak Following Repair of Incidental Durotomy**

Christopher G. Furey, MD; Katherine Sadowski, BS; Nicholas U. Ahn, MD

1Case Western Reserve University, Cleveland, OH, US; 2Cleveland, 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.

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**P30. Risk Factors for Implant Subsidence After Stand-Alone Lateral Lumbar Interbody Fusion**

David A. Essig, MD; Woojin Cho, MD, PhD; Alexander P. Hughes, MD; Russel C. Huang, MD; Andrew A. Sama, MD; Federico P. Girardi, MD; Frank P. Cammisa Jr., MD

1Hospital for Special Surgery, New York, NY, US; 2Scarsdale, NY, US

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

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**P31. How Much Deformity Correction Can We Obtain by LLIF and will It Be Affected by Approach Side: Convex Versus Concave?**

Woojin Cho, MD, PhD; Carlos A. Castro, MD; Frank P. Cammisa Jr., MD; Andrew A. Sama, MD; Alexander P. Hughes, MD; Russel C. Huang, MD; Federico P. Girardi, MD

1Scarsdale, NY, US; 2São Paulo, SP, Brazil; 3Hospital for Special Surgery, New York, NY, US

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

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**P32. Cortical Bone Trajectory Versus Percutaneous Pedicle Screw in Minimally Invasive Posterior Lumbar Fusion**

Ivan Gonchar, MD; Yoshihisa Kotani, MD; Yusuke Matsumoto, MD

Steel Memorial Muroran Hospital, Muroran, Japan

**FDA Device/Drug Status:** CBT screws (Approved for this indication), PS screws (Approved for this indication).

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Gregory D. Schroeder, MD; Brian K. Kwon, MD, PhD, FRCSC; Jason C. Eck, DO, MS; Jason W. Savage, MD; Wellington K. Hsu, MD; Alpesh A. Patel, MD, FACS

1Northwestern University, Chicago, IL, US; 2Blusson Spinal Cord Center, Vancouver, BC, Canada; 3University of MA Department of Orthopaedic Surgery, Chattanooga, TN, US; 4Chicago, IL, US; 5Northwestern Department of Orthopaedics, Chicago, IL, US

**FDA Device/Drug Status:** Methylprednisolone (Not approved for this indication).

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**P34. Comparative Study of Unilateral Minimal Invasive Transforaminal Lumbar Interbody Fusion and Mini-Open Posterior Lumbar Interbody Fusion for the Treatment of Single-Level Degenerative Lumbar Spine Diseases: Retrospective Matched Analysis of Clinical and Radiologic Results in Minimum Two-Year Follow-Up**

Jung-Woo Hur, MD

Seoul St. Mary’s Hospital, The Catholic University of Korea, Seoul, South Korea

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

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**P35. Effect of Steroid Placement on a Gelatin Sponge and Soft Tissue Swelling Following Anterior Cervical Discectomy and Fusion: A Radiological Analysis**

Joseph Weinstein, DO; Josh E. Schroeder, MD; Andrew A. Sama, MD; Federico P. Girardi, MD


**FDA Device/Drug Status:** Depo-medrol (Approved for this indication).

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**P36. The Clinical Utility of MRI for Cervical Spine Evaluation and Clearance Following Blunt Trauma**

Byron F. Stephens, MD; Richard A. Smith, PhD; Keith D. Williams, MD

1Memphis, TN, US; 2University of Tennessee Health Science Center, Memphis, TN, US; 3Campbell Clinic, Germantown, TN, US

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

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**P37. Intraoperative Spinal Cord and Nerve Root Monitoring: A Pilot Survey**

Rachel N. Rattenni; Thomas Cheriyan, MD; Alexandra A. Lee, BSN, CCRN; John A. Bendo, MD; Thomas J. Errico, MD; Jeffrey A. Goldstein, MD

New York University Langone 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.
P38. Lumbar Surgery in Parkinson Disease Patients
Josh E. Schroeder, MD1; Frank P. Cammisa Jr., MD2; Andrew A. Sama, MD2; Leon Kaplan, MD2; Alexander P. Hughes, MD2; Darren R. Lebl, MD2; Federico P. Girardi, MD3
1New York, NY, US; 2Hospital for Special Surgery, New York, NY, US; 3Hadassah Medical Center, Jerusalem, Israel
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P39. A Statistical Model to Predict Subsequent Fracture After Kyphoplasty
Frank P. Castro Jr., MD
Palo Alto Spine, Louisville, KY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P40. The Impact of a Cervical Spine Diagnosis on the Careers of National Football League Athletes
Gregory D. Schroeder, MD1; T. S. Lynch, MD2; Daniel B. Gibbs3; Mark LaBelle4; Ian Chow5; Alpesh A. Patel, MD, FACS6; Jason W. Savage, MD6; Wellington K. Hsu, MD2; Gordon W. Nuber, MD2
1Northwestern University, Chicago, IL, US; 2Cleveland Clinic, Cleveland, OH, US; 3Northwestern University School of Medicine, Chicago, IL, US; 4Northwestern Department of Orthopaedics, Chicago, IL, US; 5NorthShore University, Chicago, IL, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P41. Does a Lumbar Disc Herniation Affect Performance-Based Outcomes in National Football League Athletes?
Gregory D. Schroeder, MD1; T. S. Lynch, MD2; Daniel B. Gibbs3; Mark LaBelle4; Ian Chow5; Alpesh A. Patel, MD, FACS6; Jason W. Savage, MD6; Wellington K. Hsu, MD2; Gordon W. Nuber, MD2
1Northwestern University, Chicago, IL, US; 2Cleveland Clinic, Cleveland, OH, US; 3Northwestern University School of Medicine, Chicago, IL, US; 4Northwestern Department of Orthopaedics, Chicago, IL, US; 5NorthShore University, Chicago, IL, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P42. The Effect of Complications and Reoperation on Recovery Kinetics in 149 Adult Spinal Deformity Patients with Two-Year Follow-Up: An Area Under the Curve Analysis
International Spine Study Group1; Christopher P. Ames, MD2; Justin K. Scheer, BS3; Gregory M. Mundis Jr., MD4; Eric O. Klineberg, MD5; Robert A. Hart, MD6; Michael P. Kelly, MD7; Vedat Deviren, MD8; Douglas C. Burton, MD9; Ian McCarthy, PhD10; Shay Bess, MD11; Frank J. Schwab, MD11; Christopher I. Shaffrey, MD11; Virginie Lafage, PhD11; Justin S. Smith, MD, PhD11
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P43. Preoperative Cervical Hyperlordosis and C2-T3 Angle Are Correlated to Increased Risk of Postop Sagittal Spinal Pelvic Malalignment in Adult Spinal Deformity Patients at Two-Years Follow-up
International Spine Study Group1; Peter G. Passias, MD2; Sun Yang, BA3; Alexandra Soroceanu, MD, MPH4; Justin K. Scheer, BS5; Frank J. Schwab, MD6; Christopher I. Shaffrey, MD3; Han Jo Kim, MD7; Themistocles S. Protopsaltis, MD3; Gregory M. Mundis Jr., MD8; Munish C. Gupta, MD9; Eric O. Klineberg, MD10; Virginie Lafage, PhD3; Justin S. Smith, MD, PhD11; Christopher P. Ames, MD12
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
**P44. Risk of Development of New Onset Postoperative Cervical Deformity (CD) in Thoracolumbar Adult Spinal Deformity (ASD) and Effect on Clinical Outcomes at Two-Year Follow-Up**

International Spine Study Group; Alexandra Soroceaneu, MD, MPH; Peter G. Passias, MD; Anthony J. Boniello, BS; Justin K. Scheer, BS; Frank J. Schwab, MD; Christopher I. Shaffrey, MD; Han Jo Kim, MD; Themistocles S. Protopsaltis, MD; Gregory M. Mundis Jr., MD; Munish C. Gupta, MD; Eric O. Klineberg, MD; Virginie Lafage, PhD; Justin S. Smith, MD, PhD; Christopher P. Ames, MD


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

**P45. Does One Size Fit All? Defining Spino-Pelvic Alignment Thresholds Based on Age**

International Spine Study Group; Frank J. Schwab, MD; Renaud Lafage; Barthelemy Liabaud, MD; Bassel G. Diebo, MD; Justin S. Smith, MD, PhD; Richard A. Hostin, MD; Christopher I. Shaffrey, MD; Oheneba Boachie-Adjei, MD; Christopher P. Ames, MD; Justin K. Scheer, BS; Douglas C. Burton, MD; Shay Bess, MD; Munish C. Gupta, MD; Themistocles S. Protopsaltis, MD; Virginie Lafage, PhD

1Brighton, CO, US; 2New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 3University of Virginia Health System, Charlottesville, VA, US; 4University of California Davis Orthopaedic Surgery, Sacramento, CA, US; 5University of California Davis School of Medicine, Sacramento, CA, US; 6University of Virginia Department of Neurosurgery, Charlottesville, VA, US; 7University of California Davis Orthopaedic Surgery, Sacramento, CA, US; 8University of California San Francisco, San Francisco, CA, US

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

**P46. Porcine Model for Early Onset Scoliosis Created With a Posterior Mini-Invasive Method: A Pilot Study**

Xin Zheng, PhD

The Affiliated Drum Tower Hospital of Nanjing University Medical School, Nanjing, China

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

**P47. Biomechanical Stability of the Stalif-C™ Stand-Alone Spacer in Multilevel and Hybrid Cervical Fusion Constructs**

Daniel G. Kang, MD; Ronald A. Lehman Jr., MD; Adam Bevevino, MD; Rachel E. Gaume, BS; Robert W. Tracey, MD; John P. Cody, MD; Scott Wagner, MD

1Bethesda, MD, US; 2Potomac, MD, US; 3Walter Reed National Military Medical Center, Bethesda, MD, US; 4Great Falls, VA, US; 5Washington, DC, US

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


Nicholas Golinvaux; Bryce Basques; Daniel D. Bohl, MPH; Jonathan N. Grauer, MD

1Yale University School of Medicine, New Haven, CT, US; 2New Haven, CT, US

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

**P49. Risk Factors for Postoperative coronal Decompensation After the Posterior Osteotomies in Adult Scoliosis**

Zongshan Hu; Feng Zhu, MD

The Affiliated Drum Tower Hospital of Nanjing University Medical School, Nanjing, China

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

**P50. Surgeon Experience and Complication Rates in Anterior Cervical Discectomy and Fusions: A National Longitudinal Database Study**

Tyler S. Cole; Anand Veeravagu, MD; Michael Zhang; Ivan Cheng, MD; John Ratliff, MD


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

**P51. Percutaneous Vertebroplasty Versus Balloon Kyphoplasty for Osteoporotic Vertebral Fracture With Intravertebral Cleft**

Masaki Matsuura; Yoshinori Fujimoto, MD, PhD; Kiyotaka Yamada, MD, PhD; Toshihiko Nakamae, MD

1JA Hiroshima General Hospital, Hatsukaichi, Japan; 2Hiroshima University General Hospital, Hatsukaichi, Japan; 3Hiroshima University, Hiroshima, Japan

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P52. In Most Common Indications Lumbar Spine Fusion Surgery Improves Disability and Health Utility: A Two-Year Follow-Up Study
Liisa T. Pekkanen, MD1; Marko Neva, MD, PhD2; Kati Kyrola, MD3; Ilkka H. Marttinen, MD4; Arja Hakkinen5
1Niemisjarvi, Finland; 2Tampere University Hospital, Tampere, Finland; 3Keski-Suonen Keskussairaala, Jyvaskyla, Finland; 4Jyvaskyla Central Hospital, Department of Physical Medicine and Rehabilitation, Jyvaskyla, Finland
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P53. Meta-Analysis of the Treatment of Cervical Pseudarthrosis
Steven J. McAnany, MD1; Evan O. Baird, MD2; Sheeraz A. Qureshi, MD, MBA1; Paul A. Anderson, MD4
1New York, NY, US; 2Mount Sinai Medical Center, New York, NY, US; 3Mount Sinai School of Medicine, New York, NY, US; 4University of Wisconsin Orthopaedics and Rehabilitation, Madison, WI, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P54. Sagittal Alignment of One-Level TDR and ACDF Patients: An Analysis of Patient Outcomes from a Randomized, Prospective, Clinical Trial
Michael S. Hisey, MD1; Reginald J. Davis, MD, FACS2; Gregory A. Hoffman, MD3; Hyun W. Bae, MD4; Kee D. Kim, MD4; Steven E. Gaede, MD4; Pierce D. Nunley, MD5
1Texas Back Institute, Denton, TX, US; 2Greater Baltimore Neurosurgical Associates, Baltimore, MD, US; 3Orthopaedics NorthEast, Fort Wayne, IN, US; 4Spine Institute St. John’s Health Center, Los Angeles, CA, US; 5University of California Davis School of Medicine, Sacramento, CA, US; 6Oklahoma Spine and Brain Institute, Tulsa, OK, US; 7Spine Institute of Louisiana, Shreveport, LA, US
FDA Device/Drug Status: Mobi-C (Approved for this indication), SLIM LOC™ Anterior Cervical Plate System, ATLANTIS™ or ATLANTIS™ VISION Anterior Cervical Plate (Approved for this indication).

P55. The Impact of Dynamic Alignment, Motion and Center of Rotation on Myelopathy Grade and Regional Disability in Cervical Spondylotic Myelopathy
Shian Liu, BS1; Renaud Lafage2; Justin S. Smith, MD, PhD3; Themistocles S. Protopsaltis, MD4; Virginie Lafage, PhD2; Vincent Challier, MD2; Christopher I. Shaffrey, MD1; Han Jo Kim, MD3; Paul M. Arnold, MD4; Jens R. Chapman, MD2; Frank J. Schwab, MD6; Eric M. Massicotte, MD, FRSCC6; S. Tim Yoon, MD, PhD2; Michael G. Fehlings, MD, PhD, FRSCC6; Christopher P. Ames, MD6; International Spine Study Group7
1New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 2University of Virginia Department of Neurosurgery, Charlottesville, VA, US; 3Spine Research Institute, New York, NY, US; 4University of Virginia Department of Neurosurgery, Charlottesville, VA, US; 5Hospital for Special Surgery, New York, NY, US; 6University of Kansas Medical Center Department of Neurosurgery, Kansas City, KS, US; 7UW Harborview Medical Center, Seattle, WA, US; 8University of Toronto, Toronto, ON, Canada; 9The Emory Spine Center, Atlanta, GA, US; 10Toronto Western Hospital, Toronto, ON, Canada; 11University of California San Francisco, San Francisco, CA, US; 12Brighton, CO, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P56. Radiological Signs of Scheuermann’s Disease and Low Back Pain: Lumbar MR Classification and Six-Year Low Back Pain Follow-Up in 188 Hospital Staff Members
Zhongqiang Chen, MD
Peking University Third Hospital, Beijing, China
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P57. Is Crowned Dens Syndrome Rare?
Chikato Mannoji, MD1; Masashi Yamazaki, MD2; Masao Koda, MD, PhD3; Masazumi Murakami, MD, PhD4
1Chiba Aoba Municipal Hospital, Chiba, Japan; 2Chiba University School of Medicine, Chiba, Japan
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P58. Predicting In-Hospital Mortality in Elderly Patients with Cervical Spine Fractures: A Comparison of the Charlson and Elixhauser Comorbidity Measures
Mariano E. Menendez1; David Ring, MD, PhD2; Mitchel Harris, MD, FACS3; Thomas D. Cha, MD, MBA4
1Massachusetts General Hospital, Boston, MA, US; 2Brigham and Women’s Hospital, Boston, MA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P59. Targeted Therapy of Low Back Pain Associated With De Novo Degenerative Lumbar Scoliosis in the Elderly: Observation Cohort Study
Kiyotaka Yamada, MD, PhD1; Yoshinori Fujimoto, MD, PhD2; Toshi Nakamae, MD1; Masaki Matsuura2
1Hiroshima University General Hospital, Hatsukaichi, Japan; 2JA Hiroshima General Hospital, Hatsukaichi, Japan
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P60. Effects of Cylcic Loading on Implant Subsidence
Antonio Valdevit, PhD1; Peter F. Ullrich Jr., MD2; Michelle B. Gallagher, MS3; Jennifer Schneider2
FDA Device/Drug Status: BAK Cage (Approved for this indication), En0 (Approved for this indication), PEK Inter vertebral Device (Approved for this indication).
P61. Does Obesity Affect Surgical Outcomes in Degenerative Scoliosis?

Michael S. Chang, MD; Lingjie Fu, MD; Dennis G. Crandall, MD; Jan Revella, RN

1Phoenix, AZ, US; 2The Ninth People’s Hospital, Shanghai Jiaotong University School of Medicine, Shanghai, China; 3Sonoran Spine Center, Mesa, AZ, US

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

P62. Long-Term Cost-Effectiveness of Adult Spinal Deformity Surgery (ASD)

International Spine Study Group1; Ian McCarthy, PhD2; Chessie Robinson, MA2; Michael F. O’Brien, MD2; Munish C. Gupta, MD2; Christopher P. Ames, MD2; Virginie Lafage, PhD2; Robert A. Hart, MD2; Douglas C. Burton, MD2; Shay Bess, MD2; Christopher I. Shaffrey, MD2; Gregory M. Mundis Jr., MD2; Frank J. Schwab, MD2; Khaled M. Kebaish, MD2; Justin S. Smith, MD, PhD2; Eric O. Klineberg, MD2; Richard A. Hostin, MD2


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

P63. Role of Implant Costs in the Long Term Cost Effectiveness of Surgical Treatment of Adult Spinal Deformity (ASD)

International Spine Study Group1; Ian McCarthy, PhD2; Chessie Robinson, MA2; Ian McCarthy, PhD2; Michael F. O’Brien, MD2; Munish C. Gupta, MD2; Christopher P. Ames, MD2; Virginie Lafage, PhD2; Robert A. Hart, MD2; Douglas C. Burton, MD2; Shay Bess, MD2; Christopher I. Shaffrey, MD2; Frank J. Schwab, MD2; Khaled M. Kebaish, MD2; Justin S. Smith, MD, PhD2; Eric O. Klineberg, MD2; Richard A. Hostin, MD2


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

P64. Biomechanical Validation of a Synthetic Lumbar Spine

William Camisa, MS1; Jeremi M. Leasure, MS1; Jenni M. Buckley, PhD2

1The Taylor Collaboration, San Francisco, CA, US; 2University of Delaware, Newark, DE, US

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

P65. Posterior Surgical Correction With or Without Interbody in Matched Curves Provides Similar Correction in Adult Spinal Deformity

International Spine Study Group1; Eric O. Klineberg, MD2; Munish C. Gupta, MD2; Stacie Nguyen, MPH2; Virginie Lafage, PhD2; Christopher P. Ames, MD2; Douglas C. Burton, MD2; Robert A. Hart, MD2; Vedat Deviren, MD2; Behrooz A. Akbarnia, MD2; Gregory M. Mundis Jr., MD2; Christopher I. Shaffrey, MD2; Justin S. Smith, MD, PhD2; Themistocles S. Protopsaltis, MD2; Kai-Ming G. Fu, MD, PhD2; Khaled M. Kebaish, MD2; Matthew E. Cunningham, MD, PhD2; Michael P. Kelly, MD2; Frank J. Schwab, MD2; Thomas J. Errico, MD2; Richard A. Hostin, MD2; Han Jo Kim, MD2


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

P66. Sagittal Alignment Following Lumbar Three-Column Osteotomy: Does the Level of Resection Matter?

International Spine Study Group1; Barthlelemy Liabaud, MD2; Emmanuelle Ferrero, MD2; Christopher P. Ames, MD2; Khaled M. Kebaish, MD2; Gregory M. Mundis Jr., MD2; Richard A. Hostin, MD2; Munish C. Gupta, MD2; Ohebea Boachie-Adjei, MD2; Justin S. Smith, MD, PhD2; Robert A. Hart, MD2; Bassel G. Diebo, MD2; Themistocles S. Protopsaltis, MD2; Frank J. Schwab, MD2; Virginie Lafage, PhD2


FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P67. Surgical Skills Curriculum: Development of Orthopaedic Training Modules
Eric A. Hohn, MD; William Camisa, MS; Adam G. Brooks, MD; Jeremi M. Leasure, MS; Dimitry G. Kondrashov, MD; William H. Montgomery MD; William McGann, MD; Jennifer van Warmerdam, MD


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

P68. A Biomechanical Comparison of Short-Segment Posterior Fixation Including the Fractured Vertebra Versus 360-Degree Fixation in Unstable Burst Fractures of the Lumbar Spine in an Animal Model
Kenny S. David, MBBS, MS, FACS
Christian Medical College, Vellore, India

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

P69. Revisions and Functional Failures of Short Versus Long Fusions for Adult Spinal Deformity
International Spine Study Group1; Shian Liu, BS; Emmanuelle Ferrero, MD; Christopher P. Ames, MD; Khaled M. Kebaish, MD; Ibrahim Obeid1; Richard A. Hostin, MD; Eric O. Klineberg, MD; Oheneba Boachie-Adjei, MD; Justin S. Smith, MD, PhD2; Gregory M. Mundis Jr., MD; Stephen P. Maier II, BA; Themistocles S. Protopsaltis, MD; Frank J. Schwab, MD; Virginie Lafage, PhD


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

P70. Three-Column Osteotomies in Elderly Patients: Is it Worth It?
International Spine Study Group1; Vincent Challier, MD; Shian Liu, BS; Christopher P. Ames, MD; Khaled M. Kebaish, MD; Ibrahim Obeid; Richard A. Hostin, MD; Eric O. Klineberg, MD; Oheneba Boachie-Adjei, MD; Justin S. Smith, MD, PhD; Behrooz A. Akbarnia, MD; Kristina Bianco, BA; Themistocles S. Protopsaltis, MD; Frank J. Schwab, MD; Virginie Lafage, PhD


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

P71. Do Two Commonly Used National Databases Give Similar Results for Studies of Lumbar Fusion Procedures?
Daniel D. Bohl, MPH; Glenn S. Russo, MD, MS; Bryce Basques; Nicholas Golinvaux; Michael Fu; William D. Long III, MD; Jonathan N. Grauer, MD

1Yale University School of Medicine, New Haven, CT, US; 2Yale New Haven Hospital, New Haven, CT, US; 3New Haven, CT, US

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

P72. Cervical Spondylotic Myelopathy: Does Surgical Approach Influence Postoperative Sagittal Alignment and Outcomes?
International Spine Study Group1; Michael G. Fehlings, MD, PhD, FRCS; Justin S. Smith, MD, PhD; Vincent Challier, MD; Christopher I. Shaffrey, MD; Han Jo Kim, MD; Paul M. Arnold, MD; Themistocles S. Protopsaltis, MD; Virginie Lafage, PhD; Shian Liu, BS; Renaud Lafage; Eric M. Massicotte, MD, FRCS; S. Tim Yoon, MD, PhD; Christopher P. Ames, MD2

1Brighton, CO, US; 2Toronto Western Hospital, Toronto, ON, Canada; 3University of Virginia Health System, Charlottesville, VA, US; 4Spine Research Institute, New York, NY, US; 5University of Virginia Department of Neurosurgery, Charlottesville, VA, US; 6Hospital for Special Surgery, New York, NY, US; 7University of Kansas Medical Center Department of Neurosurgery, Kansas City, KS, US; 8Closter, NJ, US; 9New York University Hospital for Joint Diseases, New York, NY, US; 10University of Toronto, Toronto, ON, Canada; 11The Emory Spine Center, Atlanta, GA, US; 12University of California San Francisco, San Francisco, CA, US

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

Elizabeth L. Lord, MD; Jeremiah R. Cohen; Jeffrey C. Wang, MD

1Los Angeles, CA, US; 2USC Spine Center, Los Angeles, CA, US

FDA Device/Drug Status: artificial disc replacement (Approved for this indication).
P74. Should Our Elderly Spinal Deformity Patients Have the Same Targets for Correction and Is There an Optimal Alignment Target that Results in Less PJK?

International Spine Study Group1; Themistocles S. Protopsaltis, MD; Stephen P. Maier II, BA; Justin S. Smith, MD, PhD; Richard A. Hostin, MD; Christopher I. Shaffrey, MD; Oheneba Boachie-Adjei, MD; Gregory M. Mundis Jr., MD; Christopher P. Ames, MD; Thomas J. Errico, MD; Shay Bess, MD; Eric O. Klineberg, MD; Robert A. Hart, MD; Frank J. Schwab, MD; Virginie Lafage, PhD


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

P75. Incidence of Radiographic and Implant-Related Complications in Adult Spinal Deformity Surgery: Patient Risk Factors and Impact on HRQOL

International Spine Study Group1; Alexandre Soroceano, MD, MPH; Douglas C. Burton, MD; Justin S. Smith, MD, PhD; Vedat Deviren, MD; Christopher I. Shaffrey, MD; Oheneba Boachie-Adjei, MD; Behroz A. Akbarnia, MD; Christopher P. Ames, MD; Thomas J. Errico, MD; Shay Bess, MD; Richard A. Hostin, MD; Robert A. Hart, MD; Frank J. Schwab, MD; Virginie Lafage, PhD


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

P76. Local Application of Vancomycin, a Deep Wound Infection Prophylaxis

Josh E. Schroeder, MD; Federico P. Girardi, MD; Frank P. Cammisa Jr., MD; Jennifer Shue, MS, CCRC; Leon Kaplan, MD; Joseph Weinstein, DO; Andrew A. Sama, MD

1New York, NY, US; 2Hospital for Special Surgery, New York, NY, US; 3Hadassah Medical Center, Jerusalem, Israel; 4Cedars-Sinai Medical Center, Los Angeles, CA, US

FDA Device/Drug Status: Vancomycin (Approved for this indication).


Kern Singh, MD; Alejandro Marquez-Lara, MD; Sreeharsha V. Nandyala; Hamid Hassanzadeh, MD; Anton Y. Jorgensen, MD; Eric Sundberg, MD

1Rush University Medical Center, Chicago, IL, US; 2Chicago, IL, US; 3Chicago Medical School, North Chicago, IL, US; 4Rush University Medical Center, Chicago, IL, US; 5Northwestern University, Chicago, IL, US; 6University of California San Francisco, San Francisco, CA, US; 7New York University Langone Medical Center, New York, NY, US; 8San Diego Center for Spinal Disorders, La Jolla, CA, US; 9University of California Davis School of Medicine, Sacramento, CA, US; 10University of Virginia Health System, Charlottesville, VA, US; 11University of California San Francisco, San Francisco, CA, US; 12Oregon Health and Science University, Portland, OR, US

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

P78. Assessing the Impact of Thoracolumbar Deformity on Cervical Disability and Pain: How the Back Affects the Neck

International Spine Study Group1; Aaron Clark, MD, PhD; Taemin Oh; Devon J. Ryan, BA; Eric O. Klineberg, MD; Robert A. Hart, MD; Han Jo Kim, MD; Frank J. Schwab, MD; Justin S. Smith, MD, PhD; Themistocles S. Protopsaltis, MD; Virginie Lafage, PhD; Christopher P. Ames, MD

1Rush University Medical Center, Chicago, IL, US; 2University of California San Francisco, San Francisco, CA, US; 3Northwestern University School of Medicine, Chicago, IL, US; 4Spine Research Institute, New York, NY, US; 5University of California Davis School of Medicine, Sacramento, CA, US; 6Oregon Health and Science University, Portland, OR, US; 7Hospital for Special Surgery, New York, NY, US; 8New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 9University of Virginia Health System, Charlottesville, VA, US; 10University of California San Francisco, San Francisco, CA, US

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

P79. Perioperative Characteristics and Outcomes of Diabetics Following Lumbar Fusion

Kern Singh, MD; Sreeharsha V. Nandyala; Alejandro Marquez-Lara, MD; Steven J. Fineberg, MD

1Rush University Medical Center, Chicago, IL, US; 2Chicago, IL, US; 3Midwest Orthopaedics at Rush, Chicago, IL, US

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

P80. Comparison of Perioperative Outcomes for Lumbar Decompression: Orthopaedic Surgery Versus Neurosurgery

Kern Singh, MD; Alejandro Marquez-Lara, MD; Sreeharsha V. Nandyala; Steven J. Fineberg, MD

1Rush University Medical Center, Chicago, IL, US; 2Chicago, IL, US; 3Midwest Orthopaedics at Rush, Chicago, IL, US

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
**P81. The Relationship Between Donor Obesity, Gender and In Vitro Spine Biomechanics: A Retroactive Analysis of Spine Lab Data**

Anna G. Newcomb, MS; Phillip Reyes; Nestor Rodriguez-Martinez, MD; Luis Perez-Orribo, MD; Neil Crawford, PhD
Barrow Neurological Institute, Phoenix, AZ, US

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

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**P82. Global Sagittal Alignment Analysis Including Lower Extremities: Role of Pelvic Translation and the Lower Extremities in Compensation for Spinal Deformity**

Shian Liu, BS1; Emmanuelle Ferrero, MD2; Barthelemy Liabaud, MD3; Vincent Chahllier, MD4; Renaud Lafage5; Bassel G. Diebo, MD; Jean-Marc Vital, MD6; Wafa Skalli7; Jean-Charles Le Huec, MD; Brice Ilharreborde8; Themistocles S. Protopsaltis, MD; Thomas J. Errico, MD9; Frank J. Schwab, MD9; Virginie Lafage, PhD10

1New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 2New York, NY, US; 3New York University, New York, NY, US; 4Spine Research Institute, New York, NY, US; 5Hôpital Pellegrin Tripode, Bordeaux, France; 6LBM, Biomechanics laboratory, Paris, France; 7Bordeaux, France; 8Paris, France; 9New York University Langone Medical Center, New York, NY, US

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

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**P83. Validation of Correlation Between CBVA, SLS and McGregor’s Slope**

Shian Liu, BS1; Renaud Lafage1; Vincent Chahllier, MD2; Emmanuelle Ferrero, MD2; Barthelemy Liabaud, MD2; Bassel G. Diebo, MD2; Jean-Charles Le Huec, MD2; Wafa Skalli2; Jean-Marc Vital, MD2; Keyvan Mazda, MD, PhD2; Themistocles S. Protopsaltis, MD3; Thomas J. Errico, MD3; Frank J. Schwab, MD3; Virginie Lafage, PhD10

1New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 2Spine Research Institute, New York, NY, US; 3Bordeaux, France; 4LBM, Biomechanics Laboratory, Paris, France; 5Hôpital Pellegrin Tripode, Bordeaux, France; 6Robert Debre Hospital, Paris, France; 7New York University Langone Medical Center, New York, NY, US

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

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**P84. The Role of Athletic Activity on Structural Lumbar Abnormalities in Adolescent Patients With Symptomatic Low Back Pain**

Gregory D. Schroeder, MD1; Marco Mendoza, MD1; Erika Daley1; Cythnia LaBella, MD2; Jason W. Savage, MD2; Alpesh A. Patel, MD, FACS3; Wellington K. Hsu, MD1

1Northwestern University, Chicago, IL, US; 2Chicago, IL, US; 3Ann and Robert H. Lurie Children’s Hospital of Chicago, Chicago, IL, US; 4Northwestern Department of Orthopaedics, Chicago, IL, US

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

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**P85. The Effect of Lumbopelvic Morphology on Early Lumbar Degenerative Disc Disease in Adolescents**

Gregory D. Schroeder, MD1; Marco Mendoza, MD1; Erika Daley1; Cythnia LaBella, MD2; Jason W. Savage, MD2; Alpesh A. Patel, MD, FACS3; Wellington K. Hsu, MD1

1Northwestern University, Chicago, IL, US; 2Chicago, IL, US; 3Ann and Robert H. Lurie Children’s Hospital of Chicago, Chicago, IL, US; 4Northwestern Department of Orthopaedics, Chicago, IL, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.
P89. Current Evidence Regarding Diagnostic Methods for Pediatric Lumbar Spondylolisthesis: A Report from the Scoliosis Research Society Evidence Based Medicine Committee

Charles Gerald T. Ledonio, MD; Charles H. Crawford III, MD; Shay Bess, MD; Jacob M. Buchowski, MD, MS; Douglas C. Burton, MD; Serena S. Hu, MD; Baron S. Lonner, MD; David W. Polly Jr., MD; Justin S. Smith, MD, PhD; James O. Sanders, MD

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

P90. Does the Change of Weather Condition Influence Pain Level of Symptoms in the Patients with Lumbar Diseases?

Ken Ishii, MD, PhD; Naobumi Hosogane; Tomohiro Hikata, MD, PhD; Yuta Shiono, MD; Yohei Takahashi, MD; Mitsuru Furukawa; Shingo Iizuka; Eiji Okada, MD; Yasuhiro Kaneko, MD, PhD; Nobuyuki Fujita, MD; Hiroki Katoh, MD, PhD; Daisuke Ichihara, PhD; Kota Watanabe, MD; Kentaro Fukuda, MD; Hitoshi Kono, MD, PhD; Michihiro Kamata, MD, PhD; Takahiro Koyanagi, PhD; Masaya Nakamura, MD, PhD; Yuki Nishiwaki, MD; Yoshiaki Toyama, MD, PhD; Morio Matsumoto, MD

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

P91. What Specific Questions Are Responsible in Driving NDI Superiority of Two-Level Anterior Disc Replacement Over Two-Level Fusion: Post Hoc Item Analysis of Self-Reported Outcomes of Two-Level Cervical Disc Arthroplasty (CDA, Mobi-C®) Versus Two-Level ACDF Treated Patients from the IDE US-RCT

Hyun W. Bae, MD; Ashley T. Simela, DO; Lea Kanim, MA

FDA Device/Drug Status: Mobi-C (Approved for this indication), SLIM LOC™ Anterior Cervical Plate System, ATLANTIS™ or ATLANTIS™ VISION Anterior Cervical Plate (Approved for this indication).

P92. Predicting Drain Output After Anterior Cervical Discectomy and Fusion

Bryce Basques; Daniel D. Bohl, MPH; Nicholas Golinvaux; Alem Yacob, MD; Arya G. Varthi, MD; Jonathan N. Grauer, MD

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

P93. The Influence of Adjacent Level Disc Disease on Discectomy Outcomes

Michael R. Briseno, MD; Rishab D. Phukan, BA; Charles H. Cho, MD, MBA; Joseph H. Schwab, MD; Kirkham B. Wood, MD; Christopher M. Bono, MD; Thomas D. Cha, MD, MBA

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

P94. Long Construct Pedicle Screw Reduction and Residual Forces Are Decreased Using a Computer-Assisted Spinal Rod Bending System

Antoine Tohmeh, MD; Robert E. Isaacs, MD; Zachary A. Dooley, MS; Alexander W. Turner, PhD

FDA Device/Drug Status: Bendini Spinal Rod Bending System (Approved for this indication).

P95. Biomechanical Analysis of TLIF Constructs With Cortical Versus Pedicle Bilateral Screw-Rod Fixation

Edward K. Nomoto, MD; Alexandre Rasouli, MD; Guy R. Fogel, MD; Alexander W. Turner, PhD

FDA Device/Drug Status: SpheRx pedicle screw system (Approved for this indication), CoRoent intervertebral body fusion device (Approved for this indication).

P96. Recurrence Proximal Junctional Kyphosis Following Adult Spinal Deformity Surgery: Incidence and Risk Factors

Haruki Funao, MD; Floreana Naef, MD; Richard L. Skolasky Jr., ScD; Khaled M. Kebaish, MD

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

P101. Biomechanical Evaluation of a Minimally Invasive Procedure for Sacroiliac Fusion

Derek P. Lindsey, MS; Luis Perez-Orribo, MD; Nestor Rodriguez-Martinez, MD; Phillip Reyes; Anna G. Newcomb, MS; Scott A. Yerby, PhD; Neil Crawford, PhD


FDA Device/Drug Status: iFuse Implant (Approved for this indication).

P102. Outcomes and Trends of Parkinson’s Disease Patients Undergoing Degenerative Lumbar Spine Surgery

Javier Guzman, BS; Branko Skovrlj, MD; Holt Cutler, BS; Samuel K. Cho, MD; John M. Cardi, MD

1Mount Sinai School of Medicine, New York, NY, US; 2Mount Sinai School of Medicine Department of Neurosurgery, New York, NY, US; 3Cahn 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.

P103. How Does State Income and the Number of Uninsured Patients Relate to Hospital Charges for Spine Care?

Kushagra Verma, MD; Eric M. Padegimas, MD; Alexander R. Vaccaro, MD, PhD; Todd J. Albert, MD; Alan S. Hilibrand, MD; Jeffrey A. Rihn, MD; Kris Radcliff, MD


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

P104. Platelet-Rich Plasma Inhibits Intervertebral Disc Degeneration Via TGF-β1/Smad Pathway

Jun Zou, MD; Huilin Yang, MD, PhD; Xuesong Zhu

1Soochow University Department of Orthopaedic Surgery, Suzhou, China; 2First Affiliated Hospital of Soochow University, Suzhou, China; 3First Affiliated Hospital of Soochow University, Plano, TX, US

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

P105. Assessment of Impact of Long-Cassette Standing X-rays on Surgical Planning for Lumbar Pathology: An International Survey of Spine Surgeons

International Spine Study Group; Justin S. Smith, MD, PhD; Christopher I. Shaffrey, MD; Virginie Lafage, PhD; Frank J. Schwab, MD; Themistocles S. Protopsisalit, MD; Eric O. Klineberg, MD; Justin K. Scheer, BS; Vedat Deviren, MD; Robert A. Hart, MD; Shay Bess, MD; Paul M. Arnold, MD; Jens R. Chapman, MD; Michael G. Fehlings, MD, PhD, FRCS; Christopher P. Ames, MD

1Brighton, CO, US; 2University of Virginia Health System, Charlottesville, VA, US; 3University of Virginia Department of Neurosurgery, Charlottesville, VA, US; 4New York University Langone Medical Center Hospital for Joint Diseases, New York, NY, US; 5University of California Davis School of Medicine, Sacramento, CA, US; 6University of California San Diego, San Diego, CA, US; 7University of California San Francisco, San Francisco, CA, US; 8Oregon Health and Science University, Portland, OR, US; 9Rocky Mountain Scoliosis and Spine, Denver, CO, US; 10University of Kansas Medical Center Department of Neurosurgery, Kansas City, KS, US; 11UW Harborview Medical Center, Seattle, WA, US; 12Toronto Western Hospital, Toronto, ON, Canada

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P106. Influence of Educational Attainment on Pain Intensity and Disability in Patients With Lumbar Spinal Stenosis: Mediation Effect of Pain Catastrophizing
Ho-Joong Kim, MD, PhD
Seoul, South Korea
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P107. Minimally Invasive Fusion of the SI Joint: A Multicenter Outcomes Study
Robyn Capobianco, MA, BA1; Donald C. Sachs, MD2; Mukund I. Gundanna, MD3; Timothy A. Holt, MD4; Timothy G. Graven, DO5; John T. Cummings, MD6; A. Nick Shamie, MD7
FDA Device/Drug Status: iFuse Implant System (Approved for this indication).

P108. Reliability of X-ray Based Evaluation of Pedicle Screw Misplacement in Adolescent Spinal Deformity
Vishal Sarwahi, MD1; Saankritya Ayan, MD2; Beverly Thornhill, MD2; Adam L. Wollowick, MD3; Terry D. Amaral, MD4; Dan Wang5
1New York, NY, US; 2Montefiore Medical Center, Bronx, NY, US; 3Albert Einstein College of Medicine, Bronx, NY, US; 4Bronx, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P109. Predictors of Degenerative Spondylolisthesis and Loading Translation in Surgical Lumbar Spinal Stenosis Patients
Raja Y. Rampersaud, MD, FRCSC1; Rohit Amritanand, MD2; Bheeshma Ravi, MD2; Kenny S. David, MBBS, MS, FACS4
1Toronto Western Hospital, Toronto, ON, Canada; 2Toronto, ON, Canada; 3University of Toronto, Toronto, ON, Canada; 4Christian Medical College, Vellore, Vellore, TN, India
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P110. Use of Amniotic Membrane Anti-Adhesion Barrier for Lumbar Discectomy
Jeffrey L. Biehn, DO, DC, MS1; Jessica Shellock, MD2; Richard D. Guyer, MD1; Jack E. Zigler, MD1
1Utah Orthopaedics, Ogden, UT, US; 2Texas Back Institute, Plano, TX, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P111. Transforaminal Lumbar Interbody Fusion With Local Bone Graft in Degenerative Lumbar Spinal Disease: A Comparison of 4° Lordotic Angle Cage and 8° Cage
Kyu-Jung Cho, MD1; Young T. Kim, MD2
1Inha University Hospital, Incheon, South Korea; 2Incheon, South Korea
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P112. Towards a Better Understanding of Direct Vertebral Rotation (DVR) for AIS Surgery: Developing a Multisegmental Biomechanical Model and Evaluation of Factors Affecting Correction
William F. Lavelle, MD1; Siddharth A. Badve, MD2; Nathaniel R. Ordway, MS3; Stephen A. Albanese, MD3
1Manlius, NY, US; 2Dadar, Mumbai, India; 3SUNY Upstate Medical University, Syracuse, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P113. How Often is Lumbar Spinal Fusion Performed Prior to Diagnosis of Sacroiliac Joint Disruption?
Karen Spach, PhD1; Stacey J. Ackerman, PhD2; David W. Polly Jr., MD2; Tyler Knight, MS4
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P114. Comparison of Uniplanar Versus Fixed Pedicle Screws in the Restoration of Thoracic Kyphosis in the Treatment of Adolescent Idiopathic Scoliosis (AIS)
William F. Lavelle, MD1; Siddharth A. Badve, MD2; Ryan C. Goodwin, MD3
1Manlius, NY, US; 2Dadar, Mumbai, India; 3Cleveland Clinic Foundation, Cleveland, OH, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P115. Do MIS Deformity Interventions Result in Similar Reductions of Disability when Compared With Traditional Open Spinal Deformity Correction at One- and Two-Years? A Propensity Matched Cohort Analysis

Vishal Sarwahi, MD; Rachel E. Borlack, BS; Aviva Dworkin; Dan Wang; Sarika Kalantre, MD; Monica Payares, MD; Isaac Moss, MD; David N. Paglia, PhD; Hicham Drissi, PhD

1New York, NY, US; 2Bronx, NY, US; 3Montefiore Medical Center, Bronx, NY, US; 4Albert Einstein College of Medicine, Bronx, NY, US

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

P116. Pedicle Screw Safety: How Much Anterior Breach is Safe? A Cadaveric- and CT-Based Study

Vishal Sarwahi, MD; Terry D. Amaral, MD; Monica Payares, MD; Aviva Dworkin; Dan Wang; Adam L. Wollowick, MD

1New York, NY, US; 2Bronx, NY, US; 3Montefiore Medical Center, Bronx, NY, US; 4Albert Einstein College of Medicine, Bronx, NY, US

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

P117. Adolescent Idiopathic Scoliosis Patients Are at Increased Risk for Pulmonary Hypertension Which Reverses After Scoliosis Surgery

Vishal Sarwahi, MD; Rachel E. Borlack, BS; Aviva Dworkin; Dan Wang; Sarika Kalantre, MD

1New York, NY, US; 2Bronx, NY, US; 3Montefiore Medical Center, Bronx, NY, US; 4Albert Einstein College of Medicine, Bronx, NY, US

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

P118. Pedicle Screws Allow Maintenance of Thoracic Kyphosis in AIS, But Ability to Improve Hypokyphosis is Limited

Vishal Sarwahi, MD; Adam L. Wollowick, MD; Preethi M. Kulkarni, MD; Terry D. Amaral, MD


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


Charles Gerald T. Ledonio, MD; David W. Polly Jr., MD; Marc Swiontkowski, MD

1Minneapolis, MN, US; 2University of Minnesota Physicians, Minneapolis, MN, US; 3University of Minnesota Department of Orthopaedic Surgery, Minneapolis, MN, US

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

P120. Outcome of Navigated Minimally Invasive Sacroiliac Joint Fusion: Does Surgical History Matter?

Charles Gerald T. Ledonio, MD; David W. Polly Jr., MD; Ivana Ninkovic, MPH; Edward Rainier G. Santos, MD; Jonathan N. Sembrano, MD

1Minneapolis, MN, US; 2University of Minnesota Physicians, Minneapolis, MN, US; 3University of Minnesota, Minneapolis, MN, US; 4Rosemount, MN, US

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

P121. Posttraumatic Angiogenesis Correlated With Hypoxia Regulation After Acute Spinal Cord Injury in Rat

Hongbin Lu, MD, PhD

Changsha, China

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

P122. The Reliability and Validity of the Thoracolumbar Injury Classification System in Pediatric Spine Trauma

Jason W. Savage, MD; Paul M. Arnold, MD; Wellington K. Hsu, MD; Alpesh A. Patel, MD, FACS; Gregory D. Schroeder, MD; Alexander R. Vaccaro, MD, PhD; John R. Dimar II, MD; Paul A. Anderson, MD

1Chicago, IL, US; 2University of Kansas Medical Center Department of Neurosurgery, Kansas City, KS, US; 3Northwestern University, Chicago, IL, US; 4Northwestern Department of Orthopaedics, Chicago, IL, US; 5Rothman Institute, Philadelphia, PA, US; 6Spine Institute, Louisville, KY, US; 7University of Wisconsin Orthopedics and Rehabilitation, Madison, WI, US

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

P123. Treatment of Injured Intervertebral Discs with PDGF-BB Inhibits Degeneration In Vivo

Isaac Moss, MD; David N. Paglia, PhD; Hicham Drissi, PhD

1Medical Arts and Research Building, Farmington, CT, US; 2University of Connecticut Health Center, Farmington, CT, US

FDA Device/Drug Status: PDGF-BB (Investigational/Not approved).
P124. Magnetic Resonance Neurography Allows Visualization of the Lumbar Plexus at the L4-5 Disc Space: Development of a Preoperative Surgical Planning Tool for Lateral Transpsoas Interbody Fusion
John C. Quinn, MD1; Joseph L. Chazen, MD2; Darren R. Lebl, MD3
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P125. The Incremental Hospital Cost of Complications Among Medicare Beneficiaries Undergoing Spinal Fusion
Kenneth M. Little, MD1; David S. Jevsevar, MD; Kevin G. Shea, MD2; Kimberly K. Wright, RN3; Aprull W. Simon, MSN, RN4; Steven D. Culler, PhD5
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P126. A Stepwise Multiple Regression Analysis of Pedicle Screws in the Thoracolumbar Spine
William F. Lavelle, MD1; Kevin Albanese1; Nathaniel R. Orndroy, MS; Stephen A. Albanese, MD1
1Manlius, NY, US; 2SUNY Upstate Medical University, Syracuse, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P127. Can Low Dose rhBMP-2 Replace Iliac Crest Bone Graft in Achieving Successful Fusion in Adults With a Long Fusion to the Sacrum?
Sachin Gupta1; Guarav S. Gulsin, MD2; Floreana Naef, MD3; Kareem J. Kebaish4; Khaled M. Kebaish, MD; Munish C. Gupta, MD1
1Carmichael, CA, US; 2Aberdeen Royal Infirmary, Aberdeen, UK; 3Baltimore, MD, US; 4Oakton, VA, US; 5University of California Davis Orthopaedic Surgery, Sacramento, CA, US
FDA Device/Drug Status: bmp (Not approved for this indication).

P128. A Comparative Analysis of Lumbosacral Fixation Strengths: What is Best in a Long Fusion?
Emily M. Lindley, PhD1; Christopher Kleck, MD2; Damian Illing3; Vikas V. Patel, MD4; Cameron Barton4; Devin Razavi-Shearer, BA5; Christopher M. Cain, MD, FRACS6; Evalina L. Burger, MD8
1University of Colorado Denver, Aurora, CO, US; 2University of Colorado, Aurora, CO, US; 3University of Colorado Anschutz Medical Campus, Aurora, CO, US; 4Denver, CO, US; 5Aurora, CO, US; 6Department of Orthopaedics, UC Denver, Aurora, CO, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P129. Single-Level Lateral Lumbar Interbody Fusion for the Treatment of Adjacent Segment Disease: A Retrospective Two-Center Study
Alexander Aichmair, MD; Marjan Alimi; Alexander P. Hughes, MD; Andrew A. Sama, MD; Jerry Y. Du; Roger Hartl, MD; Frank P. Cammisa Jr., MD; Federico P. Girardi, MD
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FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P130. The Effect of Surgical Correction for Increased Cobb Angle and Sagittal Contour on Thoracic Volume in Adolescent Idiopathic Scoliosis
Charles Gerald T. Ledonio, MD; Jennifer Wozniczka; David W. Polly Jr., MD; Ben Rosenstein, BS2; David J. Nuckley, PhD2
1Minneapolis, MN, US; 2University of Minnesota, Minneapolis, MN, US; 3University of Minnesota Physicians, Minneapolis, MN, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P131. Patient Reported Outcome Measures Collected via Telephonic Interviews Versus Self-Administered Forms After Lumbar Spine Surgery: Does Data Collection Methodology Make a Difference
Scott L. Parker, MD1; Saniya S. Godil, MD2; Kristin Archer, PhD, DPT; Susan Vanston3; Stephen Wegener, PhD; Clinton J. Devin, MD1
1Vanderbilt University, Nashville, TN, US; 2Vanderbilt University Medical Center, Nashville, TN, US; 3Nashville, TN, US; 4Johns Hopkins, Baltimore, MD, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P132. Which Factors Predict Shoulder Asymmetry in Patients With Lenke Type 1 and 3 Curves Following Pedicle Screw Instrumentation?
Meric Enercan, MD1; Sinan Kahraman, MD2; Tunay Sanli, MA3; Bahadir Gokcen, MD; Cagatay Ozturk, MD5; Ufuk Talo, MD; Ahmet Alanan, MD; Azmi Hamzaoglu, MD
1Istanbul Spine Center, Istanbul, Turkey; 2Istanbul, Turkey; 3Istanbul University Medical Faculty, Orthopedic and Traumatology Department, Istanbul, Turkey; 4Acibadem Maslak Hospital Spine Center, Istanbul, Turkey
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P133. The Incidence of Symptomatic Adjacent Segment Disease Requiring Treatment: Cervical Arthroplasty Versus ACDF
Jacqueline Myer; William Beutler, MD, FACS; Jeffrey R. McConnell, MD; James G. Lindley Jr., MD
FDA Device/Drug Status: SECURE-C Cervical Artificial Disc (Approved for this indication).

P134. ACADIA Facet Replacement System IDE Study: Preliminary Outcomes at Two- and Four-Years Postoperative
Jacqueline Myer; Jim A. Youssef, MD; Kevin A. Rahn, MD; Morgan P. Lorio, MD, FACS; David J. McKeever
FDA Device/Drug Status: ACADIA Facet Replacement System (Investigational/Not approved).

P135. Treatment of Symptomatic Degenerative Disc Disease With the Baguera C Cervical Disc Prosthesis: Safety, Effectiveness and Clinical Results with Two-Years Follow-Up
Patrick Fransen, MD; Nils Hansen-Algenstaedt, MD; David C. Noriega, MD; Vincent Pointillart, MD, PhD
1Clinique du Parc Leopold, Bruxelles, Belgium; 2University Medical Center Hamburg-Eppendorf, Hamburg, Germany; 3Valladolid, Spain; 4CHU Bordeaux Department of Orthopedics, Bordeaux, France
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P136. Harmful Effects of Endothelial Cell-Derived Microparticles on Matrix Metabolism by Intervertebral Disc Cells
Pedro Pohl, MD; Thomas P. Lozito, PhD; Thais Copperman, MD; Takashi Yurube; Kevin Ngo; Rocky S. Tuan, PhD; Gwendolyn A. Sowa, MD, PhD; Luciano Miller R. Rodrigues, DO; James D. Kang, MD; Nam Vo, PhD
1University of Pittsburgh, Pittsburgh, PA, US; 2University of Pittsburgh Medical Center, Pittsburgh, PA, US; 3Takatsuki General Hospital, Japan; 4Pittsburgh, PA, US; 5University Federal De Sao Paulo, Sao Paulo, Brazil; 6LJPMC/Ferguson Lab, Pittsburgh, PA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P137. Compensatory L4-L5 Hyperlordosis is Reduced Following ALIF Treatment of L5-S1 Degenerative Conditions
Luiz H. Pimenta, MD; Rubens Jensen, MD; Luis Marchi, MS; Rodrigo A. Amaral, MD; Thabata Bueno; Leonardo Oliveira, MD; Etevaldo Coutinho, MD
1Instituto de Patologia da Coluna, Sao Paulo, Brazil; 2Sao Paulo, Brazil; 3Santa Rita Hospital, Sao Paulo, Brazil
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P138. Allograft and Polyetheretherketone (PEEK) Cage in Anterior Cervical Discectomy and Fusion (ACDF)
Sharon C. Yson, MD; Edward Rainier G. Santos, MD; Jonathan N. Sembrano, MD
1University of Minnesota, Minneapolis, MN, US; 2Rosemount, MN, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P139. Kypho-IORT: Intraoperative Radiotherapy in Spinal Metastases: Nine-Month Clinical Results
Frederic Bludau, MD
Medical Faculty Mannheim of the University of Heidelberg, Orthopaedic and Trauma, Mannheim, Germany
FDA Device/Drug Status: Intrabeam, Carl-Zeiss-Meditech (Approved for this indication), Intrabeam Needle Applicator (Approved for this indication).

P140. A Comparative Evaluation of Commercially-Available Cell-Based Allograft Implants in a Rat Fusion Model
Brian Johnstone, PhD; Paolo Antonio R. Punsalan, MD; Holly Cho, BA; Marcel Betsch, MD; Jung U. Yoo, MD
1Oregon Health and Science University, Portland, OR, US; 2Portland, OR, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P141. Endplate Pressure Distribution is Influenced by Bone Graft Substitute Within Interbody Cages
Kieran A. McCaffrey, MD; William Walsh, PhD; Matthew H. Pelletier, PhD; Vedran Lovric, PhD
1Surgical and Orthopaedic Research Laboratory, Sydney, Australia; 2Surgical and Orthopaedic Research Labs, Randwick, Australia
FDA Device/Drug Status: Aleutian interbody cage (Approved for this indication).
P142. Outpatient Versus Inpatient Anterior Cervical Discectomy and Fusion is Associated with Improved Patient Safety: Analysis of 7,288 Patients from NSQIP Database
Scott L. Parker, MD; Saniya S. Godil, MD; E. H. Dyer, MD; Tim E. Adamson, MD; Anthony Asher, MD, FACS; Clinton J. Devin, MD; Matthew J. McGirt, MD

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

P143. Changes in Foraminal Area With Anterior Decompression Versus Keyhole Foraminotomy in the Cervical Spine: A Cadaveric Investigation
Jeremi M. Leasure, MS; Jacqueline Nguyen, MD; Calvin Kuo, MD; Bryant Chu, BS; Christopher P. Ames, MD; Dimitriy G. Kondrashov, MD

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

P144. The Cellular and Biological Profile of Autologous Bone from Various Graft Sites
Brandon D. Lawrence, MD; Sarina Sinclair, PhD; W. Ryan Spiker, MD; Darrel S. Brodke, MD

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

P145. Quality of Life Outcomes Following Revision Lumbar Discectomy
Daniel Lubelski, BA; Matthew Alvin; Edward C. Benzel, MD; Thomas E. Mroz, MD

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

P146. Biomechanical Demands on S2AI Sacral and Pelvic Instrumentation in Long Fusion Constructs With and Without Interbody Supplementation
William Camisa, MS; Shay Bess, MD; Seong Yi, MD, PhD; Akira S. Washiya; Jeremi M. Leasure, MS; Douglas C. Burton, MD; Khaled M. Kebaish, MD; Christopher P. Ames, MD

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

P147. Clinical and Surgical Predictors of Perioperative Complication Development in Patients with Cervical Spondylotic Myelopathy: Results from a Survey of 916 AOspine International Members
Michael G. Fehlings, MD, PhD, FRCSC; Lindsay Tetreault; Anoushka Singh, PhD; Mike S. Fawcett

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

P148. Population Average T2 MRI Maps Reveal Quantitative Transformations of the Degenerating Disc in a Rabbit Puncture Model
Harvey E. Smith, MD; John T. Martin, MS; Robert L. Mauck, PhD; Dawn M. Elliott, PhD; Yejia Zhang, MD, PhD; D. Greg Anderson, MD; Todd J. Albert, MD

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

P149. Pulsed Electromagnetic Fields (PEMF) Inhibit Matrix Metalloproteinase-13 Expression in Human Annulus Fibrosus Cells
Xinyan Tang; Rachel Willardson, MSc; Dezba Coughlin, PhD; Tamara Alliston, PhD; Jeffrey C. Lotz, PhD

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
**P150. Predictive Factors for APjF After Adult Deformity Surgery With the UIV in the Thoracolumbar (TL) Spine**

Prokopis Annis, MD; Brandon D. Lawrence, MD; W. Ryan Spiker, MD; Michael D. Daubs, MD; Darrel S. Brodke, MD

1University of Utah Department of Orthopaedics, Salt Lake City, UT, US; 2Las Vegas, NV, US

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

**P151. Acute Proximal Junctional Failure After Deformity Surgery in Patients Older than 55 Years**

Prokopis Annis, MD; Brandon D. Lawrence, MD; W. Ryan Spiker, MD; Michael D. Daubs, MD; Darrel S. Brodke, MD

1University of Utah Department of Orthopaedics, Salt Lake City, UT, US; 2Las Vegas, NV, US

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

**P152. Thoracic Volume and Pulmonary Function at Minimum of 20-Years Following Treatment of Adolescent Idiopathic Scoliosis: Preliminary Results**

Charles Gerald T. Ledonio, MD; Kristin England, BA; A. Noelle Larson, MD; David W. Polly Jr., MD; Michael J. Yaszemski, MD, PhD


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

**P153. CT-Guided Navigation for Screw Placement in Children ≤ Age 10**

Charles Gerald T. Ledonio, MD; A. Noelle Larson, MD; David W. Polly Jr., MD

1Minneapolis, MN, US; 2Mayo Clinic, Rochester, MN, US; 3University of Minnesota Physicians, Minneapolis, MN, US

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

**P154. Do Adult Males Have Greater Perioperative Morbidity, More Complications and Inferior Outcomes than Females Following Spinal Deformity Surgery?**

David B. Bumpass, MD; Lawrence G. Lenke, MD; Keith H. Bridwell, MD; Lukas P. Zebala, MD; Ian G. Dorward, MD; Patrick A. Sugrue, MD; Isaac O. Karikari, MD; Jeffrey L. Gum, MD; Linda Koester

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

**P155. Association Between Obesity and 30-Day Outcomes for Spinal Arthrodesis in Children**

Justin B. Mahida, MD, MBA; Lindsey Asti, MPH; Jason Ferrel, MD; Katherine J. Deans, MD; Peter C. Minneci, MD; Allan C. Beebe, MD; Brian Kenney, MD

1Nationwide Children’s Hospital, Columbus, OH, US; 2Mount Carmel Health System, Columbus, OH, US

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

**P156. Use of the Spine AdVerse Events Severity (SAVES) System to Categorize and Report Adverse Events in Spine Surgery**

Peter J. Wagner, MD, MMS; Tamir Ailon, MD, FRCSC, MPH; Scott C. Pascal; Michael Stauff, MD; Christian P. DiPaola, MD


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

**P157. Biomechanical Fatigue Loading Evaluation of a Novel Four Rod Technique to Prevent Early Instrumentation Failure in Lumbar PSO**

Jeremi M. Leasure, MS; Munish C. Gupta, MD; Audrey Martin, BS; Peter M. Wanberg, BS; Christopher P. Ames, MD


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

**P158. Significant Decreased Radiation Exposure in Percutaneous Adult Degenerative Spinal Instrumentation with Robotic Guidance**

Andrew F. Cannestra, MD, PhD

Lyerly Neurosurgery, Jacksonville, FL, US

**FDA Device/Drug Status:** This abstract does not discuss or include any applicable devices or drugs.
P159. Outcomes of Management and Risks of Recurrence of Symptomatic Spinal Hemangiomas: A Multicenter Series of 68 Cases
Christina L. Goldstein, MD, FRCSC; Ziya L. Gokaslan, MD, FACS; Alessandro Luzzati, MD; Laurence D. Rhines, MD; Charles G. Fisher, MD; Dean Chou, MD; MD; Richard Williams, MB, FRACS; Nasir A. Quraishi, MD; Chetan Bettegowda, MD, PhD; Norio Kawahara, MD, PhD; Michael G. Fehlings, MD, PhD, FRCSC
1Hamilton, ON, Canada; 2Johns Hopkins University Department of Neurosurgery, Baltimore, MD, US; 3Istituto Ortopedico Galeazzi, Milan, Italy; 4Houston, TX, US; 5Vancouver General Hospital, Vancouver, BC, Canada; 6University of California San Francisco, San Francisco, CA, US; 7Brisbane Private Hospital, Brisbane, QLD, Australia; 8Queens Medical Centre, Nottingham, UK; 9Johns Hopkins Medicine, Baltimore, MD, US; 10Department of Orthopaedic Surgery, Uchinada-Machi, Kahoku-Gun, Ishikawa, Japan; 11Toronto Western Hospital, Toronto, ON, Canada

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

P160. Posterior Spinal Adiposity and Its Relation to Surgical Site Infection
Neil N. Patel, MD; David Buzas, MD; Ali Sobh, BSc; Eric Owashi, BSc; Nilesh M. Patel, MD

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

P161. Professional Athlete Sport Initiative: Cervical Level Analysis in NFL Players
Robert J. Burgmeier, MD; Jason W. Savage, MD; Alpesh A. Patel, MD, FACS; Wellington K. Hsu, MD
1Northwestern University School of Medicine, Chicago, IL, US; 2Chicago, IL, US; 3Northwestern Department of Orthopaedics, Chicago, IL, US; 4Northwestern University, Chicago, IL, US

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

P162. Nucleous Pulposus Tissue Engineering Using a Novel Photopolymerizable Hydrogel and Minimally Invasive Delivery
Karj L. Henrikson, MD; Pedro Pohl, MD; Hang Lin, PhD; Robert A. Hartman; Rocky S. Tuan, PhD; James D. Kang, MD; Nam Vo, PhD; Gwendolyn A. Sowa, MD, PhD
1University of Pittsburgh Medical Center, Pittsburgh, PA, US; 2University of Pittsburgh, Pittsburgh, PA, US; 3Pittsburgh, PA, US; 4LJPMC/Ferguson Lab, Pittsburgh, PA, US

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

P163. A Clinical Evaluation of LevelCheck for Automatic Localization of Target Vertebrae in Spine Surgery
Sheng-fu L. Lo, MD, MHS; Yoshito Otake, PhD; Varun Puvanesarajah, BS; Sebastian Vogt, PhD; Ziya L. Gokaslan, MD, FACS; Nafi Aygun, MD; Jeffrey H. Siewersden, PhD
1Johns Hopkins Hospital, Baltimore, MD, US; 2Johns Hopkins University, Baltimore, MD, US; 3Johns Hopkins Medicine, Baltimore, MD, US; 4Siemens Medical Solutions USA, Inc., Malvern, PA, US; 5Johns Hopkins University Department of Neurosurgery, Baltimore, MD, US; 6Johns Hopkins University Neuroradiology Department, Baltimore, MD, US

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

P164. Comparison of Severe Sagittal Malalignment Treated With and Without a Three-Column Osteotomy
Isaac O. Karikari, MD; Lawrence G. Lenke, MD; Keith H. Bridwell, MD; Patrick A. Sugrue, MD; David B. Bumpass, MD; Jeffrey L. Gum, MD
1Durham, NC, US; 2Washington University Medical Center Department of Orthopedic Surgery, St. Louis, MO, US; 3Washington University In St. Louis School of Medicine, St. Louis, MO, US; 4Northwestern University Medical School, Chicago, IL, US; 5St. Louis, MO, US; 6Louisville, KY, US

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

P165. Topical, Intrawound Vancomycin Powder Decreases the Risk of Surgical Site Infections in Complex Adult Deformity Reconstruction: A Cost-Benefit Analysis
Alexander A. Theologis, MD; Gokhan Demirkiran; Murat Pekmezci, MD; Christopher P. Ames, MD; Vedat Deviren, MD
1UCSF/SFGH Orthopaedic Trauma Institute, San Francisco, CA, US; 2Ankara, Turkey; 3University of California San Francisco Department of Orthopedic Surgery, San Francisco, CA, US; 4University of California San Francisco, San Francisco, CA, US

FDA Device/Drug Status: Vancomycin (Not approved for this indication).

P166. Polymicrobial Vertebral Osteomyelitis: Outcomes and Complications
Sina Pourtaheri, MD; Tyler N. Stewart; Kimona Issa, MD; Kumar G. Sinha, MD; Eman Shafa, MD; Mark J. Ruoff, MD; Ki S. Hwang, MD; Arash Emami, MD

FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
P167. Comparison of Outcomes for Lumbar Fusion in the Treatment of Degenerative Spondylolisthesis and Degenerative Disc Disease: A Prospective Study
Frank M. Phillips, MD1; Adam S. Kanter, MD2; Kaveh Khajavi, MD, FACS3; Mark D. Peterson, MD4
1Midwest Orthopaedics at Rush, Chicago, IL, US; 2UPMC-Presbyterian/Department of Neurological Surgery, Pittsburgh, PA, US; 3Georgia Spine and Neurosurgery Center, Atlanta, GA, US; 4Southern Oregon Spine Care, Medford, OR, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P168. The Effects of Demographics and Health Insurance Status on Physician Treatment Decisions and Patient Outcomes of Acute Spinal Fractures at an Academic Level 1 Trauma Center
Amit K. Bhandutia, MD1; Benjamin B. Whiting, BA2; Daniel T. Altman, MD1
1Pittsburgh, PA, US; 2Gibsonia, PA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P169. Incidence of Lumbar Plexopathy While Utilizing Mechanomyography (MMG) as an Alternative to Electromyography (EMG) for Transpsoas Lateral Lumbar Interbody Fusion (LLIF)
David C. Briski, MD; Brandon W. Cook, MD; Joseph M. Zavatsky, MD
Ochsner Medical Center, New Orleans, LA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P170. Bicortical S1 Screw Fixation May Obviate the Need for Iliac Screws in Minimally Invasive Surgery for Adult Spinal Deformity
David C. Briski, MD; Joseph M. Zavatsky, MD; Brandon W. Cook, MD
Ochsner Medical Center, New Orleans, LA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

Alana J. Green, BA1; Edward P. Abraham, MD2; Melissa D. McKeon, MSc3; Joshua Murray, DO4; Neil A. Manson, MD, FRCSC5
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P173. Pain on the Brain: Is the SF-36 Mental Component Summary Enough?
Alana J. Green, BA1; Neil A. Manson, MD, FRCSC5; Melissa D. McKeon, MSc3; Edward P. Abraham, MD2
1St. John, NB, Canada; 2St. John Regional Hospital, St. John, NB, Canada; 3Canada East Spine Centre, St. John, NB, Canada
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P174. Preoperative Predictors of Three-Month and One-Year Change in Quality of Life (EQ-5D) Following Multilevel Lumbar Laminectomy and Fusion
Clinton J. Devin, MD1; Stephen K. Mendenhall2; Jesse E. Bible, MD1; David N. Shau, BS3; Matthew J. McGirt, MD4
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P175. Unilateral Tubular Approach for Bilateral Laminectomy: Effect on Ipsilateral and Contralateral Buttock and Leg Pain
Marjan Alimi1; Christoph P. Hofstetter, MD, PhD2; Innocent U. Njoku Jr1; Roger Hartl, MD3
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P176. Safety and Effectiveness of Minimally Invasive Sacroiliac Joint Fusion: A Prospective Study
Daniel J. Cher, MD1; Bradley Duhon, MD2
1SI-BONE, Inc., San Jose, CA, US; 2Neurosurgical and Spine Specialists, Parker, CO, US
FDA Device/Drug Status: iFuse Implant System (Approved for this indication).
P177. The Effect of Aging on Lumbar Spineous Process Morphology and Implications for Preoperative Surgical Planning
Jeremy D. Shaw, MD; Daniel L. Shaw; Jason D. Eubanks, MD; David H. Kim, MD
1Burlingame, CA, US; 2Middlebury, VT, US; 3Waite Hill, OH, US; 4Tufts University Medical Group, NEBH, Boston, MA, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P178. The Impact of the Cage Height, Diameter and Positioning on Clinical and Radiographic Outcome of the Extreme Lateral Interbody Fusion
Marjan Alimi; Christoph P. Hofstetter, MD, PhD; Roger Hartl, MD
1New York, NY, US; 2New York-Presbyterian Hospital Weill Cornell, New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P179. Controlled Diabetes Mellitus in Patients Undergoing Degenerative Lumbar Spine Surgery
Javier Guzman, BS; Branko Skovrlj, MD; Andrew Hecht, MD; Sheeraz A. Qureshi, MD, MBA; Samuel K. Cho, MD
1Mount Sinai School of Medicine, New York, NY, US; 2Mount Sinai School of Medicine Department of Neurosurgery, New York, NY, US; 3New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P180. Incidence, Characteristics, Outcomes and Complications in Uncontrolled Diabetic Patients Undergoing Spinal Deformity Surgery
Branko Skovrlj, MD; Javier Guzman, BS; Andrew Hecht, MD; Sheeraz A. Qureshi, MD, MBA; Samuel K. Cho, MD
1Mount Sinai School of Medicine Department of Neurosurgery, New York, NY, US; 2Mount Sinai School of Medicine, New York, NY, US; 3New York, NY, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P181. DISC (Degenerate Disc Infection Study With Contaminant Control) Discussion on Methods, Interim Analysis and Comparison Between Pilot Study and the DISC Trial: The Pitfalls of Not Sending Contaminant Control
Prashanth J. Rao, MD
Prince of Wales Private Hospital, Sydney, Australia
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P182. Unilateral Hemilaminectomy is a Satisfactory Route to Remove Extramedullary Tumors
Ali Dalgic, MD
Ankara Numune Research and Training Hospital, Ankara, Turkey
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.

P183. The Effects of Spondylolisthesis on Mechanical Strength of TLIF Reconstruction Using a Synthetic Model
Bryan M. Armitage, MD, MS; Joseph Orchowski, MD; J. Matthew Cage, DO
1Waimanalo, HI, US; 2Tripler Army Medical Center, Honolulu, HI, US; 3Orthopedic Surgery, Tripler Army Medical Center, Honolulu, HI, US
FDA Device/Drug Status: TLIF cages (Approved for this indication), Posterior instrumentation, rods and pedicle screws (Approved for this indication).

P184. Clinical Outcomes of 36 Sacral Chordoma Surgeries
Yan M. Li, MD, PhD; Laurence D. Rhines, MD
Houston, TX, US
FDA Device/Drug Status: This abstract does not discuss or include any applicable devices or drugs.
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Buckley, Jenni M.: Board of Directors: The Perry initiative (Executive Director & Vice President); Scientific Advisory Board: The Taylor Collaboration (Chief Scientific Officer).

Burch, Shane: Consulting: Medtronic (B); Speaking and/or teaching arrangements: Medtronic (C); Scientific Advisory Board: Medtronic Navigation (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, Evalina L.: Consulting: Medirea (D, Paid directly to institution/employer); Trips/travel: Medirea (A, Paid directly to institution/employer); Research Support (Staff and/or Materials): Medtronic Sofamor-Danek (E, Paid directly to institution/employer), Aesculap (F, Paid directly to institution/employer), Synthes (E, Paid directly to institution/employer), Insite (B, Paid directly to institution/employer), Vertiflex (E, Paid directly to institution/employer), Medirea (B, Paid directly to institution/employer), SI-BONE (D, Paid directly to institution/employer); Fellowship Support: OREF (D, Paid directly to institution/employer).

Burton, Douglas C.: Royalties: DePuy Spine (C); Consulting: DePuy Spine (B); Board of Directors: Kansas University Physicians (None); International Spine Study Group (None); Research Support (Investigator Salary): DePuy Spine (B).

Cain, Christopher M.: Royalties: DePuy Synthes (H); Consulting: Synthes (B, Paid directly to institution/employer); Speaking and/or teaching arrangements: AOSpine (C, Paid directly to institution/employer); Research Support (Staff and/or Materials): Medtronic Sofamor Danek (D, Paid directly to institution/employer), Aesculap (H, Paid directly to institution/employer), DePuy Synthes (E, Paid directly to institution/employer), SI-BONE (C, Paid directly to institution/employer), Vertiflex (G, Paid directly to institution/employer), Medirea (B, Paid directly to institution/employer), DePuy Synthes (E, Paid directly to institution/employer), Medtronic (D, Paid directly to institution/employer), SI-BONE (D, Paid directly to institution/employer); Fellowship Support: OREF (D, Paid directly to institution/employer).

Cammisa, Frank P.: Device or Biologic Distributorship (Physician-Owned Distributorship): Alphatec (B); Royalties: NuVasive (C); Stock Ownership: Alphatec Spine (1%), NuVasive (1%), Paradigm Spine (1%), K2Medical (1%), Knee Creations (1%), Centinel Spine (1%), Orthopaedic Investment Partners (1%), Scient’s USA (1%), Small Bone Innovations (1%), Vertebral Technology (1%), Spinal Kinetics (1%); Private Investments: Ivy Healthcare I and II (Amount not disclosed), Afcell Medical (Amount not disclosed), Bonovo Orthopedic (Amount not disclosed), Healthpoint Capital Partners (Amount not disclosed), NuVasive (Amount not disclosed), BI Members (Amount not disclosed), MMF Systems (Amount not disclosed), Pioneer Surgical Technology (Amount not disclosed), Viscogliosi Brothers Venture Partners III (Amount not disclosed); Consulting: Alphatec Spine (B), NuVasive (Amount not disclosed), Paradigm Spine (Stock ownership disclosed), DePuy Synthes (A), Spinal Partners III (Amount not disclosed), Spinal Kinetics (B); Scientific Advisory Board: Alphatec (Stock ownership disclosed), Healthpoint Capital Partners (Private investments disclosed), Ivy Healthcare Partners (Private investments disclosed), Research Support (Staff and/or Materials): Orthobond (E, Paid directly to institution/employer), NovaBone (F, Paid directly to institution/employer), Bacterin (F, Paid directly to institution/employer), Integrata (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: Genesys (C); Private Investments: TrueMotion Spine (1%); Consulting: NuVasive (E), DePuy (C), SpineGuard (B), Pioneer (C); Research Support (Staff and/or Materials): Mazor (B).

Capobianco, Robyn: Consulting: SI-BONE (Salary); Research Support (Investigator Salary): SI-BONE (E).

Caridi, John M.: Consulting: Zimmer Spine (B), Stryker Spine (B); Speaking and/or teaching arrangements: Zimmer Spine (B).

Carreon, Leah Y.: Trips/travel: University of Louisville (Amount not disclosed); Scientific Advisory Board: University of Louisville Institutional Review Board (Member), Medtronic (Global Evidence Advisory Board), The Spine Journal (Editorial Advisory Board), Spine (Editorial Advisory Board); Other Office: Norton Healthcare (Clinical Research Director, Salary); Research Support (Staff and/or Materials): Norton Healthcare (Amount not disclosed, Paid directly to institution/employer), Orthopedic Research and Educational Fund (Amount not disclosed, Paid directly to institution/employer); Other: NuVasive (None), National Institutes of Health (Amount not disclosed), Children’s Tumor Foundation (Amount not disclosed); Relationships Outside the One Year Requirement: Norton Healthcare (Research grant, Paid directly to institution/employer), AOSpine (Research grant, Paid directly to institution/employer), DOD (Travel expenses), ACSR (Travel expenses), NIH (Travel expenses), Medtronic (Global Evidence Advisory Board, None), University of Louisville (Travel expenses).

Carrino, John A.: Consulting: Abbott (B), Medtronic (A), Best Doctors (A); Scientific Advisory Board: Siemens Medical Systems - Syngo (Travel expenses), Carestream Healthcare (Travel expenses), GE Pain Management (Travel expenses), Merge Healthcare (Stock ownership); Research Support - Investigator Salary: Carestream (B, Paid directly to institution/employer), Medimmune (B, Paid directly to institution/employer); Grants: Siemens Medical Systems (E, Paid directly to institution/employer), Integra (D, Paid directly to institution/employer), Toshiba Medical Systems (D, Paid directly to institution/employer).

Casnellie, Michael: Consulting: Medtronic (B); Relationships Outside the One Year Requirement: Medtronic (Dissolved 12/2014, Consulting, None).

Castro, Frank P.: Private Investments: Cardinal Spine (75%, Owner/investor); Board of Directors: insanely Great Intellectual Property (Royalties disclosed); Scientific Advisory Board: Cardinal Spine (Royalties disclosed).


Chang, Michael S.: Consulting: Globus (B); Speaking and/or teaching arrangements: Stryker (B), Integra (B), Globus (B), Medtronic (B); Scientific Advisory Board: Alphatec (B).

Chapman, Jens R.: Stock Ownership: Renovis (1%); Consulting and/or teaching arrangements: AOSpine North America (Board Member, B); Board of Directors: AOSpine North America (B); Relationships Outside the One Year Requirement: Spine Journal (Trips/Travel, B), Journals of Spine (Trips/Travel, B), JSDT (Trips/Travel, B), JBJS (Trips/Travel, B), Evidence Based Spine Care Journal (Trips/Travel, B), Global Spine Journal (Trips/Travel, B).

Chaput, Christopher D.: Speaking and/or Teaching Arrangements: Facet Link (B); Research Support - Staff and/or Materials: Medtronic (C, Paid directly to institution/employer), Globus (B, Paid directly to institution/employer), NuVasive (C, aid directly to institution/employer).

Chaudhary, Bedansh R.: Fellowship Support: Royal College of Surgeons of England (C), HCA UK (C).

Chaudhary, Saad B.: Speaking and/or Teaching Arrangements: Medtronic (B); Scientific Advisory Board: U&I Corporation (A).

Cheng, Ivan: Royalties: NuVasive (E); Consulting: Spine Wave (None); Speaking and/or teaching arrangements: Stryker Spine (D); Scientific Advisory Board: Bioventus (None).

Cheng, Joseph S.: Board of Directors: North American Spine Society (Professional, Economic and Regulatory Chair); Other Office: AANS/CNS (Recording Secretary, AANS/CNS Council of State Neurosurgical Societies; Past-Chair, AANS/CNS Joint Spine Section).

Chiba, Kazuhiro: Consulting: Seikagaku Co. (B), Kaken Pharmaceutical Co. (B); Trips/travel: Seikagaku Co. (B); Board of Directors: Japanese Society for Spine Surgery and Related Research (Amount not disclosed), Cervical Spine Research Society Asia Pacific Section (Board of Directors); Grants: Ministry of Health Labor and Welfare of Japan (C, Paid directly to institution/employer).
Ching, Alexander C.: Consulting: DePuy Spine (D), NuVasive Spine (B), Atlas Spine (B); Fellowship Support: Globus Spine (E, Paid directly to institution/employer).

Cho, Samuel K.: Consulting: Stryker (B); Grants: OREF (D, Paid directly to institution/employer).

Choma, Theodore J.: Stock Ownership: Gentis (-1%); Consulting: Stryker Spine (C); Scientific Advisory Board: Gentis (None).

Chou, Dean: Consulting: DePuy (C), Medtronic (B), Globus (B), Orthofix (C); Trips/travel: AO North America (B).

Christie, Sean D.: Consulting: Medtronic Canada (B); Speaking and/or teaching arrangements: Medtronic (C, Paid directly to institution/employer); Board of Directors: Canadian Spine Society (None); Scientific Advisory Board: Canadian Spine Society (None); Research Support (Staff and/or Materials): Medtronic (D, Paid directly to institution/employer); Grants: Capital District Health (D, Paid directly to institution/employer).

Coric, Domagoj: Royalties: Spine Wave (F); Stock Ownership: Spine Wave (<1%), DiscGenics (<1%); Spinal Motion (<1%); Consulting: Medtronic (C), Globus Medical (F), United Healthcare (B), Spine Wave (C); Speaking and/or teaching arrangements: Globus Medical (B); Scientific Advisory Board: United Healthcare (B).

Côté, Pierre: Speaking and/or teaching arrangements: European Spine Society (B); Scientific Advisory Board: European Spine Society Task Force on Research (None); Grants: Ontario Government Ministry of Finance (H, Scientific Advisory Board: AOI Medical (Dissolved 3/2010, Consulting, None), St. Jude Medical (B), Stryker Interventional Spine (Dissolved 3/2010, Consulting, B), St. Jude Medical (F, Paid directly to institution/employer); Research Support: (Staff and/or Materials): Stryker (E, Paid directly to institution/employer); Relationships Outside the One Year Requirement: AOI Medical (Dissolved 3/2010, Consulting, None), AO Foundation (None, Paid directly to institution/employer).

Crandall, Dennis G.: Royalties: Medtronic (F); Stock Ownership: kSpine (1%); CoA link (1%); Consulting: Medtronic (C).

Crawford, Charles H.: Consulting: Medtronic (D), Alphatec (D); Speaking and/or teaching arrangements: DePuy Synthes (B); Trips/travel: North American Spine Society (A), SRS (A); Other Office: Scoliosis Research Society (None), North American Spine Society (Committee Member).

Crawford, Neil: Stock Ownership: Excelsior Surgical (15%), Globus Medical (1%); Board of Directors: Excelsior Surgical (None); Scientific Advisory Board: Sartek (Stock ownership), Synergy Disc Replacement (Stock ownership); Other Office: Excelsior Surgical (Salary); Research Support (Investigator Salary): FacetLink (C, Paid directly to institution/employer), Medtronic (C, Paid directly to institution/employer), SI-BONE (B); Research Support (Staff and/or Materials): FacetLink (D, Paid directly to institution/employer), Medtronic (E, Paid directly to institution/employer), SI-BONE (C); Fellowship Support: DePuy Synthes Spine (D, Paid directly to institution/employer).

Cummings, John T.: Device or Biologic Distributorship (Physician-Owned Distributorship): Innovative Spine Monitoring Partners (F); Royalties: NuVasive (C); Consulting: NuVasive (C); Speaking and/or teaching arrangements: SI-BONE (C); Trips/travel: SI-BONE (None); Research Support (Investigator Salary): NuVasive (B); Research Support (Staff and/or Materials): SI-BONE (None).

Cunningham, Matthew E.: Speaking and/or teaching arrangements: DePuy (Amount not disclosed).

Curcin, Aleksandar: Stock Ownership: CrossCurrent (<1%); Consulting: Medtronic (Dissolved); Speaking and/or Teaching Arrangements: Medical Educational Resources (Dissolved); Board of Directors: DOCS IPA (Amount not disclosed); Scientific Advisory Board: CrossCurrent (Stock ownership disclosed).

Daffner, Scott D.: Stock Ownership: Pfizer (<1%), Amgen (<1%); Consulting and/or teaching arrangements: DePuy Synthes (B); 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 (Dissolved 8/2011, Fellowship Support, D).

Dagenais, Simon: Royalties: Elsevier (A); Stock Ownership: Pacira Pharmaceuticals (<1%); Private Investments: Palladian Health (2%); Consulting: University of South Florida (C), Intrinsic Therapeutics (A), NCMIC Foundation (B), Dr. Louis Sportelli (B), Pacira Pharmaceuticals (E), New York University (C), Palladian Health (E), Foundation for Chiropactic Progress (B), Gerson Lehrman Group (A); Speaking and/or teaching arrangements: NCMIC Foundation (B), Chiropractic and Osteopathic College of Australasia (B); Trips/travel: Canadian Chiropractic Research Foundation (A), North American Spine Society (B); Scientific Advisory Board: Societe Franco-Europeenne de Chiropraxie (None), Palladian Health (Scientific Director for Clinical Policy and Advisory Board); Other Office: North American Spine Society (Annual Meeting Program Committee), Pacira Pharmaceutical (Salary); Grants: NCMIC Foundation (D).

Daniels, Alan: Trips/travel: DePuy Synthes (B, Paid directly to institution/employer), Stryker Spine (B); Other: Flexuspine (Implant donation), Synthes Spine (Implant donation).

Daubs, Michael D.: Royalties: Synthes Spine (F); Consulting: DePuy Synthes Spine (B); Speaking and/or teaching arrangements: AOSpine 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 (E, Paid directly to institution/employer); Consulting: Zimmer Spine (C, Paid directly to institution/employer), Paradigm Spine (B, Paid directly to institution/employer), LDR (B).

Davis, Timothy T.: Private Investments: Paradigm Spine (<1%), Small Bone Innovations (<1%), MMX (<1%), Prosydian (<1%), Alpha Diagnostics (100%); Consulting: VertiFlex (Amount not disclosed), Mesoblast (Scientific Advisory Board: AOSpine North America (B); Speaking and/or teaching arrangements: St. Jude Medical (B), Stryker Interventional (B), Medtronic Spine (D), Medtronic Neurourodulation (B); Trips/travel: St. Jude Medical (B), Medtronic Spine (C), Medtronic Neurourodulation (B); Scientific Advisory Board: Mesoblast (C); Grants: Medtronic (B).

Dekker, Joost: Grants: MSD (C, Paid directly to institution/employer).

Dekutoski, Mark B.: Royalties: Mayo Office of IP/Medtronic (D, Paid directly to institution/employer); Consulting: Mayo Medical Ventures/Medtronic (B, Paid directly to institution/employer); Speaking and/or teaching arrangements: Mayo Medical Ventures/Medtronic (None); Scientific Advisory Board: Broadwater Associates (B, Paid directly to institution/employer); Fellowship Support: AO Foundation (None, Paid directly to institution/employer).

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, Salary, Paid directly to institution/employer); Scientific Advisory Board: Medtronic (Amount not disclosed, Paid directly to institution/employer); Other Office: International Spine Intervention Society (Secretary, Travel expenses); Research Support (Investigator Salary): Relivant (B, Paid directly to institution/employer), SI-BONE (B, Paid directly to institution/employer), Mesoblast (B, Paid directly to institution/employer); Research Support (Staff and/or Materials): Relivant (B, Paid directly to institution/employer), Mesoblast (B, Paid directly to institution/employer), SI-BONE (B, Paid directly to institution/employer), Relationships Outside the One Year Requirement: AOI Medical (Dissolved 3/2010, Consulting, None), Stryker Interventional Spine (Dissolved 3/2010, Consulting, B), St. Jude Medical (Dissolved 3/2010, Consulting), Stryker Biotech (Dissolved 6/2011, Grant), ATRM (Dissolved 6/2011, Grant), Kyphon/Medtronic (Dissolved 1/2008, Consulting, B).

Deutsch, Harel: Royalties: Pioneer (D); Consulting: Zimmer (B).

Devin, Clinton J.: Consulting and/or teaching arrangements: DePuy (Amount not disclosed, Paid directly to institution/employer); Research Support (Staff and/or Materials): Stryker (E, Paid directly to institution/employer); Relationships Outside the One Year Requirement: DePuy Stryker (Dissolved 8/2011, Research Support: Staff and/or Materials, D).

Deviren, Vedat: Consulting: Stryker (B), Medtronic (B), NuVasive (B), Guidepoint (A); Speaking and/or teaching arrangements: NuVasive (B), Stryker (B); Research Support (Staff and/or Materials): NuVasive (B); Fellowship Support: NuVasive (D, Paid directly to institution/employer), Globus (C, Paid directly to institution/employer).

DeWald, Christopher J.: Stock Ownership: Medtronic (100 shares); Consulting: Zimmer (D), Integra (C); Speaking and/or Teaching Arrangements: NuVasive (B); Trips/Travel: NuVasive (B), Integra (A).

DiAngelo, Denis J.: Stock Ownership: Cagenix (7.26%); Research Support - Investigator Salary: Synthes Spine (C); Research Support - Staff and/or Materials: Synthes Spine (F); Grants: Medtronic (E).

Dimar, John R.: Royalties: Medtronics Sofamor Danek (H); Consulting: Medtronics Sofamor Danek (D); Speaking and/or teaching arrangements: DePuy (Consulting disclosed).

Diflora, Christian P.: Consulting: Allen Medical (A); Speaking and/or teaching arrangements: DePuy Synthes Spine (B); Board of Directors: New England Spine Study Group (President), Spinal Injury Research and Education Foundation (President); Grants: Safe Passage Neuromonitoring (B).

Djurasovic, Mladen: Consulting: Medtronics Sofamor Danek (D).

Dohring, Edward J.: Royalties: Stryker (E, Paid directly to institution/employer); Consulting: Vertifoex (B, Paid directly to institution/employer), Titan Spine (A, Paid directly to institution/employer); Speaking and/or Teaching Arrangements: Stryker (C, Paid directly to institution/employer), Spine Wave (C, Paid directly to institution/employer); Trips/Travel: Medtronic (A, Paid directly to institution/employer); Board of Directors: North American Spine Society (CME Committee Chair, B); Research Support - Staff and/or Materials: Medtronic (B, Paid directly to institution/employer).

Dooley, Zachary A.: Stock Ownership: NuVasive (>1%); Trips/travel: NuVasive (A), Stryker (A), Medtronic (A), DePuy (A).

Dreisinger, Thomas E.: Stock Ownership: Scientific Exercise (>1%); Consulting: Scientific Exercise (Executive Vice President of Outcomes Research, E); Speaking and/or Teaching Arrangements: Various companies (Amount not disclosed); Trips/Travel: Scientific Exercise (Travel Expenses, North American Spine Society (Past Annual Meeting Program Committee Co-chair); Board of Directors: McKenzie Institute International (Board of Trustees, B).

Duggal, Neil: Stock Ownership: Synergy Disc Replacement (Amount not disclosed); Private Investments: VentureMD (Amount not disclosed); Trips/travel: Medtronic Synthes (Travel expenses, Paid directly to institution/employer); Board of Directors: Synergy Disc Replacement (None); Scientific Advisory Board: Synergy Disc Replacement (None).

DuHart, Nadine: Consulting: SI-BONE (Amount not disclosed); Speaking and/or teaching arrangements: SI-BONE (Amount not disclosed), Mazor Robotics (Amount not disclosed); Research Support (Investigator Salary): SI-BONE (B); Research Support (Staff and/or Materials): SI-BONE (C).

Dvorak, Marcel F.: Royalties: Medtronic (G); Consulting: Medtronic (E); Speaking and/or teaching arrangements: Medtronic (Consulting disclosed), Synthes (Amount not disclosed), AOSpine (Amount not disclosed); Trips/travel: Medtronic (Consulting disclosed); Scientific Advisory Board: Medtronic (Consulting disclosed); Endowments: University of British Columbia (E); Research Support (Staff and/or Materials): Medtronic (E); Grants: Medtronic (D), DePuy Spine (G), Rick Hansen Institute (H); Fellowship Support: Medtronic (E), Synthes (E), DePuy (E).

Eastlack, Robert K.: Royalties: Globus Medical (A), NuTech (None); Stock Ownership: NuVasive (>1%), Alphatec (<1%), Diffusion (>1%); Private Investments: Top Doctors Labs (4%), Chief Medical Officer, Spine Innovations (8%, Co-founder), Nocimed (<1%); Consulting: K2M (C), Ulrich (A), NuVasive (B), Aesculap (C), NuTech (None), Lanz (B), Pioneer (B, Paid directly to institution/employer), DePuy Synthes (B), Alphatec (B); Speaking and/or teaching arrangements: Aesculap (B), DePuy Synthes (B), Eli Lilly (B), NuVasive (C); Trips/travel: Alphatec (B), K2M (A), Alphatec (A), Diffusion (A); Board of Directors: San Diego Spine Foundation (None), Top Doctors Labs (Stock ownership), Spine Innovations (None); Scientific Advisory Board: Alphatec (None), Diffusion (None), Top Doctors Labs (None), Aesculap (None); Grants: Integra (D, Paid directly to institution/employer); Fellowship Support: Pioneer (E, Paid directly to institution/employer), NuVasive (E, Paid directly to institution/employer).

Eck, Jason C.: Royalties: Thieme Publishers (A); Research Support (Staff and/or Materials): DePuy (B).

Emerson, Ronald: Consulting: Reach Bionics (Stock ownership).

Emery, Sanford E.: Board of Directors: American Board Orthopaedic Surgery (None), American Orthopaedic Association (None); Grants: Cervical Spine Research Society (None, Paid directly to institution/employer); Fellowship Support: AO Foundation (E, Paid directly to institution/employer).

Errico, Thomas J.: Royalties: K2M (F); Stock Ownership: Fastenetti (F); Consulting and/or teaching arrangements: K2M (B); Board of Directors: Setting Spinalis Straight (None); Research Support (Staff and/or Materials): Paradigm (E, Paid directly to institution/employer); Grants: Fridolin Trust (E, Paid directly to institution/employer); Fellowship Support: AOSpine (E), OREF (E, Paid directly to institution/employer), OMEGA (E, Paid directly to institution/employer).

Espinoza Orias, Alejandro: Research Support (Investigator Salary): NIH NCCAM (D, Paid directly to institution/employer); Relationships Outside the One Year Requirement: National Institutes of Health (Dissolved 9/2011, Grant).

Fehlings, Michael G.: Royalties: DePuy Spine (B); Consulting: BioAxone (A); Fellowship Support: DePuy Spine (E, Paid directly to institution/employer).


Ferril, Jason: Other: DePuy Synthes (A).

Fessler, Richard G.: Royalties: Stryker (B), DePuy (B), Medtronic (B); Private Investments: in Queue Innovations (50%).

Finckenberg, John G.: Royalties: Biomet (F); Board of Directors: North American Spine Society (Advocacy Chair); Research Support - Staff and/or Materials: Biomet (B).

Fish, David E.: Grants: Medtronic (C, Paid directly to institution/employer); Fellowship Support: Boston Scientific (C, Paid directly to institution/employer).

Fisher, Charles G.: Royalties: Medtronic (G); Consulting: Medtronic (E, Paid directly to institution/employer), NuVasive (B); Speaking and/or teaching arrangements: Medtronic (B), AOSpine (B), 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), AOSpine (E, Paid directly to institution/employer).

Fournier, Daryl R.: Private Investments: Proven Care Pathways (20%); Speaking and/or teaching arrangements: AOSpine North America (A); Research Support (Staff and/or Materials): Rick Hansen Foundation (E, Paid directly to institution/employer); Fellowship Support: AOSpine North America (E, Paid directly to institution/employer).

France, John C.: Speaking and/or teaching arrangements: AOSpine (Amount not disclosed); Fellowship Support: AO Foundation (E, Paid directly to institution/employer).

Franzen, Patrick: Consulting: Spineart (B), Medtronic (B); Speaking and/or teaching arrangements: DePuy Spine (B), Trips/travel: Spineart (B).

Fu, Kai-Ming G.: Consulting: Medtronic (B); Speaking and/or teaching arrangements: DePuy (B).

Gaede, Steven E.: Consulting: LDR (B); Research Support (Investigator Salary): LDR (B, Paid directly to institution/employer).

Gallagher, Michelle B.: Other: Titan Spine (Salary, Paid directly to institution/employer).

Geisler, Fred: Royalties: Aesculap (C), Rhauer (B); Stock Ownership: Rhauer (34%, Chief Medical Officer), SurgiTech (2%); Private Investments: Spinal Integration (None); Consulting: Spinal Restoration (B), Spinal Motion (B), Medtronic (A), Mesoblast (B), VertiFlex (B), Aesculap (B), NuVasive (A); Speaking and/or Teaching Arrangements: Aesculap (B); Research Support - Staff and/or Materials: Spinal Motion (A).

Gerling, Michael C.: Consulting: Stryker (B); Speaking and/or teaching arrangements: Stryker (B).

Ghogawala, Zohar: Board of Directors: American Association of Neurological Surgeons - NeuroPoint Alliance (None), Congress of Neurological Surgeons (Executive Committee ), Collaborative Spine Research Foundation (None), 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).

Geurts, Peter: Consulting: Mesoblast (E, Paid directly to institution/employer).
Gillert, Thomas J.: Stock Ownership: Steady State Scanning (2%), MUVE (Amount not disclosed); Scientific Advisory Board: Steady State Imaging (20,000 shares); Other Office: Medical Director (20,000 shares).

Girardi, Federico R.: Royalties: Lanz (B), NuVasive (C), Ortho Development Corp. (C), DePuy Spine (D); Stock Ownership: Small Bone Innovations (1%), Pioneer Surgical Technology (1%), Life Spine (1%), Centinel Spine (1%), Spinal Kinetics (~1%), Paradigm Spine (~1%); Consulting: Lanz (B), Gerson Lehrman Group (A), SpineArt USA (C), Ortho Development Corp. (C), DePuy Spine (B); Speaking and/or teaching arrangements: PharmaWrite (None); Scientific Advisory Board: Scientx USA (None), Spinal Kinetics (None), Centinel Spine (None), SpineArt USA (None), Healthpoint Capital (None), Paradigm Spine (None).

Glaser, John A.: Trips/Travel: DePuy Synthes Spine (A); Grants: Si Bone (D, Paid directly to institution/employer).

Glassman, Steven D.: Royalties: Medtronic (H); Board of Directors: Scoliosiis Research Society (President, D); Scientific Advisory Board: NQOD (None); Research Support (Staff and/or Materials): Norton Healthcare (None, Paid directly to institution/employer); Other: NuVasive (None).

Goel, Vijay K.: Device or Biologic Distributorship (Physician-Owned Distributorship); Turning Point (B), Butterfly (A), EndoSphere (B); Royalties: Turning Point (B), X-Spine (B); Stock Ownership: BONE (33%); Consulting: DePuy (Amount not disclosed), OrthoKinetic Technologies (Amount not disclosed), Scientific Advisory Board: Turning Point (None); Grants: DePuy (E).

Gokaslan, Ziya L.: Stock Ownership: Spinal Kinetics (Amount not disclosed), US Spine (Amount not disclosed); Board of Directors: AOSpine (None); Grants: DePuy Spine (E, Paid directly to institution/employer), AOSpine North America (E, Paid directly to institution/employer), Medtronic (E, Paid directly to institution/employer), NREF (E, Paid directly to institution/employer), Integra Life Sciences (E, Paid directly to institution/employer), K2M (E, Paid directly to institution/employer); Fellowship Support: AOSpine North America (E).

Goldschlager, Tony: Consulting: Mesoblast Limited (Confidential); Research Support (Staff and/or Materials): Mesoblast (A, Paid directly to institution/employer); Fellowship Support: Spine Society of Australasia (C).

Goldstein, Jeffrey A.: Stock Ownership: NuVasive (~1%); Consulting: NuVasive (A), Medtronic (B); Board of Directors: ISASS (None); Research Support (Staff and/or Materials): AvioMed (None, Paid directly to institution/employer); Fellowship Support: OREF (None, Paid directly to institution/employer).


Gottfried, Oren N.: Consulting: Lanz (B); Speaking and/or teaching arrangements: RTI (B).

Grauer, Jonathan N.: Consulting: Stryker (C), Affinergy (None), Alphatec (B), DePuy (None), Harvard Clinical Research Institute (D), Powered Research (None), Bioventus (B), Transgenic (None); Other: Legal consulting (Amount not disclosed).

Graven, Timothy G.: Consulting: SI-BONE (B); Speaking and/or teaching arrangements: DePuy Synthes Spine (A); Relationships Outside the One Year Requirement: X Spine (Dissolved 10/2013, Speaking and/or Teaching Arrangement, None).

Green, Alan A.: Consulting: Canada East Spine Centre (D); Trips/travel: Canada East Spine Centre (B).

Gum, Jeffrey L.: Consulting: Life Spine (B); Fellowship Support: OREF (D, Paid directly to institution/employer).

Gundanna, Mukund I.: Royalties: Integra (C), SpineSmith (C); Stock Ownership: SpineSmith (~4%); Consulting: Integra (C), SI-BONE (D), Tran81 (B), VTI (C); Speaking and/or teaching arrangements: SpineSmith (B); Trips/travel: SpineSmith (B), SI-BONE (B), VTI (A); Research Support (Investigator Salary): Tran81 (B), SI-BONE (B).

Gunnburg, Robert: Private Investments: Spineology (~1%); Consulting: LFC (Amount not disclosed); Scientific Advisory Board: Nanovis (Amount not disclosed).

Gupta, Munish C.: Royalties: DePuy (H); Stock Ownership: Pioneer (18,000 shares), Johnson and Johnson (100 shares), Proctor and Gamble (100 shares), Pfizer (100 shares); Private Investments: Spinal Ventures (2%); Consulting: DePuy (C), Orthofix (B); Speaking and/or teaching arrangements: DePuy (B); Trips/travel: DePuy Spine (B); Board of Directors: FOSA (Treasurer); Scientific Advisory Board: SRS (Committee Member, Board Member); Other Office: FOSA Treasurer (None).

Guyer, Richard D.: Royalties: Alphatec (B); Stock Ownership: Spinal Motion (~1%); Private Investments: Spinal Ventures I and II (~5%); Consulting: DePuy (B); Speaking and/or teaching arrangements: Synthes (B); Scientific Advisory Board: K2M (B), Flexuspine (Stock ownership), Spinal Kinetics (Stock ownership), Nanovis (Stock ownership, B), Crocker Technologies (B), MMex (B); Fellowship Support: OREF (E, Paid directly to institution/employer), AOSpine (E, Paid directly to institution/employer), Medtronic Neurological Division (C, Paid directly to institution/employer).

Haldeman, Scott: Royalties: Multiple publishing companies (B); Stock Ownership: Palladian Health (~1%); Consulting: Palladian Health (F); Speaking and/or teaching arrangements: Multiple organizations (Amount not disclosed); Trips/travel: Multiple meetings (Amount not disclosed), Canadian Memorial Chiropractic College (B); Board of Directors: Canadian Memorial Chiropractic College (B), World Spine Care (None); Scientific Advisory Board: I-Tech Medical (None); Other Office: WFC Research Council (Committee member).

Hansen-Algenstaedt, Nils: Royalties: Stryker (None, Paid directly to institution/employer); Spineart (None, Paid directly to institution/employer); Glubus Medical (None, Paid directly to institution/employer); Consulting: DePuy Synthes (Amount not disclosed), Stryker (Amount not disclosed), Spineart (Amount not disclosed), Aesculap (Amount not disclosed); Speaking and/or teaching arrangements: AOSpine (Amount not disclosed, Paid directly to institution/employer), DePuy Synthes (Amount not disclosed, Paid directly to institution/employer), Spineart (Amount not disclosed, Paid directly to institution/employer), DePuy Synthes (Amount not disclosed, Paid directly to institution/employer), Stryker (C, Paid directly to institution/employer); Trips/travel: AOSpine (C, Paid directly to institution/employer), DePuy Synthes (C, Paid directly to institution/employer), Spineart (C, Paid directly to institution/employer), Stryker (C, Paid directly to institution/employer); Fellowship Support (Staff and/or Materials): DePuy Synthes (B, Paid directly to institution/employer), Spineart (B, Paid directly to institution/employer), Stryker (B, Paid directly to institution/employer).

Harris, Mitchel: Board of Directors: North American Spine Society (Governance Committee Chair).

Hart, Robert A.: Royalties: SeaSpine (E), DePuy (B); Stock Ownership: Spine Connect (~1%); Consulting: DePuy (C), Medtronic (B); Speaking and/or teaching arrangements: DePuy (B); Trips/travel: Globus (A); Other Office: AAOS (Editor), CSRS Editorial Committee (Editorial Board), Spine (Assistant Editorial Board), AAOS (Institutional 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), Scoliosis Research Society (Adult Deformity Committee); Research Support (Staff and/or Materials): DePuy (D, Paid directly to institution/employer), Medtronic (C, Paid directly to institution/employer), Fellowship Support: OREF (None, Paid directly to institution/employer), DePuy Synthes (None, Paid directly to institution/employer), OREF (None, Paid directly to institution/employer), AOSpine (Dissolved 12/2005, Grant, D), DePuy (Dissolved 7/2010, Fellowship Support, E), AOSpine (Dissolved 12/2005, Speaking and/or Teaching Arrangement, B).

Hartl, Roger: Royalties: Lanz (B); Consulting: DePuy Synthes (B); Speaking and/or teaching arrangements: Baxter (A), BrainLAB (A); Board of Directors: AOSpine (B).

Hecht, Andrew: Royalties: Zimmer Spine (None, Paid directly to institution/employer); Consulting: Stryker Spine (None, Medtronic (None), Zimmer Spine (C, Paid directly to institution/employer), Medtronic (None)); Speaking and/or teaching arrangements: Medtronic (None); Scientific Advisory Board: Musculoskeletal Transplant Foundation (None); Grants: OREF Grant (C).

Heggeness, Michael H.: Royalties: Relievant Medsystems (C, Paid directly to institution/employer), K2M (C, Paid directly to institution/employer); Stock Ownership: Relievant Medsystems (~1%).

Herfat, Safa: Research Support (Investigator Salary): Stryker (B, Paid directly to institution/employer); Research Support (Staff and/or Materials): Stryker (B, Paid directly to institution/employer).
<table>
<thead>
<tr>
<th>Name</th>
<th>Role/Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hilibrand, Alan S.</td>
<td>Royalties: Biomet Spine (F), Alphatec Spine (F), Stryker (C), Amedica (C), Aesculap (B); Stock Ownership: Amedica (&lt;1%), Life Spine (&lt;1%), Spinal Ventures (&lt;1%); Private Investments: Benvenuto (Amount not disclosed), NexxGen (Amount not disclosed), Paradigm Spine (Amount not disclosed), Pioneer (&lt;1%), PSD (Amount not disclosed), VertiFlex (Amount not disclosed); Scientific Advisory Board: Amedica (20,000 shares); Other Office: CSRS (Vice President).</td>
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<tr>
<td>Hipp, John A.</td>
<td>Stock Ownership: Medical Metrics (8%), Scientific Founder, Chief Scientist; Other Office: Medical Metrics (Chief Scientist).</td>
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<tr>
<td>Hiramatsu, Jayme R.</td>
<td>Speaking and/or teaching arrangements: DePuy Synthes (A); Trips/travel: DePuy Synthes (A).</td>
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<td>Hisey, Michael S.</td>
<td>Device or Biologic Distributorship (Physician-Owned Distributorship): NTSS (B); Royalties: Zimmer Spine (D), LDR Spine (B); Stock Ownership: Spine Wave (&lt;1%); Private Investments: Medical Venture Fund (&lt;1%); Consulting: Zimmer Spine (B), LDR Spine (D); Board of Directors: Texas Health Presbyterian Hospital of Flower Mound (Investor), SpineMark CRO at TBI (Investor); Scientific Advisory Board: Zimmer Spine (Travel expenses).</td>
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<tr>
<td>Hoffman, Gregory A.</td>
<td>Royalties: LDR Spine (B); Stock Ownership: LDR Spine (&lt;1%); 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 (Medical Advisory); Research Support (Staff and/or Materials): LDR Spine (D); Holman, Paul J.: Consulting: Medtronic Navigation (B, Paid directly to institution/employer); Speaking and/or teaching arrangements: Biomet/LANX (Amount not disclosed, Paid directly to institution/employer), DePuy Synthes (B, Paid directly to institution/employer).</td>
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<tr>
<td>Holt, Timothy A.</td>
<td>Consulting and/or teaching arrangements: SI-BONE (E, Paid directly to institution/employer), Trips/travel: SI-BONE (B).</td>
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<tr>
<td>Hong, Hyun J.</td>
<td>Research Support (Staff and/or Materials): Mesoblast (C), Paid directly to institution/employer; Other: Purdue Pharma (Amount not disclosed, Paid directly to institution/employer), TEVA Branded Pharmaceuticals (Amount not disclosed), St. Jude (Amount not disclosed).</td>
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<tr>
<td>Hostin, Richard A.</td>
<td>Consulting: DePuy Spine (B); Trips/travel: DePuy Spine (B); Research Support (Staff and/or Materials): DePuy Spine (F), Seeger (F), NuVasive (F), DJO (E), K2M (C).</td>
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<tr>
<td>Hsieh, Patrick C.</td>
<td>Consulting: DePuy Synthes Spine (C), Medtronic (C); Speaking and/or Teaching Arrangements: Medtronic Sofamor Danek (C).</td>
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<tr>
<td>Hsu, Wellington K.</td>
<td>Consulting: Stryker (C, Paid directly to institution/employer), Globus (A), AONA (B), Synthes (A), Medtronic (D, Paid directly to institution/employer), Pioneer (D, Paid directly to institution/employer), Bioventus (B), LifeNet (C, Paid directly to institution/employer); 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).</td>
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<tr>
<td>Hu, Serena S.</td>
<td>Royalties: NuVasive (None); Consulting: Medtronic (B); Speaking and/or teaching arrangements: Medtronic (B); Trips/travel: Synthes, Medtronic (B); Board of Directors: ISSLS (None); Fellowship Support: Globus (E, Paid directly to institution/employer), NuVasive (D, Paid directly to institution/employer).</td>
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<tr>
<td>Hughes, Alexander P.</td>
<td>Consulting: NuVasive (B); Fellowship Support: NuVasive (E, Paid directly to institution/employer).</td>
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<tr>
<td>Hunter, William D.</td>
<td>Consulting: CKN Group (Amount not disclosed), Globus Medical (Amount not disclosed), Intelligent Implant System (Amount not disclosed), NuVasive (Amount not disclosed).</td>
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<tr>
<td>Ihlarreborde, Brice</td>
<td>Consulting: Zimmer Spine (B); Speaking and/or teaching arrangements: Implant (B); Scientific Advisory Board: Zimmer Spine (Amount not disclosed).</td>
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<tr>
<td>Inoue, Nozomu</td>
<td>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).</td>
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<tr>
<td>Isaacs, Robert E.</td>
<td>Royalties: NuVasive (A); Stock Ownership: VitalSpine Limited (100%), SafeRay Spine (Owner), SafeWire (33,334 shares), Private Investments: SafeWire (30,000 shares); Consulting: NuVasive (D), Baxano Surgical (B); Trips/travel: Vertebra (A); Board of Directors: SafeWire (Stock ownership disclosed), SafeRay Spine (Director); Research Support (Staff and/or Materials): NuVasive (C, Paid directly to institution/employer).</td>
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<tr>
<td>Jackson, Robert J.</td>
<td>Royalties: Globus Spine (C); Stock Ownership: Medtronic (&lt;1%), LDRH (&lt;1%), Globus Spine (&lt;1%); Consulting: Globus (A); Speaking and/or teaching arrangements: LDR (C); Research Support (Staff and/or Materials): LDR (A, Paid directly to institution/employer).</td>
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<tr>
<td>Jackson, Roger P.</td>
<td>Device or Biologic Distributorship (Physician-Owned Distributorship): Scient’s (D), Medtronic (I), Aesculap (Zimmer), NuVasive (H); Royalties: Biomet (H); Relationships Outside the One Year Requirement: Mizuho OSI (Dissolved 4/2011, Royalties), Alphatec (Dissolved 1/2011, Royalties), DePuy (Dissolved 1/2012, Royalties), Theken (Dissolved 1/2010, Royalties).</td>
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<tr>
<td>Jenis, Louis G.</td>
<td>Royalties: Stryker (D); Consulting: Stryker (B); Speaking and/or Teaching Arrangements: NuVasive (B).</td>
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<tr>
<td>Jenkins, Graham</td>
<td>Research Support (Staff and/or Materials): Mesoblast (F, Paid directly to institution/employer); Grants: Cell Care Australia (D, Paid directly to institution/employer).</td>
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<tr>
<td>Jenkins, Arthur L.</td>
<td>Private Investments: Neurex (50%), Pemavur Holdings (50%).</td>
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<tr>
<td>Johnstone, Brian</td>
<td>Royalties: Osiris Therapeutic (A); Grants: Musculoskeletal Transplant Foundation (F, Paid directly to institution/employer).</td>
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<tr>
<td>Kalantar, S. B.</td>
<td>Speaking and/or Teaching Arrangements: NuVasive (B).</td>
</tr>
<tr>
<td>Kalfas, Iain H.</td>
<td>Royalties: Mako Surgical (C); Speaking and/or Teaching Arrangements: Stryker Spine (B), Synthes (B).</td>
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<tr>
<td>Kamysz, John</td>
<td>Consulting: Stryker Spine (Amount not disclosed); Speaking and/or Teaching Arrangements: Stryker Spine (Amount not disclosed).</td>
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<tr>
<td>Kang, James D.</td>
<td>Research Support (Staff and/or Materials): Stryker (E, Paid directly to institution/employer).</td>
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<tr>
<td>Kanter, Adam S.</td>
<td>Royalties: Lanx (F, Paid directly to institution/employer); Consulting: NuVasive (E, Paid directly to institution/employer); Research Support (Staff and/or Materials): NuVasive (E, Paid directly to institution/employer).</td>
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<tr>
<td>Kaplan, Leon</td>
<td>Consulting: Mazor (B, Paid directly to institution/employer); Speaking and/or teaching arrangements: Medtronic (Travel expenses); Trips/travel: Alphatec (Amount not disclosed); Scientific Advisory Board: The European Spine Research Group (Board member).</td>
</tr>
<tr>
<td>Kaufman, Christopher P.</td>
<td>Stock Ownership: NQOC2 (0.02%); Consulting: Hospital Corporation of America (TriStar Spine Physician Advisory Panel); Speaking and/or Teaching Arrangements: North American Spine Society (Travel expenses); Board of Directors: North American Spine Society (Health Policy Council Director).</td>
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<tr>
<td>Kebaish, Khaled M.</td>
<td>Consulting: DePuy Spine (D, Paid directly to institution/employer); Speaking and/or teaching arrangements: K2M (C, Paid directly to institution/employer); Trips/travel: K2M (B); Scientific Advisory Board: Baxano Surgical (A, Paid directly to institution/employer).</td>
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<tr>
<td>Kerr, Eubulus J.</td>
<td>Royalties: GS Medical (B, Paid directly to institution/employer); Private Investments: Paradigm Spine (&lt;1%); Consulting: GS MEDICAL (Amount not disclosed).</td>
</tr>
<tr>
<td>Khajavi, Kaveh</td>
<td>Speaking and/or teaching arrangements: NuVasive (B); Trips/travel: Georgia Spine &amp; Neurosurgery Center (B).</td>
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<tr>
<td>Khanna, A.</td>
<td>Royalties: Thieme Medical Publishers (B); Private Investments: New Era Orthopaedics (15%), Cortical Concepts (16%), Boss Medical (9%); Consulting: Orthofix Spine (D); 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; Paid directly to institution/employer); Grants: Siemens Healthcare (B, Paid directly to institution/employer).</td>
</tr>
<tr>
<td>Kieser, P.D.</td>
<td>Stock Ownership: Ethics Technologies (&lt;1%).</td>
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<tr>
<td>Kim, Choll W.</td>
<td>Royalties: Globus (C); Stock Ownership: SpineView (&lt;1%); Consulting: Medtronic (None), Globus (None), Synthes (None), Joimax (None); Speaking and/or Teaching Arrangements: Medtronic (None); Trips/Travel: Stryker (None), Globus (Travel expenses); Board of Directors: MISMIS (Executive Director); Scientific Advisory Board: Globus (Consulting disclosed).</td>
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</tbody>
</table>

Note: The table above contains Disclosures Index information for various individuals related to the NASS 29th Annual Meeting.
Kim, David H.: Consulting: Pioneer (B); Scientific Advisory Board: New England Baptist Hospital (None); Research Support (Staff and/or Materials): New England Baptist Hospital (D).

Kim, Han Joo: Royalties: World Scientific Publishers (None); Speaking and/or teaching arrangements: K2M (A); Scientific Advisory Board: Spine Innovation Advisory Board, Medtronic (B).

Kim, Kee D.: Royalties: LDR (B), Globus (B), Spinal USA (B); Consulting: Globus (B); Speaking and/or teaching arrangements: AOSpine (B); Board of Directors: Molecular Matrix (Stock ownership); Research Support (Staff and/or Materials): Globus (C, Paid directly to institution/employer); Fellowship Support: Stryker (None, Paid directly to institution/employer).

Kim, Kee: Royalties: LDR (C), Spinal USA (E), Globus (B); Consulting: Stryker (C), Globus (B), LDR Spine (B); Board of Directors: Molecular Matrix (Stock ownership); Research Support (Staff and/or Materials): Globus (Facility and material support); Grants: Asubio (C, Paid directly to institution/employer), Mesoblast (D, Paid directly to institution/employer), Coviden (C, Paid directly to institution/employer), Medtronic (C, Paid directly to institution/employer), LDR (D, Paid directly to institution/employer).

Kleck, Christopher: Trips/travel: Orthofx (B); Research Support (Staff and/or Materials): Medtronic Sofamor-Danek (E, Paid directly to institution/employer), Aesculap (H, Paid directly to institution/employer), Synthes (E, Paid directly to institution/employer), VerteFix (G, Paid directly to institution/employer), Medircia (B, Paid directly to institution/employer), Synthes (E, Paid directly to institution/employer), Medtronic Sofamor-Danek (D, Paid directly to institution/employer), SI-BONE (D, Paid directly to institution/employer); Fellowship Support: OREF (D, Paid directly to institution/employer).

Klineberg, Eric O.: Speaking and/or teaching arrangements: DePuy Synthes Spine (D), AOSpine (B); Grants: AOSpine (D, Paid directly to institution/employer); Fellowship Support: OREF (D, Paid directly to institution/employer); Synthes (E, Paid directly to institution/employer).

Knight, Tyler: Consulting: SI-BONE (Amount not disclosed, Paid directly to institution/employer).

Kondrashov, Dimitriy G.: Consulting: Spineart (C); Trips/travel: SI-BONE (C); Research Support (Staff and/or Materials): AOSpine (E, Paid directly to institution/employer); Grants: DePuy Spine (D, Paid directly to institution/employer).

Kopjar, Branko: Consulting: Smith and Nephew (F), Cerapedics (C).

Koski, Tyler R.: Consulting: NuVasive (B, MB innovations (None), Spine Wave (None), Globus (B); Speaking and/or teaching arrangements: Medtronic (Amount not disclosed); Trips/travel: Medtronic (B), Globus (B), NuVasive (A); Scientific Advisory Board: SpineCMC (None); Research Support (Staff and/or Materials): Medtronic (B, Paid directly to institution/employer); Grants: Medtronic (C, Paid directly to institution/employer).

Kucharzyk, Donald: Royalties: Precision Spine (B); Consulting: NuVasive (D), Spinal USA (D); Speaking and/or teaching arrangements: NuVasive (C); Trips/travel: Precision Spine (Amount not disclosed); Research Support (Investigator Salary): NuVasive (B).

Kurtz, Steven M.: Consulting: Exponent (Various companies, Paid directly to institution/employer); Grants: Medtronic (D, Paid directly to institution/employer); Other: Exponent (Salary).

Kwon, Brian K.: Scientific Advisory Board: Acorda Therapeutics (C); Fellowship Support: Medtronic (D, Paid directly to institution/employer), DePuy Synthes (D, Paid directly to institution/employer).

La Marca, Frank: Royalties: Globus Medical (C); Consulting: Globus (C); Grants: NIH (E, Paid directly to institution/employer).

Lafage, Virginie: Stock Ownership: Nemaris (20%); Consulting: Medtronic (A); Speaking and/or teaching arrangements: Medtronic (Amount not disclosed), DePuy Spine (Amount not disclosed), Globus (Amount not disclosed); Board of Directors: Nemaris (None); Other Office: International Spine Study Group (Executive Committee); Grants: Scoliosis Research Society (C, Paid directly to institution/employer).


Lau, Edmund: Consulting: Exponent (Various companies, Paid directly to institution/employer); Grants: Medtronic (D, Paid directly to institution/employer).

Laursen, Carl: Royalties: DePuy Spine (B, Paid directly to institution/employer), Amedica (B, Paid directly to institution/employer); Stock Ownership: Spinal Kinetics (Amount not disclosed), Amedica (Amount not disclosed), Spinal Elements (Amount not disclosed), Baxano (Amount not disclosed), Pioneer (Amount not disclosed), Replication Medical (Amount not disclosed), Alphatec (Amount not disclosed); Consulting: DePuy (B, Paid directly to institution/employer), Medtronic (B, Paid directly to institution/employer), Biomet (B, Paid directly to institution/employer), Alphatec (B, Paid directly to institution/employer); Speaking and/or Teaching Arrangements: Spinal Kinetics (A); Board of Directors: Baxano (B); Scientific Advisory Board: Replication Medical (B); Relationships Outside the One-Year Requirement: DePuy Spine (Dissolved 1/2001, Royalties, B).

Lawrence, Brandon D.: Speaking and/or teaching arrangements: AOSpine North America (A); Grants: AOSpine North America (D); Fellowship Support: AOSpine North America (E).

Le Huec, Jean-Charles: Speaking and/or teaching arrangements: Medtronic (B, Paid directly to institution/employer), SMB (B, Paid directly to institution/employer), AOSpine (B, Paid directly to institution/employer); Trips/travel: Medtronic (C, Paid directly to institution/employer); Grants: Medtronic (B, Paid directly to institution/employer).

Ledonio, Charles Gerald T.: 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 Direct Research Grant (B, Paid directly to institution/employer).

Lee, Yu-Po: Consulting: DePuy (C), Stryker (B); Fellowship Support: Synthes (E, Paid directly to institution/employer).

Lehman, Ronald A.: Grants: DARPA (G, Paid directly to institution/employer), Centinel Spine (E, Paid directly to institution/employer), DePuy Synthes Spine (C, Paid directly to institution/employer), DMRDP (H, Paid directly to institution/employer).

Lenke, Lawrence G.: Royalties: Medtronic (I, Quality Medical Publishing (B); Consulting: Medtronic (C), DePuy Synthes Spine (C), K2M (B); 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); 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 (B, 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.: Consulting: Medtronic (D); Speaking and/or Teaching Arrangements: Stryker (C), Medtronic (C); Trips/travel: Stryker (B); Fellowship Support: Medtronic (D, Paid directly to institution/employer), Johnson & Johnson (D, Paid directly to institution/employer).

Lieberman, Isador H.: Device or Biologic Distributorship (Physician-Owned Distributorship): North Texas Surgical Services (C); Royalties: Stryker (B), AxioMed Spine Corp (B); Stock Ownership: Merloth Orthopedix (32%), Zygia (1%), AxioMed Spine Corp (1%), Mazor Surgical (1%), Crosstrees Medical (1%), PearlDiver (1%); Medical Compression Systems (1%); Private Investments: AxioMed Spine Corp (1%), Bionik Laboratories (1%); Consulting: Mazor Surgical (C), Baxano (B), AxioMed (C); Speaking and/or teaching arrangements: Lilly Pharma (B); Board of Directors: Merloth Orthopedix (Founder, Inventor, 32%).

Lindley, Emily M.: Grants: Synthes (D, Paid directly to institution/employer), SI-BONE (D, Paid directly to institution/employer).

Lindley, James G.: Royalties: Globus Medical (D); Consulting: Spine Wave (B); Scientific Advisory Board: Globus Medical (None).

Lindsey, Derek R.: Stock Ownership: SI-BONE (85,000 shares); Other Office: SI-BONE (Salary).

Line, Breton: Consulting: International Spine Study Group Foundation (C); Trips/travel: International Spine Study Group Foundation (B).

Little, Kenneth M.: Consulting: Biomet (None); Trips/travel: Zimmer (A).
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<tr>
<th>Name</th>
<th>Company/Position</th>
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<tr>
<td>Manson, Neil A.</td>
<td>Royalties: MMDS Medical (A, Paid directly to institution/employer)</td>
<td>Consulting: DePuy Spine (D); Speaking and/or teaching arrangements: DePuy Spine (C), K2M (C); Board of Directors: Spine Search (None); Scientific Advisory Board: DePuy Spine (None); Grants: DePuy Spine (D), AOSpine (D), John and Marcella Fox Fund (B), OREF (C).</td>
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<tr>
<td>Royalties: Mac Millan, Michael:</td>
<td>Stock Ownership: NewVert (&lt;1%); Consulting: Foundation for Osteopathic Medicine Adjunct Clinical Professor, Lincoln Memorial University (Debusk College of Osteopathic Medicine)</td>
<td>Speaking and/or teaching arrangements: ETSU (Assistant Clinical Professor), South College in Knoxville (Adjunct Clinical Professor), Trips/travel: Alphatec (Amount not disclosed, Paid directly to institution/employer), LANX (Amount not disclosed, Paid directly to institution/employer), Scientific Advisory Board: LANX (Amount not disclosed, Paid directly to institution/employer), Ortho Kinematics (E, Paid directly to institution/employer); Endowments: LANX (None, Paid directly to institution/employer), Alphatec (B, Paid directly to institution/employer); Research Support (Investigator Salary): Exactech (None, Paid directly to institution/employer), Pioneer Surgical (B, Paid directly to institution/employer), Alphatec (None, Paid directly to institution/employer).</td>
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<td>Royalties: Alphatec (B, Paid directly to institution/employer), Alphatec (Amount not disclosed); Stock Ownership: SurgiTech (None, Paid directly to institution/employer), Chart (None); Private Investments: SurgiTech (None, Paid directly to institution/employer), Chart (None, Paid directly to institution/employer); Consulting: Ortho Kinematics (E, Paid directly to institution/employer), Alphatec (D), LANX (Amount not disclosed, Paid directly to institution/employer); Speaking and/or teaching arrangements: ETSU (Assistant Clinical Professor), South College in Knoxville (Adjunct Clinical Professor), Trips/travel: Alphatec (Amount not disclosed, Paid directly to institution/employer), LANX (Amount not disclosed, Paid directly to institution/employer), Scientific Advisory Board: LANX (Amount not disclosed, Paid directly to institution/employer), Ortho Kinematics (E, Paid directly to institution/employer); Endowments: LANX (None, Paid directly to institution/employer), Alphatec (B, Paid directly to institution/employer); Research Support (Investigator Salary): Exactech (None, Paid directly to institution/employer), Pioneer Surgical (B, Paid directly to institution/employer), Alphatec (None, Paid directly to institution/employer).</td>
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<td>Lotz, Jeffrey C.:</td>
<td>Royalties: University of California (B); Stock Ownership: Spinal Restoration (1%), Scientific Advisory Board Member, Relievant (3%), Spinal Motion (1%), IOST Technologies (1%), Scientific Advisory Board, Nocimed (5%, Founder, Scientific Advisor), Simpircia (1%, Scientific Advisor), Aleeva Medical (1%, Scientific Advisor), SMC Biotech (1%, Scientific Advisor); Private Investments: Nocimed (1%); Consulting: Applied Biomechanics (Amount not disclosed); Board of Directors: Nocimed (Stock ownership disclosed); Scientific Advisory Board: Spinal Restoration (Stock ownership), Relievant (Stock ownership disclosed), SMC Biotech (Stock ownership disclosed); Grants: Relievant (E, Paid directly to institution/employer), Orthofix (E, Paid directly to institution/employer).</td>
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<td>Lorio, Morgan R.:</td>
<td>Royalties: Alphatec (B, Paid directly to institution/employer), Alphatec (Amount not disclosed); Stock Ownership: SurgiTech (None, Paid directly to institution/employer), Chart (None); Private Investments: SurgiTech (None, Paid directly to institution/employer), Chart (None, Paid directly to institution/employer); Consulting: Ortho Kinematics (E, Paid directly to institution/employer), Alphatec (D), LANX (Amount not disclosed, Paid directly to institution/employer); Speaking and/or teaching arrangements: ETSU (Assistant Clinical Professor), South College in Knoxville (Adjunct Clinical Professor), Trips/travel: Alphatec (Amount not disclosed, Paid directly to institution/employer), LANX (Amount not disclosed, Paid directly to institution/employer), Scientific Advisory Board: LANX (Amount not disclosed, Paid directly to institution/employer), Ortho Kinematics (E, Paid directly to institution/employer); Endowments: LANX (None, Paid directly to institution/employer), Alphatec (B, Paid directly to institution/employer); Research Support (Investigator Salary): Exactech (None, Paid directly to institution/employer), Pioneer Surgical (B, Paid directly to institution/employer), Alphatec (None, Paid directly to institution/employer).</td>
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<td>Mack, Charles A.:</td>
<td>Royalties: MMDS Medical (A, Paid directly to institution/employer); Stock Ownership: Spinal Restoration (1%), Scientific Advisory Board Member, Relievant (3%), Spinal Motion (1%), IOST Technologies (1%), Scientific Advisory Board, Nocimed (5%, Founder, Scientific Advisor), Simpircia (1%, Scientific Advisor), Aleeva Medical (1%, Scientific Advisor), SMC Biotech (1%, Scientific Advisor); Private Investments: Nocimed (1%); Consulting: Applied Biomechanics (Amount not disclosed); Board of Directors: Nocimed (Stock ownership disclosed); Scientific Advisory Board: Spinal Restoration (Stock ownership), Relievant (Stock ownership disclosed), SMC Biotech (Stock ownership disclosed); Grants: Relievant (E, Paid directly to institution/employer), Orthofix (E, Paid directly to institution/employer).</td>
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<td>Mac Millan, Michael:</td>
<td>Consulting: Medtronic (B, Paid directly to institution/employer), Scientific Advisory Board: Surgical Advisory Board (None, Paid directly to institution/employer).</td>
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<td>Mac-Thiong, Jean-Marc:</td>
<td>Royalties: MMDS Medical (A, Paid directly to institution/employer); Stock Ownership: SpinoLogics (30%); Private Investments: SpinoLogics (30%); Consulting: Medtronic (E, Paid directly to institution/employer); Speaking and/or teaching arrangements: SpinoLogics (Co-founder); Trips/travel: SpinoLogics (Co-founder); Board of Directors: SpinoLogics (30%); Scientific Advisory Board: SpinoLogics (30%); Other Office: SpinoLogics (30%); Endowments: Medtronic (G, Paid directly to institution/employer); Grants: DePuy Spine (C, Paid directly to institution/employer); Fellowship Support: Medtronic Canada (D, Paid directly to institution/employer).</td>
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<td>Malham, Gregory M.:</td>
<td>Grants: Medtronic (C), Stryker (C), NuVasive (C).</td>
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<td>Mansell, Neil A.:</td>
<td>Speaking and/or teaching arrangements: Medtronic (B); Scientific Advisory Board: Medtronic (B); Research Support (Staff and/or Materials): Medtronic (E).</td>
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<td>Marco, Rex A.:</td>
<td>Speaking and/or Teaching Arrangements: DePuy Synthes (C); Scientific Advisory Board: Aesculap (B); Fellowship Support: Globus (E, Paid directly to institution/employer).</td>
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<td>Massicotte, Eric M.:</td>
<td>Consulting: Globalview Point (Board of Advisors, Paid directly to institution/employer), Speaking and/or teaching arrangements: AOSpine North America (Travel expenses); Scientific Advisory Board: 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).</td>
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<td>Matsuyama, Yukihiro:</td>
<td>Consulting: Seikagaku (B, Paid directly to institution/employer); Speaking and/or teaching arrangements: Seikagaku (A, Paid directly to institution/employer); Trips/travel: Seikagaku (B, Paid directly to institution/employer).</td>
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<td>Matz, Paul G.:</td>
<td>Speaking and/or Teaching Arrangements: AOSpine North America (B).</td>
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<td>Mayer, E. Kano A.:</td>
<td>Speaking and/or Teaching Arrangements: North American Spine Society (Travel expenses); Trips/Travel: North American Spine Society (B), AANEM (B).</td>
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<td>Mayer, John M.:</td>
<td>Consulting: Palladian Muscular Skeletal Health (B), Vert Mooney Research Foundation (B); Speaking and/or teaching arrangements: Sarasota Memorial Hospital (A); Scientific Advisory Board: Palladian Muscular Skeletal Health (Consulting disclosed); Research Support (Investigator Salary): FEMA (C, Paid directly to institution/employer), DOD (D, Paid directly to institution/employer); Research Support (Staff and/or Materials): DOD (F, Paid directly to institution/employer), FEMA (E, Paid directly to institution/employer); Grants: FEMA (Research support disclosed), DOD (Research support disclosed).</td>
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<td>McCarthy, Ian:</td>
<td>Trips/travel: DePuy Spine (A); Grants: NuVasive (F, Paid directly to institution/employer), NIH-AHRQ (F, Paid directly to institution/employer), Bayer Heart and Vascular Institute, Cardiovascular Research Review Committee (E, Paid directly to institution/employer), Bayer Health Care System Foundation, Seeger Endowment Fund (F, Paid directly to institution/employer).</td>
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<td>McClean, Robert T.:</td>
<td>Device or Biologic Distributorship (Physician-Owned Distributorship): PDH Holdings (Amount not disclosed); Stock Ownership: Biominal Holdings (1%); Private Investments: Total Connect Spine (33%), Anthem Orthopaedics VAN (25%), PDH Holdings (12%); Consulting: Advanced Biologics Corporation (None), Skeletal Kinetics (None); Board of Directors: Northern California Chapter, Western Orthopaedic Association (None), PDH Holdings (None), Anthem Orthopaedics VAN (None); Scientific Advisory Board: Anthem Orthopaedics VAN (None); Research Support (Staff and/or Materials): NuVasive (B, Paid directly to institution/employer).</td>
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<td>McConnell, Jeffrey R.:</td>
<td>Royalties: Globus Medical (C); Stock Ownership: Globus Medical (1%), Vertical Spine (1%); Consulting: Globus Medical (D), Vertical Spine (A), Lanx (A); Speaking and/or teaching arrangements: Global Medical (B); Trips/travel: Globus Medical (A).</td>
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<td>McGirt, Matthew J.:</td>
<td>Consulting: Codman (Editorial Support); Research Support (Staff and/or Materials): Stryker Spine (E, Paid directly to institution/employer), DePuy (E, Paid directly to institution/employer).</td>
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<td>Mckeever, David J.:</td>
<td>Stock Ownership: Globus Medical (1%); Other Office: Globus Medical (Salary).</td>
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<td>McKiernan, Fergus E.:</td>
<td>Research Support - Staff and/or Materials: OPKO Health (E, Paid directly to institution/employer); Other: Alexion (E, Paid directly to institution/employer).</td>
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<td>Mesfin, Addisu:</td>
<td>Fellowship Support: AOSSpine (E, Paid directly to institution/employer).</td>
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<td>Michael, Mark M.:</td>
<td>Consulting: Biomet (D), DePuy Synthes (B).</td>
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<td>Mitchell, William:</td>
<td>Private Investments: South Jersey CyberKnife (1%); Speaking and/or Teaching Arrangements: ISIS (Socioeconomic Vice-Chair, B); Trips/Travel: North American Spine Society (B); Board of Directors: North American Spine Society (Section Development Chair).</td>
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<td>Moal, Bertrand:</td>
<td>Research Support (Investigator Salary): Nemaris (C, Paid directly to institution/employer); Other: Fondation ParisTech (C, Paid directly to institution/employer).</td>
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<td>Moen, Erik P.:</td>
<td>Consulting: Retul (None); Speaking and/or Teaching Arrangements: BikePT (B, Paid directly to institution/employer); Other Office: American Physical Therapy Association (B, Paid directly to institution/employer).</td>
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<td>Moldavsky, Mark:</td>
<td>Other Office: Globus Medical (Salary).</td>
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<td>Moojen, Wouter A.:</td>
<td>Research Support (Staff and/or Materials): Paradigm Spine (None, Paid directly to institution/employer).</td>
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<td>Moorjani, Wouter A.:</td>
<td>Research Support (Staff and/or Materials): Paradigm Spine (None, Paid directly to institution/employer).</td>
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<td>Moss, Isaac:</td>
<td>Consulting: Spineart (B); Speaking and/or teaching arrangements: NuVasive (B); Trips/travel: NuVasive (B).</td>
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Mroz, Thomas E.: Stock Ownership: PearlDiver (<1%); Consulting: CeramTec (None); Speaking and/or teaching arrangements: AOSpine (B); Board of Directors: AOSpine North America (Board member), North American Spine Society (Education Council Director); Fellowship Support: AOSpine (E, Paid directly to institution/employer).


Mundis, Gregory M.: Royalties: NuVasive (B), K2M (None); Consulting: NuVasive (D), K2M (B); Speaking and/or teaching arrangements: NuVasive (C); Trips/travel: NuVasive (B); Other Office: Society of Lateral Access Surgery (None); Research Support (Staff and/or Materials): NuVasive (E, Paid directly to institution/employer); Fellowship Support: NuVasive (E, Paid directly to institution/employer), OREF (E, Paid directly to institution/employer).

Myer, Jacqueline: Other Office: Globus Medical (Salary).

Noo nan, Vanessa K.: Other Office: Rick Hansen Institute (Director of Research and Best Practice Implementation); Research Support (Investigator Salary): Rick Hansen Institute (Salary); Research Support (Staff and/or Materials): Rick Hansen Institute (C); Grants: Rick Hansen Institute (F).

Noriega, David C.: Consulting: Spineart (C, Paid directly to institution/employer), Vexim (C, Paid directly to institution/employer).

Nottmeier, Eric W.: Royalties: Globus (B, Paid directly to institution/employer); Consulting: Medtronic Navigation (B); Speaking and/or Teaching Arrangements: DePuy Synthes (B), Medtronic (C); Scientific Advisory Board: K2M (B); Relationships Outside the One-Year Requirement: BrainLAB (Dissolved 1/2009, Consulting, B), Medtronic Navigation (Dissolved 5/2011, Consulting, B).


Nunley, Pierce D.: Royalties: Osprey Biomedical (B), LDR Spine (D), K2M (C); Stock Ownership: Amedica (<1%), Paradigm Spine (<1%), Spineology (<1%); Speaking and/or teaching arrangements: K2M (E); Scientific Advisory Board: K2M (B).

Obeid, Ibrahim: 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); Trips/Travel: ISIS (Socioeconomic Council Vice-chair, B), AAPMR (Program Planning Committee); Board of Directors: North American Spine Society (Education Publishing Chair); Other Office: ISIS (Trips/travel disclosed), AAPMR (Trips/travel disclosed).

O'Brien, Joseph R.: Royalties: NuVasive (B), Globus (None); Stock Ownership: Spincity (<1%); Private Investments: Spincity (<1%); Consulting: Globus (D), NuVasive (D), Stryker (C), Relievant (E); Trips/travel: Relievant (B); Research Support (Staff and/or Materials): Globus (B), NuVasive (B); Grants: Stryker (B, Paid directly to institution/employer).

O'Brien, Michael F.: Royalties: DePuy Spine (G); Consulting: DePuy Spine (D); Trips/travel: DePuy Spine (B); Research Support (Staff and/or Materials): NuVasive (F, Paid directly to institution/employer), Seeger (F, Paid directly to institution/employer), DJO (G, Paid directly to institution/employer), DePuy Spine (F, Paid directly to institution/employer), K2M (C, Paid directly to institution/employer).

Ogon, Michael: Consulting: DePuy Synthes (Amount not disclosed), Medtronic (Amount not disclosed); Speaking and/or teaching arrangements: AOSpine (Amount not disclosed); Board of Directors: ISASS (Travel expenses).

Ohnmues s, Donna D.: Royalties: QMP (A, Paid directly to institution/employer); Other Office: International Society for the Study of the Lumbar Spine (Strategic Planning Group); Research Support (Staff and/or Materials): Spinal Motion (B, Paid directly to institution/employer), Milestone CRD (A, Paid directly to institution/employer), Tenon Medical (C, Paid directly to institution/employer), X Spine (B, Paid directly to institution/employer), Exactech (B, Paid directly to institution/employer), Mazor Robotics (C, Paid directly to institution/employer); Grants: OREF (C, Paid directly to institution/employer), AOSpine (D, Paid directly to institution/employer), AF Cell (A, Paid directly to institution/employer), Medtronic Neuro (C, Paid directly to institution/employer); Fellowship Support: OREF (D, Paid directly to institution/employer), Medtronic Neurological (C, Paid directly to institution/employer), Baxano (B, Paid directly to institution/employer), NuVasive (B, Paid directly to institution/employer).

Okonkwo, David O.: Royalties: Lax (F, Paid directly to institution/employer); Grants: Medtronic (B, Paid directly to institution/employer).

Ong, Kevin L.: Grants: Medtronic (C, Paid directly to institution/employer), Paradigm Spine (B, Paid directly to institution/employer).

Ordway, Nathaniel R.: Grants: DePuy Spine (C, Paid directly to institution/employer), Orthoboros (C, Paid directly to institution/employer).

Palumbo, Mark J.: Consulting: Stryker (C).

Parent, Stefan: Stock Ownership: Spinologics (30%); Private Investments: Spinologics (30%); Consulting: Medtronic (B); Speaking and/or teaching arrangements: Medtronic (B); Trips/travel: Medtronic (B), EOS Imaging (A); Board of Directors: Scoliosis Research Society (A); Endowments: DePuy Spine (Endowed Chair, Paid directly to institution/employer); Research Support (Staff and/or Materials): DePuy Spine (C, Paid directly to institution/employer); Fellowship Support: DePuy Spine (D, Paid directly to institution/employer), Medtronic (D, Paid directly to institution/employer).

Park, Paul: Royalties: Globus Medical (None); Consulting: Globus Medical (B), Medtronic (B); Speaking and/or teaching arrangements: Globus Medical (C), DePuy Synthes (B), Scientific Advisory Board: Neurastem (A); Grants: NIH (B, Paid directly to institution/employer), Blue Cross Blue Shield of Michigan Foundation (E, Paid directly to institution/employer).

Paterno, Alpesh A.: Royalties: Amedica (B); Stock Ownership: Amedica (<1%), Cytonetics (<1%), Nocimed (<1%), Vitalis (<1%); Consulting: Amedica (B), Stryker (B), Biomet (None), DePuy (B); Board of Directors: Lumbar Spine Research Society (None), Cervical Spine Research Society (None), Indo-American Spine Alliance (None); Fellowship Support: OREF (D), Omega (B); Other: Amedica (Stock ownership disclosed).

Pavel, Chetan K.: Royalties: Globus (B); Consulting: Stryker (D); Trips/Travel: NASS (A); Scientific Advisory Board: Medtronic Navigation (B).

Patel, Nilesh M.: Royalties: Orthofx (B, Paid directly to institution/employer); Consulting: IntegrA (D), Altus (B, Paid directly to institution/employer), Spinal USA (B, Paid directly to institution/employer); Speaking and/or teaching arrangements: Orthofx (C, Paid directly to institution/employer); Board of Directors: Osseon (Stock ownership).

Patel, Vikas V.: Royalties: Aesculap (B, Paid directly to institution/employer), Biomet (B, Paid directly to institution/employer); Private Investments: Cerapedics (<1%); Consulting: Aesculap (B), SI-BONE (B, Paid directly to institution/employer), Baxter Healthcare (B), Lanx (B, Paid directly to institution/employer); Speaking and/or teaching arrangements: Baxter Healthcare (B); Scientific Advisory Board: Aesculap (B, Paid directly to institution/employer), Lanx (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 (D, Paid directly to institution/employer); Fellowship Support: OREF (D, Paid directly to institution/employer).

Patwardhan, Avinash G.: Stock Ownership: Spinal Kinetics (<1%); Speaking and/or teaching arrangements: Spinal Kinetics (B); Trips/travel: Spinal Kinetics (B); Scientific Advisory Board: Ortho Kinematics (Stock ownership), AxioMed (Stock ownership), Spinal Kinetics (Stock ownership); Research Support (Staff and/or Materials): Department of Veterans Affairs (F, Paid directly to institution/employer).

Payares, Monica: Grants: Medtronic (B, Paid directly to institution/employer).

Pekmezci, Murat: Grants: Orthofx (C, Paid directly to institution/employer), Stryker (E, Paid directly to institution/employer).

Pelletier, Matthew H.: Trips/travel: invibio (B).

Pellise, Ferran: Consulting: DePuy Spine J&J (C), Biomet (B); Board of Directors: European Spine Journal (None), EuroSpine, The Spine Society of Europe (None); Grants: DePuy Spine Synthes (F, European Spine Study Group), K2M (D, Complex Spine Study Group).

Perez-Gue Veso, Francisco J.: Speaking and/or teaching arrangements: k2M (Amount not disclosed), DePuy (Amount not disclosed); Research Support (Investigator Salary): K2M (A, Paid directly to institution/employer).
Peterson, Mark D.: Royalties: NuVasive (D); Stock Ownership: NuVasive (<1%); Consulting: NuVasive (D); Board of Directors: Society of Lateral Access Spine Surgery (None); Research Support (Staff and/or Materials): NuVasive (B, Paid directly to institution/employer).

Pettine, Kenneth A.: Stock Ownership: Mesoblast (<1%); Consulting: Paradigm (B); Speaking and/or teaching arrangements: Spine Smith/Celling Biosciences (Travel expenses); Trips/travel: Spinal Motion (A); Research Support (Staff and/or Materials): Isto (B), Globus (B), Paradigm (B), Spinal Motion (B), SpineSmith/Celling Biosciences (B).

Peul, Wilco C.: Speaking and/or teaching arrangements: B. Braun Aesculap (B, Paid directly to institution/employer); Research Support (Investigator Salary): Medtronic (F, Paid directly to institution/employer). B. Braun Aesculap (F, Paid directly to institution/employer), Paradigm Spine (F, Paid directly to institution/employer), National Health Organization (F, Paid directly to institution/employer); Grants: B. Braun Aesculap (F, Paid directly to institution/employer), National Health Organization (F, Paid directly to institution/employer), Medtronic (F, Paid directly to institution/employer), Paradigm Spine (F, Paid directly to institution/employer).

Phillips, Frank M.: Royalties: NuVasive (F), Stryker (B), Kyphon (C), DePuy Spine (E); Stock Ownership: NuVasive (<1%), Theracell (©1%), Vital 5 (<1%), Flexuspine (<1%), AsioMed (<1%), CrossTrees (<1%), Spinal Motion (<1%), Spinal Kinetics (<1%), Facet Solutions (<1%), SI-BONE (<1%), Borrovo (2%), Pearl Diver (2%); Private Investments: BioAssets (<1%); Consulting: Kyphon (B); Board of Directors: Vital 5 (Stock ownership disclosed), Theracell (Stock ownership disclosed).

Pimenta, Luiz H.: Royalties: NuVasive (G); Consulting: NuVasive (Amount not disclosed), Zyga Tech (Amount not disclosed), MDT Biotec (Amount not disclosed); Board of Directors: ISASS (None); Scientific Advisory Board: LASAS (Scientific Reviewer).

Placie, Rick J.: Trips/Travel: Globus Spine (B); Research Support - Staff and/or Materials: Globus Spine (A).

Pointillart, Vincent: Device or Biologic Distributorship (Physician-Owned Distributorship): Alphatec (C); Royalties: Medtronic (None); Consulting: Stryker (A); Trips/travel: Scientix (None).

Polly, David W.: Trips/travel: Scoliosis Research Society (B); Board of Directors: Scoliosis Research Society (None); Grants: Department of Defense (G, Paid directly to institution/employer), OREF (F, Paid directly to institution/employer), Pediatric Spine and Chest Wall Foundation (C, Paid directly to institution/employer), Minnesota Medical Foundation (E, Paid directly to institution/employer).

Potts, Eric A.: Royalties: Medtronic (F); Stock Ownership: Lanz (Dissolved 12/2013); Private Investments: Remedy Pharmaceuticals (<1%); Consulting: LANKX (None), Medtronic (B); Board of Directors: Goodman Campbell Brain and Spine (B).

Prather, Heidi: Board of Directors: North American Spine Society (1st Vice President); Other Office: American Academy of Physical Medicine and Rehabilitation (B, Paid directly to institution/employer).


Protopsaltis, Themistocles S.: Consulting: Globus (B); Speaking and/or teaching arrangements: K2M (B), Alphatec (A), DePuy (B).

Puryear, Aki: Consulting: Medicare (A), K2M (A); Speaking and/or teaching arrangements: Medirec (B), K2M (B), DePuy (B).

Quraishi, Nasir A.: Speaking and/or teaching arrangements: Medtronic (B, Paid directly to institution/employer); Trips/travel: Medtronic (B), MBA (A), AOSpine (A), Baxter (A), Alphatec (B); Research Support (Investigator Salary): Alphatec (E, Paid directly to institution/employer); Research Support (Staff and/or Materials): Medtronic (B, Paid directly to institution/employer); Grants: ESPRC (F, Paid directly to institution/employer); Fellowship Support: Alphatec (D, Paid directly to institution/employer).

Qureshi, Sheraz 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), North American Spine Society (Evidence Based Guidelines Committee), North American Spine Society (Evidence Based Guidelines Committee).


Rampersaud, Raja V.: Consulting: Medtronic Spine (E); Scientific Advisory Board: Surgical Navigation Technologies (B).

Ratliff, John: Royalties: Stryker Spine (B); Consulting: Stryker Spine (D); Scientific Advisory Board: NeuroPoint Alliance N2QOD (Scientific Advisory Board); Other Office: AANS/CNS (RUC Advisor); Research Support (Staff and/or Materials): Orthopedic Research and Education Foundation (E, Paid directly to institution/employer); Grants: OREF (E, Paid directly to institution/employer).

Reitman, Charles A.: Trips/Travel: North American Spine Society (Travel expenses), AAS (Evidence Based Committee); Board of Directors: North American Spine Society (Evidence Compilation and Analysis Chair); Scientific Advisory Board: Clinical Orthopedics And Related Research (Deputy Editor, B, Paid directly to institution/employer).

Resnick, Daniel K.: Consulting: Astera (B); Board of Directors: North American Spine Society (Research Council Director); CNS (President-Elect); Scientific Advisory Board: Astera (Consulting disclosed).

Rhines, Laurence D.: Speaking and/or teaching arrangements: Stryker (Amount not disclosed), Globus (Amount not disclosed).

Rihn, Jeffrey A.: Consulting: Pfizer (B); Other Office: Federation of Spine Associations (President); Grants: DePuy Spine (D, Paid directly to institution/employer).

Riley, Lee H.: Stock Ownership: Spinal Kinetics (<1%); Speaking and/or teaching arrangements: AOSNA (B); Trips/travel: DePuy Spine (B); Board of Directors: LifeNet Health (C); Other Office: CSRS (A); Grants: DePuy Spine (E, Paid directly to institution/employer).

Ring, David: Royalties: Biomet (None), Wright Medical (B), Medartis (None), Skeletal Dynamics (None); Stock Ownership: Illuminoss (<1%); Consulting: Biomet (A), Acumed (A), Skeletal Dynamics (None); Grants: Biomet (A), Skeletal Dynamics (C); Other: Clinical Orthopaedics and Related Research (B), Journal of Hand Surgery (C).

Rose, Peter: Board of Directors: Collaborative Spine Research Foundation (None).


Rouben, David P.: Consulting: Medtronic Corporation (D); Relationships Outside the One Year Requirement: Medtronic Sofamor-Dane (Consulting, F).

Ruoff, Mark J.: Stock Ownership: NeoStem (<1%); Speaking and/or teaching arrangements: Baxano (C, Paid directly to institution/employer).

Sachs, Donald C.: Consulting: SI-BONE (C); Speaking and/or teaching arrangements: SI-BONE (C).


Sama, Andrew A.: Royalties: Ortho Development Corporation (E), Life Spine (None), DePuy (D); Stock Ownership: Paradigm Spine (<1%); Private Investments: Small Bone Innovations (<1%); Consulting: Ortho Development (B), Osteotech (None), HydroCision (None), Life Spine (None), DePuy (B), Sentio (None); Speaking and/or teaching arrangements: DePuy Spine (D); Scientific Advisory Board: Clariane (B); Fellowship Support: AOSpine (E, Paid directly to institution/employer).

Samuel, Suman: Fellowship Support: Life Health Care (None, Paid directly to institution/employer).

Sanders, James O.: Stock Ownership: Abbott Labs (<1%), GE (<1%), Abbvie (<1%), Hospira (<1%); Private Investments: Biomedical Enterprises (<1%); Other Office: AOAS (Section Leader Evidence Based Quality and Value Committee); Grants: Chest Wall and Spinal Deformity Foundation (C).
Sanli, Tunay: Research Support (Staff and/or Materials): DePuy Synthes (D, Paid directly to institution/employer).

Santos, Edward Rainier G.: Research Support (Investigator Salary): SI-BONE (None, Paid directly to institution/employer); Research Support (Staff and/or Materials): SI-BONE (None, Paid directly to institution/employer); Relationships Outside the One Year Requirement: Medtronic (Dissolved 12/2010, Research Support: Staff and/or Materials, F).

Sarwahi, Vishal: Consulting: DePuy Spine (B), Medtronic (C); Grants: DePuy Spine (E, Paid directly to institution/employer), Medtronic (O, Paid directly to institution/employer).

Savage, Jason W.: Consulting: Stryker Spine (B).

Schell, Benjamin: Other: Medical Diagnostics Laboratories (Spouse salary).

Schmidt, John A.: Stock Ownership: K2M (%); Trips/travel: K2M (Travel expenses); Other Office: K2M (Salary).


Schneider, Michael J.: Royalties: OPTP (A); Consulting: NCMIC (B), Katten, Muchin & Rosenman (B), Goldberg, Miller & Rubin (B); Speaking and/or teaching arrangements: NCMIC (B); Trips/travel: NCMIC (B), ICA Council on Pediatrics (B); Research Support (Investigator Salary): NIH/ NCCAM (D, Paid directly to institution/employer), PCORI (D, Paid directly to institution/employer); Research Support (Staff and/or Materials): NIH/NCCAM (F, Paid directly to institution/employer, PCORI (F, Paid directly to institution/employer), Grants: NIH/NCCAM (F, Paid directly to institution/employer), PCORI (F, Paid directly to institution/employer), NIH/NCCAM (F, 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); Other: American Academy of Orthopaedic Surgeons (Adult Spine Evaluation Committee).

Schofferman, Jerome: Board of Directors: North American Spine Society (Ethics Committee Chair).

Schwab, Frank J.: Royalties: MSB (D); Stock Ownership: Nemaris (30%); Consulting: MDS (F); Speaking and/or teaching arrangements: DePuy Spine (D); Trips/travel: MDS (C); Board of Directors: Nemaris (Stock ownership disclosed); Research Support (Staff and/or Materials): MDS (E); Grants: SRS (C).

Schwab, Joseph H.: Consulting: Stryker Spine (Travel expenses); Scientific Advisory Board: Biom’up (Amount not disclosed).

Schwartz, Zvi: Device or Biologic Distributorship (Physician-Owned Distributorship): AB Dent (D); Stock Ownership: Spherigenics (55%); Scientific Advisory Board: AB Dent (D); Research Support (Staff and/or Materials): MTF ITI (E, Paid directly to institution/employer); Grants: Titan Spine (E, Paid directly to institution/employer).

Scibba, Daniel M.: Consulting: NuVasive (C, Paid directly to institution/employer); Speaking and/or teaching arrangements: Medtronic (C), DePuy (C), Globus (C).

Scally, Thomas B.: Royalties: Life Spine (B); Stock Ownership: Life Spine (%); Private Investments: Langford (3%); Consulting: BrainLAB (B); Speaking and/or Teaching Arrangements: AANS (B); Board of Directors: Langford (None).

Seex, Kevin A.: Consulting: Medtronic (B, Paid directly to institution/employer); Board of Directors: Relax Retractors (Amount not disclosed).

Sembro, Jonathan N.: Board of Directors: Society of Lateral Access Surgeons (None), Philippine Minnesota Medical Association (None), University of the Philippines Alumni of Minnesota (None); Research Support (Staff and/or Materials): NuVasive (C, Paid directly to institution/employer).

Sengupta, Dilip K.: Royalties: Globus Medical (D); Stock Ownership: Globus Medical (%); Private Investments: International Spine and Orthopaedic Institute (%); Consulting: Globus Medical (None); Scientific Advisory Board: Globus Medical (Travel expenses); 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 (Travel expenses, Dissolved 2011, Paid directly to institution/employer).

Shaffrey, Christopher I.: Royalties: Medtronic (F), Biomet (D); Consulting: Biomet (C), Globus (D), NuVasive (D); Speaking and/or teaching arrangements: NuVasive (C); Trips/travel: Medtronic (B); Board of Directors: CSRS (None), NREF (None), AANS (None), SRS (None); Research Support (Investigator Salary): NIH (B, Paid directly to institution/employer); Grants: Department of Defense (F, Paid directly to institution/employer), Fellowship Support: AOSpine (E, Paid directly to institution/employer), NREF (E, Paid directly to institution/employer).

Shamie, A. Nick: Royalties: SeaSpine (C); Stock Ownership: SI-BONE (%), VertiFlex (%); 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).

Sharan, Alok D.: Consulting: Paradigm Spine (B); Speaking and/or Teaching Arrangements: Synthes Spine (B).

Shea, Kevin G.: Trips/travel: AAOS (B).

Shellock, Jessica: Consulting: Innovation (A); Speaking and/or teaching arrangements: DePuy Synthes Spine (B).

Siewerdsen, Jeffrey H.: Royalties: Elekta Oncology (E); Consulting: Carestream Health (Scientific Advisory Board); Scientific Advisory Board: Carestream Health (None); Research Support (Investigator Salary): Siemens Healthcare (C); Research Support (Staff and/or Materials): Siemens Healthcare (D); Grants: Siemens Healthcare (D).

Sinclair, Sarina: Relationships Outside the One Year Requirement: Zimmer (Dissolved 12/2012, Research Support: Staff and/or Materials, F).

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 5 (None), Indo-American Spine Alliance (None), TruVue Surgical (None), Avaz Surgical (None); Other Office: J Contemporary Spine Surgery (Editor-in-Chief), Spine Surgery Today (Editorial Board), Journal of Orthopedics (Editorial Board).


Slosar, Paul J.: Royalties: Titan Spine (None); Stock Ownership: Titan Spine (%), DFINE (%), Relievant (%), Bacterin (12,000 shares); Consulting: Relievant (Amount not disclosed); Scientific Advisory Board: DFINE (Amount not disclosed); Other Office: Medical Director Titan Spine (E).

Smith, Harvey E.: Other: DePuy Spine (A); Relationships Outside the One Year Requirement: Stryker Spine (Dissolved 12/2012, Trips/Travel, A). Smith, Jeremy S.: Consulting: Spineart (B); Speaking and/or Teaching Arrangements: DePuy (C).

Smith, Justin S.: Consulting: Biomet (C); Speaking and/or teaching arrangements: Biomet (C), AOSpine North America (B), Globus (C).

Smith, Margaret M.: Device or Biologic Distributorship (Physician-Owned Distributorship): Fidia SpA (A); Trips/travel: Fidia SpA (B); Board of Directors: Sylvan Scientific (C); Grants: Lincoln Foundation (D, Paid directly to institution/employer).

Smith, Matthew J.: Consulting: Kent Hospital (C, Paid directly to institution/employer).

Smuck, Matthew: Private Investments: Sikoya (20%); Consulting: State Farm (D), Kaiser Permanente (B); Trips/Travel: International Spine Intervention Society (B), North American Spine Society (B), Board of Directors: Sikoya (None); Other Office: The Spine Journal (Deputy Editor), International Spine Intervention Society (Board of Directors); Relationships Outside the One-Year Requirement: Cytonics (Dissolved 12/2013, Research Support: Staff and/or Materials, F).

Smucker, Joseph D.: Consulting: Watermark Research Partners (B), Theorem Clinical Research (C), Back Bay Life Science Advisors (A); Trips/Travel: Medtronic Sofamor Danek (A); Grants: Biostuctures (F, Paid directly to institution/employer), Medtronic (F, Paid directly to institution/employer).

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Spach, Karen: Consulting: SI-BONE (F, Paid directly to institution/employer); Other Office: Covance (Salary).
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Stone, Jeffrey A.: Relationships Outside the One-Year Requirement: Venenue Medical (Dissolved 10/2012, Research Support: Staff and/or Materials).

Stone, Marcus: Relationships Outside the One Year Requirement: Medtronic (Dissolved 8/2009, Consulting).

Stout, Alison A.: Speaking and/or Teaching Arrangements: ISIS (Education Committee, Patient Safety Task Force), AAPMU (B), AAPMR (Program Planning Committee); Board of Directors: McKenzie Institute USA (None).

Street, John: Consulting: Medtronic (A); Speaking and/or teaching arrangements: Medtronic (None); Trips/travel: Medtronic (A); Research Support (Staff and/or Materials): Medtronic (B, Paid directly to institution/employer); Grants: Medtronic (D, Paid directly to institution/employer); Fellowship Support: Medtronic (D).

Sucato, Daniel J.: Board of Directors: OREF (Amount not disclosed, Paid directly to institution/employer); Grants: POSNA (D, Paid directly to institution/employer); Other: AAOS (B).

Sullivan, William J.: Trips/Travel: Emerging Technologies Education Summit (B), Maadi Military Hospital Egypt (B); Other Office: AAPMR (Reimbursement and Policy Review Committee Chair, Coding and Billing Workshop Course Director, C), North American Spine Society (RUC Advisor, Coding Committee Co-Chair, North American Spine Society Registry Committee, SpineLine Editorial Committee, B).

Swiontkowski, Marc: Royalties: Elsevier (B); Consulting: Ei Lilly (Amount not disclosed); Board of Directors: TRIA Orthopaedic Center (CEO, Paid directly to institution/employer); Grants: NIH/NIAIMS (C, Paid directly to institution/employer).

Tay, Bobby: Consulting: Biomet (B), Stryker (B), Synthes (B); Speaking and/or teaching arrangements: Stryker (B), Synthes (B), Biomet Spine (B); Fellowship Support: NuVasive (D, Paid directly to institution/employer), OREF (E, Paid directly to institution/employer), Globus (D, Paid directly to institution/employer), OREF (E, Paid directly to institution/employer), Omega (C, Paid directly to institution/employer).

Tohme, Antoine: Royalties: NuVasive (F); Stock Ownership: NuVasive (<1%); Consulting: NuVasive (Amount not disclosed); Speaking and/or teaching arrangements: NuVasive (Amount not disclosed); Trips/travel: NuVasive (Amount not disclosed); Scientific Advisory Board: SOLAS (Travel expenses); Research Support (Staff and/or Materials): Spine Research Institute (E, Paid directly to institution/employer).

Toyama, Yoshiaki: Consulting: Seikagaku Co. (B); Endowments: Seikagaku Co. (B).

Trombanhauser, Scott G.: Stock Ownership: Sotiera (<1%); Speaking and/or Teaching Arrangements: DePuy Synthes Spine (B); Other Office: Best Doctors Occupational Health Institute (Medical Director).

Trumeau, Eric: Royalties: Stryker Spine (C); Stock Ownership: Doctor’s Research Group (<1%); Private Investments: IP Evolutions (23%); Board of Directors: North American Spine Society (Administration and Development Council Director); Other Office: AAOS Communications Cabinet (Incoming Editor-in-Chief of AAOS Now, Communications Cabinet); Research Support - Investigator Salary: Relievant (B, Paid directly to institution/employer); Research Support - Staff and/or Materials: Globus (B, Paid directly to institution/employer); Other: Stryker Biotech (Dissolved 2004, Paid directly to institution/employer). Turner, Alexander W.: Stock Ownership: NuVasive (<1%); Other Office: NuVasive (Salary).

Tutton, Sean: Consulting: Venenue Medical (C); Research Support - Investigator Salary: Venenue Medical (D, Paid directly to institution/employer).

Ullrich, Peter F.: Royalties: Titan Spine (F, CEO/Founder); Stock Ownership: Titan Spine (33%); Trips/travel: Titan Spine (Travel expenses); Board of Directors: Titan Spine (None); Scientific Advisory Board: Titan Spine (None).

Uribe, Juan S.: Consulting: NuVasive (F); Speaking and/or teaching arrangements: Orthofx (C); Research Support (Investigator Salary): NuVasive (D, Paid directly to institution/employer); Research Support (Staff and/or Materials): NuVasive (C, Paid directly to institution/employer); Grants: NuVasive (B, Paid directly to institution/employer); Fellowship Support: NuVasive (D, Paid directly to institution/employer).

Vaccaro, Alexander R.: Royalties: DePuy Spine (C), NuVasive (None), Biomet Spine (E), Globus (F), Medtronic (H), Aesculap (B), Book royalties (C), Stryker Spine (H); Stock Ownership: K2Medical (Dissolved), Gamma Spine (<1%), Innovative Surgical Design (<1%), Electrocure (<1%), Rothman Institute and Related Holdings (Partner in Practice), Cytonics (<1%), Location Based Intelligence (20%), Progressive Spinal Technology (<1%), Computational Bio-Dynamics (<1%), Stout Medical (<1%), Bonovo Orthopaedics (<1%), Flagship Surgical (1%), In Vivo (<1%), Small Bone Innovations (<1%), Neureco (<1%), Cross Current (<1%), Syndicom (<1%), Paradigm Spine (<1%), Spineology (<1%), Replication Medica (<1%), Globus (<1%), Flow Pharma (<1%), Advanced Spinal Intellectual Properties (30%), Spine Medica (<1%), RSI (<1%), Spyclinic (<1%); Consulting: Gerson Lehrman Group (B), ICON Clinical Research (B), Innovative Surgical Design (None), Stout Medical (A), Guidepoint Global (B), Medacorp (A); Trips/travel: Company Sponsored Travel (B); Board of Directors: AOSpine (North American Board of Directors), Association of Collaborative Spine Research (None), Innovative Surgical Design (None), Spine (Partner in Practice), ASIA (Past President Board member), North American Spine Society (Past Program Committee Co-Chairman); Research Support (Staff and/or Materials): PI5 Cerapedics (C), Cerapedics (C); Other: Rothman Institute (Salary); Grants: NuVasive (None), Cerapedics (None), Stryker Spine (None).

Valdevit, Antonio: Consulting: Titan Spine (D, Paid directly to institution/employer), Stryker Spine (C); Board of Directors: Orthogonal Diagnostics (Director, Co-Founder), Clinical Engineering Services (Director, Co-Founder); Research Support (Staff and/or Materials): NIH (F, Paid directly to institution/employer); Grants: Titan Spine (D, Paid directly to institution/employer); Relationships Outside the One Year Requirement: Titan Spine (Dissolved 12/2015, Research Support: Staff and/or Materials, B).

Vanni, Steven: Royalties: NuVasive (E); Consulting: Globus (B); Speaking and/or Teaching Arrangements: DePuy (B).

Vigna, Franco E.: Consulting: Baxter (Travel expenses, Paid directly to institution/employer), Stryker (Travel expenses, Paid directly to institution/employer), Orthofx (Travel expenses, Paid directly to institution/employer); Speaking and/or Teaching Arrangements: Stryker (B, Paid directly to institution/employer), Trips/Travel: Orthofx (A, Paid directly to institution/employer); Research Support - Staff and/or Materials: Baxter (B, Paid directly to institution/employer), Orthofx (B, Paid directly to institution/employer), NuVasive (B, Paid directly to institution/employer).

Villavicencio, Alan T.: Device or Biologic Distributorship (Physician-Owned Distributorship): Leading Edge Spinal Implants (A); Stock Ownership: Lanz (2%, Founder); Board of Directors: Justin Parker Neurological Institute (None); Other Office: Boulder Neurosurgical Associates (Managing Partner); Research Support - Investigator Salary: ProFibrix (F, Paid directly to institution/employer), Medtronic (F, Paid directly to institution/employer).

Vives, Michael J.: Private Investments: Accelalox (<1%); Speaking and/or Teaching Arrangements: Musculoskeletal Transplant Foundation (B); Other Office: AAOS (Spine Program Committee Chair); Relationships Outside the One-Year Requirement: Zimmer (Dissolved 12/2009, Research Support: Staff and/or Materials, D).

Vliegeert-Lankamp, Carmen: Speaking and/or Teaching Arrangements: Braun Aesculap (B, Paid directly to institution/employer); Research Support (Staff and/or Materials): Medtronic (F, Paid directly to institution/employer), B. Braun (F, Paid directly to institution/employer), Paradigm Spine (F, Paid directly to institution/employer); Grants: National Health Organization (F, Paid directly to institution/employer).

Vogt, Sebastian: Stock Ownership: Siemens (1%); Other Office: Siemens Medical Solutions USA (Salary).
Walsh, William: Private Investments: CIMTECH (<1%); Consulting: Invibio (Amount not disclosed, Paid directly to institution/employer), OsteoNovus (Amount not disclosed, Paid directly to institution/employer), Advanced Biologics (Amount not disclosed, Paid directly to institution/employer), KH Nxegen (Amount not disclosed, Paid directly to institution/employer), Soft Tissue Regeneration (Amount not disclosed, Paid directly to institution/employer), Spinal Elements (Amount not disclosed, Paid directly to institution/employer), Skeletal Kinetics (Amount not disclosed, Paid directly to institution/employer), Biocomposites (Amount not disclosed, Paid directly to institution/employer), OrthoRebirth (Amount not disclosed, Paid directly to institution/employer); Speaking and/or teaching arrangements: Medtronic (Amount not disclosed); Scientific Advisory Board: CIMTECH (Stock ownership); Research Support (Staff and/or Materials): Biocomposites (D, Paid directly to institution/employer), OsteoNovus (C, Paid directly to institution/employer).

Wang, Jeffrey C.: Royalties: Stryker (B), Osprey (C), Aesculap (B), Biomet (F), Amedica (D), SeaSpine (D), Synthes (C), Alphatec (E); Stock Ownership: FioMed (<1%), Alphatec (<1%); Private Investments: Prometheus Spine (<1%), Paradigm Spine (<1%), Benvenu (<1%), Nxgen (<1%), Pioneer (<1%), Amedica (<1%), VertiFlex (<1%), Electrococore (<1%), SurgiTech (<1%), Axiomed (<1%), VG Innovations (<1%), CoreSpine (<1%), Expanding Orthopedics (<1%), Syndicom (<1%), Osprey (<1%), Amerodia (<1%), Bone Biologics (<1%), Curative Biosciences (<1%), PearlDiver (<1%); Board of Directors: North American Spine Society (Treasurer), Cervical Spine Research Society (Travel expenses), AOSpine/AOFoundation (E), Collaborative Spine Research Foundation (Travel expenses); Fellowship Support: AO Foundation (E, Paid directly to institution/employer).

Wang, Michael Y.: Royalties: DePuy Spine (G); Consulting: DePuy Spine (E), Aesculap (B); Speaking and/or teaching arrangements: DePuy Spine (D); Scientific Advisory Board: ISD (None); Grants: Department of Defense (None, Paid directly to institution/employer).

Watters, William C.: Royalties: Stryker (B); Stock Ownership: Intrinsic Therapeutics (10,000 shares, Dissolved 2014); Board of Directors: North American Spine Society (President, D), World Spine Care (None), American College of Spine Surgeons (None); Scientific Advisory Board: Intrinsic Therapeutics (Stock ownership disclosed), Palladian Health (Clinical Advisory and Policy Board, B); Other: The Spine Journal (Assistant Editor), Spine Arthroplasty Journal (Assistant Editor), Spine (Reviewer), Kirby Glenn Surgical Center (1/22nd minority interest ownership).

Wegener, Stephen: Scientific Advisory Board: Amputee Coalition (None); Research Support (Investigator Salary): NIH (C, Paid directly to institution/employer); Research Support (Staff and/or Materials): DOD (C, Paid directly to institution/employer); Grants: DOD (C, Paid directly to institution/employer).

Wetzal, F. Todd: Stock Ownership: Relievable Medical (<1%); Board of Directors: McKenzie Institute International (B), North American Spine Society (Secretary).

Whang, Peter G.: Stock Ownership: Diffusion (<1%); Consulting: Stryker Spine (C), Spinal Elements (B), Medtronic (E); Speaking and/or teaching arrangements: Stryker Spine (B); Scientific Advisory Board: Diffusion (Stock ownership disclosed); Other Office: Cerepedics (B), Relievant (F); Research Support - Staff and/or Materials: VertiFlex (A, Paid directly to institution/employer), SI-BONE (A, Paid directly to institution/employer).

Wolloch, Adam L.: Consulting: Stryker Spine (C), DePuy Spine (B).

Wood, Kirkham B.: Stock Ownership: Trans1 (100%); Consulting: DePuy Spine (B); Research Support (Staff and/or Materials): NIH (F, Paid directly to institution/employer); Grants: Scoliosis Research Society (C, Paid directly to institution/employer), Synthes (E, Paid directly to institution/employer), NIH (E, Paid directly to institution/employer), Madtronic (D); Fellowship Support: OREF (E), Globus (E), Synthes (E), AOSpine (E).

Yang, Hailou: Research Support (Investigator Salary): UC Irvine Center for Occupational Health (B, Paid directly to institution/employer).

Yaszemski, Michael J.: Consulting: Medtronic (B, Paid directly to institution/employer).


Yoo, Jung U.: Royalties: Osiris Therapeutics (B, Paid directly to institution/employer); Fellowship Support: Globus (E).

Yoon, S. Tim: Royalties: Stryker Spine (C, Paid directly to institution/employer), Medtronic Advisors (C); Stock Ownership: Phygen (<1%), Alphatec (<1%); Private Investments: Meditec (<1%); Consulting: Meditec Advisors (B); Speaking and/or teaching arrangements: Stryker (A); Trips/travel: The Spine Journal (None); Other Office: The Spine Journal (None); Grants: AOSpine (B, Paid directly to institution/employer).

Youssef, Jim A.: Royalties: NuVasive (F), Osprey Medical (F), Amedica (F); Integra (F); Stock Ownership: Amedica (<1%), Benvenue Medical (<1%), Paradigm Spine (<1%), Promethea Surgical Devices (<1%), Spinal Ventures (<1%), VertiFlex (<1%), SpineWave (<1%), ISD (<1%), Providence Medical (<1%); Private Investments: Amedica (<1%), VertiFlex (<1%), Benvenue (<1%), NuVasive (<1%); Consulting: Integra (Amount not disclosed), NuVasive (Amount not disclosed), Amedica (Amount not disclosed); Board of Directors: Durango Orthopedic Associates (None); Research Support (Staff and/or Materials): Globus Medical (C, Paid directly to institution/employer), NuVasive (C, Paid directly to institution/employer), VertiFlex (C, Paid directly to institution/employer), Integra (C, Paid directly to institution/employer).

Yu, Warren D.: Royalties: Spineart (F); Consulting: Integra Spine (F), Interventional Spine (C); Speaking and/or teaching arrangements: Globus (B); Scientific Advisory Board: AO Foundation International (B).

Zahrawi, Faissal: Consulting: DePuy (D), Medtronic (D), Spine Wave (D), LDR (D); Speaking and/or teaching arrangements: DePuy (B), LDR (B); Other: Sentio (None).

Zavatsky, Joseph M.: Consulting: DePuy Synthes Spine (D); Speaking and/or teaching arrangements: Biomet Spine (C), Amendia (B).

Zebula, Lukas P.: Consulting: Amedica, Ulrich Medical (A); Speaking and/or teaching arrangements: DePuy Spine (B), Broadwater (Amount not disclosed); Trips/travel: Medtronic (B); Fellowship Support: AOSpine/Omega (C, Paid directly to institution/employer).

Zeilstra, Dick J.: Stock Ownership: Trans1 (5,000 shares); Consulting: Flexuspine (None, Paid directly to institution/employer); Speaking and/or teaching arrangements: Trans1 (None, Paid directly to institution/employer), Spine Frontiers (None).

Zhang, Yejia: Consulting: Smith and Nephew (C, Paid directly to institution/employer); Research Support (Staff and/or Materials): SpinalCyte (D, Paid directly to institution/employer), ApaTech Limited (E, Paid directly to institution/employer).

Zigler, Jack E.: Device or Biologic Distributorship (Physician-Owned Distributorship): PDP (B); Royalties: Zimmer Spine (B); Stock Ownership: Expanding Orthopedics (<1%), Flexuspine (<1%); Consulting: Synthes Spine (C); Speaking and/or teaching arrangements: Synthes Spine (C); Research Support (Staff and/or Materials): Various companies (D, Paid directly to institution/employer); Fellowship Support: Synthes (D, Paid directly to institution/employer), Medtronic (D, Paid directly to institution/employer).

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NASS CAREER FAIR

Room 101

Wednesday, November 12: 11:00 a.m. - 5:00 p.m.
Thursday, November 13: 9:00 a.m. - 5:00 p.m.

Stop by the new 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 will be able to reach out to you to set up interviews. Companies interested in signing up onsite for an online package can stop by the Career Fair. Visit the registration area outside of the Career Fair for more information.
The Surgical Showcase offers hands-on demonstrations of products and equipment in two mobile surgical laboratories. The demonstrations are offered by vendors using specimens in the laboratories.

The Surgical Showcase will have demonstrations 9:00 a.m.-12:00 p.m. and 1:00–4:00 p.m. on Wednesday, Thursday and Friday. Workshops will be offered 5:00-8:00 p.m. on Wednesday and Thursday.
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<td><strong>3DSYSTEMS—LayerWise</strong></td>
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<td><a href="http://www.layerwise.com">www.layerwise.com</a></td>
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<td>3DS LayerWise Medical is a pioneer in the use of metal 3D printing for manufacturing metal implants and instruments for the broad medical field. 3D Medical Modeling provides personalized surgery technologies, mostly based on additive manufacturing. Both are now part of 3D Systems, a leading provider of 3D printing centric design to manufacturing solutions.</td>
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<td><strong>Advanced Biologics</strong></td>
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<td><a href="http://www.advancedbiologics.com">www.advancedbiologics.com</a></td>
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<td>Advanced Biologics’ focus is to develop innovative and clinically relevant biologic solutions across a wide degree of medical specialties. Our company is fully dedicated to improving patients’ lives and the health care provider’s experience with our products. Award-winning OsteoAMP® allogeneic-derived growth factor has been proven to be a formidable alternative to rhBMP-2 and allograft derived stem cell matrices with clinical scientific data showcasing faster, safer and denser bone growth.</td>
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<td><strong>Accel LAB Inc.</strong></td>
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<td><a href="http://www.accellab.com">www.accellab.com</a></td>
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<td>AccelLAB is a preclinical CRO that conducts Regulatory Testing on product safety and efficacy for the evaluation of medical devices. Services include study designs, sophisticated surgical suites and imaging technology (incl. on-site CT-Scan, MRI, Radiography and µCT), blood assays, histomorphometry, histopathology and report production by experienced full-staff pathologists. AccelLAB is Fully AAALAC and CCAC accredited, and was successfully audited by the FDA in 2012.</td>
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<td><strong>AccelSPINE</strong></td>
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<td><a href="http://www.accelspine.com">www.accelspine.com</a></td>
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<td>AccelSPINE is a forward thinking medical device company that strives to develop products and services that treat spinal disorders. The AccelSPINE portfolio showcases a wide range of complementary products that include a minimally invasive spine system, posterior cervical system, thoracolumbar system, anterior cervical plate system, interbody device options, biologics and P-STIM a non-narcotic pain management solution.</td>
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<td><strong>Accutek Testing Laboratory</strong></td>
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<td><a href="http://www.accutektesting.com">www.accutektesting.com</a></td>
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<td>For over 25 years, major companies across the medical device industry have turned to Accutek for their product conformance, materials identification, and failure analysis needs. Accutek supports feasibility and submission testing for hip, knee, spine, and small bone implants, plates, and screws. In addition, Accutek offers comprehensive wear testing solutions for hip, knee and spinal implants. Stop by our booth to speak with one of our knowledgeable test engineers about your next testing project.</td>
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<td><strong>Aesculap Implant Systems</strong></td>
<td>1413</td>
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<td><a href="http://www.aesculapimplantsystems.com">www.aesculapimplantsystems.com</a></td>
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<td>Combining years of R&amp;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.</td>
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<td><strong>AIP Precision Machining</strong></td>
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<td>AIPprecision.com</td>
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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.

Allen Medical Systems
www.allenmedical.com

Allen Medical announces the launch of the Allen Advance Spine Table. This is a premium patient positioning solution for complex spine procedures offering prone and supine positioning in addition to 360° capabilities. The Allen Advance Table is designed with improved safety features, a modern user interface, intuitive pendant controls, central locking castors and many other convenience features, all at an acceptable cost.

Alliance Spine
www.alliance-spine.com

Alliance Spine is dedicated to providing surgeons with the highest quality products. Our company devotes time and effort in research and development to continue producing advancements in spinal technology. We focus on the latest in regenerative medicine to achieve optimal results. At Alliance Spine, our goal is to continually develop and enhance the best products available to treat spinal pathologies by combining regenerative medical breakthroughs with the newest spinal technologies.

Allina Health
www.allinahealth.org

Join our award-winning physician team. At Allina Health, we’re here to care, guide, inspire and comfort the millions of patients we see each year. With more than 90 clinics, 12 hospitals and specialty care services throughout Minnesota and western Wisconsin, our not-for-profit organization focuses on patients’ complete health and wellness To learn more, contact Brooke. Eilbert@allina.com, call 1-800-248-4921 (toll-free) or apply online at allinahealth.org/careers.

AlloSource
www.allosource.org

Please stop by our new booth and learn how AlloSource partners with healthcare leaders to progress patient healing. AlloSource is a preferred provider of innovative allograft solutions including cellular bone allografts, spinal grafts and DBMs, for spine procedures and orthopedics. AlloSource is registered with the FDA, accredited by the AATB and is compliant with all applicable state regulations and with the ISO 9001:2008 standard. Please visit allosource.org for more information.

Alphatec Spine
www.alphatecspine.com

Alphatec Spine, Inc., a wholly owned subsidiary of Alphatec Holdings, Inc., is a global provider of spinal fusion technologies. The company’s mission is to combine innovative surgical solutions with world-class customer service to improve outcomes and patient quality of life. The company and its affiliates market products in the U.S. and internationally via a direct sales force and independent distributors. Additional information can be found at www.alphatecspine.com.

Amedica
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, Inc.
www.amendia.com

Headquartered in Marietta, Georgia, Amendia is quickly becoming a recognized leading provider of innovative Class II and Class III medical devices used in spinal surgical procedures. As a specialty-device manufacturer, Amendia collaborates with surgeons to develop, manufacture, and market minimally invasive spine and orthopedic implants and instruments. Visit us at the NASS Surgical Showcase Thursday, November 13th OLLIF Demonstration 1:00 p.m. & 2:30 p.m. OLLIF Hands-on Cadaver Course 5:00 p.m. & 7:30 p.m.

American Board of Spine Surgery
www.americanboardofspinesurgery.com

The American Board of Spine Surgery was formed in 1997 by Orthopaedic Surgeons and Neurological Surgeons who viewed spine surgery as its own unique specialty. ABSS is an independent certification organization that supports Orthopaedic Surgeons and Neurological Surgeons whose practices are primarily in spine surgery. We uphold comprehensive educational requirements for certification, as well as providing written and oral examinations.
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www.americanhealthcarelending.com

American HealthCare Lending makes large, out-of-pocket healthcare expenses affordable.
- Financing for ANY healthcare expense associated with a hospital, ambulatory surgery center, or physician group including deductibles/co-pays.
- Loans up to $100,000 with Terms up to 84 months
Come by and learn how you can save money and help more patients!

APS Materials, Inc.
www.apsbiomedical.com

APS Materials Inc. is currently an implant coating provider for 7 of the top 10 medical manufacturers in the world. Our process for Titanium and Hydroxyapatite (HA) coatings uses Thermal plasma spray to deposited molten droplets onto the surface of an implant. The Titanium process creates a rough and porous surface for bone onto/into growth which provides excellent bone/implant fixation. The HA process creates a bio-active surface which accelerates bone growth improving healing time.

Arcam AB
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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.

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.

Aspen Medical Products
www.aspenmp.com

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. Focusing solely on the spine, Aspen Medical Products offers a complete line of orthotic options that provide unsurpassed motion restriction, superior comfort and an economic advantage.

Association of Spine Surgeons of India (ASSI)
assi.in

The aim of Association of Spine Surgeons of India (ASSI) is to promote scientific spine care, both surgical and non-surgical, in India through the medium of national, regional and local meetings, symposia, CMEs and workshops. ASSI is also involved in advocacy as well as social work and promotes research.

Aurora Spine
www.auroraspine.us

Aurora specializes in minimally-invasive, regenerative technologies. Our mission is to be the leader in advanced spinal innovations which will have a positive impact on lives worldwide. Our philosophy is to make our implants match the patient’s anatomy, not to make their anatomy fit our implants.

Autocam Medical
www.autocam-medical.com

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. ISO13485:2003/ISO 9001:2008, FDA Registered, VISA (Brazil).

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Our ezDispense Workers Compensation medication dispensing program allows your patient to receive medications while in your office. Our proprietary software ensures the practice remains compliant while capturing ancillary revenue.
Avalign Technologies 1621
www.avaligntech.com

Avalign Technologies is the premier, full-service supplier of implants, instruments, cutting tools, German Specialty Instruments and cases and trays for medical device OEM’s.

Bacterin 2004
www.bacterin.com

Bacterin is a medical device company and accredited tissue bank that designs, processes, manufactures, and markets advanced medical products for spine applications. Using designs focused on efficacy and safety for the patient, and functionality and ease of use for the surgeon, our innovative products fulfill niche needs in the industry. Bacterin has revolutionized the handling characteristics of allograft bone while maintaining many of the benefits that are native functions of autograft bone.

Barrier Technologies 1446
www.barriertechnologies.com

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 & include our Leaded Eyewear, Protective Aprons, (Lead & Lead-Free) SecureTouch Sterile Radiation Protective Gloves, Scatter Reducing Pads & Drapes, Mobile Barriers, & X-ray Accessories. For more information please visit us in booth #1446 or at our web site www.barriertechnologies.com.

Baxano Surgical, Inc. 1513
www.BaxanoSurgical.com

Baxano Surgical, Inc. is a medical device company focused on designing, developing, and marketing minimally invasive products to treat degenerative conditions of the spine affecting the lumbar region. Baxano Surgical currently markets the AxiaLIF® system for lower lumbar fusion, The VED® lateral access and interbody fusion system, the iO-Flex®, flexible, micro-blade shaver for decompressions, the iO-Tome® rapid facetectomy instrument, and the AVANCE™ MIS pedicle screw system.

Benvenue Medical 639
www.benvenuemedical.com

Benvenue Medical, Inc. develops next-generation, minimally invasive expandable implants for the spine. Its first products are designed for the treatment of vertebral compression fractures and degenerative disc disease. Its premier product is the Kiva VCF Treatment System cleared by the U.S. Food and Drug Administration in January 2014.

Berkeley Advanced Biomaterials, Inc. 1907
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Berkeley Advanced Biomaterials, Inc. manufactures high-quality and cost-effective skeletal repair resorbable biomaterials. The company offers the entire range of biologics from synthetics HAP/TCP Granules, Strip, Putty to allograft DBM 100% DBM Putty, Sponge, and Chip. Berkeley Advanced Biomaterials, Inc. is an AATB accredited licensed Tissue Bank.

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We have more than 35 years in Orthopedic products.

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Applying today’s most advanced engineering and manufacturing technologies, we’ve developed our product line to offer surgeons a comprehensive approach for a wide variety of surgical applications for the spine. Visit our exhibit to see how our products can help surgeons change lives for the better, one patient at a time.

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Biosafe develops, manufactures and supplies innovative solutions for cell processing in adult stem cell banking and regenerative medicine. The Sepax system’s fully integrated design and compact size makes it especially suitable for bedside use. A complete operating room package is available to ensure safe harvesting, concentration, and concentrated cell injection.

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BioStructures® specializes in the design, development and marketing of innovative and proprietary bioreabsorbable implants used in spinal fusion procedures. BioStructures® offers a comprehensive portfolio of bone graft materials. The Company’s core offerings are comprised of BioActive, Collagen, Allograft, Demineralized Bone and Synthetic graft materials.

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Biotronic is the largest and most respected provider of intraoperative neural monitoring services. Biotronic monitors over 40,000 surgeries annually in more than 450 hospitals. Biotronic is committed to providing quality monitoring solutions that protect patients. Because of Biotronic’s technologists’ distinguished performance and the company’s reliable neuroprotection, Biotronic is continuously recognized by leading physicians as the premier provider of quality surgical monitoring.

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A reputable name in the orthopedic industry for over 30 years, Bledsoe Brace Systems continues to provide innovative, quality products and exceptional service to treat patients with musculoskeletal conditions resulting from degenerative diseases, deformities, traumatic events and sports-related injuries.

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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.

Boston Scientific
www.controlyourpain.com
Investing in innovative products, clinical initiatives, and world-class service, Boston Scientific is committed to leading the way in spinal cord stimulation by providing better pain relief to a broad range of patients.

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There resides a great pride within our company in providing you with top notch orthopedic and spinal instrumentation. We invite you to contact us at the earliest concept phase to ensure a seamless transition from prototype through production. Our knowledgeable staff has over 25 years of industry experience and is available at all developmental stages to ensure you receive the support you deserve. Quality. Innovation. Service. Rule #1: If we don’t take care of our customers, someone else will.

Brainlab
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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
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<th>Company Name</th>
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<td><a href="http://www.coluna.com.br">www.coluna.com.br</a></td>
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<td>The Brazilian Spine Society (BSS) is an entity that represents around 1000 Brazilian spine surgeons (orthopedists and neurosurgeons). The current president is Dr. Carlos Henrique Ribeiro. Email: <a href="mailto:coluna@coluna.com.br">coluna@coluna.com.br</a> Future events: XV Brazilian Spine Congress will be held from 18th to 21th of April, 2015 in Belo Horizonte city, Minas Gerais state, Brazil. Registration and General Information at <a href="http://www.cbc2015.com.br">www.cbc2015.com.br</a></td>
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<td>On turbulent seas of hi-tech companies Their ominous messages Of latest &quot;truths&quot;, 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.</td>
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<td>C &amp; A Tool Engineering, Inc.</td>
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<td><a href="http://www.catool.com">www.catool.com</a></td>
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<tr>
<td>Contract Manufacturer of Spinal Implants and Instruments. Be sure to ask about our Laser Sintering capabilities for Rapid Prototyping.</td>
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<tr>
<td>Cadwell Laboratories, Inc.</td>
<td>2435</td>
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<td><a href="http://www.cadwell.com">www.cadwell.com</a></td>
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<td>Cadwell has been focused on the development of useful and innovative devices for neurophysiologists, neurologists, physiatrists, and technologists who want reliable, innovative and easy to use monitoring and diagnostic devices to help surgeons and others provide superior patient care since 1979. Based in Kennewick, WA, our product lines include Intraoperative Monitoring, EEG, EMG/NCV/EP. Along with our full range of electrodes, probes and accessories, our products are reliable.</td>
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<tr>
<td>Caesar Rivise Bernstein Cohen &amp; Pokotilow Ltd.</td>
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<td><a href="http://www.crbcp.com">www.crbcp.com</a></td>
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<tr>
<td>Have you ever thought of unique devices or methods of treatment that would benefit your patients or improve surgery? The best way to capitalize on your creativity is to obtain a patent for your invention. Caesar Rivise is a full-service IP law firm specializing in procuring medical device patents. Our attorneys have a wealth of experience and expertise across all disciplines of medical technology to guide you from conception of the invention to its commercialization. Let’s explore at Booth 2419.</td>
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<td>Captiva Spine, Inc.</td>
<td>2020</td>
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<td><a href="http://www.captivapsine.com">www.captivapsine.com</a></td>
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<td>Captiva Spine is committed to creating and maintaining sincere, honest, collaborative relationships in the spine industry for the advancement of products, technologies and outcomes. We seek to provide smart, elegant and intuitive solutions for patients, surgeons, distributors and healthcare facilities. These principles are evident in our TowerLOX MIS system, our Pivotec articulating TLIF, our SmartLOX Cervical Plate, and the rest of our full line of spine products.</td>
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<tr>
<td>Cardinal Spine</td>
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<td><a href="http://www.cardinalspine.net">www.cardinalspine.net</a></td>
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<td>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 two 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.</td>
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<td>CareFusion</td>
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<td><a href="http://www.carefusion.com">www.carefusion.com</a></td>
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<td>CareFusion offers the AVAmax® Advanced Vertebral Augmentation system, featuring the AVAmax 11 G vertebral balloon, which is the most minimally invasive kyphoplasty system available today (as of October 2012) because the 11 G balloon fits through a cannula 17% smaller than a 10 G balloon. The system also includes the unique AVAFlex® curved needle that targets cement placement and offers maneuverability and flexibility unmatched by traditional straight needles.</td>
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<td>Carl Zeiss Meditec, Inc.</td>
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<td><a href="http://www.zeiss.com">www.zeiss.com</a></td>
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<td>Carl Zeiss Meditec (<a href="http://www.meditec.zeiss.com/us">www.meditec.zeiss.com/us</a>) 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.</td>
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CellRight Technologies LLC
www.cellrighttechnologies.com

CellRight Technologies is an emerging leader in the development and manufacture of evolutionary regenerative orthopedic and wound care collagen 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, a minimally manipulated 100% human derived DBM putty for use as a bone void filler.

CG Bio Inc.
www.cgbio.com

CG Bio Inc. is a total healthcare provider with a goal of enhancing the quality of life by offering range of innovative solutions for the spectrum of spinal disorders and wound management. Through extensive research activity, CG Bio is a leading manufacturer and distributor of comprehensive portfolio of allograft and synthetic bone grafts, spinal implants, GMP grade growth factors and total wound care solution.

Chinese Association of Orthopaedic Surgeons
www.caos-china.org

Dedicated to serving over 100,000 Chinese orthopaedic surgeons, Chinese Association of Orthopaedic Surgeons is the national and nonprofit organization for surgeon education, examination and certification in the field of orthopedics, endorsed by Chinese government. Chinese Association of Orthopaedic Surgeons welcomes to work with the world to integrate the most comprehensive resources and to be the bridge connecting Chinese orthopedic community with the world.

Centinel Spine
www.centinelspine.com

Centinel Spine™ sets “The Gold Standard” for anterior column spine support with the introduction of Ti-ACTIVE™ titanium-coating technology, available for both STALIF C® cervical and MIDLINE II™ lumbar systems. This technology “raises the bar” for stand-alone interbody fusion implants. Centinel Spine™ continues to evolve spinal fusion by innovating on its core No-Profile™ STALIF® Integrated Interbody™ technology, proven with a clinical heritage of over 25 years. Visit us at www.centinelspine.com.

Cerapedics, Inc.
www.cerapedics.com

Cerapedics develops and commercializes novel osteobiologic products utilizing its proprietary anorganic bone mineral (ABM) and synthetic small peptide (P-15™) technology platform to stimulate the natural bone healing process. i-FACTOR™ Bone Graft is available in 20+ countries worldwide for use in spine, trauma and orthopedic procedures. i-FACTOR bone graft is currently being evaluated in the USA (FDA) as part of an Investigational Device Exemption (IDE) Clinical Study in the cervical spine.

Chinese Orthopaedic Association
www.coachina.org

Chinese Orthopaedic Association (COA) is a not-for-profit organization, which provides information on scientific exchange and improving the orthopaedic health service level. With a registered membership of more than 30,000 surgeons, COA is the largest and most influential orthopaedic society in China. The current president is Prof. TIAN Wei from Beijing Jishuitan Hospital, who takes the leading position of upper cervical spine malformation and computer-assisted minimal invasive surgery in China.

Choice Spine
www.choicespine.net

ChoiceSpine is committed to bringing superior products to orthopedic & neurosurgeon specialists who focus on the treatment of spinal disorders & deformities through operative intervention. We are committed to meeting the needs of our customers through new product offerings, existing product enhancement, and continued product development. By working closely with physicians & maintaining service-focused distribution, we will continue to bring technically-superior spinal products to the market.

Clariance, Inc.
www.clariance-spine.com

Founded in 2007, 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.
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<tr>
<th><strong>Collagen Matrix Inc.</strong></th>
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<tr>
<td><strong><a href="http://www.collagenmatrix.com">www.collagenmatrix.com</a></strong></td>
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<tr>
<td>CMI, a leading collagen- and mineral-based biomaterials company, will feature bone graft matrices and collagen dura substitute membranes. We have products at various stages of development. We are seeking independent distributors and partnerships/joint ventures with established medical device companies.</td>
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<th><strong>ContainMed</strong></th>
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<td><strong><a href="http://www.containmed.com">www.containmed.com</a></strong></td>
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<td>ContainMed, Inc. has provided standard and customized sterilization cases and trays along with screw caddies for the last nine years. We offer full engineering and manufacturing design services. Our Lead times are among the best in the industry with layouts for final approval completed within 1 to 2 weeks, prototypes completed within 3 to 5 weeks, and ongoing production of 4 to 6 weeks. Please visit us at booth #1848 or <a href="http://www.containmed.com">www.containmed.com</a></td>
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<th><strong>Cordata Healthcare Innovations</strong></th>
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<td><strong><a href="http://www.cordatahealth.com">www.cordatahealth.com</a></strong></td>
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<td>Cordata Spine, an online spine patient management solution, facilitates spine patient intake, clinician triage, nurse navigation and the collection of clinical outcomes data. Centers utilizing Cordata quickly direct patients to the most appropriate provider in 1 to 3 days and increase patient satisfaction, ancillary services, procedures and surgeries.</td>
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<th><strong>CRC Press</strong></th>
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<td><strong><a href="http://www.crcpress.com">www.crcpress.com</a></strong></td>
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<th><strong>CTE Solutions</strong></th>
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<td><strong><a href="http://www.culverttool.com">www.culverttool.com</a></strong></td>
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<td>CTE Solutions (Culver Tool &amp; Engineering) has supplied to orthopedic OEMs serving the Spine industry for over 27 years by building enduring partnerships with our clients. Our aim is a culture of excellence, based upon integrity. Specializing in Spine Rods, related implants and instruments from prototypes, custom or production quantities, we offer single-source solutions. CTE Solutions is ISO 13485 certified, FDA registered and accredited with Japan as a foreign medical device manufacturer.</td>
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<th><strong>CUSMED</strong></th>
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<td><strong><a href="http://www.cusmed.com">www.cusmed.com</a></strong></td>
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<td>CUSMED, custom made medical, is a CMF and spinal implant company specializing in developing patient specific implant and innovative non-fusion and fusion technologies by PPM, porous paw metal, a trabecular bone like inter-connection structure. PPM, Porous Paw Metal, applied in below fields: 1.Spine; PPM Porous Lumbar Cage, PPM Porous Cervical Cage, PPM Hybrid Ti and PEEK Cage, LOTUS Expandable Cage 2.Orthopedics: Osteolysis Hip Revision, Tumor Reconstruct, Hip Dysplasia, Acetabular Defect Reconstruct.</td>
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<th><strong>Custom Spine</strong></th>
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<td><strong><a href="http://www.customspine.com">www.customspine.com</a></strong></td>
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<td>Custom Spine, Inc. with 29 patents issued and 41 patents pending, continually seeks to create surgeon-friendly products which provide the patient with added benefits over other products in the market. Products include Securis MIS screw system with low profile screw head that features a 5.0mm chrome cobalt rod, Regent ACP low profile anterior cervical plate, ISSYS LP complete lumbar fixation system, and Pathway interbody fusion devices for both the lumbar and cervical spine.</td>
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<th><strong>Cutting Edge Spine</strong></th>
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<td><strong><a href="http://www.cutting-edge-spine.com">www.cutting-edge-spine.com</a></strong></td>
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<td>Structural implant design with load sharing in mind A 510K approved family of spinal interbody systems, encompassing five different forms of Peek Optima® LTI interbody spacers; with forms specific to anterior, posterior, lateral and transfemoral approaches and offering comprehensive instrumentation.</td>
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<th><strong>Danco Anodizing</strong></th>
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<td><strong><a href="http://www.danco.net">www.danco.net</a></strong></td>
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<td>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® anodizing techniques. Danco maintains production facilities in Arcadia, CA and Warsaw, IN with R&amp;D support in CA.</td>
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<th><strong>DePuy Synthes Spine</strong></th>
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<td><strong><a href="http://www.depuyspine.com">www.depuyspine.com</a></strong></td>
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<td>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 &amp; Johnson, the largest provider of orthopaedic and neurological solutions in the world. <a href="http://www.depuysynthes.com">www.depuysynthes.com</a></td>
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<tr>
<th><strong>DESIGNS FOR VISION, INC</strong></th>
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<td><strong><a href="http://www.designsforvision.com">www.designsforvision.com</a></strong></td>
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<td>Just See It™ with Designs for Vision’s lightweight custom-made surgical Telescopes- now 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.</td>
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<tr>
<td>Company Name</td>
<td>Exhibit Number</td>
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<td>DFINE</td>
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<td>DIO MEDICAL Co.,Ltd.</td>
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<td>DiscGenics</td>
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<td>DJO GLOBAL</td>
<td>1007</td>
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<td>Doctors Mobile Healthcare Intl.</td>
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<td>Dynamic Disc Designs Corp.</td>
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<td>ECA Medical Instruments</td>
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<td>Eisertech</td>
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<td>Ellipse Technologies</td>
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<tr>
<td>elliquence LLC</td>
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DFINE is the developer of minimally invasive radiofrequency (RF) targeted therapies for the treatment of vertebral pathologies. Our devices are built on an extensible RF platform that currently covers two procedural applications: The treatment of vertebral compression fractures (VCFs) with the StabiliT Vertebral Augmentation System, and the palliative treatment of metastatic vertebral body lesions with the STAR Tumor Ablation System.

DFINE is the developer of minimally invasive radiofrequency (RF) targeted therapies for the treatment of vertebral pathologies. Our devices are built on an extensible RF platform that currently covers two procedural applications: The treatment of vertebral compression fractures (VCFs) with the StabiliT Vertebral Augmentation System, and the palliative treatment of metastatic vertebral body lesions with the STAR Tumor Ablation System.

DIO medical is a professional medical equipment manufacturing firm for orthopedic. Based on continuous improvement concept of our firm, we are seeking for the “Actualization of customer satisfaction by acquiring the best products and safety” Our customer satisfaction concept reflects the philosophy of Dio medical, which emphasizes the safety. Safety is the most important part of medical equipment and we think of it as the most important goal to acquire competitiveness in technology.

DiscGenics™ is a spinal therapeutics company developing novel treatments for patients suffering from intervertebral disc diseases. Back pain is the second most common reason to visit one’s doctor, and costs the US an estimated $100 billion each year. From our patented culture method comes the Discosphere™, a therapeutic cluster of stem/progenitor cells shown to excrete the biological components needed to regenerate an intervertebral disc.

DJO Global is a leading global medical device company providing solutions for musculoskeletal and vascular health, and pain management. The Company’s products help patients prevent injuries or rehabilitate after surgery, injury or degenerative disease. DJO’s brands include Aircast®, DonJoy®, ProCare®, CMF®, Empi®, Saunders®, Chattanooga Group™, DJO Surgical, Cefar®-Compex® and Ormed®., Dr. Comfort, Bell Horn www. DJOglobal.com

Doctors Mobile Healthcare Intl. offers an intuitive mobile app that delivers essential business tools to surgeons, hospitals, medical professionals and vendors. Doctors Mobile Healthcare Intl also offers robust software programs that include PACS (picture archiving communication systems) and EMR (electronic medical records).

Eisertech is a medical device manufacturer focusing on the spine. Our products are designed for surgeon efficiency. Please stop by our website at www.eisertech.com to learn more about our current and future products.

Eisertech is a medical device manufacturer focusing on the spine. Our products are designed for surgeon efficiency. Please stop by our website at www.eisertech.com to learn more about our current and future products.

Ellipse Technologies, Inc. is a privately held medical device company located in Irvine, California. The Company is dedicated to the design, development, and commercialization of its evolving proprietary technology platform for orthopedic and spinal applications. This technology enables precisely controlled, non-invasive post-operative adjustment of implants allowing surgeons to better address a range of clinical needs. For more information, please visit www.ellipse-tech.com.

elliquence, LLC. manufactures patented Low Temperature surgical Radiowave technology, Cobra™ energized cobb elevator, Meddusa™ bipolar coagulator, and Disc-FX™ discectomy system are examples of the full line of accessory applications offered for all orthopedic procedures. Ellience focuses on sparing healthy tissue while precisely treating pathology.
Elite Surgical
www.elitesurgical.com

Elite Surgical has achieved international manufacturing recognition through its’ contributions to Research and Development in orthopaedics and through its’ compliance to the European CE, American FDA and ISO series of quality accreditations. The company produces many leading-edge arthroplasty, spinal and specialist orthopaedic devices. Elite Surgical’s commitment to experimental research resulted in such pioneering achievements as the use of cross-linked polyethylene in the 1970’s, and innovative product developments under the ARD brand name in the 1980’s and 1990’s. Elite remains committed to forging meaningful and lasting partnerships that can be translated into commercially viable, value-added products and services for all.

Elite Surgical                   231
www.elitesurgical.com

EPTAM Plastics
www.eptam.com

EPTAM Plastics is ISO:13485:2003 certified and registered. EPTAM’s advanced machining technologies and quality systems deliver the highest quality components from materials such as Invibio PEEK OPTIMA®, EPTAM offers: Multi-axis – dry Machining technology, Microblast Deburring insures critical components are burr free. In-house Laser Marking and Automated “Marker”/Pin manufacturing.

EPTAM Plastics                   236
www.eptam.com

Elsevier, Inc.
www.elsevierhealth.com

ELSEVIER presents The Spine Journal, the official journal of the North American Spine Society. Please stop by our booth to view the latest issue of the journal and browse our other books and journals.

Elsevier, Inc.                   705
www.elsevierhealth.com

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.

Esaote                    1039
www.esaoteusa.com

Eminent Spine
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.

Eminent Spine                   228
www.eminentspine.com

Empirical
www.empiricaltesting.com

With more than 15 years’ experience, the Empirical family of companies offers the full range of consulting, testing, manufacturing and validation services. Our testing division, ETC, holds A2LA accreditation for the largest number of medical device testing methods in the U.S. With sterilization and distribution validation services, our ISO/IEC 17025:2005 accreditation, custom protocol development, submission-ready reports, and tailored communications support our commitment to your success.

Empirical                   1412
www.empiricaltesting.com

Evonik Corporation
www.evonik.com/vestakeep

Evonik, a global leader in specialty polymers, supplies implant biomaterials for permanent and temporary contact applications in the orthopedic spine and medical device markets. Evonik’s polyetheretherketone (PEEK) products are known as VESTAKEEP® PEEK and serve a wide range of medical applications. VESTAKEEP® has been referenced in numerous spine 510(k) clearances. The Evonik Master File with the FDA contains the necessary testing to confirm mechanical and biocompatibility performance.

Evonik Corporation                   2530
www.evonik.com/vestakeep

Enova Illumination
www.enovaillumination.com

Enova model D-200 is the world’s brightest LED surgical headlight and Enova model XLT-125 is brightest LED headlight with adjustable spot and co-axial alignment. Pure white illumination, light-weight and comfortable too. Up to 24 hrs battery life! 5 year warranty on LED and made in the USA. Both models are popular with spine surgeons worldwide.

Enova Illumination                   308
www.enovaillumination.com

Exactech, Inc.
www.exac.com

Suite 129

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.

Exactech, Inc.                   505
www.exac.com

NASS 29TH ANNUAL MEETING 181
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<tr>
<th>Exhibitor Name</th>
<th>Booth Number</th>
<th>Website</th>
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<tr>
<td>Fehling Surgical Instruments, Inc.</td>
<td>1420</td>
<td><a href="http://www.fehlingsurgical.com">www.fehlingsurgical.com</a></td>
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<tr>
<td>Fziomed, Inc.</td>
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<td><a href="http://www.fziomed.com">www.fziomed.com</a></td>
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<td>Gauthier Biomedical, Inc</td>
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<td>gSource, LLC</td>
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<td><a href="http://www.gssource.com">www.gssource.com</a></td>
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<td>Hans Biomed USA Inc.</td>
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<td><a href="http://www.hansbiomed.com">www.hansbiomed.com</a></td>
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**Fehling Surgical Instruments, Inc.**

Featuring the “CERAMO® 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® Surgical Instrument Line”. See AND feel the black ceramic instruments.

**Fziomed, Inc.**

FzioMed is a medical device company engaged in the development and commercialization of advanced, absorbable biosurgery products. Oxiplex®, FzioMed’s patented polymer technology, is being developed for use in adhesion prevention, hemostasis, sealants, and drug delivery. Oxiplex®/ SP Gel for the prevention of epidural adhesions has received the CE Mark and is approved in almost 70 countries.

**Gauthier Biomedical, Inc.**

Gauthier Biomedical, Inc. is a proud manufacturer of high-quality instruments, off-the-shelf and contract manufacturing, for spine, trauma, hip, shoulder, knee, ankle and small bone surgical applications. At the core of Gauthier Biomedical instrumentation is our patented multi-color silicone overmolding product capability. We are a one-stop shop that offers in-house engineering and industrial design support.

**Gibraltar Laboratories**

Gibraltar Laboratories is a 44 year old, highly respected, FDA registered, ISO 17025 certified laboratory specializing in studies for the spinal implant/surgical instrument industries: Sterilization Validation (ST77/ST79) Cleaning Validation (Protein, Hemoglobin, Carbohydrate, Bioburden, Cytotoxicity) Sterility testing Endotoxin Reprocessing Environmental Monitoring GBL has been an annual recipient of the top awards in customer satisfaction from the American Council of Independent Laboratories.

**Gold Standard Orthopaedics**

With thousands of successful fusion cases, Gold Standard Orthopaedics is the standard for spinal solutions in a changing marketplace. Headquartered in Louisville KY, we design and manufacture high quality spinal implants and instruments in the US, including our proprietary cannulated system. Marketed directly and through select distributors and representatives.

**GS Medical Co., Ltd.**

GS Medical is the largest and most established South Korean spinal implant manufacturer and distributor and is positioned to grow exponentially within the global spine market. Staffed with a network of industry leaders, medical sales distributors, accomplished engineers, and collaborating physicians. GS Medical is at the forefront of high-quality, cost contained medical technology with a number of innovative implant solutions in the commercialization pipeline.

**gSource, LLC**

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.

**Hans Biomed USA Inc.**

Hans Biomed USA is the FDA registered and AATB accredited processing Tissue Bank. We introduce our S10K cleared DBM Gel & Putty “SurFuse & ExFuse” and look for distributors and private partners.
<table>
<thead>
<tr>
<th>EXHIBITOR INDEX</th>
<th>TECHNICAL EXHIBITION</th>
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<tr>
<td><strong>HARVEST TECHNOLOGIES CORP.</strong></td>
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<td><a href="http://www.harvesttech.com">www.harvesttech.com</a></td>
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<tr>
<td>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.</td>
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</table>

| **HENSLER SURGICAL PRODUCTS, LLC** | 1309 |
| [www.henslersurgical.com](http://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. |

| **HILLDT SOLUTIONS** | 2323 |
| [www.hilldtsolutions.com](http://www.hilldtsolutions.com) |
| HillDT delivers a NonOperative option for low back and cervical pain. Deliver pain relief and lasting rehab with the ‘Missing Link’ in patient care with the non-invasive HillDT solution. Gain a new revenue stream with widely accepted cash based services. Get the training, office procedures and clinical support delivered to your clinic to quickly begin treating patients and generating six figure income. To learn more see us in Booth 2323 in the ‘First Time Exhibitors’ Area |

| **HYDROCISION** | 1631 |
| [www.hydrocision.com](http://www.hydrocision.com) |
| HydroCision is the leading developer, manufacturer and marketer of fluidjet based surgical tools for the spine market. The SpineJet products cut and aspirate tissue at the same time allowing surgeons to quickly and precisely prepare the disc space for fusion and discectomy. The high-velocity, non-thermal fluid jet cuts tissue continuously, reducing procedure time and surgeon fatigue. The power of the fluidjet easily cuts and removes tissue without damaging surrounding cartilage and bone. |

| **IHI IONBOND INC.** | 240 |
| [www.ionbond.com](http://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** | 733 |
| [www.imedicom.co.kr](http://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** | 213 |
| [www.implanet.com](http://www.implanet.com) |
| IMPLANET America, a spine company providing IMPLANET “Made in France” solutions. Carrying over 20 years of experience and more than 80 patents in surgical implants, our team uses cutting edge technologies to design, develop, manufacture, control and trace our products. Provided in GST ready-single sterile packaging, our solutions allow surgeons and hospital staffs to help their patients to return to a normal, productive and pain free life. |

| **INFINITE THERAPEUTICS** | 2145 |
| [www.infinitymasagechairs.com](http://www.infinitymasagechairs.com) |
| The Infinity IT-8800, COMPARABLE TO THE INADA™ for 1/2 the price, offers state of the art roller foot reflexology, thigh and hip massage, an amazing spinal decompression stretch, sensors for customized targeted massage, lumbar heat and music, endless luxury, ULTIMATE MASSAGE! |

| **INNOVASIS, INC.** | 619 |
| [www.innovasis.com](http://www.innovasis.com) |
| Innovasis is committed to the constant innovation of Spinal implants and other related products. We Innovate. We Involve. We Invent. |

<p>| <strong>THE INSTITUTE OF MUSCULOSKELETAL SCIENCE &amp; EDUCATION (IMSE)</strong> | 2221 |
| <a href="http://www.imseinstitute.org">www.imseinstitute.org</a> |
| IMSE has a staff of physicians, engineers and clinical experts that deliver a turnkey solution for physicians who want to be published or commercialize their ideas. IMSE also provides solutions to medical device companies who want to bring new and/or improved products to market or into compliance. IMSE core initiatives are: Product Development, Clinical Studies, Intellectual Property and Certified Medical Education. IMSE &amp; IMSE-CME are independent companies; we are not a medical device company. |</p>
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<tr>
<th>Company Name</th>
<th>Exhibit Number</th>
<th>Website</th>
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<tbody>
<tr>
<td>Integra</td>
<td>1129</td>
<td><a href="http://www.integralife.com">www.integralife.com</a></td>
<td>Integra is a leading provider of spinal and orthobiologics solutions with a comprehensive product line from occiput to sacrum. Integra is a fully integrated medical device company targeting medical specialties worldwide. Products include surgical implants, regenerative technologies, orthobiologics and medical instruments used in neurosurgery, spinal, orthopedic and general surgery. Integra Spine is expanding its technology portfolio with the launch of Nanometalene.</td>
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<tr>
<td>InTech Medical</td>
<td>824</td>
<td><a href="http://www.intech-medical.com">www.intech-medical.com</a></td>
<td>Founded in France in 2000, In'Tech Medical is a privately held manufacturer of surgical instruments, specialized in Orthopaedics. With a team of 280 dedicated employees, offices and production facilities in both Europe and the United States, the company is ideally positioned for sustainable growth and personalized customer care. InTech is proud to offer a comprehensive range of elegant “off-the-shelf” surgical instruments as well as cutting-edge systems, such as its proprietary “MIS Retractor”.</td>
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<tr>
<td>Instron</td>
<td>2533</td>
<td><a href="http://www.instron.com">www.instron.com</a></td>
<td>Intron systems are used extensively by the biomedical industry. Test applications range from biomaterials, such as human and bio-engineered tissues, to devices using medical-grade plastics and nitinol wire. Intron provides customers with comprehensive solutions for all their research, quality and service-life testing requirements.</td>
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<tr>
<td>Intellirod Spine</td>
<td>1645</td>
<td><a href="http://www.intellirodspine.com">www.intellirodspine.com</a></td>
<td>Intellirod Spine is developing wireless disposable and implantable sensor technology for monitoring strain in spinal rods. This innovative system will allow spine surgeons to assess the changing loads on spinal rods which may reduce the need for unnecessary procedures while potentially accelerating patients’ return to work after surgery. The Intellirod System will provide objective intraoperative and postoperative data complementing surgeon data currently collected from various imaging studies.</td>
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<tr>
<td>Intrepid Orthopedics</td>
<td>2146</td>
<td><a href="http://www.intrepidorthopedics.com">www.intrepidorthopedics.com</a></td>
<td>Intrepid Orthopedics’ mission is to help customers advance their ideas from conceptualization to commercialization. For over the last 20 years, the engineers at Intrepid have successfully developed over 30 medical device systems. Some were as simple as a cannulated screw, while others were as complex as a total disc replacement. Our team offers product development, testing, operations, quality, and regulatory expertise to entrepreneurs, surgeons, startup and major orthopedic companies.</td>
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<tr>
<td>Invibio Biomaterial Solutions</td>
<td>1714</td>
<td><a href="http://www.invibio.com">www.invibio.com</a></td>
<td>Invibio revolutionized spinal device design by introducing the breakthrough implantable polymer PEEK-OPTIMA, which has become the standard for spinal interbody fusion. Since then, we have continued to pioneer spinal industry innovation driven by clinical need and our customers’ desire to continually improve patient outcomes. Whether your program objectives focus on new product development, improving production efficiencies, or accessing new markets, Invibio can help you meet your goals.</td>
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<tr>
<td>Invuity, Inc.</td>
<td>1139</td>
<td><a href="http://www.invuity.com">www.invuity.com</a></td>
<td>Invuity develops advanced medical devices to dramatically improve access and visualization in minimally invasive and minimal access surgery. The company’s products incorporate its proprietary Eigr™ technology into sophisticated hand-held illumination devices and access systems for a variety of surgical specialties including spine, orthopedics, breast and thyroid oncologic, plastic and general surgery.</td>
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<td>jalexmedical.com</td>
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<td>Jewel Precision</td>
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<tr>
<td>K2M Inc.</td>
<td>805</td>
<td>Suite 135</td>
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<td>KARL STORZ Endoscopy-America, Inc.</td>
<td>1613</td>
<td><a href="http://www.ksea.com">www.ksea.com</a></td>
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<td>Kinduct Technologies</td>
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<tr>
<td>Kirwan Surgical Products LLC</td>
<td>1905</td>
<td><a href="http://www.ksp.com">www.ksp.com</a></td>
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ISIS Services is a leader in preclinical medical device contract research with over 25 years of experience in experimental surgery. With four surgical suites and imaging equipment including a cath lab, c-arms, ultrasound, endo and lap towers, ISIS is fully equipped to handle all of your study needs from research and development to non-GLP and GLP. We take a collaborative approach with our clients understanding the complexities of research and the unique needs of individual companies.

At ISTO Technologies, we’re applying innovative orthobiologics to develop breakthrough products that restore and regenerate function to damaged cartilage and bone. It’s the future of regenerative medicine for chronic spine and joint conditions—and it’s happening today at ISTO.

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.

KARL STORZ is an established leader in diagnostic and operative endoscopy technology solutions. Our comprehensive range of products for minimally invasive spine surgery includes the new SpineTIP® System. This pure endoscopic system is designed for lumbar discectomy procedures and offers the flexibility of three surgical approaches: transforaminal, interlaminar and posterolateral.

Kinduct Health is a software as a service (SaaS) based system that provides patients with personalized content and tools that have been developed with healthcare professionals and are prescribed based upon a patient’s condition to enable the patient to be better informed and equipped to manage their path to wellness. The patient portal provides the practitioner the capability to monitor a patient’s progress and interactions with the portal throughout the continuum from referral to recovery.

Kirwan Surgical Products LLC is dedicated to creating and developing high-quality specialty electrosurgical instruments and accessories. An innovator in the field of electro surgery, we offer a full range of reusable and disposable bipolar forceps and bipolar cords. Our AURA Elite non-stick bipolar forceps employ the physics of high conductivity to achieve the non-stick effect during coagulation. Highlighting our product line is the AURA 70-Watt Irrigating Bipolar Electrosurgical Generator.
Knight Mechanical Testing  
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.  
www.korosusa.com

For the past 33 years Koros USA has manufactured and distributed state of the art surgical instruments such as our Cervical Black Belt Retractor & Lumbar Super Slide and ALIF Polaris retractors, along with our rotating Osteopunch & Ejector Punch Plus rongeurs. Our devices provide ergonomically controlled movement and stability.

L3 Healthcare Design Architects  
www.l3asc.com

L3. is a national leader in the Design and Development of Spine Surgery Centers. 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. At L3, Surgery Center Architecture is not only our business, it’s our passion. L3 has the knowledge, experience and ability to deliver projects from concept through accreditation to opening day.

LDR Spine USA  
www.ldr.com

LDR Holding Corporation is a global medical device company focused on the treatment of spinal disorders. LDR’s exclusive VerteBRIDGE® fusion and Mobi® non-fusion technologies are designed for less invasive applications in the cervical and lumbar spine, which provide greater intra-operative flexibility, simplified surgical techniques, and improved clinical outcomes for patients.

Life Instrument Corporation  
www.lifeinstruments.com

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.  
www.lifespine.com

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.

Leica Microsystems  
www.leica-microsystems.com

The best just got better. Introducing innovations to the Leica line of surgical microscopes with a greater working distance and advanced ergonomics specially designed for spine cases. See and capture more detail than ever before with brilliant 400 watt illumination and the Leica HDC100 high definition camera.

LifeLink Tissue Bank  
www.lifelinktb.org

LifeLink Tissue Bank, the largest not-for-profit tissue bank in the south east, 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.
<table>
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<th>Exhibitor</th>
<th>Booth Number</th>
<th>URL</th>
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<td>2019</td>
<td><a href="http://www.accesslifenethealth.org">www.accesslifenethealth.org</a></td>
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<td>Lilly USA, LLC</td>
<td>1839</td>
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<td>LINKSpine</td>
<td>1023</td>
<td><a href="http://www.linkspine.com">www.linkspine.com</a></td>
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<td>1148</td>
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<td>Lumitex MD</td>
<td>210</td>
<td><a href="http://www.lumitexmd.com">www.lumitexmd.com</a></td>
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<td>Mazor Robotics Inc.</td>
<td>519</td>
<td><a href="http://www.mazorrobotics.com">www.mazorrobotics.com</a></td>
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<tr>
<td>Mazur Marketing</td>
<td>204</td>
<td><a href="http://www.newrongeur.com">www.newrongeur.com</a></td>
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<tr>
<td>MD Conference Express</td>
<td>1048</td>
<td><a href="http://www.mdconferenceexpress.com">www.mdconferenceexpress.com</a></td>
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LifeNet Health helps save lives and restore health for 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 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 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 is focused upon improving outcomes and in the process has created an innovative portfolio of powerful, yet simple solutions for less invasive surgery. Function lies at the core of our products. We design for superior performance and take a meaningful and empathetic approach to innovation. Our devices are elegant and intuitive, fulfilling a desire for a simple, less invasive approach to lumbar surgery, adding true value for surgeons who are tiring of long learning curves.

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 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.

Lumitex Medical Devices creates, manufactures and distributes unique devices for medical illumination. LightMat Surgical Illuminator provides cool, shadowless deep cavity lighting. Flexible or malleable, it may be placed onto most retractors or instruments. VersaLight Multifunctional Surgical Illuminator illuminates, irrigates, aspirates and provides moderate blunt retraction in one easy to use hand held surgical tool. www.lumitexmd.com 800-969-5483

As a leading manufacturer of medical implants and instruments, Marox utilizes the most advanced machining technology. Process capabilities include simultaneous 5-axis CNC milling, CNC 6-8 axis multi-process milling, CNC Swiss turning, CNC wire and sinker EDM, CNC thread whirling, and assemblies. We process titanium, implantable grade PEEK, cobalt chrome, stainless steel and many other materials. ISO 13485 and FDA registered.

Mazor Robotics is dedicated to the development and marketing of innovative surgical guidance systems and complementary products that provide a safer surgical environment for patients, surgeons, and operating room staff. Mazor Robotics’ flagship product, Renaissance®, is a state-of-the-art surgical guidance system that enables surgeons to conduct spine surgeries in an accurate and secure manner. Mazor Robotics systems have been successfully used in the placement of over 50,000 implants worldwide.

MAZUR MARKETING provides physician designed surgical instruments used primarily in spine surgery. The premier instrument is the New Mazur Rongeur with angled concave and asymmetrical tips for accurately, quickly, and efficiently shaping and smoothing all bony surfaces, especially the anterior cervical spine. It has a unique non-clogging tip. It is made with the highest quality German stainless steel and German manufacturing craftsmanship.
MD Logic is the leading U.S. provider of High Performance Electronic Health Records Solutions empowering healthcare providers the technology to document care “real time” in the exam room. Since 1994, MD Logic has been successfully installing Electronic Health Records in healthcare clinics from coast to coast. With the MD Logic World Wide EHR you eliminate dictation and go home after the last patient is seen. Call us today and learn why MD Logic is unmatched in speed, efficiency and value.

Medacta International, a Swiss company, develops, manufactures and distributes orthopaedic and neurosurgical devices worldwide. Medacta’s success is based on innovation and education. Since 2009 Medacta has worked closely with a strong international faculty to design and develop the next generation of spine implants. Its focus is anatomical design, modular functionality and system efficiency. Medacta is committed to become a major spine partner/supplier within the leading world markets.

MedCure is a leading international provider of non-transplant, anatomical specimens and surgical training services, with state-of-the-art surgical training facilities in Oregon, Nevada, and Rhode Island. These services contribute to emergency medical personnel and advanced physician training, disease study, medicine improvements, and the development of assistive medical devices and less invasive patient surgical treatments.

Medfix® International, LLC is focusing on delivering total solutions to the global spine market which enable our customers to deliver a more cost-effective procedure while maintaining the highest level of quality in their instrumentation and implants. Our design team has removed the uncertainty of what equipment is necessary for spinal procedures. Medfix® International, LLC can provide a comprehensive package of spine instruments, retractor sets procedure-specific instrumentation and implants.

MEDICREA is a fully-dedicated spinal implant company focused on introducing reliable and innovative technologies to the global marketplace. With over 19 years of experience, MEDICREA provides a full range a full range of patented products that are conceived, developed and manufactured to advance patient outcomes and support the work of medical professional.
**Misonix, Inc.**
[www.misonix.com/bonescalpel](http://www.misonix.com/bonescalpel)

**Solution Showcase Theater Presentation (Booth 2504):**
Thursday, November 13, 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. Please visit us at booth #510 at NASS 2014 for more information.

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**Mitaka USA**
[www.mitakausa.com](http://www.mitakausa.com)

Mitaka USA, Inc. specializes in optical, electronic, and fluorescence imaging devices for surgical use. The KestrelView is an overhead 3D imaging system designed to replace loupes in the OR. The KestrelView allows the surgeon to comfortably look from any angle without stressing his neck. Rather than wearing loupes, the surgeon can view the surgical site via a 32” 3D monitor. The KestrelView is made up of an overhead stand, a repositionable overhead 3D imaging device, and a HD recording device.

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**Mizuho America, Inc.**
[www.mizuno.com](http://www.mizuno.com)

Mizuho America, Inc. is a cerebrovascular focused instrumentation company whose main products include Sugita T2 Aneurysm Clips, 7201B Operating Table, Cranial Stabilization Systems, Micro Instruments, Kelly Endonasal Set, Lawton Neurovascular Bypass Set, Evans Rotatable Set, Day-Bailes Suction Tubes, NSK Surgical Drill System, ICP-Monitoring System, and Intracranial & Vascular Dopplers. When it’s Microsurgery, it’s Mizuho America, Inc.

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**Mizuho OSI**
[www.mizuhosi.com](http://www.mizuhosi.com)

Mizuho OSI designs and markets Specialty Surgical Tables for spinal, orthopedic trauma and joint replacement procedures. The Spinal Table System (STS), proAXIS® & INSITE® provide three 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.

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**MTS Systems Corporation**
[www.mts.com](http://www.mts.com)

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.

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**Musculoskeletal Clinical Regulatory Advisers, LLC**
[www.mcra.com](http://www.mcra.com)

MCRA is the leading advisory firm & CRO to the neuro-musculoskeletal industry. MCRA’s integrated service divisions include regulatory, reimbursement, clinical research, compliance, and quality assurance and manufacturing. MCRA provides “first-in-class” services through its superior knowledge base, global surgeon and physician relationships, and deeply experienced management team. Additionally, MCRA recently started Specialty Healthcare Advisers, which specializes in healthcare provider consulting.

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**Musculoskeletal Transplant Foundation**
[www.mtf.org](http://www.mtf.org)

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.

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**Nadia International, Inc.**
[www.ronadro.com](http://www.ronadro.com)

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 75 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.”

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**National Health Finance**
[www.aznhf.com](http://www.aznhf.com)

National Health Finance (NHF) is one of the premier medical lien and finance companies in the country. We are currently in over 20 major markets and looking to grow. Whether it’s becoming a provider within one of our already established networks or by joining us as a partner in markets we’re looking to grow in, you have an opportunity to increase your bottom-line with NHF. Please stop by booth #242 to discuss how you can become a part of NHF and generate more revenue for your practice.

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**National Surgical Healthcare**
[www.nshinc.com](http://www.nshinc.com)

National Surgical Healthcare (NSH) is a Chicago based company that currently owns and operates 13 surgical hospitals and 8 ASCs that are musculoskeletal-focused (orthopedics, spine, and pain management). All facilities are structured as joint ventures with physicians and/or with health systems. NSH’s success is driven by our physician-focused operating philosophy, with a continuous focus on high clinical quality and sustainable growth on behalf of its partners.
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<thead>
<tr>
<th>Company</th>
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<td>NeuroStructures</td>
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<td>NeuroStructures is committed to bringing superior products to orthopedic and neurosurgeon specialists who focus on the treatment of spinal disorders and deformities. We combine innovative surgical solutions with world-class customer service to improve outcomes and patient quality of life. Additional information can be found at <a href="http://www.neurostructures.com">www.neurostructures.com</a>.</td>
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<tr>
<td>Next Orthosurgical</td>
<td><a href="http://www.nextorthosurgical.com">www.nextorthosurgical.com</a></td>
<td>2439</td>
</tr>
<tr>
<td>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.</td>
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<tr>
<td>Nexus Spine</td>
<td>Suite 2736</td>
<td>2736</td>
</tr>
<tr>
<td>Nexus Spine provides novel, differentiated products for spine surgery. Our PressOn spinal fixation system features an ultra-low profile design; eliminates cross-threading and rod bending; provides a built-in revision feature, creates greater locking strength, using couplers 60-75% smaller than conventional tulips.</td>
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<tr>
<td>NOC2 Healthcare</td>
<td>noc2healthcare.com</td>
<td>244</td>
</tr>
<tr>
<td>NOC2 Healthcare sees our current paradigm shift in healthcare as an opportunity for greater cross-industry alignment. Our network is interested in creating change versus being at the effect of it. In the face of shrinking reimbursement, funding cuts and increasing healthcare expenditures, it is up to each of us in the medical industry to take a stand for what we believe will truly lead to improved patient care and a more judicious healthcare system for all.</td>
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<tr>
<td>Nordson Medical</td>
<td><a href="http://www.nordsonmicromedics.com">www.nordsonmicromedics.com</a></td>
<td>223</td>
</tr>
<tr>
<td>Nordson Medical, comprised of Nordson Micromedics and Value Plastics, A Nordson Company, is your partner in the global life sciences industry specializing in the design and manufacture of innovative components, devices and custom OEM solutions for precision fluid management and biomaterial delivery systems.</td>
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<tr>
<td>Norman Noble, Inc.</td>
<td><a href="http://www.nnoble.com/index.htm">www.nnoble.com/index.htm</a></td>
<td>415</td>
</tr>
<tr>
<td>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.</td>
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<tr>
<td>North American Spine Foundation</td>
<td><a href="http://www.spine.foundation">www.spine.foundation</a></td>
<td>2304</td>
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<tr>
<td>North American Spine Foundation has launched the North American Spine Foundation as the first public nonprofit organization to collaboratively address spine-related disability, the #1 cause of global suffering. The Spine Foundation is leading and coordinating research, education, and advocacy efforts to reduce and, ultimately, end spine-related disability. Research grants, multi-stakeholder collaborations, legislative advocacy, and public awareness campaigns are being employed to achieve the mission of the Spine Foundation. Please join NASS in supporting the Spine Foundation.</td>
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<tr>
<td>NovaBone Products</td>
<td><a href="http://www.novabone.com">www.novabone.com</a></td>
<td>1035</td>
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<tr>
<td>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.</td>
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<tr>
<td>NSI Health Systems</td>
<td><a href="http://www.nsi-healthsystems.com">www.nsi-healthsystems.com</a></td>
<td>546</td>
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<tr>
<td>NSI Health Systems specializes in the development, manufacturing and distribution of innovative medical devices and technologies.</td>
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<tr>
<td>Nueterra</td>
<td><a href="http://www.nueterra.com">www.nueterra.com</a></td>
<td>1033</td>
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<tr>
<td>Nueterra is taking healthcare forward. Through the power of partnership, we have built an expansive network of providers and together we are transforming the world’s medical landscape. Our powerful programs and services eliminate borders and allow us to integrate providers, connect them to consumers and collaborate with them throughout the healthcare journey. <a href="http://www.nueterra.com">www.nueterra.com</a></td>
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**Nutech**
www.nutechspine.com

Nutech is a leading biologics and medical device company that provides an integrated portfolio of innovative products. They offer a wide range of allograft tissue products, a full line of spinal implants, and a complete line of innovative products taking advantage of the unique properties of the amniotic tissues and fluids. Nutech is dedicated to providing new technologies that will benefit surgeons, hospitals, and most importantly, patients.

**Ortho Development**
www.odev.com

Ortho Development® designs and manufactures spinal fusion and fixation devices along with related surgical instrumentation. Engineered for superior clinical results and ease-of-use, Ortho Development currently offers a lumbar pedicle screw system, a cervical plate, as well as a full complement of PEEK. Distribution opportunities are available.

**NuVasive, Inc.**
www.nuvasive.com

NuVasive® is an innovative medical device company focused on developing minimally disruptive surgical products and procedures for the spine. Our mission is to improve the lives of patients who suffer from debilitating back, neck, or leg pain by creating cutting-edge products and procedures that revolutionize spine surgery through focusing on Speed of Innovation®, Absolute Responsiveness®, and Superior Clinical Results.

**OPM—Oxford Performance Materials, Inc.**
www.oxfordpm.com

Solution Showcase Theater Presentation (Booth 2504):
Friday, November 14, 12:00 p.m.

OPM operates at the intersection of high performance polymers, additive manufacturing technologies, and the creation of structures for the biomedical and aerospace sectors. OPM has obtained ISO 13485:2003 and ISO 9001:2008/AS9100C certificates and received FDA clearance in February 2013 for the OsteoFab® Patient Specific Cranial Device. For more information, please visit www.oxfordpm.com.

**Orthofix, Inc.**
www.orthofix.com

Orthofix is a diversified, global medical device company focused on developing and delivering innovative repair and regenerative solutions to the spine and orthopedic markets. Our products are designed to address the lifelong bone-and-joint health needs of patients of all ages, helping them achieve a more active and mobile lifestyle.

**Orchid**
www.orchid-ortho.com

Orchid strives to affect people’s lives in a positive manner. We feel very fortunate and proud to be working in an industry that has the ability to impact lives in such a profound and positive way. With a comprehensive portfolio of services, every Orchid employee is motivated to work with you from start to finish, or at any step in the development process, to deliver the most innovative products possible and provide the best total supply chain value.

**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.

**Orthopedic Design & Technology**
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. With 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.
Orthopedic Sciences, Inc. promotes the harvest and use of autologous bone and growth factors taken from the iliac crest using a minimally invasive technique. The company offers two systems for bone and bone marrow harvesting. The Bone Tool Bone™ a patented vacuumed assisted bone and marrow (mesenchymal cells-autologous growth factors) harvesting system. The OT-A™ Large Volume Marrow Harvesting System harvests bone marrow from the iliac crest or the proximal tibia through a stab incision.

Orthopedic Solutions Center is a non-profit organization founded by HTI Technologies of France and Sayan Orthopedics of Türkiye. HTI is professionalized in HA coating and ceramic component manufacturing whereas Sayan’s expertise is designing and manufacturing orthopedic and spinal instruments as well as implants on OEM/OBM bases. With unified cooperation, OSC is glad to offer complete solution as a partner to all orthopedic and spinal implant manufacturers worldwide.

ORTHOREBIRTH Co., Ltd. We are manufacturing the new shaped Synthetic Bone, which is the cotton-like Bone Voild Filler named “REBOSSIS” This is made from β-TCP, Calcium Carbonate, Silicate and PLLA. We have already submitted the 510(K) Application for Trauma usage at August 1, 2014. We will start to sell this product in 2015.

ORTHOWORLD, INC. Founded in 1992, ORTHOWORLD is a highly specialized publishing firm offering strategic intelligence, integrated advertising and educational conferences exclusively to the global orthopaedic market. Its singular mission is helping orthopaedic companies and individuals improve their performance.

Osseon LLC develops, markets, and distributes minimally invasive devices for the treatment of vertebral compression fractures (VCF). Headquartered in Santa Rosa, CA, the company’s groundbreaking technology and delivery systems provide safe and effective solutions while offering significant advantages in efficiency and cost. At Osseon our goal is to improve the quality of life for patients and provide healthcare professionals with innovative treatment options for VCFs.

Össur Americas, a leader in Injury Solutions, offers industry proven brands like Miami J®, Resolve® Halo, Occian™ Back, and Miami Lumbar® LSO and TLSO. Össur’s complete spinal care system and fracture management solutions meet the specialized needs of the healthcare provider and patient during each phase of the continuum of care.

OsteoMed, LLC is a leading innovator, developer, and manufacturer of specialty medical devices and implants for the spine. The first to market with a polyaxial interspinous fusion device, which conforms to a patient’s anatomy allowing for better fixation. Now introduces the first “inside-out” lateral access system, to better preserve soft tissue during lateral access. OsteoMed maintains focused on improving patient outcomes through minimally disruptive, innovative technology.

OsteoNovus is an early stage orthopedic medical device company focused on the development of biologic materials to support and regenerate bone. Our innovative technology encompasses novel synthetic calcium phosphate based cements suitable for bone voids, treatment of various fractures and spinal disorders. The product is available as putty (injectable and moldable), granules and structural blocks for spine, trauma and orthopedic surgery.

Otto Trading Inc.

Pacific Instruments, Inc. As a globally recognized contract manufacturer, Pacific Instruments does more than just deliver surgical instruments. We’re a one-stop company for “Total Instrument Management.” We manage, so you can focus on your core business. With over 20 years of experience in the orthopedic industry, and being ISO 13485:2003 certified, we possess the expertise to help design, choose materials, quality inspect, and deliver on time. Above all, customer service is our edge. We focus on you and WE CARE.
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<tr>
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<td>Pak Manufacturing, Inc.</td>
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<td><a href="http://www.pakmanufacturing.com">www.pakmanufacturing.com</a></td>
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<tr>
<td>Pan Medical</td>
<td>2139</td>
<td><a href="http://www.pan-medical.co.uk">www.pan-medical.co.uk</a></td>
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<td>Paradigm BioDevices, Inc.</td>
<td>1619</td>
<td><a href="http://www.paradigmbiodevices.com">www.paradigmbiodevices.com</a></td>
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<td>Paradigm Spine, LLC</td>
<td>2119</td>
<td><a href="http://www.paradigmspine.com">www.paradigmspine.com</a></td>
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<td>Paragon Medical</td>
<td>731</td>
<td><a href="http://www.paragonmedical.com">www.paragonmedical.com</a></td>
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<tr>
<td>Phillips Precision Medicraft</td>
<td>2034</td>
<td><a href="http://www.phillipsmedicraft.com">www.phillipsmedicraft.com</a></td>
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<tr>
<td>Physician Owned Surgery Centers</td>
<td>746</td>
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<tr>
<td>Pinnacle Spine Group</td>
<td>2239</td>
<td><a href="http://www.pinnaclespinegroup.com">www.pinnaclespinegroup.com</a></td>
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**Pacira Pharmaceuticals**

Pacira Pharmaceuticals, Inc. is a specialty pharmaceutical company focused on the development of products that meet the needs of acute care practitioners and their patients. Its lead products, EXPAREL (bupivacaine liposome injectable suspension), was launched in 2012. EXPAREL utilizes the Pacira proprietary delivery technology DepoFoam. For more information, visit http://www.pacira.com.

**Pak Manufacturing, Inc.**

PAK Manufacturing, Inc. has become the leading supplier of forging based specialty and custom hand held instruments to the spinal and orthopaedic industry. An extensive inventory of forgings and manufacturing in the USA allows us to provide quick solutions to customer’s needs. We take great pride in our reputation for quality, value and on time delivery. In house manufacturing capabilities include milling, grinding, heat treating, passivation and polishing. FDA registered.

**Pan Medical**

Pan Medical, a worldwide leader in interventional radiology, has dominated international markets for the last four years with its Kyphoplasty product range. A range which has 8 and 10 gauge balloons and kits, all products British made with full FDA approval and available from the distribution branch in Tampa Florida. We welcome you to visit us at our booth 2139 to find out more information.

**Paragon Medical**

Paragon Medical offers turnkey solutions to the medical device marketplace and partners with its customers to share best practices and jointly develop and implement world-class methods of engineering and manufacturing. Paragon designs, validates, and manufactures cases and trays and reusable and single use surgical instrumentation and implantable components in strategic centers of manufacturing excellence throughout the United States, Europe, and China.

**Phillips Precision Medicraft**

Phillips Precision Medicraft is a leading manufacturer of advanced orthopedic implants, instrumentation, and delivery systems. With sophisticated manufacturing technology, outstanding personnel, and an exceptional level of customer service, we consistently meet the rigorous demands of the global orthopedic marketplace. Our expertise is yours.

**Physician Owned Surgery Centers**

PHYSICIAN OWNED SURGERY CENTERS (POSC) owns and operates multi-specialty and profitable ambulatory surgery centers in partnership with physicians. We also acquire centers for the purpose of expanding/restructuring them.

**Pinnacle Spine Group**

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 we can’t create something innovative, we won’t do it at all. If you have your own innovative idea, bring it to us to help bring it to life.
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<tr>
<th>Company Name</th>
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<td>Precision Medical Technologies, Inc.</td>
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<td>Prosidyán</td>
<td>2340</td>
<td><a href="http://www.prosidyan.com">www.prosidyan.com</a></td>
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<td>Precision Spine Inc.</td>
<td>539</td>
<td><a href="http://www.precisionspineinc.com">www.precisionspineinc.com</a></td>
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<td>Protech Ledged Eyewear, Inc.</td>
<td>2431</td>
<td><a href="http://www.protecheyewear.com">www.protecheyewear.com</a></td>
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<td>Proclaim Physician Services</td>
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<tr>
<td>Pronto Marketing</td>
<td>2207</td>
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<td>Proscan Reading Services</td>
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<td>Providence Medical Technology</td>
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<td><a href="http://www.providencemt.com">www.providencemt.com</a></td>
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<td>Puracon</td>
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<td><a href="http://www.puraon.com">www.puraon.com</a></td>
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<td>Pyxidis</td>
<td>2008</td>
<td><a href="http://www.pyxidis-medical.com">www.pyxidis-medical.com</a></td>
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**Precision Medical Technologies, Inc.**

Precision Medical Technologies, Inc. is a contract manufacturer of orthopaedic 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.

**Prosidyán**

Prosidyán develops ultra-porous synthetic bone graft substitutes from microscopic fibers of bioactive glass.

**Protecch Ledged Eyewear, Inc.**

PPE such as radiation reducing apparel is OSHA required. Come visit with the leading supplier of Radiation Safety Products. We offer an extensive line of radiation reducing eyewear, apparel and the best surgical radiation protective gloves on the market. Special discounts if you place an order at the show. Now offering Nike and Nine West lead glasses including over 20 options. We’ve got you covered, literally.

**Proclaim Physician Services**

PROCLAIM PHYSICIAN SERVICES is a management services provider that Helps Practices Prosper! We show you how to Increase Practice Revenue and Reduce Overhead. Proclaim provides turnkey management of Point of Care Pharmacy and Toxicology Programs. We also provide full billing and collection services along with practice management.

**Pronto Marketing**

At last, a web presence that works as hard as you do. Our custom-made websites are specifically designed to meet the Internet Presence needs of medical professionals, companies and individuals alike. Pronto gives you Internet Peace of Mind, so you can focus on your business and have more time to serve the needs of your patients. For one low monthly rate, our experts handle your entire Internet Presence including web design, hosting and infrastructure, copywriting, SEO, social media and much more.

**Proscan Reading Services**

Proscan Reading Services: World Leader in MSK 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 Radiologists. Proscan: Getting the quality and economics right!
### QTC A Lockheed Martin Company
**www.qtcm.com**
QTC is the largest private provider of government-outsourced occupational health and disability examination services in the nation. Our more than 30-year history has been marked by a focus on delivering technology-driven examination solutions for our customers.

### Quality Medical Publishing Inc.
**www.qmp.com**
Quality Medical Publishing, Inc. is widely recognized for creating high quality medical educational material. Stop by the booth to learn about our online offerings and to check out our new operative videos and mobile device apps!

### Quinn Medical
**www.quinnmedical.com**
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 945 to learn more about Quinn Medical and our revolutionary SLEEQ™ Spinal Therapy System.

### Reliance Medical Systems
**www.reliance-medical-systems.com**
Reliance Medical Systems is a growing spinal implant manufacturer serving the surgeon’s individual needs. We specialize in new and exciting products, but also at strengthening and improving existing products. We offer a full gamete of spinal fusion products, with some of the industry’s best designs and instruments. Reliance is able to create customized product to better suit its customers’ needs.

### Renovis Surgical Technologies
**www.renovis-surgical.com**
Renovis Surgical Technologies is pioneering the use of additive manufacturing for spinal implants. Using this technology, our Tesera™ line of porous titanium interbody fusion cages feature truly porous upper and lower contact surfaces, providing an optimum scaffold for bone ingrowth from the vertebral endplates. A solid titanium core provides strength and allows for a large graft chamber. Featured at NASS is our Tesera Stand-alone ALIF cage, with integrated screws and locking cover plate.

### Richard Wolf Medical Instruments Corporation
**richardwolfusa.com**
Richard Wolf is the world leader in spine endoscopy, featuring high-definition working-channel endoscopes enabling revolutionary surgeries of the lumbar and cervical spine. A comprehensive system of instrumentation - including the new 10mm Central Stenosis Set – facilitates a range of MIS procedures including endoscopic discectomy, foraminoplasty, rhizotomy, fusion, and central canal decompression.

### rms Surgical
**www.rmssurgical.com**
rms Surgical is a contract manufacturer of sterilization Cases & Trays and custom Surgical Instruments. Formed in 2012 through a consolidation of Juno Inc.’s Case / Tray and rms Company’s Instrumentation operations, rms Surgical is an integral part of the Cretex Medical family of companies providing innovative and unique manufacturing solutions to medical device OEM’s. Our other Cretex Medical companies include rms Co., Meier Tool, JunoPacific (with Wickstrom Rapid Tooling) and Spectralytics.

### Rose Micro Solutions
**www.rosemicrosolutions.com**
Rose Micro Solutions sells High Quality Optical Loupes & LED Lights for Less! Our Loupes start @ $279.00. We are a “Family” Business consisting of 4 Brothers. We named the company after our Mother “ROSE”. Stop by Booth(s) #220, 1346 & 2531 to see for yourself. Or Visit us online @ www.rosemicrosolutions.com 716-608-0009

### RTI Surgical
**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.

### Safe Orthopaedics
**www.safeortho.com**
Safe Orthopaedics is focused on enhancing the cost-effectiveness, safety and efficiency of orthopedic implant and instrument systems through a new model of single-use, sterile and traceable procedure kits. By streamlining the expensive, complex and inefficient process by which implant systems are delivered, Safe Orthopaedics endeavors to dramatically improve the value proposition of these procedures.
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<tr>
<th>Company Name</th>
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<td>Safewire, LLC</td>
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<td>SBH</td>
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<td>Scanlan International, Inc.</td>
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<td>Seabrook International</td>
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<td>SentioMMG</td>
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<td>Shukla Medical</td>
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<td>SI-BONE, Inc.</td>
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<td>Siemens Medical Solutions USA, Inc.</td>
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**SafeWire, LLC**
www.safe-wire.com

SafeWire is a spine and orthopedic instrument company committed to improving MIS procedures. It is our goal to bring new technology and materials into the arena of MIS surgery, replacing common instruments and techniques still being utilized from earlier open procedures.

**Sawbones**
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.

**SBH**
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.

**Scanlan International, Inc.**
www.scanlaninternational.com


**Seabrook International**
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, customs & specials, instrument modification, and production-volume manufacturing services.

**SentioMMG**
www.sentiommg.com

SentioMMG is a proprietary FDA-approved intraoperative nerve mapping device based on MMG smart-sensor technology. SentioMMG is resilient to electrical interference, and does not require complex filtering or expert interpretation, resulting in a system simple to setup and interpret, providing the surgeon with real-time feedback of precise nerve location. SentioMMG is a simple to use, cost effective alternative to traditional monitoring for spine cases.

**SHOWA IKA Kohgyou Co., Ltd.**
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

**Shukla Medical**
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.

**SI-BONE, Inc.**
www.si-bone.com

**Solution Showcase Theater Presentations (Booth 2504):**
Wednesday, November 12, 12:30 p.m.
Thursday, November 13, 12:00 p.m.

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 SI joint disorders. The company is manufacturing and marketing a minimally invasive surgical (MIS) technique for the treatment of SI joint pathology.

**Siemens Medical Solutions USA, Inc.**
www.usa.siemens.com/healthcare

Siemens Healthcare is one of the world’s largest suppliers to the healthcare industry and the first full-service diagnostics company. The company is known for bringing together innovative medical technologies, healthcare information systems, management consulting, and support services, to help customers achieve tangible, sustainable, clinical, and financial outcomes. www.usa.siemens.com/healthcare
<table>
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<td>Sintea Plustek</td>
<td>1128</td>
<td><a href="http://www.sinteaplustek.com">www.sinteaplustek.com</a></td>
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<td>Skye Orthobiologics/Osprey</td>
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<td><a href="http://www.ospreybiomedical.com">www.ospreybiomedical.com</a></td>
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<td>Solvay</td>
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<td><a href="http://www.SolvaySpecialtyPolymers.com">www.SolvaySpecialtyPolymers.com</a></td>
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<td>Southern Spine, LLC</td>
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<td><a href="http://www.southernspine.net">www.southernspine.net</a></td>
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<td>Spinal Balance Inc.</td>
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<td><a href="http://www.spinalbalance.us">www.spinalbalance.us</a></td>
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<td>Spinal Elements, Inc.</td>
<td>1729</td>
<td><a href="http://www.spinalelements.com">www.spinalelements.com</a></td>
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<tr>
<td>Spinal News International</td>
<td>2211</td>
<td><a href="http://www.spinalnewsinternational.com">www.spinalnewsinternational.com</a></td>
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SIGNUS has a worldwide reputation for developing, marketing and selling unique spinal implants using cutting-edge technology. Vastly differentiated spinal fusion products are now being designed from Endless Carbon Fiber PEEK®. SIGNUS is also spearheading the diagnosis and treatment for the problematic indication of SI pain.

Simpirica Spine develops minimally invasive, flexion-restricting stabilization devices. The company’s lead product, the LimiFlex™ Spinal Stabilization System, is a paraspinous tension band that provides stabilization following surgical decompression for treatment of lumbar spinal stenosis with or without degenerative spondylolisthesis, providing an alternative to traditional screw-based stabilization. For investigational use only in the U.S.

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.

Established in 1987 near Milano-Italy, 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 lines include: Posterior Lumbar System, Dorso-lumbar Somatic Cages, Anterior Cervical Plates, PLIF, TLIF. Needle to safely inject cement. Ongoing developments are: cervical arthroplasty, posterior dynamic stabilization.

Osprey Biomedical Corp/Skye Orthobiologics are orthobiologics companies teamed with surgeon design and innovation to maximize fusion and patient’s outcomes through the use of natural biologics. Our focus is designing, manufacturing and supporting a full line of spinal allograft bio-implants, amniotic biologics, barriers, DBM putties, sponges and demineralized cancellous strips.

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.

Southern Spine features the new StabiLink® MIS Spinal Fixation along with the innovative, patented PG™ Precision Guided Inserter/Compressor, that redefines “ease of use”. StabiLink is the new standard in minimally invasive spinal fusion, filling the “void” between conservative therapy and more traditional, invasive spinal fusion procedures. StabiLink should be a part of every surgeon’s armamentarium.

Spinal Balance is committed to developing intuitive instruments, advanced implants, and processes that will enhance surgeon experience, improve patient outcomes and reduce costs. Spinal Balance recently received a 3rd Frontier Innovation Platform Program Award in collaboration with the University of Toledo Educational Center for Orthopaedic Research Excellence (ECORE) for the purpose of developing improved spinal implants.

Spinal Elements develops innovative technologies for traditional and MIS procedures. The portfolio includes: Lucent® Ti-Bond® (Titanium Coated PEEK Interbody Devices) in PLIF, TLIF, and ALIF; Hero® Allograft (proceeds donated to charities benefiting children with life-threatening medical conditions); Vertu® Stand-Alone ACDF; Magnum+® Stand-Alone ALIF; Sapphire® Anterior Cervical Plate; Mercury® Classic Pedicle Screw and Mercury MIS System; and Lotus® Posterior Cervical/Thoracic System.

Spinal News International is a specialised, quarterly, newspaper dedicated to spinal specialists. It contains the latest news, opinion from thought leaders, summaries of cutting-edge research, expert analysis, conference coverage and information and updates on the latest products in the spinal world. Geographical distribution: Europe and North America by post, worldwide on the web. For subscription, please visit www.spinalnewsinternational.com/register.
Spinal Simplicity
www.spinalsimplicity.com

Spinal Simplicity products are designed to further enhance patient care while providing physicians with a greater array of minimally invasive solutions. The Minuteman® interspinous inter-laminar fusion device is currently available in the European Union*. *Devices not cleared by the FDA for sale in the United States

Spine Education & Research Center (SERC)
www.spine.org

NASS’ Spine Education & Research Center is a premier training facility conveniently located just outside of Chicago. SERC accommodates medical groups of all sizes and specialties for educational events, product demonstrations, research, and training. Medical professionals return to SERC each year to enhance their skills and enjoy everything the state-of-the-art facility has to offer. Stop by the booth to learn more, try out Google Glass technology, and play a giant game of operation!

SPINE SOFT FUSION
www.spinesoftfusion.com

Introducing a new implant, the translaminar facet PEEK screw for a non rigid fusion; a new percutaneous surgical approach, with a free hand navigation system and a brand new indication: combined with microdiscectomy, avoiding the recurrence disc herniation and back pain.

Spine Surgery Today and Healio.com
by SLACK Incorporated
www.healio.com/orthopaedics

SLACK Incorporated, delivering the best in healthcare information and education worldwide, invites you to booth #1315. Pick up a free issue of SPINE SURGERY TODAY, ORTHOPEDICS TODAY and ORTHOPEDICS. Sign up for the free news wire at Healio.com/orthopedics.

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. For medical professionals, Spine Universe offers a search-optimized practice listing, a condition-based and searchable case library, and more. You can also join our survey panel to receive surveys with honoraria compensation to help shape the future of patient care. Visit our booth to sign up and complete our spine survey for a Starbucks gift card today.

Spine Wave
www.spinewave.com

Spine Wave develops and markets clinical solutions for several market segments, including tumor, trauma, and spinal fusion. The company’s product portfolio includes StaXx® Posterior and Lateral Expandable Devices, CapSure® PS3 Spine System, Sniper® Spine System, Annex® Adjacent Level System, geneX® ds Injectable Bone Graft, and additional products.

Spineart USA, Inc.
www.spineart.com

Spineart is a privately held medical device company focused on simplifying the surgical act by designing, developing and promoting safe and efficient solutions to spine surgeons, operating room teams, and patients. Spineart is a pioneer in its field, having introduced unique patented and clinically validated technologies in the fields of Minimally Invasive Surgery, Motion Preservation, Fusion, Biologics, and Fractures Treatment. Please visit www.spineart.com for more information.

SpineDirect
www.spinedirectonline.com

SpineDirect’s mission is to provide motivated and like minded organizations a sustainable quality spinal implant delivery model while giving control back to the administration and supply chain. We have the expertise and experience to produce the highest quality products, offer outstanding services, and do it all at an affordable price!

SpineGuard, Inc.
www.spineguard.com

PediGuard® is the first device that can detect possible cortical perforations during pedicle preparation. Based on the conductivity of the tissue around the tip of the probe (device), it can accurately predict the type of tissue that the device is being inserted into. PediGuard has assisted spine surgeons in accurately placing pedicle screws in over 33,000 spinal procedures. Come visit us at Booth 1708 to learn more about this unique technology and how it can enhance your surgical experience.

Spineology
www.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 is an organization that provides recruitment services for spine practices. SpineSearch is led by experts in the industry who are knowledgeable about every dimension of the field. We invite a commitment to those employed in the industry and can assist with all of your clinical and non-clinical recruitment needs.

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.

Spineway is dedicated to improving implants and instruments in spine surgery, for the benefits of surgeons and patients. Our range of arthrodesis solutions for adult and paediatrics is now completed with a new direct global correction system to treat spinal deformities. Distributed in 48 countries, Spineway becomes a significant player in the spine sector. With our experience in international development and a reactive R&D team, we achieve high added-value products with short time-to-market.

Stability Biologics, based in Nashville, Tennessee is a rapidly growing organization focused on providing innovative products for spinal surgery, orthopedics, sports medicine and advanced wound care. Stability provides a full range of allograft and synthetic tissue including cellular repair products, structural and flowable bone products and sports medicine grafts.

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 and spine products to help people lead more active and more satisfying lives. For more information about Stryker, please visit www.stryker.com.

Surface Dynamics / Eurocoating are medical device coating companies with state-of-the-art manufacturing facilities in Cincinnati, Memphis and 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.

Symmetry Medical is a leading provider of products to the global orthopedic device industry. The company produces implants (customer specifications) instruments and containers for the medical device markets including spine. Additional specialization exists in product development, high precision manufacturing and project management. With Symmetry’s Total Solutions® every detail of product development, from idea generation through quality assurance is managed by Symmetry saving you time and money.

Non-profit TBI/Tissue Banks International is the only integrated, global provider of dermal, ocular, orthopedic, spine, and sports medicine biological implants to surgeons and their patients. TBI has been changing lives through tissue transplantation and innovation for over 50 years. More than 100,000 patients are treated with TBI tissue annually. For more information, visit www.tbionline.org.

Tecomet is a leading contract manufacturing, engineering and technology company specializing in net shape forging, precision machining, photochemical etching, surface texturing, vacuum brazing, laser and electron beam welding, and rapid prototyping. Tecomet is ISO13485-ISO9001 and supplies precision engineered components, assemblies and instrumentation to the medical and aerospace/defense markets, with special emphasis on orthopedic, cranial maxillofacial, trauma, and spinal implants.

Tecres is a leading developer and manufacturer of bone cements and acrylic resins with over thirty-year experience in orthopaedics and in minimal invasive spine surgery. We sell our products in more than seventy countries. We are proud to launch Mendec Spine HV, our high viscosity acrylic resin for vertebroplasty and kyphoplasty and Mendec Spine HV System, the unique all in one closed mixing device for the preparation of our high density acrylic resin which is preloaded in the mixing cartridge.
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<tr>
<th>Name</th>
<th>Booth No.</th>
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<tr>
<td>TeDan Surgical Innovations</td>
<td>611</td>
<td><a href="http://www.tedansurgical.com">www.tedansurgical.com</a></td>
<td>TeDan Surgical Innovations specializes in retractor systems and instrumentation for use in spine surgery. The Phantom Series offers cervical and lumbar retractor systems and are designed to meet the diverse demands of the operating room. We also offer minimally invasive lumbar and extreme lateral retractors that maximize exposure without enlarging the incision. All of our retractor systems have a patented, ergonomically designed blade locking mechanism which simplifies their use in surgery.</td>
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<tr>
<td>Thompson Surgical Instruments, Inc.</td>
<td>1331</td>
<td><a href="http://thompsonmedical.com">thompsonmedical.com</a></td>
<td>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. In addition, Thompson now offers spinal implant devices through its Thompson MIS division specializing in accelerated fusion technologies.</td>
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<td>Tegra Medical</td>
<td>2525</td>
<td><a href="http://www.tegramedical.com">www.tegramedical.com</a></td>
<td>WHO WE ARE - Tegra Medical® is a leading supplier of implants, reusable instruments and single use devices for orthopaedics and spine. We are ISO 13485:2003, 9001:2008 registered with 200,000 sf of modern manufacturing space in 4 sites outside Boston, Memphis, and Costa Rica. MAJOR MARKETS - spine, arthroscopy, joint reconstruction, sports medicine, dental, interventional spine, and trauma. SERVICES OFFERED - Quick Wire and Tubing, dedicated GENESIS Tech Center®, numerous manufacturing capabilities.</td>
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<td>Tides Medical</td>
<td>2640</td>
<td><a href="http://www.tidesmedical.com">www.tidesmedical.com</a></td>
<td>Tides Medical is committed to bringing the latest products in regenerative medicine to market. Our focus is on our customers by providing our patients with safe, effective therapies, our physicians with quality surgical products, and our distributors and hospitals with reliable inventory and personalized service. Our products have proven clinical safety and efficacy. We also offer assistance with health outcomes research to support clinicians conducting surgical outcome studies of our products.</td>
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<td>TEKNIMED</td>
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<td><a href="http://www.teknimed.com">www.teknimed.com</a></td>
<td>TEKNIMED is recognized as the reference in BIOMATERIALS devices for Orthopaedics and Spine. TEKNIMED designs, develops and manufactures more than 100 items, including: Synthetic &amp; Resorbable Bone Substitutes, Orthopaedic-Cranioplasty Cements, Vertebroplasty &amp; 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.</td>
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<td>Titan Spine</td>
<td>1923</td>
<td><a href="http://www.titanspine.com">www.titanspine.com</a></td>
<td>Titan Spine, LLC is a surface technology company focused on the design and manufacture of interbody fusion devices for the spine. The company is committed to advancing the science of surface engineering to enhance the treatment of various pathologies of the spine that require fusion. Titan Spine, located in Mequon, Wisconsin and Laichingen, Germany, markets a full line of Endoskeleton® interbody devices featuring its proprietary textured surface. To learn more, visit <a href="http://www.titanspine.com">www.titanspine.com</a>.</td>
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<td>Thieme Publishers</td>
<td>2215</td>
<td><a href="http://www.thieme.com">www.thieme.com</a></td>
<td>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!</td>
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<td>Triangle Manufacturing</td>
<td>1448</td>
<td><a href="http://www.trianglemfg.com">www.trianglemfg.com</a></td>
<td>Triangle is a value-added engineering and contract manufacturing partner to the medical device industry specializing in spinal implants and instruments, with a special expertise in powered hand tools. From design, development, prototyping and volume production; we help you get from concept to market faster and more economically. With emphasis on innovative manufacturing solutions, Triangle achieves the highest quality standards with ISO 13485:2012, ISO 9001:2003 certifications &amp; FDA Registered.</td>
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<td>Company Name</td>
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<td>Trinity Orthopedics, LLC</td>
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<td><a href="http://www.trinity-ortho.com">www.trinity-ortho.com</a></td>
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<td>We are dedicated to innovating procedures and devices that enable spine surgeons to meaningfully impact patient satisfaction and healthcare economics. Our initial focus is on improving lumbar and cervical fusion outcomes.</td>
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<td>Tyber Medical, LLC</td>
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<td><a href="http://www.tybermedical.com">www.tybermedical.com</a></td>
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<td>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 orthopaedic 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 <a href="http://www.tybermedical.com">www.tybermedical.com</a>.</td>
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<td>U&amp;I Corporation</td>
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<td><a href="http://www.youic.com">www.youic.com</a></td>
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<td>Drive innovation, Drive success.</td>
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<td>US Health Group</td>
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<td><a href="http://www.ushealth-group.com">www.ushealth-group.com</a></td>
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<td>US HEALTH GROUP The Premier Ancillary Healthcare Company Anywhere. Anytime. US Health Group is the parent company created to give doctors and healthcare providers one place to go to get services for their patients or become part of one of the physician owned companies that truly focuses on results and the total health of the patient. Contact us: 972.386.6399 or <a href="http://www.ushealth-group.com">www.ushealth-group.com</a></td>
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<td>Vertebral Technologies, Inc.</td>
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<td>vti-spine.com</td>
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<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>
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<td>Vertical Spine</td>
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<td><a href="http://www.verticalspine.com">www.verticalspine.com</a></td>
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<td>Vertical Spine LLC is a commercial stage orthobiologics company with a unique system providing intra-procedural collection of autologous Platelet Rich Fibrin Membrane (PRFM) Grafts and a Surgeon Defined Graft (SDG). To learn more about the FIBRINET® System’s ability to concentration platelets and their associated growth factors in a fibrin membrane graft without excess exogenous activators and the available clinical studies in spine fusion procedures, please visit us at booth #1747.</td>
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<td>VGI Medical, LLC</td>
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<td><a href="http://www.VGImedical.com">www.VGImedical.com</a></td>
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<td>Founded in 2007, VGI Medical, LLC, (formerly VG Innovations) is a privately held medical device company headquartered in St. Petersburg, FL. VGI Medical is focused on developing a broad range of spinal implants and surgical instrument systems through industry knowledge, creative thinking and engineering prowess. 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 Surgical</td>
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<td><a href="http://www.vikonsurgical.com">www.vikonsurgical.com</a></td>
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<td>Vikon® specializes in surgical illumination and specialty instrumentation. We will showcase the Quick Release Kerrison Rongeur, the Featherlight Xenon Surgical Headlight System, and the ONE HeadLiT. Feel the difference of a kerrison designed to reduce hand fatigue and facilitate bone and bioburden removal. See the difference in the Featherlight system and the tether-free ONE HeadLiT with its evenly distributed, homogeneous, clean, bright light. “See the difference. Feel the difference.”</td>
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<td>Wake Forest Innovations</td>
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<td><a href="http://www.wakeforestinnovations.com">www.wakeforestinnovations.com</a></td>
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<td>Wake Forest Innovations offers industry a business-supportive, single point of entry to the scientists, clinicians and services of Wake Forest through sponsored research agreements and contract research &amp; development services. Our offerings include: preclinical and clinical testing to facilitate approval for new therapeutics and devices; clinical trial design and management for multicenter trials; and core research laboratory and imaging facilities for reliable data collection and analysis.</td>
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<td>Weigao Orthopaedic Device Co., Ltd.</td>
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<td>wegortho.en.alibaba.com</td>
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<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 opportunities to work with partners all over the world.</td>
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<td>Wenzel Spine</td>
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<td>wenzelspine.com</td>
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<td>Wenzel Spine is dedicated to providing true minimally invasive solutions for treatment of spinal disorders. Wenzel's flagship product, the VariLift Expandable Interbody Fusion System, is the only, stand-alone, expandable interbody solution on the market. Through these types of products, Wenzel Spine delivers simple, dependable, and proven alternatives to traditional spinal fusion. These products help simplify and shorten spine surgery, while providing excellent clinical patient outcomes.</td>
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NASS 29TH ANNUAL MEETING 201
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<th>Company Name</th>
<th>Booth Number</th>
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<tr>
<td>Whale Imaging, Inc.</td>
<td>445</td>
<td>WhaleImagingUSA.com</td>
<td>Whale Imaging provides world class solutions for spinal surgery using its unique G-Arm™ biplanar fluoroscopy system. See the latest developments in our booth.</td>
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<tr>
<td>Wolters Kluwer Health</td>
<td>1005</td>
<td><a href="http://www.lww.com">www.lww.com</a></td>
<td>Lippincott Williams &amp; Wilkins, a Wolters Kluwer Health company, is a global provider of information, business intelligence and point-of-care solutions for the healthcare industry and a leading international publisher of medical books, journals, and electronic media. We proudly offer specialized publications and software for physicians, nurses, students and clinicians. Visit booth 1005 to review Spine, the most cited journal in the field of spinal deformity.</td>
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<td>World Congress of Minimally Invasive Spine Surgery and Techniques</td>
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<td>World Premier Materials Korea</td>
<td>341</td>
<td><a href="http://www.cellumed.co.kr">www.cellumed.co.kr</a></td>
<td>World Premier Materials Korea Inc. is a leading biotechnology company in Korea dedicated to developing human recombinant protein for orthopedic, spinal treatment by employing genetic recombination technology. With the expanding experiences and expertise in the fields of allograft, medical devices, and bio-similar products, stem-cell medicine and products related to bio-engineering, we are in pursuit of high value products with advanced biotechnology.</td>
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<td>X-spine Systems, Inc.</td>
<td>429</td>
<td><a href="http://www.x-spine.com">www.x-spine.com</a></td>
<td>X-spine is a progressive spinal implant company delivering intuitive technologies for the treatment of spinal disease worldwide. X-spine is committed to the highest standards of product quality in service of the patient and physician. Our spinal implants and instrumentation are made in the USA and exported worldwide.</td>
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<td>Ziehm Imaging, Inc.</td>
<td>324</td>
<td><a href="http://www.ziehm.com">www.ziehm.com</a></td>
<td>Ziehm Imaging specializes in the development, manufacture and worldwide marketing of mobile C-arm X-ray imaging solutions for interventional operating room procedures. Through continuous dialogue and close cooperation with renowned universities, research centers and hospitals, Ziehm Imaging has developed groundbreaking technologies known for their outstanding versatility, easy handling, seamless digital network integration and significant dose savings for a wide variety of medical applications.</td>
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<tr>
<td>Zigg Design</td>
<td>1445</td>
<td><a href="http://www.ziggdesign.com">www.ziggdesign.com</a></td>
<td>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 start-ups 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.</td>
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<td>Zimmer Spine</td>
<td>1105</td>
<td><a href="http://www.zimmerspine.com">www.zimmerspine.com</a></td>
<td>Zimmer delivers comprehensive solutions and clinical support that instill confidence and provide value. Experience our newest innovations: Virage® OCT Spinal Fixation System, a system that will change your perspective; Optio-C™ Anterior Cervical System, a stand-alone cervical device with a unique load-sharing interface; Ancora™ Lateral Interbody Fusion System with intrinsic locking plate fixation; and TriCor™ Sacroiliac Fusion System designed to facilitate true bony fusion of the SI joint.</td>
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<td>ZipLine Medical</td>
<td>2545</td>
<td><a href="http://www.ziplinemedical.com">www.ziplinemedical.com</a></td>
<td>ZipLine Medical’s Zip® Surgical Skin Closure is a non-invasive skin closure alternative to staples, sutures and glue with suture-like outcomes at the speed of staples and decreased risk of surgical site infection. The Zip® is 8x stronger than sutures, and is Class I, 510(k) Exempt and has received CE Mark.</td>
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<td>Zyga</td>
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<td><a href="http://www.zyga.com">www.zyga.com</a></td>
<td>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 has developed the Glyder® Facet Restoration Device, currently under IDE investigation in the U.S., and markets the Simmetry® Sacroiliac Joint Fusion System, the only minimally invasive system designed to provide a true arthrodesis of the SI Joint, including decortication, bone graft delivery and fixation.</td>
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- Zyga .......................... 222
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**Microbiological Testing**
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**VERTEBRAL COMPRESSION FRACTURE TREATMENT PRODUCTS**

**Kyphoplasty**
Alphatec Spine .................. 829
Amendia, Inc. ................... 238
Barrier Technologies .......... 1446
BM Korea Co. Ltd. ............. 2433
CareFusion ..................... 1426
CUSMED .......................... 2320
IMEDICOM ...................... 733
Osseon LLC ........................ 224
Pan Medical ..................... 2139
Tecres spa ........................ 2522
TEKNIMED ....................... 405

**Vertebroplasty**
Alphatec Spine .................. 829
Amendia, Inc. ................... 238
Barrier Technologies .......... 1446
BM Korea Co. Ltd. ............. 2433
CareFusion ..................... 1426
DFINE .......................... 1539
IMEDICOM ...................... 733
Orthopedic Solutions Center . 2534
Osseon LLC ...................... 224
Stryker .......................... 1405
Tecres spa ........................ 2522
TEKNIMED ....................... 405

**SAN FRANCISCO PHOTO CREDITS**
Page 6: SFTA/Can Balcioglu. Page 30, top to bottom: SFTA; SFTA/Scott Chernis; SFTA/Scott Chernis; SFTA/Scott Chernis; SFTA/Can Balcioglu.
Page 33, top to bottom: SFTA/Jack Hollingsworth; SFTA/Scott Chernis; SFTA/Can Balcioglu; SFTA/Scott Chernis; Public Domain; SFTA/Can Balcioglu; SFTA/Scott Chernis; SFTA/Scott Chernis
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.

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 $3.1 million in research funding to date.

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.

ADMINISTRATION & DEVELOPMENT COUNCIL
The Administration & 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.

SPINE EDUCATION & RESEARCH CENTER
NASS opened the state-of-the art Spine Education & Research Center (SERC) outside Chicago in spring 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.
NORTH AMERICAN SPINE FOUNDATION

The North American Spine Foundation is a non-profit organization established to end spine-related disability, the #1 cause of suffering, through research, education and advocacy. The North American 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. For further information or to contribute to the North American 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. TSJ sponsors an annual Outstanding Paper Awards program to recognize excellence in Basic Science, Surgical Science, Medical and Interventional Science and Value in Spine Care. Award winners each receive $10,000 during a podium presentation at the Annual Meeting. Published online and printed monthly by Elsevier, Inc., The Spine Journal holds the highest Impact Factor and largest circulation 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).

Today, 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 8,500 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 NASS Resource Center in the lobby for more information about membership, to renew your membership for 2015, 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
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
Includes print and online subscriptions to TSJ and SpineLine

**Affiliate** members are physicians and 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
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
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 science or allied health services who are enrolled in a full-time, accredited program.
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 membership directory)

Company Name: _______________________________________________________________________

Address: ______________________________________________________________________________

City: ______________________ State/Province: _______ Postal Code: __________ Country: ______________

Phone: ____________________ Fax: ____________________ Email: ____________________________

Office Manager Name (to contact regarding membership information): ____________________________

Office Manager Email: ______________________ Office Manager Phone: _______________________

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 The Spine Journal ☐ Opt out of receiving printed copies of SpineLine

North American Spine Society
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Phone: 630-230-3600 | Fax: 630-230-3700
www.spine.org | membership@spine.org

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.

Source: AM14FP
THANK YOU!

The North American Spine Society would like to express its sincere appreciation to the following companies for their support of the NASS 29th Annual Meeting.
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2016
SUMMER SPINE MEETING
Dates TBD
Location TBD

2016
31ST ANNUAL MEETING
October 26-29
Boston, MA

2017
32ND ANNUAL MEETING
October 25-28
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, IL

2023
38TH ANNUAL MEETING
October 18-21
Los Angeles, CA

2024
39TH ANNUAL MEETING
October 9-12
Boston, MA