NORTH AMERICAN SPINE SOCIETY
34TH ANNUAL MEETING

September 25-28, 2019
McCormick Place West, Chicago, IL
www.spine.org

Final Program
Medtronic welcomes Titan Spine to the family, now the most comprehensive titanium interbody portfolio on the market.

Inspired by nature and driven by science, our nanoLOCK™ Surface Technology is a proprietary blend of surfaces at the macro, micro, and nano levels, including:

- Macro texture on endplate contact surfaces for initial fixation
- Micro and nano textures present on all surfaces

By utilizing “biomimicry” of structures, nanoLOCK Surface Technologies emulates nature’s patterns and strategies for bone remodeling.1 The research-first approach to the development of nanoLOCK Surface Technologies includes six peer-reviewed published articles in vitro studies.2

Visit booths 4611 and 4624 to learn more.

POTENTIAL RISKS

All of the possible adverse events associated with spinal fusion surgery without instrumentation are possible. With instrumentation, a listing of potential adverse events includes, but is not limited to:

- Early or late loosening of any or all of the components.
- Disassembly, bending, and/or breakage of any or all of the components.
- Non-union (or pseudarthrosis), delayed union, and mal-union.

Please see the package insert for the complete list of indications, warnings, precautions, and other important medical information.

1 Internal testing
2 In vitro studies not necessarily indicative of human clinical outcomes.

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Since joining forces with K2M, we’re focused on five core principles. One of these principles is that continuous innovation is core to spine success. Our comprehensive product portfolio allows us to create market-leading solutions for patients.

A surgeon must always rely on his or her own professional clinical judgment when deciding whether to use a particular product when treating a particular patient. Stryker does not dispense medical advice and recommends that surgeons be trained in the use of any particular product before using it in surgery. The information presented is intended to demonstrate the breadth of Stryker product offerings. A surgeon must always refer to the package insert, product label and/or instructions for use before using any Stryker product. Stryker products are CE marked according to the Medical Device Directive 93/42/EEC. Products may not be available in all markets because product availability is subject to the regulatory and/or medical practices in individual markets. Please contact your Stryker representative if you have questions about the availability of Stryker products in your area.

Available through Stryker’s Spine Division | 600 Hope Parkway SE | Leesburg, VA 20175 | Tel. 866 526 4171
Copyright © 2019 Stryker
Faster procedures.
Lower costs.
No radiation.

The 7D Surgical System lets you harness the full potential of image guidance with the first and only Machine-vision Image Guided Surgery (MvIGS) platform that uses only visible light to easily register patients in just a few seconds. No intraoperative radiation. No complicated workflows.

Discover a new kind of vision for spinal navigation at booth 3224.

7Dsurgical.com
Thank you for attending the 34th NASS Annual Meeting.

You will have plenty of opportunities to hear the latest research including the 21 selected Best Papers as well as an abundance of educational programming. There also are interactive ePosters to view in addition to participating in hands-on courses, cadaver demonstrations and workshops throughout the week.

You may choose to attend surgical, medical and multidisciplinary symposia and sessions. Endoscopic spine surgery, ambulatory surgical centers, BMP in 2019, the role of the first contact practitioner, biologics, robotics & navigation, low back pain disability and episode risk reduction, and neuromonitoring are just a few of the topics.

The ePosters are “breaking out of the box” at this year’s meeting. Using a new hybrid system, ePosters will have a physical and virtual presence. Download the NASS 2019 mobile app with a code reader to scan a selected poster on the mini-poster walls. View the content and post directly to the ePoster as well as have digital discussions with both the author and others viewing that ePoster.

To further your education opportunities, participate in hands-on courses. Hear MDs, DOs and PhDs working in conjunction with industry present new and innovative technologies addressing the latest products, instruments and tech. Watch top surgeons demonstrate specific techniques using cadavers and pose your questions.

Touch and examine the latest and greatest products from more than 350 exhibitors and speak with the engineers and researchers who develop them. The largest spine exhibition in North America is more than just a trade show. It is an interactive learning experience.

You can get hands-on with the latest products and try procedures on specimens during surgical innovation lab demonstrations presented by multiple exhibiting companies.

Rest up in the lounge area throughout the meeting, and enjoy Chicago-style food and local microbrewery beers during the social hour on Wednesday. The Spotlight Zone area in the lounge allows you to review and recharge. Watch online courses and Ask the Experts videos, as well as listen to podcasts while charging your electronic devices.

In your free time, take advantage of Chicago’s incredible lakefront, enjoy a multitude of cuisines, and trek the Mag Mile and Oak Street for a unique shopping experience.
WHEN IT COMES TO RELIABILITY, WE’VE GOT YOUR BACK

With over 9 million devices implanted worldwide, surgeons and patients have relied on PEEK-OPTIMA™ polymers for 20 years.

- Zero material-related recalls
- Extensive clinical evidence
- Beneficial patient outcomes

1. Supporting information available upon request.

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Visit us at NASS2019
Booth 4224
Sept. 25 - 27

Images of scans provided courtesy of Timothy Bassett, MD
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 26 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

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

Additional credit is available by attending the following courses:
• Coding Update 2019: Mastering the Coding Maze
• Hands-On Course: Minimally Invasive Spine Surgery
• Hands-On Course: Endoscopic Spine Surgery Symposium and Cadaver Workshop Co-sponsored with KOMISS
• Hands-On Course: Basic Fluoroscopic Guided Lumbar Spinal Injections

How to Claim your CME
On Tuesday evening and Saturday afternoon all attendees will receive an email directing them to www.spine.org/CME to report session attendance each day. You will not be able to submit answers or print a certificate until the meeting has concluded on Saturday, September 28 at noon.

Evaluation and Educational Certificates
After the meeting, you may submit your evaluation electronically and print your CME certificate directly from our website. Visit spine.org/CME to claim education credit and to print CME certificates. Contact education@spine.org with questions.

Disclaimer
The material presented at the 34th 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 August 20, 2019. Any changes to the published Final Program will be announced at the beginning of each session.
**Continuing Education (CE) Credit for Allied Health Professionals**

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

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

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

**Chiropractors:** CE Credit for Chiropractors applied for select states by: National University of Health Sciences and Southern California University of Health Sciences. Contact education@spine.org for more information.

**Physical Therapists:** NASS has received approval to offer continuing education credits to Physical Therapists from Illinois. The Illinois Chapter Continuing Education Committee has approved this meeting according to the Criteria for Approval of Continuing Education offerings established by the Illinois Physical Therapy Association. NASS has received approval from additional select states as well. Please contact education@spine.org for details.

**Nurses:** In support of improving patient care, this activity has been planned and implemented by AXIS Medical Education and North American Spine Society. AXIS Medical Education is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.

**Credit Designation for Nursing:** AXIS Medical Education designates this continuing nursing education activity for 25 contact hours.

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

**AXIS Contact Information:** For information about the accreditation of this program, please contact AXIS at info@axismeded.org.

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**Annual Meeting 2019 Sessions OnDemand—CME Credit Available!**

Order the 2019 Annual Meeting session recordings and get 24/7 access to more than 500 scientific presentations, including electronic posters, scientific sessions, symposia, breakout sessions, abstracts, featured lectures and more. These web-based, fully synchronized audio, video and slide presentations are available anywhere with Internet access. Purchase through the online shop at www.spine.org/ondemand.

**NASS members who attend the Annual Meeting receive session recordings as a member benefit.**

CME credit is available for watching symposia and the Interdisciplinary Spine Forum. View recordings by visiting www.spine.org/presentations.

The North American Spine Society designates this enduring material for a maximum of 78 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.
Orthofix Cervical Solutions

CervicalStim™
Spinal Fusion Therapy

M6-C™
Artificial Cervical Disc

Centurion®
Posterior Occipital Cervical Thoracic (POCT) System

fiberFUSE™
Demineralized Bone Matrix

Construx® Mini PTC
PEEK Titanium Composite Spacer System
If you are looking for industry innovations, the Technical Exhibition offers you a variety of experiences to continue your professional development. If you’re looking for food, a place to meet, surgical training, interactive learning or a new job, the Technical Exhibition features something for everyone.

With more than 350 exhibitors you can find the newest products in spine. The mobile event app is the best way to search for what you seek. Search by product category, type in a keyword. Don’t wander. Plan your search and find what you need. Our exhibitors would love to put their products into your hands and NASS is the only place all of the spine market gathers for you.

**ePosters**

The ePosters are “breaking out of the box” at this year’s meeting. Using a new hybrid system, ePosters will have a physical and virtual presence. Download the NASS 2019 mobile app with a code reader to scan a selected poster on the mini-poster walls. View the content and post directly to the ePoster as well as have digital discussions with both the author and others viewing that ePoster.

**NASS Spotlight Zone**

Review and Recharge at the Spotlight Zone. Watch online courses and Ask the Experts videos, as well as listen to podcasts while charging your electronic devices. Visit the lounge area in the Technical Exhibition to relax and view/listen to surgical and medical content of your choice. Four kiosks are available throughout the meeting.

**Food Options**

**Complimentary Boxed Lunches: Booth 1538**

Connect with past colleagues or make new connections over lunch. For registered medical attendees, complimentary boxed lunches are available in the Technical Exhibition from 12:00-1:00 p.m. on Wednesday, Thursday and Friday.

**P.U.R.E.: Booth 938**

P.U.R.E. is another lunch option that offers three International hot lunch options for just $21.00 per day.

**Concessions**

Coffee and sandwich concessions are available at Starbucks on the Central Concourse and Labrea on Level 2.
Improving patient care with novel and established therapies

RTI Surgical is a leading spine company with a highly regarded portfolio of hardware, biologic and synthetic-based spinal implants. RTI has expanded its offering to include novel spine therapies, such as the Simmetry® system for sacroiliac joint fusion, and the coflex® Interlaminar Stabilization® device for lumbar spinal stenosis. The company is anchored by established therapies, such as the award-winning Fortilink® IBF Systems with TETRAfuse® 3D Technology, ViBone® Viable Bone Matrix, as well as comprehensive hardware solutions that address multiple spinal disorders.

Join us for a conversation about RTI’s technology and innovation!

Surgeon Reception
Wednesday, September 25, 2019, 5:30–8:30 p.m.
VU Rooftop Bar, 133 E Cermak Road, Chicago, IL 60616
RSVP to events@rtix.com

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rtisurgical.com
THE LEARNING PLACE

More to see.  
More to do.  
More to learn.  

The Learning Place is an interactive learning experience. 
Located at the entrance to the Technical Exhibition.

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

Surgical Innovation Labs
Touch the latest products and try procedures on actual specimens in the Surgical Innovation Labs. Take part in one of the 36 different surgical demonstrations, workshops and courses. Want to continue your learning after the meeting ends for the day? Come to one of the NASS After Hours Workshops. Focusing on SI-Joint and Robotics & Navigation, these non-CME workshops get you hands-on experience with the leading companies' equipment with an opportunity to compare.

Thank you to GE Healthcare, Ziehm Imaging and Protech Medical for their lab support.

De-Stress with Therapy Dogs
The Lounge
Need a break? Visit with therapy dogs from Canine Therapy Corps from 1:00–3:00 p.m. on Wednesday and Thursday.

Solution Showcase
Red Theater
Hear from key opinion leaders on products and procedures to improve your outcomes and practices in the Solution Showcase. Up to two presentations each day will take place from 12:00-1:00 p.m. Listen to presentations from Stryker, DePuy Synthes, A Johnson & Johnson Company, Terumo BCT, Radius Pharm and Legally Mine.

Exercise Booth: Exercise Is Medicine®
Exercise Is Medicine® (EIM) was co-launched with the American College of Sports Medicine (ACSM) and the American Medical Association in 2007 with the goal of making physical activity assessment and promotion a standard in clinical care. Public health, medical and scientific association representatives from around the world have expanded the global scope of the initiative.

In conjunction with the ACSM, the NASS Exercise Booth will feature information on Exercise Is Medicine® as well as a real-time step counter competition where attendees can track their step count with an app and win a fabulous prize if you have the most steps.

Practical Theater Presentations
Gold Theater
Connect with topics of interest to you and your practice. Presentations occur throughout the week during breaks. Come hear about NASS' new low back pain guideline and the NASS Spine Registry, and ask any questions you may have.

Thursday, September 26, 9:30-10:00 a.m.  
NASS Low Back Pain Guideline

Thursday, September 26, 3:05-3:35 p.m.  
NASS Spine Registry
Stop Neck Pain with MultiPoint™ Ergonomics

Up to 92.3% of clinicians report having working pain. 27.6% of this group develop chronic pain or a permanent injury.

Other companies claim loupe ergonomics but only help your lower back. SurgiTel’s patented ergonomic loupes help you achieve and maintain a neutral, healthy posture, eliminating pain and extending your career.

“I trained using Designs for Vision loupes. They forced me to excessively tilt my head... Over time I developed herniated cervical discs at C6 and C7. Since using the SurgiTel loupes, I am able to stand perfectly upright with shoulders relaxed.”

-Raymond L. Singer
MD, FACS, FACC, FCCP

Stop Neck Pain
with MultiPoint™ Ergonomics

Portable LED Surgical Lighting

Proprietary LED Technology
• Homogenous spot provides even light
• No hot spot means better image
• Easy on the eye

Battery Powered
• Swappable, rechargeable batteries
• No unplugging to move around the table

Adaptable
• This LED can be mounted on loupes

Try Ergonomic Loupes at Booth #4403
ATTENDEE RESOURCES

Mobile Event App

**NEW:** Following attendee desire for more eco-friendly, quick access mobile meeting content, NASS has moved all detailed symposia and abstract presentation agendas to the app. The app also hosts the full Disclosure and Author Indexes, as well as quick links to NASS resources such as SpineLine, TSJ, and NASS social media pages.

Download the NASS 2019 mobile app to view the schedule, review speakers and their disclosures, locate exhibitors and products, etc. Simply search “NASS SPINE” in your app store.

NASS Social Hour

**Lounge**
Enjoy Chicago-style food and local microbrewery beers during the social hour on Wednesday, September 25 from 5:00-6:00 p.m. to relax before heading out to dinner. Visit with friends while enjoying Chicago fare and complimentary beverages.

Coat and Luggage Check

**Level 1 – West Transportation Lobby**
The Coat and Luggage Check is available for your convenience. The cost is $3 per coat and $4 per bag checked.

*Please Note: All items must be picked up by closing. NASS and the convention center are not responsible for items left at the close of the day.*

Hours:

- Wednesday, September 25: 7:00 a.m.-6:15 p.m.
- Thursday, September 26: 7:00 a.m.-5:30 p.m.
- Friday, September 27: 7:00 a.m.-5:30 p.m.
- Saturday, September 28: 7:30 a.m.-12:15 p.m.

Registration

**F2 Lobby**

Hours:

- Tuesday, September 24: 1:00-4:30 p.m.
- Wednesday, September 25: 6:30 a.m.-5:00 p.m.
- Thursday, September 26: 6:30 a.m.-5:00 p.m.
- Friday, September 27: 7:00 a.m.-5:00 p.m.
- Saturday, September 28: 7:30-10:45 a.m.

International Certificate Printing

Visit the certificate printing station next to the registration desk to print your certificate of meeting attendance.
**Photography Orders**
Looking for photos from the Annual Meeting? Visit [http://spine.smugmug.com](http://spine.smugmug.com) to view and order photos of the general sessions, symposia, Technical Exhibition, special events and more.

**Chicago Concierge**
**Central Concourse**
Staff at the information counter will be able to supply you 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**
**Central Concourse**
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 2020 Annual Meeting in San Diego.

**San Diego 2020 Information**
**Central Concourse**
Stop by the information counter to review exciting material for your trip to the San Diego area, site of the 2020 Annual Meeting.

**NASS Advocacy and Political Action Committee: SpinePAC**
**Central Concourse Outside W375a**
Founded in July of 1999, the National Association of Spine Specialists serves as the advocacy arm of the North American Spine Society. The “other” NASS advocates in the legislative and regulatory arenas for public policies that protect members’ ability to practice medicine and give patients access to the specialists, technologies and treatments they require for quality spine care. As the primary voice for spine specialists on Capitol Hill, NASS helps frame the debate in Washington, DC by sponsoring a political action committee, SpinePAC. SpinePAC’s purpose is to work within the federal election process to further the goals of the spine care community by supporting candidates for the U.S. House of Representatives and Senate. In short: SpinePAC serves as the voice of our profession in elective politics. Last election cycle, Spine endorsed more than 50 candidates for Congress, 90% of whom were elected to the U.S. House of Representatives or Senate. These efforts ensured YOUR VOICE will be championed in the important debates that stand to impact our profession. NASS members are encouraged to visit the SpinePAC booth located in the south lobby to learn more about ongoing NASS advocacy initiatives and how to get involved.
Fully Stocked.

SURGIFLO®.

SURGIFLO Kit is back on the market with an enhanced supply chain.

Learn more, visit us at booth 4019
SURGIFLO®
Fully Stocked.

SURGIFLO Kit is back on the market with an enhanced supply chain.

Learn more, visit us at booth 4019
Grammy winner Christian Gansch is highly regarded internationally as a conductor, producer, author and consultant.

Gansch has two distinct perspectives of the musical world, as a musician and as a manager. He has been able to create a unique coaching concept, which demonstrates the similarities between orchestras and company structures.

Gansch compares these similarities and demonstrates what companies can learn from the complex structures in orchestras, which outwardly look like a perfect unit to the audience. With their high potential for human conflicts, leadership issues and complex integrated communications, orchestras are a perfect example of how to bring a huge variety of specialists and instruments together to form one integrated harmonious unit.

Born in Austria in 1960, Gansch was the leader of several high profile orchestras. His book From Solo to Symphony—What Businesses Can Learn from Orchestras led him to work as a consultant for a number of major companies with direct reference to communication and “orchestral consciousness.”

Witness to History: Leadership Lessons from a Presidential Advisor

Senior Political Commentator, CNN, and Host, The Axe Files; Director, University of Chicago Institute of Politics; Senior Advisor to President Barack Obama (2009-2011)

A respected journalist, political strategist, and award-winning ad maker, David Axelrod is perhaps best known as the architect of President Barack Obama’s improbable four-year march from the Illinois State Senate to the White House. As senior advisor to the President, Axelrod was a key figure in shaping and selling the administration’s agenda and legislative priorities, including passage of the Affordable Care Act. From his unique vantage point, Axelrod will share the leadership lessons he learned working in the West Wing and analyze the major issues of the day.
SPINAL FUSION
NATURALLY

The AlloSource product portfolio advances spinal fusion with cost-effective, natural allograft solutions. Visit us at NASS booth 3111 to hear how our products leverage the proven science of allografts to naturally support spinal fusion.

LEARN MORE AT ALLOSOURCE.ORG

VISIT US AT NASS BOOTH 3111

The AlloSource product portfolio advances spinal fusion with cost-effective, natural allograft solutions. Visit us at NASS booth 3111 to hear how our products leverage the proven science of allografts to naturally support spinal fusion.

LEARN MORE AT ALLOSOURCE.ORG
Member Concierge

You are encouraged to visit Member Services to take advantage of meeting-only membership offers and promotions including a drawing to win one of 34 gift cards. Stop by the booth for more details, or see our ad below. Members can pick up their complimentary water bottle or renew their membership for 2020 and receive a NASS window decal. Meeting attendees can also join NASS or purchase logo merchandise at the booth.

Get access to meeting-only specials including a chance to win one of 34 gift cards at the 34th Annual Meeting!

To enter, text the word NASS to 33222 to be registered for your chance to win!*

*By entering this drawing through text, you agree to receive automated text messages from NASS (no more than 10 during the week of the NASS Annual Meetings; and no more than 1 per month following the meeting) regarding special offers and NASS membership. Message and data rates may apply. Reply STOP to end. Entry via text is limited to United States phone numbers only and is not required for participation in gift card drawing. For further options to enter, stop by the Member Concierge booth before Friday at noon CST. Offer available to attendees of the 2019 NASS Annual Meeting. Winners will be chosen twice daily and will be notified via email that day. Prizes are non-transferable and must be picked up at the Member Concierge booth by Friday at 3 PM CST.
Is it time to go
BACK
TO THE FUTURE
In the Treatment of Back Pain

1  NO
2  NON-
3  INVASIVE!
4  PROVEN
5  COST-
6  PATIENT
  OPIOIDS!
  ADDICTIVE!
  RELIEF!
  EFFECTIVE!
  CONTROLLED!

IT’S NOT COMPLICATED!

For more information see us at NASS Booth #3621 or call 800-428-2304.
Career Building
Stop by the Career Center booth to participate in Practice and Employer Meet & Greets, get a new professional headshot taken, or view the schedule of career-related educational sessions and social events happening throughout the meeting. All events located within the Career Center, unless otherwise noted.

Wednesday, September 25
9:00 a.m.-5:00 p.m.
Practice and Employer Meet & Greet
10:35 a.m.-12:00 p.m.
Presentation—Transition to Practice I: Landing a Job (W470a)
12:00-1:00 p.m.
Professional Headshots
Resident & Fellow Pizza Lunch (W375cde Lobby)

Thursday, September 26
8:30-9:30 a.m.
Presentation—Career Building (W470a)
9:00 a.m.-5:00 p.m.
Practice and Employer Meet & Greet
12:00-1:00 p.m.
Professional Headshots
5:15-6:15 p.m.
Resident, Fellow and Program Directors’ Reception (W375cde Lobby)

Friday, September 27
7:30-10:00 a.m.
Presentation—Transition to Practice II: Essential Skills for Starting Practice (W470a)
9:00 a.m.-1:30 p.m.
Practice and Employer Meet & Greet
12:00-1:00 p.m.
Professional Headshots

NASS Spine Registry and Research Booth
Come visit the NASS Spine Registry and Research booth. The NASS Research Council and its committees are dedicated to advancing the science and care of spine on behalf of the NASS membership and spine field. Stop by to see what’s new from these volunteers working on your behalf and pick up information about:
- Clinical guidelines
- Appropriate use criteria and mobile app
- Patient safety alerts
- 2020 Research Funding Application
- NASS Spine Registry
- Clinical tools and more!

Publications
NASS Bookstore
Visit the NASS Bookstore for essential clinical, coverage and patient education content, including:
- Clinical Guidelines*
  View and purchase hard copies of NASS’ library of Evidence-Based Clinical Guidelines.
- Common Coding Scenarios for Comprehensive Spine Care
  Get the 2019 Coding Book at half-price and preorder the 2020 edition.
- Coverage eDocuments: Defining Appropriate Coverage Decisions*
  Select from 27 procedures
- Compendium of Outcomes Instruments for Assessment & Research of Spinal Disorders, 2nd Edition
- OKU Spine: 5
- Advanced Reconstruction: Spine
- Instructional Course Lectures: Spine 2
- Patient Education Brochures*
  Select from 33 topics

*Digital versions are free for NASS members at spine.org

The Spine Journal and SpineLine
TSJ and SpineLine welcome authors, readers and reviewers. Visit the Publications booth for the latest information on submitting manuscripts, Outstanding Paper Award entries for 2020, and pick up a copy of the latest issues.

Connection Questions
Do you have questions about how to access your benefits or connect through the many channels available to you and your colleagues? Stop by the Publications booth for updates on the many convenient options for: Spine Journal and SpineLine mobile apps, SpineLine podcast, free eBooks, Facebook, Twitter, LinkedIn, Instagram, NASS Annual Meeting Daily News, and more.

SpineLine 20 under 40
The SpineLine Editorial Board selected its second annual 20 Under 40 class this year, honoring the best and brightest young spine physicians. We received an overwhelming number of nominations this year from physicians around the world. Winners will be featured at the Publications booth this week.
Simplify Disc®

The Difference is Clear™

- MRI compatible*
- Disc heights: 4-6mm
- 1 & 2 level IDE-enrollment completed
- Ti Coated PEEK endplates with ceramic core
- Mobile bearing

Visit us at NASS Booth #4419
www.simplifymedical.com

*MR Conditional per ASTM 2503-13
CAUTION: Investigational device.
Limited by United States law to investigational use.
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Speaker Information Center  
Central Concourse Outside W375a  
Course faculty and symposia presenters may upload or amend presentations by visiting the Speaker Information Center near the registration area. Speakers are not permitted to use their own laptops for their presentations. No exceptions will be made.

Podium and ePoster presenters are not permitted to upload or amend their presentations at any time onsite. Exceptions include The Spine Journal Outstanding Paper Awards and Research Grant Award presentations.

Press Room  
Room W181bc  
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 will be available.

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, September 25 6:30 a.m.-5:00 p.m.
Thursday, September 26 6:30 a.m.-5:00 p.m.
Friday, September 27 7:00 a.m.-11:00 a.m.

SAN DIEGO HOTELS ARE NOW AVAILABLE  
Get to know onPeak — hotel booking solutions with more flexibility.

- **Pay Delay**  
  Book now, pay later to ease your commitment.

- **Hotel Rewards Points**  
  Get credit for your hotel loyalty program.

- **Flexible Policies**  
  Make adjustments without penalty in case your plans change.

Plan ahead and book today.  
[onPeak.com/NASS20-ATT](http://onPeak.com/NASS20-ATT)

McCormick Place - West Building  
Central Concourse | Level 3 near Registration  
Tuesday, Sept 24 - Thursday, Sept 26: 8:00 am - 5:00 pm  
Friday, Sept 27: 8:00 am - 3:00 pm
What is the Discovery Study 6603?

- Investigational Product: Condoliase (code: SI-6603)
- Indication: Lumbar disc herniation
- Administration: Single injection into the nucleus pulposus of the intervertebral disc
- Study is Sponsored by Seikagaku Corporation

**SI-6603 is a new potential treatment option for LDH patients who have failed conservative treatment and who are considering surgery**

**Study Design:**
- Arms and Interventions: (SI-6603 : Sham) = (1 : 1)
- Duration of the study: about 52 weeks
- Planned number of patients: 320 patients
- Target patients:
  - Clear herniation as confirmed by MRI and symptoms
  - Unilateral radicular leg pain for 6 weeks to 1 year
  - Agree to suspend use of Opioid
  - Other criteria may apply

**What is required to qualify as an investigator?**
- Have any clinical trial experiences
- Have a colleague who is capable of performing intradiscal injection
- Work with experienced study coordinator
- Other requirements for the facility may apply

**SI-6603 has been approved in Japan**

- In Japan, SI-6603 has been launched with the brand name “Hernicore®” on 1/Aug/2018.
- In a few months after the launch, more than 100 facilities began using “Hernicore®”.
- This new treatment option has been independently discussed in the Japanese news media.

**SEE US AT BOOTH 4134 IN THE EXHIBIT HALL!**

Please scan the QR code to communicate your interest in trial participation to the study team.

Discovery6603Study@rhoworld.com
NASS International Distinction Program

Earlier this year, the North American Spine Society (NASS) introduced the "NASS International Distinction Program". This program encourages spine specialists to improve health care outcomes through the continued accumulation of CME and participation in worldwide education. NASS international physician and physician assistant paid members in good standing are eligible.

For every international course you attend, you will receive the next level of distinction, be recognized in the "Find a Member" section of the NASS website, as well as in SpineLine and on the International Distinction web page.

To maintain status in the program, you must maintain your NASS membership by renewing annually, attend a NASS-sponsored international course or Distinction Program module once every three years, and attend the NASS Annual Meeting once every five years.

Please see Sabina Choinski at the International Distinction Program booth to pick up your certificate.

NASS thanks these societies for participating:

ARABSPINE
Association of Spine Surgeons of India
Brazilian Spine Society
Brazilian Society of Minimally Invasive Spine Surgery and Techniques
GEER (Spanish Spine Society)
Indonesian Spine Society
Israel Spine Society
Japanese Society for Spine Surgery and Related Research
Korean Minimally Invasive Spinal Surgery Society
Kuwait Spine Society
Pakistan Spine Society
Qatar Spine
Saudi Spine Society
SILACO
Sudanese Spine Society
Taiwan Neurosurgical Spine Society
Ukrainian Spine Society
World Congress of Minimally Invasive Surgery and Techniques

International Surgical Symposia

International key opinion leaders will speak at the following sessions.

A Global Perspective on Deformity
Wednesday, September 25
1:00–2:00 p.m.
Room W471ab

A Global Perspective on Minimally Invasive Spine Surgery
Thursday, September 26
8:30–9:50 a.m.
Room W471ab

A Global Perspective on Cervical Spine
Thursday, September 26
2:05–3:25 p.m.
Room W470b

A Global Perspective on Spine Trauma
Friday, September 27
7:30–8:55 a.m.
Skyline Ballroom W375d

A Global Perspective on Degenerative Lumbar Spine
Friday, September 27
9:00–10:10 a.m.
Room W470b
OsteoXpress™ Graft Delivery Devices are designed to hydrate allograft, autograft, or synthetic bone graft materials and deliver as either a log or directly to an orthopedic surgical site. The system utilizes a patented vented membrane that releases air during hydration, eliminating air pockets. The female luer on the distal end makes for a simple connection to a hydration syringe. Both the 15cc and 5cc devices are available to be privately labeled as well.
NASS AWARDS

THURSDAY, SEPTEMBER 26
NASS Recognition Awards Presentation
9:45-9:55 a.m.
Skyline Ballroom W375ab

The Recognition Awards are for outstanding society members.

2019 LEON WILTSE AWARD:
Charles G. Fisher, MD, FRCSC, MHS
To recognize excellence in leadership and/or clinical research in spine care.

Dr. Charles Fisher is a Professor and Head of the Division of Spine Surgery in the Combined Neurosurgical and Orthopaedic Spine Program in the Department of Orthopaedic Surgery at the University of British Columbia. He has demonstrated nationally- and internationally-recognized leadership in both clinical research and spine care throughout his career. During his first years in practice at an academic surgical spine practice, Dr. Fisher completed a Masters in Health Care and Epidemiology. This provided the expertise in the design and evaluation of clinical trials that he needed to establish a research center focused on spine trauma and health related quality of life outcomes. Dr. Fisher was an early proponent of the judicious use of evidence-based medicine in spine surgery and published and lectured on this topic.

Together with Marcel Dvorak, Dr. Fisher built the Combined Neurosurgical/Orthopedic Spine Program in Vancouver, one of the earliest centers to embrace the collaboration of the two specialties in the care of spine patients. He has mentored numerous spine fellows during his career, and many of them have gone on to lead programs both in North America and around the world. Dr. Fisher has led the Canadian Spine Outcomes and Research Network. He has been a Co-Director of the Spine Oncology Study Group (SOSG). Most recently, he Chairs the Steering Committee of the AOSpine Knowledge Forum Tumor (AOKFT), a collaborative of spine care providers (including neurosurgeons, orthopedic surgeons, radiation oncologists, and medical oncologists) from high volume centers around the world. Of particular note, the efforts of the SOSG and AOKFT have led to novel scoring systems for neoplastic spinal instability, as well as novel tools for measuring health related quality of life and patient satisfaction.

He has more than 270 peer-reviewed publications, most of them focused on the practical aspects of patient care. Simply put, Dr. Fisher’s research efforts have impacted the way patients with spinal trauma and spinal tumors are managed all over the world.

Nominated by: Dino Samartzis, DSc, Niccole Germscheid, MSc, Ziya L. Gokaslan, MD, FAANS, FACS, Ilya Laufer, MD, MS, Michelle Clarke, MD, Michael G. Fehlings, MD, PhD, FRCSC, FACS, James S. Harrop, MD, Laurence D. Rhines, MD, Chetan Bettegowda, MD, PhD, John H. Shin, MD, Dean Chou, MD and Alexander R. Vaccaro, MD, PhD.
Dr. David Kennedy is a Professor and Chair of Physical Medicine and Rehabilitation at Vanderbilt University Medical Center where his practice focuses on non-operative and interventional spine. He completed his residency in Physical Medicine and Rehabilitation at the University of Washington in Seattle where he served as Chief Resident, and then a Spine and Sports Fellowship at the Rehabilitation Institute of Chicago.

Dr. Kennedy’s research has focused on the safety and efficacy of interventional spine procedures. He has pioneered safe injection techniques and is an internationally recognized expert in interventional spine procedures. His definitive, randomized-controlled trial on particulate versus non-particulate steroids in transforaminal epidural injections has influenced practice patterns, which should reduce the complications (spinal cord injury and death) associated with these procedures. Similarly, Dr. Kennedy’s study on facet injections versus radiofrequency ablation has had a substantial influence on practice patterns, resulting in better pain relief in spine patients. As a prolific researcher, he has been the recipient of numerous research grants and has published more than 90 peer-reviewed journal articles, 50-plus published abstracts, and more than 20 book chapters. As a spine researcher, he has had publications in the New England Journal of Medicine, the Journal of the American Medical Association (JAMA), and he is a frequent publisher in Pain Medicine, PM&R, and The Spine Journal (TSJ). His research has won research awards from The Spine Journal and the Spine Intervention Society (SIS).

In addition, Dr. Kennedy is a prolific lecturer. He has given over 100 lectures at national meetings, over 50 lectures at international meetings, and numerous local presentations and invited grand rounds. He is currently a Deputy Editor for The Spine Journal and on the editorial board for Pain Medicine. He is on the Board of Directors for the Spine Intervention Society. He is also on the Board of Directors for the American Academy of Physical Medicine & Rehabilitation (AAPM&R).

Nominated by: Scott Kreiner, MD

Dr. Gregory L. Whitcomb, DC

To recognize contributions to the art and science of spinal disorder management through service to NASS but has not been elected NASS President.

Dr. Greg Whitcomb is a 1981 graduate of Palmer College, a board-certified chiropractor and an Assistant Professor in the Department of Neurosurgery at the Medical College of Wisconsin (MCW).

In 1995, Dr. Whitcomb was among the lead team to conceptualize and launch a multidisciplinary spine program offering integrated surgical and non-surgical services at MCW where he became the first faculty-appointed DC in the institution’s history. This commitment to mutual cooperation of spine professionals has led to advances in patient care.

He continues full-professional effort practice at MCW SpineCare where he also spearheaded the development of a translational program for pregnancy-related axial pain in concert with the MCW Department of Obstetrics and Gynecology. Dr. Whitcomb has chaired multiple CME courses and has presented both nationally and internationally on evidence-informed, gender-specific, interdisciplinary and psychologically-informed spine practice.

Dr. Whitcomb has been a member of the North American Spine Society since 1997 and has served as a member and chair of the NASS Interdisciplinary Spine Section as well on the CME Committee. The development of these sections has been critical for appropriate representation of the less prominent specialties within this society whose identity is epitomized by the multidisciplinary nature of its members and mission. The sections have evolved substantially from those early years to give NASS a broader and stronger collaboration of its members. This commitment to multidisciplinary care led Dr. Whitcomb to take a lead role in developing a pathway to active NASS membership status for non-medical spine specialists, which has since been incorporated into the NASS By-Laws. He was appointed to NASS’ Advocacy Council in 2018. He has further contributed to the mission of NASS by participation in numerous projects including panelist for development of AUC, Strategic Task Force on PhD and Allied Health, NASS delegate for Alliance of Specialty Medicine Advocacy Conference, and abstract reviewer for several annual meetings.

Nominated by: Charles A. Reitman, MD
2019 SPINE ADVOCACY AWARD:
Neil Kahanovitz, MD
To recognize members of the North American Spine Society who have made exceptional contributions to the federal advocacy efforts on behalf of patients and members of the society.

Dr. Kahanovitz served as NASS President in 2002 and is widely considered NASS’ first real advocate—having pushed to establish the National Association of Spine Specialists. Dr. Kahanovitz got NASS involved in starting yearly Capitol Hill Days and also started “Spine Health Days.” During his Presidency, both The Spine Journal and SpineLine began.

Further, Dr. Kahanovitz had many preexisting relationships with members of Congress and introduced NASS to several congressmen and senators as well as certain state legislators. He was awarded a Commendation from the United States House Physician’s Office for surgery performed on members of the Supreme Court and Congress, and frequently testified on health care issues at Senate and House hearings. He also was awarded the Order of the Supreme Soviet Medal of Personal Courage by Mikhail Gorbachev for his humanitarian work in the USSR.

Dr. Kahanovitz has been a prominent leader for NASS in this area—a trailblazer actually and ran his own Center for Patient Advocacy. In 2017, he returned to his earlier passion and work in the circus, no longer as a performer but as Chairman and Executive Producer of the Big Apple Circus.

Nominated by: Philip L. Schneider, MD

THURSDAY, SEPTEMBER 26
The Spine Journal Outstanding Paper Awards Presentations
1:00-2:00 p.m.
W471ab

Honor your colleagues as The Spine Journal presents this year’s Outstanding Paper Awards.

2019 Outstanding Paper in Surgical Science:
Andrew J. Schoenfeld, MD; Marco L. Ferrone, MD; Peter G. Passias, MD; Justin A. Blucher, MS; Lauren B. Barton, BS; John H. Shin, MD; Mitchel B. Harris, MD; Joseph H. Schwab, MD, MS

2019 Outstanding Paper in Basic Science:
S. Rajasekaran, PhD; Chitraa Tangavel, PhD; Sri Vijay Anand, K S MS; Dilip Chand Raja, S MS; Sharon Miracle Nayagam, MSc; Monica Steffi Matchado; M. Ravendran, PhD; Ajoy Prasad Shetty, MS; Rishi Mugesh Kanna, MS; K. Dharmalingam, PhD

2019 Outstanding Paper in Value in Spine Care:
Azeem Tanq Malik, MBBS; Frank M. Phillips, MD; Elizabeth Yu, MD; Safdar N. Khan, MD

Value Abstract Awards Presentations
Value Abstract Awards foster and recognize efforts to define value in spine care. Value Abstract Awards recipients present during abstract sessions throughout the meeting.

Resident & Fellow Research Awards Presentations
Resident & Fellow Research Awards recognize young researchers and clinicians who work in spine care. Resident & Fellow Research Awards recipients present during abstract sessions throughout the meeting.

Section Best Paper Awards
Awarded by NASS’ specialty sections, these awards recognize research efforts in specific disciplines. Section Best Paper Award recipients will present during abstract sessions throughout the meeting.

NASS presents this year’s research grants and traveling fellowships to those proposing advancements in spine care and research. Grant recipients from 2016 and 2017 present their research findings during abstract sessions throughout the meeting.
SHAPING THE FUTURE OF SURGERY

CONDUIT™ Interbody Platform featuring EIT™ Cellular Titanium Technology

Visit Us At NASS Booth 4019
Complimentary shuttle service is provided between McCormick Place and the hotels listed below.

<table>
<thead>
<tr>
<th>Hotel</th>
<th>Route</th>
<th>Shuttle boarding location at hotel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicago Marriott Downtown Magnificent Mile</td>
<td>4</td>
<td>SW Corner Ohio &amp; Rush Streets</td>
</tr>
<tr>
<td>Courtyard Chicago Downtown Magnificent Mile</td>
<td>3</td>
<td>Walk to Hyatt Centric - Front of hotel, on St. Clair &amp; Erie Streets</td>
</tr>
<tr>
<td>Courtyard Chicago Downtown River North</td>
<td>4</td>
<td>Walk to Chicago Marriott - SW corner of Ohio &amp; Rush Streets</td>
</tr>
<tr>
<td>Embassy Suites Chicago - Downtown/Lakefront</td>
<td>4</td>
<td>Curbside on Columbus</td>
</tr>
<tr>
<td>Fairmont Millennium Park</td>
<td>5</td>
<td>Walk to Hyatt Regency - Curbside on Wacker Drive</td>
</tr>
<tr>
<td>Hampton Inn McCormick Center</td>
<td>Walk</td>
<td>Walk to McCormick Place</td>
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<tr>
<td>Hilton Chicago</td>
<td>1</td>
<td>8th Street side entrance</td>
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<tr>
<td>Hilton Garden Inn McCormick Center</td>
<td>Walk</td>
<td>Walk to McCormick Place</td>
</tr>
<tr>
<td>Home 2 Suites</td>
<td>Walk</td>
<td>Walk to McCormick Place</td>
</tr>
<tr>
<td>Hyatt Centric Magnificent Mile</td>
<td>3</td>
<td>Front of hotel, on St. Clair &amp; Erie Streets</td>
</tr>
<tr>
<td>Hyatt Regency Chicago</td>
<td>5</td>
<td>Curbside on Wacker Drive</td>
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<tr>
<td>Hyatt Regency McCormick Place</td>
<td>Walk</td>
<td>Walk to McCormick Place</td>
</tr>
<tr>
<td>InterContinental Chicago</td>
<td>3</td>
<td>Upper Illinois side door</td>
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<tr>
<td>Marriott Marquis Chicago</td>
<td>Walk</td>
<td>Walk to McCormick Place</td>
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<tr>
<td>Palmer House Hilton</td>
<td>2</td>
<td>Wabash Avenue door</td>
</tr>
<tr>
<td>Swissotel Chicago</td>
<td>5</td>
<td>Walk to Hyatt Regency - Curbside on Wacker Drive</td>
</tr>
<tr>
<td>The Gwen, A Luxury Collection Hotel</td>
<td>4</td>
<td>Walk to Chicago Marriott - SW corner Ohio &amp; Rush Streets</td>
</tr>
</tbody>
</table>

**Shuttle Schedule**

<table>
<thead>
<tr>
<th>Day</th>
<th>Time Range</th>
<th>Frequency</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday, September 24</td>
<td>12:00 p.m. – 6:00 p.m.</td>
<td>Every 30 minutes*</td>
<td>*Departs McCormick Place 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. Please note: This is a preliminary shuttle schedule and is subject to change. Please check the signage in your hotel lobby, upon your arrival in Chicago, for the most current information.</td>
</tr>
<tr>
<td>Wednesday, September 25</td>
<td>6:00 a.m. – 2:00 p.m.</td>
<td>Every 10-15 minutes</td>
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<tr>
<td></td>
<td>2:00 p.m. – 4:00 p.m.</td>
<td>Every 30 minutes*</td>
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<tr>
<td></td>
<td>4:00 p.m. – 5:30 p.m.</td>
<td>Every 10-15 minutes</td>
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<tr>
<td></td>
<td>5:00 p.m. – 6:00 p.m.</td>
<td>NASS Social Hour</td>
<td></td>
</tr>
<tr>
<td>Thursday, September 26</td>
<td>6:00 a.m. – 10:30 a.m.</td>
<td>Every 10-15 minutes</td>
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<tr>
<td></td>
<td>10:30 a.m. – 2:30 p.m.</td>
<td>Every 30 minutes*</td>
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<tr>
<td></td>
<td>2:30 p.m. – 5:30 p.m.</td>
<td>Every 10-15 minutes</td>
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<tr>
<td>Friday, September 27</td>
<td>6:00 a.m. – 10:30 a.m.</td>
<td>Every 10-15 minutes</td>
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<tr>
<td></td>
<td>10:30 a.m. – 2:30 p.m.</td>
<td>Every 30 minutes*</td>
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<tr>
<td></td>
<td>2:30 p.m. – 5:30 p.m.</td>
<td>Every 10-15 minutes</td>
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</tr>
<tr>
<td>Saturday, September 28</td>
<td>7:00 a.m. – 12:30 p.m.</td>
<td>Every 30 minutes*</td>
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</tbody>
</table>
DO YOUR LONG CONSTRUCTS HAVE A SOLID FOUNDATION?

iFuse Bedrock™
Fixation. Fusion. Foundation.

Data shows a 30% reduction in SI joint motion by adding iFuse Bedrock to sacral-alar iliac (S2AI) screws.*

* SI-BONE Technical Study 300720-TS.

Visit us at NASS 2019
Booth 3424

"iFuse Bedrock™ represents a potentially important advancement in how we treat adult deformity patients."
Chris Shaffrey, MD, Chief of the Duke Spine Division at Duke University
Join Us To Experience The Future of Spine Care.

Benefits of Dynamic Intraoperative Patient Positioning

Thursday, September 26
8:00 - 10:00 am
The Learning Place,
Exhibit Hall (Orange Lab)

Live Demo with
Brett Babat, MD

The ProAxis® Table and Levó™ Head Positioning System can assist in optimizing spinal alignment through intraoperative adjustments. This session features an overview, a surgeon-led demonstration, and a hands-on opportunity to use these innovative products.

Mizuho OSI® is the leading manufacturer of specialty surgical tables for spine and orthopedic surgeries including patient care products.
MECHANOBIOLOGY

The emerging field of science at the interface of biology & engineering focusing on how physical forces and changes in the mechanical properties of cells & tissues contribute to development, cell differentiation, proliferation, and healing.
### MEETING-AT-A-GLANCE

#### Monday, September 23

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 a.m.-5:00 p.m.</td>
<td><strong>Ticketed Session:</strong> Coding Update 2019: Mastering the Coding Maze (Two-day course)</td>
<td>Room W471ab</td>
</tr>
<tr>
<td></td>
<td><strong>Exhibitor Registration</strong></td>
<td>F2 Lobby</td>
</tr>
</tbody>
</table>

#### Tuesday, September 24

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 a.m.-5:00 p.m.</td>
<td><strong>Ticketed Session:</strong> Coding Update 2019: Mastering the Coding Maze (Two-day course, continued)</td>
<td>Room W471ab</td>
</tr>
<tr>
<td>8:00 a.m.-6:00 p.m.</td>
<td><strong>Exhibitor Registration</strong></td>
<td>F2 Lobby</td>
</tr>
<tr>
<td>1:00-4:30 p.m.</td>
<td><strong>Attendee Registration</strong></td>
<td>F2 Lobby</td>
</tr>
</tbody>
</table>

#### Wednesday, September 25

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:30-8:00 a.m.</td>
<td><strong>Continental Breakfast</strong></td>
<td>F2 Lobby</td>
</tr>
<tr>
<td>6:30 a.m.-5:00 p.m.</td>
<td><strong>Attendee Registration</strong></td>
<td>F2 Lobby</td>
</tr>
<tr>
<td>7:00 a.m.-12:00 p.m.</td>
<td><strong>Ticketed Hands-on Course:</strong> Minimally Invasive Spine Surgery</td>
<td>Yellow &amp; Green Labs (Learning Pl.)</td>
</tr>
<tr>
<td>7:00 a.m.-4:15 p.m.</td>
<td><strong>Ticketed Hands-on Course:</strong> Endoscopic Spine Surgery Symposium and Cadaver Workshop</td>
<td>Gold Theater, Yellow &amp; Green Labs (Learning Pl.)</td>
</tr>
<tr>
<td>7:00 a.m.-5:00 p.m.</td>
<td><strong>Exhibitor Registration</strong></td>
<td>F2 Lobby</td>
</tr>
<tr>
<td>7:20-7:25 a.m.</td>
<td><strong>Welcome Remarks</strong></td>
<td>Skyline Ballroom W375ab</td>
</tr>
<tr>
<td>7:25-7:30 a.m.</td>
<td><strong>NASS Working for You:</strong> NASS Low Back Pain Guideline</td>
<td>Skyline Ballroom W375ab</td>
</tr>
<tr>
<td>7:30-8:55 a.m.</td>
<td><strong>Symposia:</strong>&lt;br&gt;Surgical: The Real Deal of the Opioid Crisis&lt;br&gt;Medical: Clinical Management of Spinal Cord Injury: Current Literature and Experience</td>
<td>Skyline Ballroom W375ab</td>
</tr>
<tr>
<td></td>
<td><strong>Abstract Presentations:</strong>&lt;br&gt;Biomechanics and Basic Science I&lt;br&gt;Cervical Spine Surgery I&lt;br&gt;Spinal Deformity I&lt;br&gt;Thoracolumbar Surgery I</td>
<td>Room W471ab, Room W470a, Room W470b, Skyline Ballroom W375d</td>
</tr>
</tbody>
</table>
### Wednesday, September 25 (continued)

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00-10:00 a.m.</td>
<td><strong>Surgical Innovation Lab Demos:</strong></td>
<td>Orange Lab (Booth 1310)</td>
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<tr>
<td></td>
<td>Globus: ExcelsiusGPS® Advanced Surgical Innovation Lab—Invitation Only</td>
<td>Ind</td>
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<tr>
<td></td>
<td>Medtronic</td>
<td>Blue Lab (Booth 1325)</td>
</tr>
<tr>
<td>9:00-10:00 a.m.</td>
<td><strong>Symposia:</strong></td>
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<tr>
<td></td>
<td>Surgical: Endoscopic Spine Surgery: New Techniques and Outcomes</td>
<td>Skyline Ballroom W375ab</td>
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<tr>
<td></td>
<td>Integrated: Surgical Treatment of Low Back Pain: Evidence, Controversy and Debate</td>
<td>Skyline Ballroom W375c</td>
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<tr>
<td></td>
<td><strong>Best Papers</strong></td>
<td>Room W471ab</td>
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<tr>
<td></td>
<td><strong>Abstract Presentations:</strong></td>
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<tr>
<td></td>
<td>Cervical Spine Surgery II</td>
<td>Room W470b</td>
</tr>
<tr>
<td></td>
<td>Improving Surgical Outcomes</td>
<td>Room W470a</td>
</tr>
<tr>
<td></td>
<td>Thoracolumbar Surgery II</td>
<td>Skyline Ballroom W375d</td>
</tr>
<tr>
<td>9:00 a.m.-5:00 p.m.</td>
<td><strong>Technical Exhibition</strong></td>
<td>F1 &amp; F2 Exhibit Hall</td>
</tr>
<tr>
<td></td>
<td><strong>Practice and Employer Meet &amp; Greet</strong></td>
<td>West Central Lobby</td>
</tr>
<tr>
<td>10:00-10:30 a.m.</td>
<td><strong>Networking Break Beverage Service</strong></td>
<td>Learning Place &amp; Lounge</td>
</tr>
<tr>
<td></td>
<td><strong>Poster Grand Rounds</strong></td>
<td>The Learning Place</td>
</tr>
<tr>
<td>10:30-10:35 a.m.</td>
<td><strong>NASS Working for You:</strong> Advocacy</td>
<td>Skyline Ballroom W375ab</td>
</tr>
<tr>
<td>10:35 a.m.-12:00 p.m.</td>
<td><strong>Symposia:</strong></td>
<td>Skyline Ballroom W375ab</td>
</tr>
<tr>
<td></td>
<td>Surgical: Predictive Analysis and Data Utilization to Improve Patient Assessment and Outcomes in Adult Spinal Deformity Surgery</td>
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<tr>
<td></td>
<td>Integrated: Leadership Perspective: Identifying and Managing Physician Burnout in Today’s Health Care Environment</td>
<td>Skyline Ballroom W375c</td>
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<tr>
<td></td>
<td><strong>Abstract Presentations:</strong></td>
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<tr>
<td></td>
<td>Spinal Deformity II</td>
<td>Room W471ab</td>
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<tr>
<td></td>
<td>Interdisciplinary Care</td>
<td>Room W470b</td>
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<tr>
<td></td>
<td><strong>Resident/Fellow Education Pathway:</strong></td>
<td>Room W470a</td>
</tr>
<tr>
<td></td>
<td>Transition to Practice I: Landing a Job</td>
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<tr>
<td></td>
<td><strong>Interdisciplinary Spine Forum:</strong></td>
<td>Skyline Ballroom W375d</td>
</tr>
<tr>
<td></td>
<td>The Optimal Role of the First Contact Practitioner in Spine Care</td>
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</tr>
<tr>
<td>11:00 a.m.-1:00 p.m.</td>
<td><strong>Surgical Innovation Lab Demos:</strong></td>
<td>Orange Lab (Booth 1310)</td>
</tr>
<tr>
<td></td>
<td>Globus: ExcelsiusGPS® Advanced Surgical Innovation Lab—Invitation Only</td>
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<tr>
<td></td>
<td>Medtronic</td>
<td>Blue Lab (Booth 1325)</td>
</tr>
<tr>
<td>11:00 a.m.-2:30 p.m.</td>
<td><strong>P.U.R.E.</strong> (Ticketed Hot Lunch)</td>
<td>Booth 938</td>
</tr>
</tbody>
</table>
### Wednesday, September 25 (continued)

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<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>12:00-12:30 p.m.</td>
<td><strong>Solution Showcase:</strong> Radius Pharm: Fragility Fracture Alert: Treating Postmenopausal Patients with Osteoporosis at High Risk for Fracture with an Anabolic Agent</td>
<td>Red Theater (Booth 1538)</td>
</tr>
<tr>
<td>12:00-1:00 p.m.</td>
<td><strong>Complimentary Boxed Lunch</strong> (Medical Attendees Only)</td>
<td>Booth 1838</td>
</tr>
<tr>
<td></td>
<td><strong>Spine Fellowship Directors’ Meeting</strong></td>
<td>Room W474</td>
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<tr>
<td></td>
<td><strong>Professional Headshots</strong></td>
<td>West Central Lobby</td>
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<td></td>
<td><strong>Resident/Fellow Pizza Lunch</strong></td>
<td>R/F W375cde Lobby</td>
</tr>
<tr>
<td>12:30-1:00 p.m.</td>
<td><strong>Solution Showcase:</strong> Stryker: SpineMap Go: Augmented Fluoroscopy for Radiation Reduction</td>
<td>Red Theater (Booth 1538)</td>
</tr>
<tr>
<td>12:55-1:00 p.m.</td>
<td><strong>NASS Working for You:</strong> NASS Spine Registry</td>
<td>ALL Skyline Ballroom W375ab</td>
</tr>
<tr>
<td>1:00-2:00 p.m.</td>
<td><strong>Symposia:</strong></td>
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<tr>
<td></td>
<td>Surgical: A Global Perspective on Deformity</td>
<td>SUR Room W471ab</td>
</tr>
<tr>
<td></td>
<td>Medical: Ambulatory Surgical Centers: Is This the Next Big Thing?</td>
<td>MED Skyline Ballroom W375c</td>
</tr>
<tr>
<td></td>
<td><strong>Abstract Presentations:</strong></td>
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<tr>
<td></td>
<td>Cervical Spine Surgery III</td>
<td>SUR Skyline Ballroom W375ab</td>
</tr>
<tr>
<td></td>
<td>Thoracolumbar Surgery III</td>
<td>SUR Room W470b</td>
</tr>
<tr>
<td></td>
<td>Functional Analysis and Therapy</td>
<td>MED Room W470a</td>
</tr>
<tr>
<td></td>
<td><strong>Innovative Technology Presentations</strong> (Non-CME)</td>
<td>IND Skyline Ballroom W375d</td>
</tr>
<tr>
<td>1:00-3:00 p.m.</td>
<td><strong>De-stress with the Best:</strong> Therapy Dog Meet &amp; Greet</td>
<td>The Lounge</td>
</tr>
<tr>
<td>2:00-4:00 p.m.</td>
<td><strong>Surgical Innovation Lab Demos:</strong></td>
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<td>Globus: ExcelsiusGPS® Advanced Surgical Innovation Lab—Invitation Only</td>
<td>IND Orange Lab (Booth 1310)</td>
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<td>Medtronic</td>
<td>IND Blue Lab (Booth 1325)</td>
</tr>
<tr>
<td>2:05-3:05 p.m.</td>
<td><strong>Section on Spinal Cord Injury:</strong> Latest Advances in Basic Science Research</td>
<td>SUR Skyline Ballroom W375ab</td>
</tr>
<tr>
<td></td>
<td><strong>Section on Biologics &amp; Basic Research:</strong> BMP in 2019: The Biologic Hasn’t Changed, but the Evidence Has</td>
<td>ALL Skyline Ballroom W375c</td>
</tr>
<tr>
<td></td>
<td><strong>Section on Minimally Invasive Procedures:</strong> Advances and Case Scenarios</td>
<td>SUR Room W471ab</td>
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<tr>
<td></td>
<td><strong>Section on Biologics &amp; Basic Research:</strong> Abstract Presentations</td>
<td>MED Room W470a</td>
</tr>
<tr>
<td>3:05-3:35 p.m.</td>
<td><strong>Networking Break Beverage Service</strong></td>
<td>Learning Place &amp; Lounge</td>
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<td><strong>Members’ Business Meeting</strong></td>
<td>Room W474</td>
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<td></td>
<td><strong>Poster Grand Rounds</strong></td>
<td>ALL The Learning Place</td>
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### Wednesday, September 25 (continued)

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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</table>
| 3:35-5:05 p.m. | **Section on Spine Oncology:** Evaluation and Management of Unknown Spinal Lesions  
**Section on Biologics & Basic Research:** Biologics in Spine Surgery: Back to the Future  
**Section on Robotics & Navigation:** How to Get the Best Outcome from Your Robotics and Navigation System  
**Exercise Committee Presents:** Back to the Future: Low Back Pain Disability and Episode Risk Reduction  
**Section on Motion Technology:** Abstract Presentations  
**Section on Intraoperative Neurophysiological Monitoring:** Neuromonitoring in Spine Surgery: What Would You Do? | Skyline Ballroom W375ab, Skyline Ballroom W375c, Room W471ab, Room W470b, Room W470a, Skyline Ballroom W375d |
| 3:45-8:00 p.m. | **NASS After Hours:** SI-Joint Hands-On Workshop: Corelink, Medtronic, RTI, SI-BONE, xTant (Non-CME) | Gold Theater & Orange Lab |
| 5:00-6:00 p.m. | Social Hour                                                          | Lounge                 |
| 5:00-8:00 p.m. | **Surgical Innovation Lab Workshops:**  
Stryker Interventional Spine  
Medtronic | Green Lab (Booth 1320), Blue Lab (Booth 1325) |

**Surgical** | **Medical** | **All Specialties** | **Industry** | **Residents/Fellows** | **Requires separate fee**
---|---|---|---|---|---
Surgeons | Medical | All Specialties | Industry | Residents/Fellows | Requires separate fee

---

**Thank you to OMeGA’s Spine education supporters**

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**Zimmer Biomet**  
*Founding supporter*

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>6:30-8:00 a.m.</td>
<td>Continental Breakfast</td>
<td>F2 Lobby</td>
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<tr>
<td>6:30 a.m.-5:00 p.m.</td>
<td>Attendee Registration</td>
<td>F2 Lobby</td>
</tr>
<tr>
<td>7:25-8:25 a.m.</td>
<td><strong>Symposia:</strong></td>
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<tr>
<td></td>
<td>Surgical: Anticipating and Reducing Complications in Adult Spinal</td>
<td>Skyline Ballroom W375ab</td>
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<tr>
<td></td>
<td>Deformity Surgery: Clinical Translatable Research Findings From the</td>
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<td>International Spine Study Group</td>
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<td>Section on RIMS: Medical Cannabis, Diet and Nutritional Supplements</td>
<td>Skyline Ballroom W375c</td>
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<tr>
<td></td>
<td>and Other Self-Help Treatments for Pain</td>
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<tr>
<td>8:00-10:00 a.m.</td>
<td><strong>Surgical Innovation Lab Demos:</strong></td>
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<td></td>
<td>Mizuho OSI: Benefits of Dynamic Intraoperative Patient Positioning</td>
<td>Orange Lab (Booth 1310)</td>
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<td>Providence Medical Technology: Novel Instrument Tracking Platform</td>
<td>Yellow Lab (Booth 1315)</td>
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<td></td>
<td>Coupled with a Tissue Sparing Approach to Posterior Cervical Fusion—</td>
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<td>Reduced Radiation &amp; Operative Time</td>
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<td>Medacta</td>
<td>Green Lab (Booth 1320)</td>
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<td></td>
<td>Medtronic</td>
<td>Blue Lab (Booth 1325)</td>
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<tr>
<td>8:00 a.m.-5:00 p.m.</td>
<td><strong>Exhibitor Registration</strong></td>
<td>F2 Lobby</td>
</tr>
<tr>
<td>8:30-9:30 a.m.</td>
<td><strong>Medical Symposium:</strong> Section on RIMS: Optimization for Spine Surgery</td>
<td>Skyline Ballroom W375c</td>
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<td><strong>Best Papers</strong></td>
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<td></td>
<td><strong>Abstract Presentations:</strong> Spine Interventions</td>
<td>Room W470b</td>
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<td></td>
<td><strong>Resident/Fellow Education Pathway:</strong> Career Building</td>
<td>Room W470a</td>
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<td></td>
<td><strong>Interdisciplinary Spine Forum:</strong> Future of Spine Care: How will</td>
<td>Skyline Ballroom W375d</td>
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<tr>
<td></td>
<td>Spine Care Adapt to the Changing Dynamics of Health Care Delivery?</td>
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</tr>
<tr>
<td>8:30-9:50 a.m.</td>
<td><strong>Surgical Symposium:</strong> A Global Perspective on Minimally Invasive</td>
<td>Room W471ab</td>
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<tr>
<td></td>
<td>Spine Surgery</td>
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<tr>
<td>9:00 a.m.-5:00 p.m.</td>
<td><strong>Technical Exhibition</strong></td>
<td>F1 &amp; F2 Exhibit Hall</td>
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<tr>
<td></td>
<td><strong>Practice and Employer Meet &amp; Greet</strong></td>
<td>West Central Lobby</td>
</tr>
<tr>
<td>9:30-10:00 a.m.</td>
<td><strong>Networking Break Beverage Service</strong></td>
<td>Learning Place &amp; Lounge</td>
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<td></td>
<td><strong>Practical Theater:</strong> NASS Low Back Pain Guideline</td>
<td>Gold Theater (Learning Pl.)</td>
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<td></td>
<td><strong>Poster Grand Rounds</strong></td>
<td>The Learning Place</td>
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</table>
**Thursday, September 26 (continued)**

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<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>9:45-9:55 a.m.</td>
<td>NASS Recognition Awards Presentation</td>
<td>Skyline Ballroom W375ab</td>
</tr>
<tr>
<td>9:55-10:00 a.m.</td>
<td>2019 Research Grants and Fellowship Awards Presentations</td>
<td>Skyline Ballroom W375ab</td>
</tr>
<tr>
<td>10:00-10:15 a.m.</td>
<td>Incoming Presidential Remarks: William J. Sullivan, MD</td>
<td>Skyline Ballroom W375ab</td>
</tr>
<tr>
<td>10:15-11:00 a.m.</td>
<td>2018-2019 Presidential Address: Jeffrey C. Wang, MD</td>
<td>Skyline Ballroom W375ab</td>
</tr>
<tr>
<td>11:00 a.m.-12:00 p.m.</td>
<td>Presidential Guest Speaker: Christian Gansch</td>
<td>Skyline Ballroom W375ab</td>
</tr>
<tr>
<td>11:00 a.m.-1:00 p.m.</td>
<td>Surgical Innovation Lab Demos:</td>
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<td>Life Spine</td>
<td>The Learning Place</td>
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<td>Misonix</td>
<td>Orange Lab (Booth 1310)</td>
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<td>Anchor Ortho: The Future of Herniated Disc Repair Procedures: A Demonstration on the Design and Clinical Application of the AnchorKnot® Tissue Approximation Kit</td>
<td>Yellow Lab (Booth 1315)</td>
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<td>Medtronic</td>
<td>Green Lab (Booth 1320)</td>
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<td></td>
<td>Blue Lab (Booth 1325)</td>
</tr>
<tr>
<td>11:00 a.m.-2:30 p.m.</td>
<td>P.U.R.E. (Ticketed Hot Lunch)</td>
<td>Booth 938</td>
</tr>
<tr>
<td>12:00-1:00 p.m.</td>
<td>Complimentary Boxed Lunch (Medical Attendees Only)</td>
<td>Booth 1838</td>
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<td>Professional Headshots</td>
<td>West Central Lobby</td>
</tr>
<tr>
<td>12:00-12:30 p.m.</td>
<td>Solution Showcase: DePuy Synthes, A Johnson &amp; Johnson Company: The Science of Fusion: What You Thought You Knew</td>
<td>Red Theater (Booth 1538)</td>
</tr>
<tr>
<td>12:30-1:00 p.m.</td>
<td>Solution Showcase: Terumo BCT: Autologous Biologics: A Novel Treatment Option in Spinal Fusion</td>
<td>Red Theater (Booth 1538)</td>
</tr>
<tr>
<td>1:00-2:00 p.m.</td>
<td>Symposia:</td>
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<td></td>
<td>Surgical: Prevention of Flat Back Deformity in Lumbar Spine Surgery</td>
<td>Skyline Ballroom W375ab</td>
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<td>Medical: Using Regenerative Medicine to Treat Chronic Pain Emanating from the Spine</td>
<td>Skyline Ballroom W375c</td>
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<td>The Spine Journal Outstanding Paper Awards Presentations</td>
<td>Room W471ab</td>
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<td></td>
<td>Abstract Presentations: Socioeconomics of Spine Care</td>
<td>Room W470b</td>
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<tr>
<td></td>
<td>Innovative Technology Presentations (Non-CME)</td>
<td>Room W470a</td>
</tr>
<tr>
<td>1:00-3:00 p.m.</td>
<td>De-stress with the Best: Therapy Dog Meet &amp; Greet</td>
<td>The Lounge</td>
</tr>
<tr>
<td>1:00-3:05 p.m.</td>
<td>Interdisciplinary Spine Forum: Psychologically Informed Spine Practice: A Learning Experience (Part I) (Limit 60 Participants)</td>
<td>Skyline Ballroom W375d</td>
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### Thursday, September 26 (continued)

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Location</th>
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</table>
| 2:00-4:00 p.m.| **Surgical Innovation Lab Demos:**  
Spineology  
Orthofix: M6-C™ Artificial Cervical Disc: The Natural Choice  
Relievant Medsystems  
Medtronic       | The Learning Place  
Orange Lab (Booth 1310)  
Yellow Lab (Booth 1315)  
Green Lab (Booth 1320)  
Blue Lab (Booth 1325)   |
| 2:05-3:05 p.m.| **Medical Symposium:** Neuromodulation  
**Abstract Presentations:**  
Trauma and Biomechanics I  
Cervical Spine Surgery IV | Skyline Ballroom W375c  
Room W471ab  
Skyline Ballroom W375ab |
| 2:05-3:25 p.m.| **Surgical Symposium:** A Global Perspective on Cervical Spine                      | Room W470b                         |
| 3:05-3:35 p.m.| **Networking Break Beverage Service**  
**Practical Theater:** NASS Spine Registry  
**Poster Grand Rounds** | Learning Place & Lounge  
Gold Theater (Learning Pl.)  
The Learning Place |
| 3:35-3:40 p.m.| **NASS Working for You:** Value Update                              | Skyline Ballroom W375ab            |
| 3:35-5:05 p.m.| **Integrated Symposium:** Opiates: The Changing Roles and Responsibilities of the Spine Surgeon  
**Abstract Presentations:**  
Thoracolumbar Surgery V  
Spinal Deformity III  
Radiology  
**Interdisciplinary Spine Forum:** Psychologically Informed Practice: A Learning Experience (Part II) (Limit 60 Participants) | Skyline Ballroom W375c  
Room W471ab  
Room W470b  
Room W470a  
Skyline Ballroom W375d |
| 3:40-5:05 p.m.| **Surgical Symposium:** Lateral Approach Spine Surgery  
Co-sponsored with Society of Lateral Access Surgery | Skyline Ballroom W375ab           |
| 3:45-8:00 p.m.| **NASS After Hours:** Robotics & Navigation Hands-On Workshop: D Surgical, Inc., Globus, Medtronic (Non-CME) | Gold Theater & Orange Lab (Booth 1310) |
| 5:00-8:00 p.m.| **Surgical Innovation Lab Workshops:**  
SI-BONE  
DePuy Synthes, A Johnson & Johnson Company  
RIWO Spine | Yellow Lab (Booth 1315)  
Green Lab (Booth 1320)  
Blue Lab (Booth 1325)   |
<p>| 5:15-6:15 p.m.| <strong>Resident, Fellow and Program Directors’ Reception</strong> | W375cde Lobby                      |</p>
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<tr>
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<tr>
<td>6:30-8:00 a.m.</td>
<td>Continental Breakfast</td>
<td>F2 Lobby</td>
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<tr>
<td>7:00-8:45 a.m.</td>
<td>Surgical Technique Cadaver Demonstrations: Endoscopic Spine Surgery</td>
<td>Skyline Ballroom W375ab</td>
</tr>
<tr>
<td>7:00 a.m.-12:00 p.m.</td>
<td>Ticketed Hands-on Course: Basic Fluoroscopic Guided Lumbar Spinal Injections</td>
<td>Gold Theater, Yellow Lab (The Learning Place)</td>
</tr>
<tr>
<td>7:00 a.m.-5:00 p.m.</td>
<td>Attendee Registration</td>
<td>F2 Lobby</td>
</tr>
<tr>
<td>7:30-8:55 a.m.</td>
<td>Symposia: Surgical: Complications Avoidance and Management Strategies</td>
<td>Skyline Ballroom W375c</td>
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<tr>
<td></td>
<td>Surgical: A Global Perspective on Spine Trauma</td>
<td>Skyline Ballroom W375d</td>
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<td></td>
<td>Medical: The Utility of Functional Analysis in Patients Afflicted With Spinal Disorders</td>
<td>Room W471ab</td>
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<tr>
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<td>Abstract Presentations: Spinal Deformity IV</td>
<td>Room W470b</td>
</tr>
<tr>
<td>7:30-10:00 a.m.</td>
<td>Resident/Fellow Education Pathway: Transition to Practice II: Essential Skills for Starting Practice</td>
<td>Room W470a</td>
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<tr>
<td>8:00-10:00 a.m.</td>
<td>Surgical Innovation Lab Demos: Terumo BCT: Autologous Biologics: The Role of Bone Marrow Concentrate in Tissue Healing</td>
<td>Orange Lab (Booth 1310)</td>
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<td>Medacta</td>
<td>Blue Lab (Booth 1325)</td>
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<tr>
<td>8:00 a.m.-1:00 p.m.</td>
<td>Exhibitor Registration</td>
<td>F2 Lobby</td>
</tr>
<tr>
<td>8:45-10:30 a.m.</td>
<td>Surgical Technique Cadaver Demonstrations: MIS Tubular Decompression</td>
<td>Skyline Ballroom W375ab</td>
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<tr>
<td>8:55-9:00 a.m.</td>
<td>NASS Working for You: Advocacy</td>
<td>Skyline Ballroom W375c</td>
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<tr>
<td>9:00-10:00 a.m.</td>
<td>Surgical Symposium: Pelvic Fixation: Where Are We Now?</td>
<td>Skyline Ballroom W375c</td>
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<td></td>
<td>Best Papers</td>
<td>Room W471ab</td>
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<td></td>
<td>Grassroots Training Seminar: At the Table or On the Menu: The Value of NASS Advocacy</td>
<td>Room W475a</td>
</tr>
<tr>
<td>9:00-10:10 a.m.</td>
<td>Surgical Symposium: A Global Perspective on Degenerative Lumbar Spine</td>
<td>Room W470b</td>
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<tr>
<td>9:00 a.m.-1:30 p.m.</td>
<td>Technical Exhibition</td>
<td>F1 &amp; F2 Exhibit Hall</td>
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<td>Practice and Employer Meet &amp; Greet</td>
<td>West Central Lobby</td>
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<td>10:00-10:30 a.m.</td>
<td>Networking Break Beverage Service</td>
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<tr>
<th>Time</th>
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<tbody>
<tr>
<td><strong>10:30 a.m.-12:00 p.m.</strong></td>
<td><strong>Symposia:</strong> Surgical: Augmented Reality, Virtual Reality and Artificial Intelligence: Are We There Yet?</td>
<td>Skyline Ballroom W375c</td>
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<tr>
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<td>Integrated: A Look at Medicare for All Prospects, the Legacy of the ACA and the Path Forward for American Health Care</td>
<td>Room W471ab</td>
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<tr>
<td></td>
<td><strong>Abstract Presentations:</strong> Spinal Deformity V</td>
<td>Room W470b</td>
</tr>
<tr>
<td></td>
<td>Cervical Spine Surgery V</td>
<td>Room W470a</td>
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<tr>
<td></td>
<td><strong>Interdisciplinary Spine Forum:</strong> Obesity and Diabetes: Impact on the Spine and Evidence-Based Management Strategies</td>
<td>Skyline Ballroom W375d</td>
</tr>
<tr>
<td><strong>10:45 a.m.-12:00 p.m.</strong></td>
<td><strong>Surgical Technique Cadaver Demonstrations:</strong> Minimally Invasive Lateral Interbody Fusion</td>
<td>Skyline Ballroom W375ab</td>
</tr>
<tr>
<td><strong>11:00 a.m.-1:00 p.m.</strong></td>
<td><strong>Surgical Innovation Lab Demos:</strong> SI-BONE</td>
<td>Orange Lab (Booth 1310)</td>
</tr>
<tr>
<td></td>
<td>Medacta</td>
<td>Blue Lab (Booth 1325)</td>
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<tr>
<td><strong>11:00 a.m.-1:30 p.m.</strong></td>
<td><strong>P.U.R.E.</strong> (Ticketed Hot Lunch)</td>
<td>Booth 938</td>
</tr>
<tr>
<td><strong>12:00-1:00 p.m.</strong></td>
<td><strong>Complimentary Boxed Lunch</strong> (Medical Attendees Only)</td>
<td>Booth 1838</td>
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<td></td>
<td><strong>SpinePAC Luncheon</strong></td>
<td>W375cde Lobby</td>
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<td></td>
<td><strong>Professional Headshots</strong></td>
<td>West Central Lobby</td>
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<td></td>
<td><strong>Solution Showcase:</strong> Legally Mine: Law Suit Prevention, Asset Protection, Medical License Protection &amp; Tax Reduction</td>
<td>Red Theater (Booth 1538)</td>
</tr>
<tr>
<td><strong>12:55-1:00 p.m.</strong></td>
<td><strong>NASS Working for You:</strong> Payor Policy Review Committee Update</td>
<td>Skyline Ballroom W375c</td>
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<tr>
<td><strong>1:00-2:30 p.m.</strong></td>
<td><strong>Surgical Symposium:</strong> Adult Cervical Spine Deformity: Assessment, Surgical Outcomes and Complications</td>
<td>Skyline Ballroom W375c</td>
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<tr>
<td></td>
<td><strong>Abstract Presentations:</strong> Trauma and Biomechanics II</td>
<td>Room W471ab</td>
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<tr>
<td></td>
<td>Spinal Deformity VI</td>
<td>Room W470b</td>
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<td></td>
<td><strong>Interdisciplinary Spine Forum:</strong> Point-Counterpoint: Is it Necessary or Possible to Make a Specific Diagnosis?</td>
<td>Skyline Ballroom W375d</td>
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<tr>
<td><strong>1:00-2:45 p.m.</strong></td>
<td><strong>Surgical Technique Cadaver Demonstrations:</strong> Cervicothoracic Osteotomy for Cervical Kyphosis</td>
<td>Skyline Ballroom W375ab</td>
</tr>
<tr>
<td><strong>1:00-5:05 p.m.</strong></td>
<td><strong>Spine Interventional Society and North American Spine Society Joint Symposium:</strong> Evolution: How Our History Shapes the Future of Spine Interventions</td>
<td>Room W470a</td>
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| **2:30-2:55 p.m.** | **Networking Break Beverage Service**                                | Level 4 Foyer
### Friday, September 27 (continued)

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>3:00-4:00 p.m.</td>
<td><strong>Surgical Symposium:</strong> Management Models for Complex Spine Surgery</td>
<td>Skyline Ballroom W375c</td>
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<tr>
<td></td>
<td><strong>Abstract Presentations:</strong> Cervical Spine Surgery VI</td>
<td>SUR Room W471ab</td>
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<td></td>
<td>Biopsychosocial</td>
<td>ALL Room W470b</td>
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<td><strong>Interdisciplinary Spine Forum:</strong> Friend or Foe? Rethinking Advanced Imaging for the 21st Century</td>
<td>ALL Skyline Ballroom W375d</td>
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<tr>
<td>3:00-5:05 p.m.</td>
<td><strong>Surgical Technique Cadaver Demonstrations:</strong> Spinal Deformity Correction</td>
<td>SUR Skyline Ballroom W375ab</td>
</tr>
<tr>
<td>4:05-5:05 p.m.</td>
<td><strong>Surgical Symposium:</strong> Cervical Surgery: Proximal Junctional Kyphosis Following Long TL Fusions</td>
<td>SUR Skyline Ballroom W375c</td>
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<tr>
<td></td>
<td><strong>Abstract Presentations:</strong> Cervical Spine Surgery VII</td>
<td>SUR Room W471ab</td>
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<tr>
<td></td>
<td>Complication Avoidance</td>
<td>ALL Room W470b</td>
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<td></td>
<td><strong>Interdisciplinary Spine Forum:</strong> Value Models in Spine Care</td>
<td>ALL Skyline Ballroom W375d</td>
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### Saturday, September 28

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>7:30-8:00 a.m.</td>
<td>Continental Breakfast</td>
<td>Level 4 Foyer</td>
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<tr>
<td>7:30-10:45 a.m.</td>
<td>Attendee Registration</td>
<td>F2 Lobby</td>
</tr>
<tr>
<td>8:00-9:00 a.m.</td>
<td><strong>Integrated Symposium:</strong> Spine Injuries Associated with Contact Sports (Part I)</td>
<td>ALL Room W471ab</td>
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<tr>
<td>9:00-10:00 a.m.</td>
<td><strong>Integrated Symposium:</strong> Spine Injuries Associated with Contact Sports (Part II)</td>
<td>ALL Room W471ab</td>
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<tr>
<td></td>
<td><strong>Abstract Presentations:</strong> Biomechanics</td>
<td>MED Room W470b</td>
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<tr>
<td></td>
<td>Cervical Spine Surgery VIII</td>
<td>SUR Room W470a</td>
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<tr>
<td>10:00-10:30 a.m.</td>
<td>Networking Break Beverage Service</td>
<td>Level 4 Foyer</td>
</tr>
<tr>
<td>10:30 a.m.-12:00 p.m.</td>
<td><strong>Surgical Symposium:</strong> Emerging Technologies in Spine Surgery: Essentials of Navigation and Robotics</td>
<td>SUR Room W471ab</td>
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<tr>
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<td><strong>Abstract Presentations:</strong> Perioperative Care</td>
<td>ALL Room W470b</td>
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<tr>
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<td>Spinal Deformity VII</td>
<td>SUR Room W470a</td>
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<tr>
<td>12:00 p.m.</td>
<td>Meeting Adjourns</td>
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CAREER BUILDING EVENTS
AT THE NASS 34TH ANNUAL MEETING

PRACTICE AND EMPLOYER MEET & GREET
Wednesday, September 25
9:00 a.m.–5:00 p.m.

Thursday, September 26
9:00 a.m.–5:00 p.m.

Friday, September 27
9:00 a.m.–1:30 p.m.

PROFESSIONAL HEADSHOTS
Wednesday, September 25
12:00–1:00 p.m.

Thursday, September 26
12:00–1:00 p.m.

Friday, September 27
12:00–1:00 p.m.

RESIDENT & FELLOW PIZZA LUNCH
Wednesday, September 25
12:00-1:00 p.m.

RESIDENT, FELLOW & PROGRAM DIRECTORS’ RECEPTION
Thursday, September 26
5:15–6:15 p.m.

EDUCATION PATHWAY PRESENTATIONS
Wednesday, September 25
10:35 a.m.–12:00 p.m.
Transition to Practice I: Landing a Job

Thursday, September 26
10:35 a.m.–12:00 p.m.
Career Building

Friday, September 27
7:30–10:00 a.m.
Transition to Practice II: Essential Skills for Starting Practice
MONDAY, SEPTEMBER 23

8:00 a.m.–5:00 p.m.
Ticketed Session: Coding Update 2019: Mastering the Coding Maze (Two-day Course)
Room W471ab
Whether you are a beginning or advanced coder, this highly interactive course led by physician faculty will provide comprehensive coding information you can immediately use. Faculty will cover the latest information on ICD-10, E&M coding, and CPT4 coding of surgical, medical and radiologic procedures. Upon completion of this course, you will be able to parlay your coding knowledge to optimize reimbursement, navigate through the authorization and denial process, identify nuances that affect proper billing and cause rejected/delayed claims, utilize Medicare NCCI edits, and properly document to meet medical necessity guideline.

8:00 a.m.–5:00 p.m.
Exhibitor Registration
F2 Lobby

TUESDAY, SEPTEMBER 24

8:00 a.m.–5:00 p.m.
Ticketed Session: Coding Update 2019: Mastering the Coding Maze (Continued)
Room W471ab

8:00 a.m.–6:00 p.m.
Exhibitor Registration
F2 Lobby

1:00–4:30 p.m.
Attendee Registration
F2 Lobby

WEDNESDAY, SEPTEMBER 25

6:30-8:00 a.m.
Continental Breakfast
F2 Lobby

6:30 a.m.–5:00 p.m.
Attendee Registration
F2 Lobby

7:00 a.m.–12:00 p.m.
Ticketed Hands-on Course: Minimally Invasive Spine Surgery
Yellow & Green Labs (The Learning Place)
Chairs: Nathaniel P. Brooks, MD and Khoi D. Than, MD
Attendees will receive presentations before the course begins for review of MIS surgical procedures, pros and cons, and patient selection. On-site, faculty will demonstrate the latest advances including laser endoscopy (LESS), augmented reality and navigation enabled Exoscope, which is unique. There will be MIS surgery demonstrations from incision to closure and hands-on time for attendees in the cadaver lab. Faculty also will demonstrate advanced techniques including correction of deformity with MIS system. This course will have participation from several companies for an unbiased and comparative advantage.

7:00 a.m.–4:15 p.m.
Gold Theater, Yellow & Green Labs (The Learning Place)
Chairs: Jeffrey C. Wang, MD and Hyeun-Sung Kim, MD, PhD
Endoscopic spinal surgery has become more prominent and improved spinal treatment through ongoing research and development. There is an increase in endoscopic spinal surgery for spinal disc disease and spinal stenosis, and has potential to resolve many of the degenerative spinal diseases in the future. Faculty from NASS/Neurospine will provide detailed information about endoscopic spinal surgery during this symposium and cadaver workshop.
The rates of opioid overdose continue to rise despite government interventions to stem the tide. Faculty will discuss perioperative pain management strategies to improve safety and reduce the burden of opioid management. A series of short, moderated lectures by content experts will provide a backdrop for a discussion on desirable outcomes in care models.

7:30  **Time is Spine**  
Michael G. Fehlings, MD, PhD, FRCSC, FACS

7:45  **Acute and Chronic Strategies to Optimize Functional Outcome Following Traumatic Spinal Cord Injury**  
Christoph P. Hofstetter, MD, PhD

7:55  **Hypothermia: Early Experience**  
Karthik Madhavan, MD

8:05  **Expansile Duroplasty**  
Rajiv Sagal, MD, PhD

8:15  **Unstable Spine Fracture Without Neurological Injury: Early vs. Late**  
Yi Lu, MD, PhD

8:25  **Hemodynamic Management in Acute SCI: Current Concepts**  
Brian K. Kwon, MD, PhD, FRCSC

8:35  **Central Cord Syndrome: Timing of Operation**  
Walter Jermakowicz, MD, PhD

8:45  **Discussion, Questions and Answers**
8:16 6. Biomechanical investigation of the potential development and prevention of scoliosis following various sizes of chest wall resection
Zackery W. Witte, MD

8:22 7. Eccentric kinematic patterns of the sacroiliac junction following lumbopelvic reconstruction
Daina M. Brooks, BS

8:28 8. The immune response of two separate polymer spinal interbody device materials
Stephen F. Badylak, DVM, PhD, MD

8:34 9. Insulin protects intervertebral discs stimulated with diabetes-related cytokines
Mark Lambrechts, MD

8:40 Discussion

7:30-8:55 a.m.
Abstract Presentations:
Cervical Spine Surgery I
Room W470b
Moderator: Samuel C. Overley, MD

7:30 10. Cervical decompression surgery improves dynamic balance in cervical spondylotic myelopathy patients
Akwasi Boah, MD

7:36 11. Predicting disability and pain outcomes one year after elective surgery for degenerative cervical diseases: analysis from quality outcomes database
Inamullah Khan, MD

7:42 12. Angiotensin-II type-1 receptor blockade decreased T2 signal intensity in spinal cord compression in symptomatic cervical spondylotic myelopathy
Alexander Perdomo-Pantoja, MD

7:48 13. Minimally invasive posterior cervical foraminotomy as an alternative to anterior cervical discectomy and fusion for unilateral cervical radiculopathy
Stuart Changoor, MD

7:54 Discussion

8:09 14. Day surgery anterior cervical discectomy and fusion at one, two and three levels is safe and effective in a public health system; experience from 273 patients at a single Canadian institution
Jamie R. Wilson, MbChB, FRCS

8:15 15. Surgical treatment of lower cervical fracture dislocation with spinal cord injuries using the anterior approach: A ten year case review with minimum five year follow-up
Ding-Jun Hao, MD

8:21 16. Discrepancies in the surgical management of central cord syndrome: Assessment of nonoperative, surgical, and crossover to surgery patients
Peter G. Passias, MD

8:27 17. The impact of preoperative cannabis on outcomes following cervical spinal fusion: A propensity score-matched analysis
Neil V. Shah, MD, MS

8:33 18. Safety and efficacy of tranexamic acid use in posterior cervical decompression and fusion surgery
Joseph P. Gjolaj, MD

8:39 Discussion

7:30-8:55 a.m.
Abstract Presentations:
Spinal Deformity I
Room W470a
Moderator: Jason W. Savage, MD

7:30 19. Adult symptomatic lumbar scoliosis patients have high orthopedic disease burden beyond their spinal deformities: Results from a prospective multicenter study
Justin S. Smith, MD, PhD

7:36 20. Cost-effectiveness of operative versus nonoperative treatment of adult symptomatic lumbar scoliosis an intent-to-treat analysis at five-year follow-up
Leah Y. Carreon, MD, MSc

7:42 21. Machine learning models to predict operative versus nonoperative management of adult spinal deformity patients
Alan H. Daniels, MD

7:48 22. Subclinical infection as an etiology for pseudarthrosis in multi-level thoracolumbar spinal fusions
Alexander Tenorio, BS

7:54 Discussion

8:09 23. Sacroiliac fusion surgery improves gait patterns of patients with sacroiliac joint dysfunction
Damon E. Mar, PhD

8:15 24. Adolescent idiopathic scoliosis in adulthood: How often do these patients require surgery?
Douglas C. Burton, MD

8:21 25. Use of pre-contoured titanium alloy rods to induce thoracic kyphosis after sequential posterior release: A cadaveric spine study
William F. Lavelle, MD

8:27 26. Posterior ligamentous reinforcement does not prevent proximal junctional kyphosis in adult spinal deformity
Sravisht Iyer, MD

8:33 2019 Value Award Winner
27. Costs and utility of post-discharge acute inpatient rehabilitation following adult spinal deformity surgery
Alexander A. Theologis, MD

8:39 Discussion
<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
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</table>
| 7:30-8:55 a.m. | **Abstract Presentations:** Thoracolumbar Surgery I  
Skyline Ballroom W375d  
Moderator: Sigurd H. Berven, MD and Ali Bydon, MD |
| 7:30         | 28. Evaluation of three commercially available synthetic bone grafts in a clinically relevant Ovine model of instrumented lumbar posterolateral fusion  
William Walsh, PhD |
| 7:36         | 30. Declining trend in osteoporosis screening and medical management following primary vertebral compression fractures: A national analysis of commercial and Medicare advantage beneficiaries  
Azeem T. Malik, MBBS |
| 7:42         | 2019 Resident and Fellow Research Award Winner  
31. Development of clinical prognostic models for postoperative survival and quality of life in patients with surgically treated metastatic epidural spinal cord compression  
Anick Nater, MD, PhD |
| 7:48         | Discussion |
| 7:54         | 32. Does the number of patient-reported allergies impact clinical outcomes after lumbar spinal fusion?  
Jannat M. Khan, MD |
| 8:00         | 33. Comparison of bone-morphogenetic protein and allogeneic stem cells in lateral interbody lumbar fusion  
Elizabeth L. Lord, MD |
| 8:06         | 34. Timing of surgery for thoracolumbar spine trauma: Patients without neurological injury  
Jack H. Ruddell, BA |
| 8:27         | 35. How many screws are necessary to be considered an experienced surgeon for freehand placement of thoracolumbar pedicle screws? Analysis of the learning curve using the cumulative summation test for learning curve (LC-CUSUM)  
Sang-Min Park, MD |
| 8:33         | 36. Timing of surgery for thoracolumbar spine trauma: Patients with neurological injury  
Jack H. Ruddell, BA |
| 8:39         | Discussion |
| 8:00-10:00 a.m. | **Surgical Innovation Lab Demos**  
**Globus**  
**ExcelsiusGPS® Advanced Surgical Innovation Lab**—Invitation Only  
Orange Lab (The Learning Place) 1310  
**Medtronic**  
Blue Lab (The Learning Place) 1325 |
| 9:00-10:00 a.m. | **Surgical Symposium:** Endoscopic Spine Surgery: New Techniques and Outcomes  
Skyline Ballroom W375ab  
Moderators: Michael P. Steinmetz, MD and Christopher A. Yeung, MD |
| 9:00         | Introduction  
Michael P. Steinmetz, MD |
| 9:05         | Revision Endoscopic Approaches  
Christoph P. Hofstetter, MD, PhD |
| 9:15         | Lumbar Awake Endoscopic Fusion and ERAS  
Ralf Wagner, MD |
Christopher A. Yeung, MD |
| 9:35         | Interlaminar Discectomy: Technique and Pearls  
Jin-Sung L. Kim, MD, PhD |
| 9:45         | Investment and Coding for Endoscopy  
Nathaniel P. Brooks, MD |
| 9:55         | Discussion, Questions and Answers |
| 9:00-10:00 a.m. | **Integrated Symposium:** Surgical Treatment of Low Back Pain: Evidence, Controversy and Debate  
Skyline Ballroom W375c  
Moderator: Michael D. Daubs, MD |
| 9:00         | Introduction/Case Presentation  
Michael D. Daubs, MD |
| 9:05         | The Patient: Who is the ideal candidate for LBP surgery? What are the red flag patient characteristics to avoid?  
Michael D. Daubs, MD |
9:15 Imaging: Are there valid MRI imaging findings that predict an accurate pain generator and improved surgical outcomes? (i.e. Modic changes, annular tears, disc degeneration)
W. Ryan Spiker, MD

9:25 Discography: Is there still a role for discography in evaluating lower back pain?
Todd F. Alamin, MD

9:35 Debate: Surgical treatment for lower back pain
• Surgery is a valid option for the treatment of lower back pain.
  Frank M. Phillips, MD
• Surgery has no role in the treatment of LBP.
  William J. Sullivan, MD

9:50 Discussion, Questions and Answers

9:00-10:00 a.m.
Best Papers
Room W471ab
Moderator: Danisa A. Olumide, MD

9:00 37. Effect of topical steroid on swallowing following ACDF: Results of a prospective randomized double blind control trial
Todd J. Albert, MD

9:06 38. Prioritization of realignment associated with superior clinical outcomes for surgical cervical deformity patients
Peter G. Passias, MD

9:12 2019 Value Award Winner
39. Anterior cervical discectomy and fusions (ACDFs) at physician-owned hospitals: Is it time to reconsider the sanctions of the Affordable Care Act (ACA)?
Azeem T. Malik, MBBS

9:18 40. Posterior cervical fusion for fracture vs. degenerative cervical spine disease: Implications for a bundled payment model
Azeem T. Malik, MBBS

9:24 41. Reliability of the Neck Disability Index (NDI) and Japanese Orthopedic Association (JOA) questionnaires in adult cervical radiculopathy and myelopathy patients when administered by telephone or via online format
Gaurang Gupte, BS

9:30 42. The impact of surgical decompression on neck pain outcomes in patients with degenerative cervical myelopathy: Results from the multicenter prospective AOSpine studies
Michel M. Schneider, MD

9:36 43. Reduction in mortality in pediatric patients undergoing surgery for non-idiopathic scoliosis by implementing a multidisciplinary screening process
Lorenzo Deveza, MD, PhD

9:42 Discussion
WEDNESDAY, SEPTEMBER 25

9:18 54. Preoperative MRI predictors of health related quality of life improvement after microscopic lumbar discectomy
   Aaron J. Buckland, MBBS, FRACS

9:24 55. Ending opioid addiction following spine surgery
   Sina Pourtaheri, MD

9:30 56. The development of a predictive scoring system for discharge to a facility following posterior spinal fusion for adult spinal deformity
   Michael T. Noile, MD

9:36 57. Resilience and self-efficacy are protective psychological factors for 12-month outcomes after lumbar spine surgery
   Rogelio A. Coronado, PT, PhD

9:42 Discussion

9:00-10:00 a.m.

Abstract Presentations:
Thoracolumbar Surgery II
Skyline Ballroom W375d
Moderator: Aloysius B. Darwono, MD, PhD

9:00 58. rhBMP-2 in short segment thoracolumbar fusion augmented with transforaminal lumbar interbody fusion: Does dosage matter?
   Nina Lara, MD

9:06 59. Outcomes following discectomy for lumbar disc herniation in patients with substantial back pain
   Leah Y. Carreon, MD, MSc

9:12 60. Spine patients demystified: What are the predictive factors of poor surgical outcome in patients after elective lumbar spine surgery?
   Jose H. Jimenez-Almonte, MD, MS

9:18 61. Multi-modal analgesia protocol significantly decreased opioid requirements following lumbar spine surgery: Results from a feasibility trial
   Richard L. Skolasky, ScD

9:24 62. Impaction grafting of the pedicle: A biomechanical analysis
   Francis H. Shen, MD

9:30 63. Orthopaedic vs. neurosurgery: Understanding 90-day complications and costs in patients undergoing elective 1-to-2 level posterior lumbar fusions by different specialties
   Jae Baek, BS

9:36 64. Unfolding the outcomes of surgical treatment of lumbar spinal stenosis: A prospective five- and ten-year follow-up study
   Iina Tuomainen, MD

9:42 Discussion

9:00-5:00 p.m.

Technical Exhibition
F1 & F2 Exhibit Hall

Practice and Employer Meet & Greet
West Central Lobby
Registered practices and employers will be available at the Career Center booth for 30-minute time slots to answer questions, give advice, and promote their practice or open positions. There will be an updated schedule of presenters available daily at the booth.

10:00-10:30 a.m.

Networking Break Beverage Service
The Learning Place & Lounge

Poster Grand Rounds
The Learning Place

Gray Theater

P58. Patients with psychiatric diagnoses have increased odds of morbidity and mortality in elective orthopedic surgery
   Peter G. Passias, MD

P69. A cost benefit analysis of increasing surgical technology in lumbar spine fusion
   Peter G. Passias, MD

P102. Does matching Roussouly spinal shape and improvement in SRS-Schwab modifier contribute to improved patient-reported outcomes?
   Peter G. Passias, MD

P62. Preliminary results of randomized controlled trial investigating the role of psychological distress on cervical spine surgery outcomes: A baseline analysis
   Peter G. Passias, MD

Pink Theater

P79. Evolution of adult spine deformity surgery practice patterns over the past decade has impacted the rates and types of complications
   Mathieu Bannwarth, MD

P82. Sexual dysfunction due to lumbar stiffness is not diminished following adult spinal deformity surgery
   Alan H. Daniels, MD

Purple Theater

P48. Translation of the Interprofessional Spine Assessment and Education Clinic (ISAEC) to the New Brunswick population
   Donna M. Eastwood, RN

P51. Associations in the sagittal plane: No evidence that foot radiographs predict sagittal alignment or degeneration of the spine
   Jannat M. Khan, MD
White Theater

P84. Predicting ASD surgeries that exceed Medicare allowable payment thresholds: A comparison of hospital costs to what the government will actually pay
Jeffrey L. Gum, MD

P85. Objective realignment guidelines in corrective ASD surgery accounting for reciprocal truncal and pelvic compensation
Renaud Lafage, MSc

P86. Patients with high preoperative activity are still satisfied at two-years following ASD surgery despite the potential for postoperative functional decline
Brian J. Neuman, MD

10:30-10:35 a.m.

NASS Working for You: Advocacy
Skyline Ballroom W375ab

10:35 a.m.-12:00 p.m.

Surgical Symposium: Predictive Analysis and Data Utilization to Improve Patient Assessment and Outcomes in Adult Spinal Deformity Surgery
Skyline Ballroom W375ab
Moderator: Shay Bess, MD

In this symposium, faculty will provide a methodological overview of techniques used to employ predictive analytics to medical databases, and share research findings from the International Spine Study Group and the European Spine Study Group designed to improve counseling for adult spinal deformity patients undergoing surgery.

10:35 Introduction
Shay Bess, MD

10:39 Evolving From Risk Stratification to Predictive Models to Improve Outcomes in Adult Spine Deformity Surgery
Christopher P. Arnes, MD

10:49 The Methodology and Science of Predictive Analytics
Miquel Serra-Burniel, PhD

10:59 Applying Predictive Models to Complications
Virginie Lafage, PhD

11:09 Use of Predictive Models to Anticipate Complications in Adult Spine Deformity Surgery
Breton Line, MS

11:19 Questions

11:24 Are Currently Used Patient-Reported Outcome Measures Compatible with Predictive Models for Adult Spine Deformity
Michael P. Kelly, MD

11:34 Platforms for Hospital Model Training and Application for Providers and Hospitals
Shay Bess, MD

11:44 Applying Predictive Models to Cost Analysis in the Care of Adult Spine Deformity
Jeffrey L. Gum, MD

11:54 Discussion, Questions and Answers

10:35 a.m.-12:00 p.m.

Integrated Symposium: Leadership Perspective: Identifying and Managing Physician Burnout in Today’s Health Care Environment
Skyline Ballroom W375c
Moderator: Richard L. Skolasky, ScD

There is increasing attention in the medical community to the importance of physician well-being. Physicians, as a group, have lower work-life satisfaction compared to the general population. With a growing workload and increasing administrative tasks, modern physicians and health care professionals are facing significant challenges. With increased rates of depression and burnout, the American Psychiatric Association estimates that the suicide rate among physicians is nearly twice that of the general population. The consequences of burnout are borne both by the individual physician and the health care system.

The recognition of burnout as a serious individual and institutional challenge is leading to an increased need to design, implement, and evaluate systems that promote well-being. As with other areas of mental health, however, there is often an undeserved stigma associated with seeking help for burnout. Organizations must make strides to change this perception those who seek care.

In the symposium, attendees will have an opportunity to hear recognized leaders discuss identification and management of burnout as well as the role that stigma plays in intervening in burnout and will be able to identify risk factors and strategies to mitigate these risk factors in their own lives or in the organization that they represent.

10:35 Introduction to Leadership Development Program and Speakers

• Polling Questions
• Distribution of Draft Action Plan and References
Richard L. Skolasky, ScD

10:40 Reducing Physician Burnout: Destigmatize, Then Organize
Todd J. Albert, MD

11:05 Discussion
Identifying Risk Factors and Strategies to Mitigate Risk Factors
Eric J. Muehlbauer, MJ, CAE

Discussion

Developing Action Plan, Next Steps
Faculty Panel

Abstract Presentations: Spinal Deformity II
Room W471ab
Moderator: Reginald Q. Knight, MD, MS

65. A risk benefit analysis of increasing surgical invasiveness relative to frailty status in adult spinal deformity surgery
Peter G. Passias, MD

66. Preop opioid use is associated with worse postop outcomes and chronic opioid use in non-revision adult scoliosis patients: Corroboration of two independent multi-center studies
Shay Bess, MD

67. Lateral lumbar interbody fusion with percutaneous pedicle screw fixation (llif-pps): Are we getting the sagittal alignment right?
Jonathan N. Sembrano, MD

68. Early patient reported-outcomes can be used to identify patients at risk for poor 1-year outcomes in adult spinal deformity
Alvaro Ibaseta, MS

69. Coronal correction using the kickstand rod technique: A pilot adult scoliosis study and analysis of early outcomes and complications
Thomas Buell, MD

70. Anterior column realignment (ACR) performed at T2-3 achieves suboptimal lumbo-pelvic realignment compared with T2 pedicle subtraction osteotomy (PSO)
Brian Dial, MD

71. High preoperative t1 slope is a marker for global sagittal malalignment
Themistocles S. Protopsaltis, MD

72. Operation timing affects outcomes after adult spinal deformity surgery
Tina Raman, MD

73. Tranexamic acid in patients undergoing adult spinal deformity surgery
Tina Raman, MD

Section on Interdisciplinary Spine Best Paper

Yagiz U. Yolcu, MD

75. Preliminary results of the prospective observational study of spinal metastasis treatment (POST)
Andrew J. Schoenfeld, MD

76. High dose radiation therapy improves survival for chordoma patients with positive surgical margins
Brian Dial, MD

77. Development of predictive models for ninety-day and one-year mortality in spinal metastatic disease
Aditya V. Karhade, MD

78. Scoliosis surgery normalizes cardiac function in AIS patients
Vishal Sarwahi, MD

79. The regional effect of lumbar fusion surgery on volumetric bone mineral density measured by quantitative computed tomography in adjacent vertebrae: A longitudinal cohort study
Ichiro Okano, MD

80. Bariatric surgery prior to elective anterior cervical discectomy and fusion in obese patients is associated with a reduced risk of 90-day post-operative complications and readmissions
Azeem T. Malik, MBBS

81. Nature of neurological deficits influences the treatment order preference for hip-spine syndrome
Kirkham B. Wood, MD

82. Bariatric surgery diminishes spinal symptoms in a morbidly obese population: A 2-year survivorship analysis of cervical and lumbar pathologies
Peter G. Passias, MD
10:35 a.m.-12:00 p.m.

**Resident/Fellow Education Pathway:**
**Transition to Practice I: Landing a Job**
Room W470a
Moderator: Michael Stauff, MD

The transition from training to practice can be one of the most daunting and critical periods in the life of a physician. Faculty will provide insight into navigating the period spanning the end of clinical training and the start of independent practice, as well as guidance for transitioning to a new position.

10:35 **Finding a Job**
Khoi D. Than, MD

10:45 **Academic Positions**
Saad B. Chaudhary, MD, MBA

10:55 **Community Positions**
Sandeep Gidvani, MD

11:05 **Pitfalls**
Avery L. Buchholz, MD, MPH

11:15 **Negotiating**
Andrew J. Schoenfeld, MD

11:25 **Overview of Employment Contracts**
Sandeep N. Gidvani, MD

11:45 **Interactive Q&A: Bring Your Contract Questions**
Faculty Panel: Saad B. Chaudhary, MD, MBA; Michael D. Daubs, MD; Sandeep N. Gidvani, MD; E. Kano Mayer, MD; Melvin C. Makhni, MD, MBA

10:35 a.m.-12:00 p.m.

**Interdisciplinary Spine Forum:**
**The Optimal Role of the First Contact Practitioner in Spine Care**
Skyline Ballroom W375d
Moderator: Brian Justice, DC

The first practitioner a spine pain patient encounters plays a key role in outcome, downstream costs and patient satisfaction. Faculty will present the concept of “primary spine care” and the “primary spine practitioner”. Presenters with diverse backgrounds discuss evidence, concepts and real-life experiences of bringing “front-end efficiency” to spine.

10:35 **Introduction**
Brian Justice, DC

10:40 **The Role of the Primary Spine Practitioner**
Donald R. Murphy, DC

10:50 **Integrating Primary Spine Concepts into Chronic Pain Management: A VA Experience**
Lindsay Rae, DC

11:00 **A Transitional Role for PTs and Chiropractors?**
Marcia Spoto, PT, DC

11:10 **The Future of the Primary Spine Practitioner Movement: U. Pittsburgh**
Mike Schneider, DC, PhD

11:20 **Optimal First Contact: A Global Spine Perspective**
Claire Johnson, DC, MSeD, PhD

11:30 **First Contact and Value: What Does ‘Big Data’ Tell Us?**
Dave Elton, DC

11:40 **Discussion, Questions and Answers**

11:00 a.m.-1:00 p.m.

**Surgical Innovation Lab Demos:**

**Globus**
**ExcelsiusGPS® Advanced Surgical Innovation Lab—Invitation Only**
Orange Lab (The Learning Place) 1310

**Medtronic**
Blue Lab (The Learning Place) 1325

11:00 a.m.–2:30 p.m.

**P.U.R.E. (Ticketed Hot Lunch)**
Booth 938

12:00-12:30 p.m.

**Solution Showcase:**
**Radius Pharm**
Red Theater (Booth 1538)

12:00-1:00 p.m.

**Complimentary Boxed Lunch**
(Medical Attendees Only)
Technical Exhibition Booth 1838

**Spine Fellowship Directors’ Meeting**
Room W474

**Professional Headshots**
West Central Lobby

Be sure to stop by the Career Center booth in the West Lobby to get a professional headshot photo taken and emailed to you after the conference.

**Resident/Fellow Pizza Lunch**
W375cde Lobby
**WEDNESDAY, SEPTEMBER 25**

**12:30-1:00 p.m.**

**Solution Showcase:**
Stryker: SpineMap Go: Augmented Fluoroscopy for Radiation Reduction

Red Theater (Booth 1538)

**12:55-1:00 p.m.**

**NASS Working for You:**
NASS Spine Registry

Skyline Ballroom W375ab

**1:00-2:00 p.m.**

**Surgical Symposium:**
A Global Perspective on Deformity

Room W471ab

Moderators: Norman B. Chutkan, MD and Hani H. Mhaidli, MD, PhD

1:00  GEER
The L3L5 Segment in Adult Deformity: Degenerative de novo vs. Idiopathic Evolved Scoliosis
Máximo-Alberto Diez-Ulloa, MD

1:10  SILACO
What is the Evidence for Conservative Treatment of Adult Deformity
Hani Mhaidli, MD, PhD

1:20  Pakistan Spine Society
Kyphotic Deformity TB Spine
Muhammad Tariq Sohail, MD, PhD, FRCS

1:30  Japanese Society for Spine Surgery and Related Research (JSSR)
Transition of Surgical Strategy for Degenerative Kyphoscoliosis in Elderly Patients
Yu Yamato, MD, PhD

1:40  Saudi Spine Society
Is Adolescent Idiopathic Scoliosis Associated With Premature Facet Degeneration?
Fahad H. Abduljabbar, MD

1:50  Brazilian Spine Society
Scoliosis Severity Score in Adolescent Idiopathic Scoliosis: A Review of the Literature and Score Proposal for Surgical Priority
Allan Hiroshi de Araujo Ono, MD

**1:00-2:00 p.m.**

**Medical Symposium:**
Ambulatory Surgical Centers: Is This the Next Big Thing?

Skyline Ballroom W375c

Moderators: Michael P. Steinmetz, MD and Christopher A. Yeung, MD

A recent law passed by CMS regarding transparency, bundled payment lurking to follow and physician centered leadership have been some of the prime factors in spine surgeons embracing ambulatory surgical centers (ASC). In this symposium, faculty will provide an overview of ambulatory centers and their unique logistics and present pros and cons of ASC hospital-based practice vs. completely hospital-based practice, billing and other benefits. Lastly, there will be discussion about the common procedures performed in ASC and procedures to avoid.

1:00  Overview of ASC
Karthik Madhavan, MD

1:08  Efficiencies and Value with the ASC
Scott Raffa, MD

1:17  ASC Early Adopters: My First Case
Joseph R. Blythe, DO

1:26  Hospital-Based Practice: My Take on It
Michael P. Steinmetz, MD

1:35  ASC Practice: Is This the Best Environment?
Dawn Knight, MHA

1:44  Implants to Use in ASC vs. Hospital-Based Surgery
Christopher A. Yeung, MD

1:53  Hospital-ASC Joint Ventures
John H. Peloza, MD

**1:00-2:00 p.m.**

**Abstract Presentations:**
Cervical Spine Surgery III

Skyline Ballroom W375ab

Moderator: Alan S. Hilibrand, MD

1:00  83. Postoperative opioids and 1-year outcomes after spine surgery
Catherine Carlile, MD

1:06  84. Incidence and predictors of long-term opioid use following cervical spine fusion surgery
Sameh Abolfotouh, MD

1:12  85. Unexpected post-operative clinical encounters with elective cervical spine surgery patients: Can we predict them?
Jose H. Jimenez-Almonte, MD, MS
1:18  86. Rate of revision surgery following multilevel posterior cervical fusion at the cervicothoracic junction
Bryan T. Head, MD

1:24  87. Effects of spinal decompression on the gait efficiency and balance of cervical spondylotic myelopathy patients: Preliminary results
Lawal Labaran

1:30  88. Asymptomatic ACDF non-unions underestimate the true prevalence of radiographic pseudoarthrosis
Charles H. Crawford III, MD

1:36  89. 3D evaluation and classification of the anatomy variations of vertebral artery at the craniovertebral junction
Yiheng Yin, MD

1:42  Discussion

1:00-2:00 p.m.

Abstract Presentations:
Thoracolumbar Surgery III  SUR
Room W470b
Moderator: Chris Steyn, MD

1:00  90. Impact of patient-controlled analgesia on clinical outcomes after posterior lumbar spinal fusion surgery
Corey Walker, MD

1:06  91. Can the proposed posterior ligament-bone injury classification and severity score predict the failure of anterior-only surgery for subaxial cervical facet dislocations?
Jun-Song Yang, MD

1:12  92. Timing of postoperative anticoagulant resumption as a predictor of thromboembolic events in spine surgery
Michael P. Steinmetz, MD

1:18  93. Certificate-of-need state laws and elective posterior lumbar fusions: Medicare trends, costs and outcomes analysis
Azeem T. Malik, MBBS

1:24  94. Cost analysis of primary single level lumbar discectomies
W. Ryan Spiker, MD

1:30  95. Clinical observation of the effect of thoracic-lumbar fracture of Ankylosing Spondylitis treated by posterior percutaneous long segmental internal fixation
Nianhu Li, MD

1:36  96. Superior facet joint violations in single level minimally invasive vs. open transforminal lumbar interbody fusion: prospective comparative study
Jwalamant Y. Patel, MS

1:42  Discussion

1:00-2:00 p.m.

Abstract Presentations:
Functional Analysis and Therapy  MED
Room W470a
Moderator: Donna D. Ohnmeiss, PhD

1:00  97. The effect of physical therapy on time to discharge after lumbar interbody fusion
Mohamed Macki, MD

1:06  98. Differences in functional treadmill tests in patients with adult symptomatic lumbar scoliosis treated operatively and non-operatively
Jamal Shillingford, MD

1:12  99. Gait analysis provides an objective measure of functional deficit not adequately assessed by Oswestry Disability Index
Isador H. Lieberman, MD, FRCSC, MBA

1:18  100. The Dubousset Functional Test: A baseline analysis of a novel, multi-domain assessment of physical function and balance
Bassel G. Diebo, MD

1:24  101. Improvement in multiple domains of functional status with increasing physical activity after lumbar surgery: Longitudinal analysis
Carol A. Mancuso, MD

1:30  102. Accuracy of physical examination on ruling out CES: Is MRI necessary?
Natalie L. Zusman, MD

1:36  103. Factors associated with motor, sensory, bladder and bowel function recovery after traumatic cauda equina injury (TCEI)
Najmedden Attabib, FRCSC

1:42  Discussion

1:00-2:00 p.m.

Innovative Technology Presentations  IND
(Non-CME)
Skyline Ballroom W375d
Moderator: Ed Dohring, MD
All Innovative Technology Presentations also are available as ePosters through Kubify.

1:00  1. Biomechanical and minimum one year clinical results of a novel 3-D expandible cage for lumbar interbody fusion
Richard G. Fessler, MD, PhD

1:06  2. Clinical outcomes following cervical and lumbar interbody fusion: The ENTRUST clinical study
Joseph O’Brien, MD, MPH

1:12  3. A novel interbody fusion cage design: A biomechanical and kinematic assessment of contact area, graft incorporation, and stability
Pierce D. Nunley, MD
Spinal cord injury (SCI) leads to cellular destruction from primary injury at the time of insult followed by secondary injury from release of cascade of chemical reactions, which is of interest to researchers since it is modifiable and modulatable. In this symposium, faculty will present the latest advances in basic science research both in acute and chronic SCI and discuss the pros and cons of some of the latest topics and publications. Faculty will provide clinicians and researchers opportunities to discuss some of the research they are working on and enrolling in new SCI trials.
Section on Minimally Invasive Procedures: Advances and Case Scenarios
Room W471ab
Moderators: Nathaniel P. Brooks, MD and Khoi D. Than, MD

MIS symposium is part of the MIP committee at NASS. In this symposium, faculty will address recent advancements in MIS technology, debate various case scenarios and discuss how to adopt MIS in your practice.

2:05  Case Scenario: Grade 1 Spondylolisthesis
Nathaniel P. Brooks, MD

2:10  TLIF
Larry T. Khoo, MD

2:18  XLIF
Juan S. Uribe, MD

2:25  Endoscopic Fusion
Michael P. Steinmetz, MD

2:33  Case Scenario: Spine Trauma: Facet Fracture without Neurological Complication
Khoi D. Than, MD

2:41  MIS Stabilization Options
Yi Lu, MD

2:49  Open Decompression: Disc Disruption
Karthik Madhavan, MD

2:57  Newer Technology in Spine
Luke Macyszyn, MD, MA

2:35  109. An investigational study of a dual-layer, chorion-free amnion patch as a protective barrier following lumbar laminectomy in a sheep model
Bryan W. Cunningham, PhD

2:41  110. Use of a novel allograft in single-level posterolateral lumbar spine fusion surgery: One-year clinical and radiographic results from a prospective multicenter study with comparison to reported results for ICBG
Joshua Bunch, MD

2:47  Discussion

Section on Biologics & Basic Research:
Abstract Presentations
Room W470a
Moderator: Wellington K. Hsu, MD

2:05  104. Zoledronic acid decreases infection burden in mouse model of spine implant infection
Kellyn Hori, BS

2:11  105. Sex-based differential response in rhBMP-2-mediated spinal fusion in vivo
Jonathan T. Yarnaguchi, BS

2:17  106. Subclinical propionibacterium acnes infection estimation in the intervertebral disc (SPInE-ID)
Nelson Astur Neto, MD, MSc

2:23  107. Internal deformations in human intervertebral discs under axial compression: A 9.4T MRI study
Nic Newell, PhD, MEng

2:29  108. Posterior bone-graft options and success in single-level circumferential lumbar fusions
Glenn R. Buttermann, MD

2:35  109. An investigational study of a dual-layer, chorion-free amnion patch as a protective barrier following lumbar laminectomy in a sheep model
Bryan W. Cunningham, PhD

2:41  110. Use of a novel allograft in single-level posterolateral lumbar spine fusion surgery: One-year clinical and radiographic results from a prospective multicenter study with comparison to reported results for ICBG
Joshua Bunch, MD

2:47  Discussion

Networking Break Beverage Service
The Learning Place & Lounge

Members’ Business Meeting
Room W474

Poster Grand Rounds
The Learning Place

Gray Theater
P155. Clinical outcomes of conservatively managed type II odontoid fractures in older people
Suzanne McIlroy, MCSP, MSc

P156. Update on percutaneous lumbopelvic fixation for unstable sacral fractures with spinopelvic dissociation patterns: Two-year follow up
Seth K. Williams, MD

Pink Theater
P71. Is academic department teaching status associated with adverse outcomes after lumbar laminectomy and discectomy for degenerative spine diseases?
Dean C. Perfetti, MD, MPH

P78. The true penalty of the waiting room: The role of wait time in patient satisfaction in a busy spine practice
Rasheedat Zakare-Fagbamila, BA

Purple Theater
P11. Facile aqueous based method to improve mineralization onto PEEK
Saadyah E. Averick, PhD

P12. Comparisons of patterns of upregulation of inflammatory cytokines in herniated nucleus pulposus, disc and nerve root lavagates and in the serum of patients with acute sciatica secondary to lumbar disc herniation undergoing surgery
Paul B. Bishop, MD, PhD, DC

P14. Comparative effectiveness of expandable versus static lateral lumbar interbody fusion devices: Two-year clinical and radiographic outcomes
Richard F. Frisch Jr., MD
White Theater

P29. Caudally directed upper-instrumented vertebra pedicle screws minimize the risk of proximal junctional failure in patients with long posterior spinal fusion for adult spinal deformity
Andrew B. Harris, BS

P27. Postop opioid cessation in ASD patients using opioids preop is associated with improved outcomes and satisfaction
Alexandra Soroceanu, MD, MPH

3:35-5:05 p.m.
Section on Spine Oncology: Evaluation and Management of Unknown Spinal Lesions
Skyline Ballroom W375ab
Moderators: Joseph H. Schwab, MD and Daniel M. Sciubba, MD

This interactive session will start and end with a pre- and post-test asking the same questions. Faculty will present cases while the chairpersons ask volunteers to answer questions as they arise during the case. Each case will cover a particular pathology or approach to pathology. A case will start with an unknown lesion of the mobile spine (Case 1) and another with the sacrum (Case 2). Both cases will involve various scenarios that arise in the diagnosis, workup and treatment of the lesion. This will include staging, biopsy, surgical timing, etc. Faculty will present a malignant primary as Case 1 and a benign primary as Case 2. At this point participants should be comfortable with the approach to an unknown lesion in the spine and sacrum (both malignant and benign). For Case 3, faculty will introduce an insufficiency fracture that may be pathologic in which the patient may have one or more insufficiency fractures, and the case will take the participants through an approach to work up such a patient. The case may end, for example, with the diagnosis of hyperparathyroidism from a parathyroid tumor. For the last case, faculty will conclude with an unknown lesion about the neural elements (Case 4), as participants work through an unknown primary tumor about a nerve root (schwannoma, MPNST, etc.).

3:35  Introduction
Daniel M. Sciubba, MD; Joseph H. Schwab, MD

3:40  Pre-Test
Daniel M. Sciubba, MD; Joseph H. Schwab, MD

3:45  Case 1: Lesion of Unknown Origin in Spine
Matthew L. Goodwin, MD, PhD

4:00  Case 2: Lesion of Unknown Origin in the Sacrum
Matthew L. Goodwin, MD, PhD

4:15  Case 3: New Diagnosis of Insufficiency Fracture versus Path Fracture
Matthew Colman, MD

4:30  Case 4: Unknown Lesion of Spinal Corse/Nerve Roots
John H. Shin, MD

4:45  Discussion, Questions and Answers

4:50  Post-Test
Daniel M. Sciubba, MD; Joseph H. Schwab, MD

4:55  Closing
Daniel M. Sciubba, MD; Joseph H. Schwab, MD

3:35-5:05 p.m.
Section on Biologics & Basic Research: Biologics in Spine Surgery: Back to the Future
Skyline Ballroom W375c
Moderators: Christina Goldstein, MD, FRCSC and Zorica Buser, PhD

Faculty will present attendees with a past, present and future look at the use of, and research into, the arena of biologics in spine surgery. There will be a review of technologies for promotion of spinal fusion, percutaneous treatment of osteoporotic fractures, treatment of symptomatic degenerative disc disease, and neuroregeneration following spinal cord injury. Through cases and questions using an audience response system, attendees will gain knowledge of the breadth of biologic interventions, as well as the literature in support of them, that are currently in use or in development, for the management of a variety common spine conditions.

3:35  Fusion Biologics Cross-talk
Zorica Buser, PhD

3:55  Injectable Biologics for Fracture Management
Christina Goldstein, MD, FRCSC

4:10  Degenerative Disc Disease: Second Generation Injectables
Ray Hah, MD

4:30  Biologics for Neuroregeneration in Spinal Cord Injury
Greg Schroeder, MD

4:45  Discussion, Questions and Answers

3:35-5:05 p.m.
Section on Robotics & Navigation: How to Get the Best Outcome from Your Robotics and Navigation System
Room W471ab
Moderator: Chetan K. Patel, MD

Faculty will examine the optimal workflow for robotics, navigation and 3-D printed guides, discuss the spine surgeon perception of robotics and navigation systems and their outcomes as well as demonstrate the ideal technique to optimize outcomes from robotics, navigation, and 3-D printed guides.
3:35 Introduction
Chetan K. Patel, MD

3:40 How to Achieve the Best Outcomes with Mazor X Stealth Edition Robotic System
Isador H. Lieberman, MD, FRCSC, MBA

4:00 How to Achieve the Best Outcomes with Excelsius GPS Robotic System
Nicholas Theodore, MD

4:20 How to Achieve the Best Outcomes with 3-D Printed Guides
Sigurd H. Berven, MD

4:35 How to Achieve the Best Outcomes with Navigation Systems
Eric W. Nottmeier, MD

4:50 Hype or Reality: Spine Surgeons’ Perspective of Robotics and Navigations Systems
Andrew J. Fabiano, MD and Chetan K. Patel, MD

5:00 Discussion, Questions and Answers

3:35-5:05 p.m.
Section on Motion Technology: Abstract Presentations
Room W470a
Moderator: Lisa A. Ferrara, PhD

3:35 Section on Motion Technology Best Paper
111. Is osteoporosis screening routinely needed to evaluate cervical total disc replacement patients?
Jack Zigler, MD

3:41 112. Changes in flexion/extension range of motion due to oversizing of cervical total disc arthroplasty
Kee D. Kim, MD

3:47 113. Segmental contribution to total cervical flexion-extension motion before and after cervical disc arthroplasty (CDA)—Influence of prosthesis design
Avinash G. Patwardhan, PhD

3:53 114. Intra-operative conversion of cervical total disc replacement to fusion: incidence and reasons
Scott L. Blumenthal, MD

3:59 115. Clinical outcomes of a PEEK-on-ceramic total disc replacement: Data from three sites participating in the single-level cervical FDA IDE trial
Richard D. Guyer, MD

4:05 Discussion

4:20 116. Comparison of imputation methods for evaluating long-term clinical outcomes following lumbar total disc replacement
Vikas V. Patel, MD

4:26 117. Ten-year BRYAN cervical disc arthroplasty: does change in angular motion have an effect on changes in patient reported outcomes?
William F. Lavelle, MD

4:32 118. Prospective animal study of five FDA-approved cervical artificial discs
Hoon Choi, MD, MS

4:38 119. Ten-year outcomes of one-and two-level cervical disc arthroplasty: Results from a U.S. multi-center study
Kee D. Kim, MD

4:44 120. Can hybrid constructs prevent adjacent segments degeneration? Long-term follow-up results
Shiu-Jau Chen, MD, PhD

4:50 Discussion

3:35-5:05 p.m.
Exercise Committee Presents:
Back to the Future: Low Back Pain Disability and Episode Risk Reduction
Room W470b
Moderator: Ryan A. Tauzell, PT, MA, Cert. MDT

Should providers promote appropriate exercise while the population is asymptomatic to reduce the future risk of a low back pain episode. Faculty will provide the essential background to help the spine provider promote exercise as a preventative measure against the escalating prevalence of disability associated with low back pain.

3:35 Introduction
Ryan A. Tauzell, PT, MA, Cert. MDT

3:38 The Impact of Physical Activity on Health
Stanley A. Herring, MD

3:48 Risk of a Sedentary Lifestyle/Nutrition
Alison A. Stout, DO

3:58 Popular Exercise Methods Deconstructed
Michael C. Geraci, MD, PT

4:08 Movement Equivalence
Ryan A. Tauzell, PT, MA, Cert. MDT

4:18 Work Load Monitoring
Joe Ghorayeb, DC, MHA

4:28 Psychosocial Considerations
Donald Murphy, DC, FRCC

4:38 Behaviors, Rituals and Motivation
Amy Fletcher, DPT, Dip. MDT, FAAOMPT

4:48 Economics of Low Back Pain Prevention
Simon Dagenais, PhD, MSc, DC

4:58 Discussion, Questions and Answers
Section on Intraoperative Neurophysiological Monitoring:
Neuromonitoring in Spine Surgery: What Would You Do?  
Skyline Ballroom W375d
Moderators: Richard Vogel, PhD, DABNM and Adam Doan, DC, DABNM

Use of neuromonitoring (IONM) in spine surgery varies significantly by region in the US and around the globe. In some centers, IONM is a valuable surgical adjunct; in others, it’s unreliable due to frequent failure. These variances may explain contrasting reports on the diagnostic and therapeutic utility of IONM. In this interactive symposium, faculty will challenge participants with real world scenarios to explore variability in the use and efficacy of IONM in spine surgery. Participants are encouraged to share their perspectives and bring their own examples of neuromonitoring failures for the panel to diagnose.

3:35 How Should I Monitor This Surgery?  
Interactive audience and panel activity and discussion  
Anthony Sestokas, PhD; Nancy Mirarchi, DC, DABNM; John P. Ney, MD, MPH; F. Todd Wetzel, MD and Joshua E. Heller, MD (Faculty Panel)

4:05 How Do I Respond to a Neuromonitoring Alert?  
Interactive audience and panel activity and discussion  
Faculty Panel

4:35 Why Did Neuromonitoring Fail?  
Interactive audience and panel discussion  
Faculty Panel

NASS After Hours:  
SI-Joint Hands-On Workshop:  
Corelink, Medtronic, RTI, SI-BONE, xTant (Non-CME)  
Gold Theater and Orange Lab (The Learning Place)
### THURSDAY, SEPTEMBER 26

**6:30-8:00 a.m.**

**Continental Breakfast**  
F2 Lobby

**6:30 a.m.-5:00 p.m.**

**Attendee Registration**  
F2 Lobby

**7:25-8:25 a.m.**

**Surgical Symposium:**  
**Anticipating and Reducing Complications in Adult Spinal Deformity Surgery: Clinical Translatable Research Findings From the International Spine Study Group**  
Skyline Ballroom W375ab  
Moderator: Shay Bess, MD

Adult spinal deformity surgery is associated with high rates of complications that may compromise surgical outcomes. Faculty will utilize research findings from the International Spine Study Group to help surgeons and medical providers recognize critical timeframes during which patients are at risk for specific complications and employ techniques to reduce complications.

**7:25**  
**Introduction**  
Shay Bess, MD

**7:28**  
**What is the True Incidence of Specific Complications in ASD Surgery and When Do They Occur**  
Alan H. Daniels, MD

**7:38**  
**Avoiding Proximal Junctional Kyphosis: What Have We Learned in 10 Years**  
Shay Bess, MD

**7:48**  
**Reducing Rod Breakage and Nonunion in Pedicle Subtraction Osteotomy: The Importance of Rod Number and Configuration**  
Munish C. Gupta, MD

**7:58**  
**Questions**  
Faculty

**8:03**  
**Can Standard Work Reduce Complications in ASD Surgery?**  
Douglas C. Burton, MD

**8:13**  
**How Should We be Collecting Complications Data to Improve Research and Patient Outcomes**  
Eric O. Klineberg, MD

**8:23**  
**Conclusions**  
Shay Bess, MD

### 7:25-8:25 a.m.

**Medical Symposium:**  
**Section on RIMS: Medical Cannabis, Diet and Nutritional Supplements and Other Self-Help Treatments for Pain**  
Skyline Ballroom W375c  
Moderator: Jerome Schofferman MD

Most patients try self-help treatments including over the counter and other complementary remedies for spine pain. Medical cannabis, especially CBD, is all the rage. Special diets and/or nutritional supplements are also very popular. Some of the choices patients make are based only on the “evidence” that “they say it works.” It is important that the spine practitioner knows the potential benefits as well as the potential risks of these remedies. Faculty will explore the evidence and the role of medical cannabis and nutrition for pain management as well as discuss the placebo effect and other physiological phenomena. Additionally, faculty will offer some suggestions for approaching patient care when these issues arise.

**7:25**  
**Introduction**  
Jerome Schofferman, MD

**7:35**  
**Nutrition and Dietary Supplements for Pain**  
Carrie A. Diulus, MD

**7:45**  
**Medical Cannabis and Pain: The High Side**  
Jerome Schofferman, MD

**7:55**  
**Medical Cannabis and Pain: The Con Side**  
Jason Friedrich, MD

**8:05**  
**Other Self-help Treatments: Topicals, Yoga, Tai Chi, Mindfulness**  
Jerome Schofferman, MD

**8:15**  
**Discussion, Question and Answer**
7:25-8:25 a.m.

**Abstract Presentations:**

**Updates in Technology**

**Room W471ab**
Moderator: Sandeep N. Gidvani, MD

7:25 121. Machine-vision Image Guided Surgery (MvIGS): An intraoperative and radiation-free spine navigation system workflow analysis
Antonio T. Brecevich, MD

7:31 122. Cartilage derived stem cells: A novel cellular replacement therapy to treat degenerative disc disease
William Mark Erwin, DC

7:37 123. Three-dimensional printed drill guides versus fluoroscopic-guided freehand technique for pedicle screw placement: A systematic review and meta-analysis of radiographic and clinical outcomes
Bilal B. Butt, MD

7:43 124. 3D-Printed Hyperelastic Bone® composite scaffolds as bone graft substitutes
Joseph G. Lyons, BS

7:49 125. The use of combinatorial supervised machine learning and wearable sensors to objectively measure activities of daily living from the Oswestry Disability Index
Nicholas M. Benson, PhD

7:55 126. Introducing navigation or robotics into TLIF techniques: Are we optimizing our index episode of care or just spending more money?
Jeffrey L. Gum, MD

8:01 127. Viable allograft intervertebral disc augmentation: Preliminary results and safety data in the first 24 patients
Edward Yoon, MD

8:07 Discussion

7:25-8:25 a.m.

**Abstract Presentations:**

**Thoracolumbar Surgery IV**

**Room W470b**
Moderator: Michael P. Steinmetz, MD

7:25 128. Posterior lumbar fusions (PLFs) at physician owned hospitals—Reconsidering the restrictions of the Affordable Care Act (ACA)
Azeem T. Malik, MBBS

7:31 129. Presence of a surgical trainee does not affect patient outcomes in lumbar fusion surgery
Srikanth Divi, MD

7:37 130. Cold facts of surgical Tarlov Cysts
Marcelo Galarza, MD, PhD, MSc

7:43 131. Primary single-level lumbar discectomy/decompression at a free-standing ambulatory surgery center (ASC) vs. a hospital-owned outpatient facility (HOPD) - an analysis of 90-day outcomes and costs
Azeem T. Malik, MBBS

7:49 132. Risk factors for cage migration and cage retropulsion following transforaminal lumbar interbody fusion
Man Kyu Park, MD

7:55 133. Patient reported outcomes following surgery for lumbar disc herniation: Comparison of a universal and multitier health care system
Oliver G. Ayling, MD

8:01 134. Surgeon volume affects short- and long-term surgical outcomes in idiopathic scoliosis
Vishal Sarwahi, MD

8:07 Discussion

7:25-8:25 a.m.

**Abstract Presentations:**

**Biomechanics and Basic Science II**

**Room W470a**
Moderator: Dominic W. Pelle, MD

7:25 135. Neutral cervical sagittal vertical axis (SVA) varies with T1 tilt
Ryan Hoffer, MD, MS

7:31 136. Biomechanical study of the sacral replacement part as a model for spinopelvic reconstruction following total sacrectomy
Antonio Martin Benlloch, MD, PhD

7:37 137. Surgical overcorrection relative to ideal spinopelvic alignment reduces rates of pelvic non-response for severely mal-aligned adult spinal deformity patients
Peter G. Passias, MD

7:43 138. Can dual headed pedicle screws simplify use of dual rods and without sacrificing biomechanical stability?
Jakub Godzik, MD
7:25-8:25 a.m.

Interdisciplinary Spine Forum: Should Spine Care Include the Prevention Spectrum?
Skyline Ballroom W375d
Moderator: Claire Johnson, DC, MSEd, PhD

The five categories of prevention are typically not included in traditional models of spine care. Why is this? During this session, faculty will review the spectrum of prevention related to spinal disorders and pose two questions: What are the barriers that limit including prevention in spine care? What are potential solutions to address these barriers? Participants are encouraged to join the discussion about the development of a practical interdisciplinary prevention model of care.

7:25 Welcome and Introduction
Claire Johnson, DC, MSEd, PhD

7:30 Prevention in Spine Care
The five prevention categories and the spectrum of prevention as they relate to spine care
Claire Johnson, DC, MSEd, PhD

Example of technology to facilitate patient empowerment in the prevention of spine pain
Brian D. Justice, DC

Cautions and limitations. Troublesome issues to stimulate discussion
Claire Johnson, DC, MSEd, PhD

7:55 Facilitated Discussion with Attendees
What are additional barriers or disadvantages for prevention in spine care?
What are potential solutions for including prevention in spine care?
Claire Johnson, DC, MSEd, PhD and Brian D. Justice, DC

8:20 Wrap up
Take home messages and next steps
Claire Johnson, DC, MSEd, PhD and Brian D. Justice, DC

8:00-10:00 a.m.

Surgical Innovation Lab Demos:

Mizuho OSI
Benefits of Dynamic Intraoperative Patient Positioning
Orange Lab (The Learning Place) 1310

Providence Medical Technology
Novel Instrument Tracking Platform Coupled with a Tissue Sparing Approach to Posterior Cervical Fusion—Reduced Radiation & Operative Time
Yellow Lab (The Learning Place) 1315

Medacta
Green Lab (The Learning Place) 1320

Medtronic
Blue Lab (The Learning Place) 1325

8:00 a.m.-5:00 p.m.

Exhibitor Registration
F2 Lobby

8:30-9:30 a.m.

Medical Symposium:
Section on RIMS: Optimization for Spine Surgery
Skyline Ballroom W375c
Moderator: Alison A. Stout, DO

8:30 Introduction and Nutrition (Considerations Aside from Diabetes)
Carrie A. Diulus, MD

8:40 Physical Therapy
Ryan A. Tazelle, PT, MA, MDT

8:50 Psychosocial: Clinically Useful Tools
Kristin R. Archer, PhD, DPT

9:00 How Many Injections are Enough? Are There Surgical Side Effects?
Alison A. Stout, DO

9:10 SNB
Byron J. Schneider, MD

9:20 Perioperative Medication Management
Sanjog Pangarkar, MD
8:30-9:30 a.m.

**Best Papers**

Skyline Ballroom W375ab  
Moderator: Jeffrey C. Wang, MD

8:30 142. Impact of preoperative chronic opioid therapy on long-term outcomes, re-operations, complications and resource utilization after lumbar arthrodesis  
Andrew J. Pugely, MD

8:36 143. Chiropractors treating patients with acute lower back pain in a spine treatment pathway model: A five year prospective cohort study  
Paul B. Bishop, MD, PhD, DC

8:42 144. Common psychiatric conditions and anterior cervical discectomy and fusion: An assessment of postoperative outcomes, two-year costs, and postoperative opioid utilization  
Andrew B. Harris, BS

8:48 145. Opioid utilization in adult idiopathic scoliosis after multi-level deformity correction: Postoperative trends and factors associated with long-term use  
Piyush Kalakoti, MD

8:54 146. Duplicate abstract

9:00 147. Prospective randomized controlled trial of implant density in AIS: Results of the minimize implants maximize outcomes study  
David W. Polly Jr., MD

9:06 148. Which MRI findings are associated with long-term disability in low back pain patients?  
Peter Udby, MD

9:12 Discussion

8:30-9:30 a.m.

**Abstract Presentations:**

**Spine Interventions**  
Room W470b  
Moderator: Allen S. Chen, MD, MPH

8:30 149. Results of the degenerate-disc infection study with contaminant control (DISC) study  
Ralph J. Mobbs, MD, FRACS

8:36 150. Examining the relationship between epidural steroid injections and patient satisfaction  
W. Ryan Spiker, MD

8:42 151. Efficacy of transforaminal steroid injections to prevent surgical treatment for patients with cervical radiculopathy  
William F. Lavelle, MD

8:48 152. Stem cell therapy for pressure injury: A pilot study with autologous bone marrow derived stem cell (BM-MNC)  
Rajeshwar N. Srivastava, MD

8:54 153. Can cervical transforaminal epidural steroid injections be surgery sparing?  
Kush K. Goyal, MD

8:30-9:30 a.m.

**Resident/Fellow Education Pathway:**

**Career Building**  
Room W470a  
Moderator: Danielle L. Sarno, MD

Faculty will address actions to avoid in the fellowship interview and match process, key approaches to be competitive in the match as well as career advancement through the preparation of abstracts, research papers and presentations.

8:30 Abstracts, Papers and Presentations  
Andrew J. Schoenfeld, MD

8:50 Advice for the Fellowship Match/Evaluating Programs  
Saad B. Chaudhary, MD, MBA

9:10 Interactive Q&A: Bring Your Fellowship Questions  
Faculty Panel: Avery L. Buchholz, MD, MPH; Saad B. Chaudhary, MD, MBA; Safdar N. Khan, MD; Melvin C. Makhni, MD, MBA; Peter G. Passias, MD; Khoi D. Than, MD; Raul A. Vasquez-Castellanos, MD

8:30-9:30 a.m.

**Interdisciplinary Spine Forum:**

**Future of Spine Care: How will Spine Care Adapt to the Changing Dynamics of Health Care Delivery?**  
Skyline Ballroom W375d  
Moderator: Eric Buchl, PA-C

Faculty will discuss the significant percentage of health care providers using telehealth or telemedicine tools to connect with patients, how will spine care change, how do providers adapt to reach patients, as well as how to improve accesses and outcomes, reduce disability, and maintain cost effective care models.

8:30 Introduction  
Eric H. Buchl, MPAS, PA-C

8:41 Patient Scenario with Acute Back Pain Episode

8:45 Telemedicine Visit with Provider  
Brett Cunningham

8:55 Virtual Therapy Visits  
Todd Norwood, PT
Surgical Symposium: A Global Perspective on Minimally Invasive Spine Surgery
Room W471ab
Moderator: John C. Liu, MD

8:30-9:50 a.m.

8:30 Brazilian Society of Minimally Invasive Spine Surgery and Techniques (BRAMISS)
Historical Evolution of Lumbar Percutaneous Discectomies and Their Role in the Therapeutic Arsenal of Spinal Surgeons
Pil Sun Choi, MD

8:40 Qatar Spine
MISS TLIF in Multilevel Degenerative Lumbar Disc Disease
Nasser M. Khan, MBBS

8:50 Korean Minimally Invasive Spinal Surgery Society
The Nomenclature of Endoscopic Spine Surgery
Jin-Sung L. Kim, MD

9:00 Association of Spinal Surgeons of India (ASSI)
Minimally Invasive Surgery in Spinal Infections: Cutting Corners!
Ranjith Unnikrishanan, MS, DNB, DO

9:10 Brazilian Society of Minimally Invasive Spine Surgery and Techniques (BRAMISS)
Percutaneous Endoscopic Surgery for Treatment of Lumbar Spinal Stenosis
David Del Curto, MD

9:20 World Congress of Minimally Invasive Surgery and Techniques (WCMISST)
Full Endoscopic Decompression for Thoracic Myelopathy
Gun Choi, MD, PhD

9:30 ArabSpine
Do We Need Decompression in Thoracolumbar Burst Fracture with Retropulsed Fragment Treated by MIS
Mohammad Alfawareh, MD

9:40 World Congress of Minimally Invasive Surgery and Techniques (WCMISST)
Pornpavit Sriphirom, MD

9:00 a.m.-5:00 p.m.

Technical Exhibition
F1 & F2 Exhibit Hall

Practice and Employer Meet & Greet
West Central Lobby

Registered practices and employers will be available at the Career Center booth for 30-minute time slots to answer questions, give advice, and promote their practice or open positions. There will be an updated schedule of presenters available daily at the booth.

Networking Break Beverage Service
The Learning Place & Lounge

Practical Theater:
NASS Low Back Pain Guideline
Gold Theater (The Learning Place)

Poster Grand Rounds
The Learning Place

Gray Theater

P4. Autologous blood coagulum as a native carrier for rhBMP6 induces new bone formation and posterolateral lumbar spine fusion in rabbits and sheep
Munish C. Gupta, MD

P1. Improvement of motor function induced by skeletal muscle contraction in spinal cord injury rats
Norito Hayashi, MD

Pink Theater

P83. Predictive modeling for pseudarthrosis performance benchmarking in 404 patients with a minimum two-year follow up
Justin K. Scheer, MD

P80. The impact of body mass index (BMI) on postoperative outcomes following posterior spinal fusion in neuromuscular scoliosis
Azeem T. Malik, MBBS

Purple Theater

P56. Preoperative patient activation is not associated with inpatient pain or narcotic utilization after minimally invasive lumbar discectomy
Arash Sayari, BS, MD

P59. Greater PHQ-9 score predicts worse clinical outcomes following minimally invasive transforaminal lumbar interbody fusion
Joon Yoo, BA
White Theater

P152. The effect of frailty on outcome after traumatic spinal cord injury
Daniel Banaszek, MD, FRCSC

P153. Sarcopenia, independent of age, predicts mortality and acute care adverse events in patients with traumatic spinal cord injury
Daniel Banaszek, MD, FRCSC

9:45-9:55 a.m.
NASS Recognition Awards Presentation
Skyline Ballroom W375ab

9:55-10:00 a.m.
2019 Research Grants and Fellowship Awards Presentations
Skyline Ballroom W375ab

10:00-10:15 a.m.
Incoming Presidential Remarks:
William J. Sullivan, MD
Skyline Ballroom W375ab

10:15-11:00 a.m.
2018-2019 Presidential Address:
Jeffrey C. Wang, MD
Skyline Ballroom W375ab

11:00 a.m.-1:00 p.m.
Surgical Innovation Lab Demos:

Life Spine
Orange Lab (The Learning Place) 1310

Misonix
Yellow Lab (The Learning Place) 1315

Anchor Ortho
The Future of Herniated Disc Repair Procedures: A Demonstration on the Design and Clinical Application of the AnchorKnot® Tissue Approximation Kit
Green Lab (The Learning Place) 1320

Medtronic
Blue Lab (The Learning Place) 1325

11:00 a.m.-2:30 p.m.
P.U.R.E. (Ticketed Hot Lunch)
Booth 938

12:00-12:30 p.m.
Solution Showcase:
Red Theater (Booth 1538)

12:00-1:00 p.m.
Complimentary Boxed Lunch
(Medical Attendees Only)
Technical Exhibition Booth 1838

Professional Headshots
West Central Lobby

Solution Showcase:
Terumo BCT: Autologous Biologics: A Novel Treatment Option in Spinal Fusion
Red Theater (Booth 1538)

Be sure to stop by the Career Center booth in the West Lobby to get a professional headshot photo taken and emailed to you after the conference.
### Surgical Symposium: Prevention of Flat Back Deformity in Lumbar Spine Surgery

Skyline Ballroom W375ab  
Moderator: John G. DeVine, MD

Faculty will discuss incorporating pelvic parameters into practice, present alternative fusion techniques to get proper sagittal balance and address fused flat back correction strategies. Participants will hear a case and decide how to approach the patient.

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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| 1:00     | Evaluation of Sagittal Alignment and Lumbopelvic Balance in Treatment of Lumbar Degenerative Spine Disease  
Brandon D. Lawrence, MD |
| 1:10     | Lateral Interbody Fusion is Most Ideal for Restoring Lumbar Lordosis  
John C. Liu, MD |
| 1:20     | How to Maximize Lumbar Lordosis with Transforaminal Lumbar Interbody Fusion  
Lawrence G. Lenke, MD |
| 1:30     | Indications for Anterior and Posterior Approach for Prevention of Flat Back Deformity  
John C. France, MD |
| 1:40     | Discussion, Questions and Answers |

### Medical Symposium: Using Regenerative Medicine to Treat Chronic Pain Emanating from the Spine

Skyline Ballroom W375c  
Moderator: Corey W. Hunter, MD

Regenerative medicine within the field of Pain Medicine is rarely part of the curriculum within a pain fellowship. As such, there is a lack of standardization in the use of regenerative medicine and practice leading to mixed outcomes. Faculty will emphasize the proper indications for orthobiologics and outline the evidence to support their use.

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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</table>
| 1:00     | Introduction  
Corey W. Hunter, MD |
| 1:03     | Neuraxial Uses for Platelet Rich Plasma  
Aaron Calodney, MD |
| 1:16     | Allogeneic Grafts for Discogenic Pain  
Michael DePalma, MD |
| 1:29     | Intradiscal Mesenchymal Stem Cells for Degenerative Disc Disease  
Timothy Davis, MD |
| 1:40     | Discussion, Questions and Answers |

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### Abstract Presentations: Socioeconomics of Spine Care

Room W470b  
Moderator: Alexander Tuchman, MD

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
</tr>
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</table>
| 1:00     | 156. Forecasting spinal deformity healthcare burden and operative utilization in the United States from 2015 to 2040: An Epidemiological-based Auto-Regressive Integrated Moving Average (ARIMA) computation modeling  
Piyush Kalakoti, MD |
| 1:06     | 157. Economic Analysis of 90-day return to the emergency room and readmission after elective lumbar spine surgery: A single center analysis of 5,444 patients  
Leah Y. Carreon, MD, MSc |
| 1:12     | 158. Determinants of variability in observed costs in spinal surgery episodes within the bundled care payment initiative  
Patrick Dermarkarian, MD, MBA |
| 1:18     | 159. A financial analysis of outpatient spine clinic: an analysis of 36,312 patient appointments and subsequent surgeries at a single major academic institution  
Aditya Mazmudar, BA |
1:24 160. Increasing cost efficiency in adult spinal deformity surgery: Identifying predictors of lower total costs
Peter G. Passias, MD

1:30 161. Effects of Drug Enforcement Agency (DEA) narcotic restrictions on a multi-disciplinary spine practice: Analysis of patient discharges from the practice during a ten-year period
Jennifer J. Shivers, PA-C

1:36 162. Opioid usage patterns, patient characteristics, and the role of chiropractic services in a publicly funded inner city healthcare facility
Steven Passmore, DC, PhD

1:42 Discussion

1:00-2:00 p.m.
Innovative Technology Presentations  (Non-CME)
Room W470a
Moderator: Ed Dohring, MD

All Innovative Technology Presentations also are available as ePosters through Kubify.

1:00 9. Importance of cryoprotectant in bioavailability of cell-based matrices
Shabnam M. Namin, PhD

1:07 10. Multi-level anterior cervical disectomy and fusion (ACDF) with expandable cages for fixed kyphotic spondylotic myelo-radiculopathy obviating a posterior reconstruction
Kornelis A. Poelstra, MD, PhD

Luiz Pimenta, MD, PhD

1:21 12. Cell potential derived from viable allograft: Histologic evidence from a retrieved spine implant device
Quante A. Singleton, MD

1:34 13. Bone-anchored annular closure reduces long-term symptomatic recurrent herniation and reoperation compared to disectomy alone during a randomized controlled trial in a high-risk patient population
Jason A. Inzana, PhD

1:41 14. A novel compressible core artificial cervical disc compared to anterior cervical disectomy and fusion: Two year clinical results
Richard D. Guyer, MD

1:48 15. What drives spinal fusion within graft materials, cells or growth factors?
Frank Vizesi, PhD

Gold Theater Presentation:
Gold Theater (The Learning Place)

1:00-3:00 p.m.
De-stress with the Best: Therapy Dog Meet & Greet
The Lounge

1:00-3:05 p.m. and 3:35-5:05 p.m.
Interdisciplinary Spine Forum:
Psychologically Informed Spine Practice: A Learning Experience (Parts I and II)
(Limit 60 Participants)
Skyline Ballroom W375d
Sherri Weiser, PhD and Gregory Whitcomb, DC

Extensive and mounting science is showing that psychosocial factors are predictive of the transition from acute to chronic disabling spine pain. Nevertheless, barriers to implement psychologically-informed practice (PiP) remains widespread. Participants will have an experiential learning experience as faculty provide the latest evidence on the neurophysiological and psychological aspects of pain with special emphasis on patient-centered communication in a biopsychosocial care model.

Part I
1:00 Welcome and Introductions
Sherri Weiser, PhD

1:05 The Need for PiP in Spine Care
Todd Wetzel, MD

1:10 PiP Development, Concepts and Practice
Chris Main, PhD

1:30 PiP Training: Lessons from the TARGET Trial
Jason Beneciuk, PT, PhD

1:50 Discussion (Clarifications)
Sherri Weiser, PhD

2:00 Workshop—Introduction & Guidelines
Chris Main, PhD

2:05 Group Exercise I
All

3:20 Break
Part II

3:35 Workshop—Introduction & Guidelines
Tamar Pincus, PhD

3:40 Group Exercise II: “Yes-But”
All

4:30 Questions and Answers
- Faculty Discussion on the Barriers and Facilitators to PiP Implementation
- What’s Next for PiP at NASS?
  Greg Whitcomb, DC

5:00 Closing Remarks
Greg Whitcomb, DC

2:00-4:00 p.m.

Surgical Innovation Lab Demos:

**Spineology**
Orange Lab (The Learning Place) 1310

**Orthofix**
M6-CTM Artificial Cervical Disc: The Natural Choice
Yellow Lab (The Learning Place) 1315

**Relievant Medsystems**
Green Lab (The Learning Place) 1320

**Medtronic**
Blue Lab (The Learning Place) 1325

2:05-3:05 p.m.

**Abstract Presentations:**

**Trauma and Biomechanics I**
Room W471ab
Moderator: John C. France, MD

2:05 163. Is conservative treatment effective for unilateral sagitally split fractures of C1 lateral mass?
  Jong-Beom Park, MD, PhD

2:11 164. The reliability of the AOSpine thoracolumbar spine injury classification system in children: Results of a multicenter study
  Andrew Z. Mo, MD

2:17 165. Transverse pedicle angle is associated with pelvic incidence and increased in isthmic spondylolisthesis
  Atticus C. Coscia, BS

2:23 166. Can C7 slope be used as a substitute for T1 slope? A radiographic analysis
  John T. Schwartz, BS

2:29 167. Assessment of the efficacy of teriparatide (FORTEO®) in patients undergoing posterolateral lumbar spinal fusion: a double-blinded randomized pilot study
  Kevin Taliaferro, MD

2:35 168. Non-viral transfection of human intervertebral disc cells with developmental factors induces reprogramming to a healthy anti-catabolic/inflammatory phenotype with enhanced extracellular matrix accumulation
  Shirley N. Tang, BS

2:41 169. Biomechanical analysis of motion following lateral sacroiliac joint screw fixation with or without lumbosacral fixation
  Sonia V. Eden, MD

2:47 Discussion

2:05-3:05 p.m.

**Medical Symposium:**

**Neuromodulation**
Skyline Ballroom W375c
Moderator: Miles Day, MD

Neuromodulation continues to advance as a treatment for chronic pain refractory to other interventional treatments. In this symposium, faculty will introduce participants to advanced uses of neuromodulation in addition to examining and understanding the new neuromodulation platforms.

2:05 Stimulation for the Treatment of Chronic, Intractable Facial Pain
  Miles Day, MD

2:25 Novel Uses of Peripheral Nerve Stimulation
  Peter Staats, MD

2:45 New Neuromodulation Platforms: What Have We Learned?
  Robert Levy, MD
2:05-3:05 p.m.

**Abstract Presentations:**

**Cervical Spine Surgery IV**

Skyline Ballroom W375ab

Moderator: Wellington K. Hsu, MD

1. **2:05**
   - In which cases do surgeons specializing in total disc replacement perform fusion in patients with cervical spine symptoms?
   - Jack Zigler, MD

2. **2:11**
   - Postoperative recovery of motor strength and patient-reported physical function following anterior cervical discectomy and fusion
   - Aditya Mazmudar, BA

3. **2:17**
   - Preoperative diagnosis of psychiatric mood disorder is predictive of postoperative course in patients after elective cervical spine surgery
   - Jose H. Jimenez-Almonte, MD, MS

4. **2:23**
   - Defining symptomatic versus radiographic distal junctional kyphosis after cervical deformity-corrective surgery
   - Peter G. Passias, MD

5. **2:29**
   - Analysis of radiological accuracy among different intraoperative imaging systems for screw fixation in cervicothoracic region
   - Nermine Habib, MBBS, MD

6. **2:35**
   - Intraoperative alignment goals for severe cervical deformity to achieve optimal improvements in health-related quality of life measures
   - Sohrab Virk, MD

7. **2:41**
   - Degenerative cervical spondylolisthesis: does adjacent level surgical stabilization result in progressive listhesis?
   - Garrett Harada

2:47 Discussion

2:05-3:25 p.m.

**Surgical Symposium:**

**A Global Perspective on Cervical Spine**

Room W470ab

Moderators: Jean-Jacques Abitbol, MD and Hirotaka Haro, MD, PhD

1. **2:05**
   - Indonesian Spine Society
     MISS Posterior Approach in Cervical Spondylosis
     Aloysius B. Darwono, MD, PhD

2. **2:15**
   - Kuwait Spine Society
     Hypoglossal Nerve Injury Following Anterior Cervical Spine Surgery: Lessons Learned
     Abdulaziz Al-Mutair, MD, FRCSC

2.25 **Qatar Spine**
   - Plate Construct Versus Stand Alone Cage in Anterior Cervical Decompression and Fusion: Does the Plate Maintain Sagittal plane Correction? Clinical Outcome and Radiological Findings Correlation
   - Abdul Moeen Baco, FRCS, MSc, MbChB

2:35 Sudanese Spine Society
   - Effect of Spinal Cord Signal Changes on Surgical Outcome of Cervical Spondylotic Myelopathy
   - El Fatih Bashir El Malik, MBBS, FRCS(Ed), FRCS(SN), FACS

2:45 Saudi Spine Society
   - Atlantoaxial Instability and Cervical Myelopathy in Morquio Syndrome
   - Wael Alshaya, MBBS, FRCSC

2:55 Taiwan Neurosurgical Spine Society
   - Multi-level Cervical Disc Arthroplasty: Indications and Outcomes
   - Jau-Ching Wu, MD, PhD

3:05 ArabSpine
   - Experience with Anterior Cervical Fusion Using a Bio-resorbable Cage
   - Saleh S. Baeesa, MbChB, FRCSC, FAANS

3:15 Brazilian Spine Society
   - Interfacet Release and Distraction for Management of Craniovertebral Junction Diseases
   - Alderico Girao Campos de Barros, MD

3:05-3:35 p.m.

**Networking Break Beverage Service**

The Learning Place & Lounge

**Practical Theater:**

**NASS Spine Registry**

Gold Theater (The Learning Place)

**Poster Grand Rounds**

The Learning Place

**Gray Theater**

P20. Titanium expandable interbody spacers placed via bilateral-TLIF provides stability similar to ALIF: An in-vitro range of motion analysis
   - Steven A. Schopler, MD

P33. Degenerative paraspinal muscles impact thoracic spine compensation in ASD patients
   - Mathieu Bannwarth, MD

**Pink Theater**

P136. Randomized, prospective clinical trial to evaluate efficacy and safety in lumbar fusion surgery of implantation of autologous bone marrow mesenchymal cells expanded ex vivo and combined with allogeneic bone tissue, compared with autologous iliac crest graft; part II: clinical findings
   - Pilar Gonzalez-Tartiere, MSc

P137. A 5-year review of hospital costs and reimbursement in the surgical management of degenerative spondylolisthesis
   - Keith W. Lyons, MD
**Purple Theater**

**P8.** Electrospun synthetic bone grafts promote mesenchymal stem cell function and spinal fusion  
Derek Ju, MD

**P5.** Experimental study on the expression of growth factors in the vertebral growth plate and pedicle in severe idiopathic scoliosis  
Tao Li, MD

**P3.** Perioperative immunonutrition in spine and total joint surgery  
Michael Shumaker, DO

**White Theater**

**P134.** Preoperative PROMIS scores can predict patient satisfaction following surgery for cervical degeneration  
Alvaro Ibaseta, MS

**P135.** Radiological outcomes of a novel 3-dimensional printed titanium cervical interbody cage following single and multilevel anterior cervical disectomy and fusion: A case series of 108 operated levels  
Antonio T. Brecevich, MD

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**NASS Working for You: Value Update**  
Skyline Ballroom W375ab

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**Integrated Symposium: Opiates: The Changing Roles and Responsibilities of the Spine Surgeon**  
Skyline Ballroom W375c  
Moderators: Nilesh Patel, MD and Katherine D. Travnicek, MD

Despite the added regulatory and payer scrutiny, and in spite of heightened vigilance as well as decreased prescriptions of opioids, the number of overdoses and deaths continue to increase. Faculty will examine the opiate problem, address regulatory burdens, discuss alternatives before, during and after surgery as well as cover how to improve the surgical outcomes at the same time decrease the opiate burden.

**3:35-3:40 p.m.**

**NASS Working for You: Value Update**  
Skyline Ballroom W375ab

**3:35-5:05 p.m.**

**Integrated Symposium:** Opiates: The Changing Roles and Responsibilities of the Spine Surgeon  
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**4:15** Clinical Pearls from a Spine Surgeon to Decrease “Failures” and Hence Reliance on Opiates  
John Sherman, MD

**4:25** Current Data on Spinal Neuromodulation on Decreasing Opiate Burden, Spine Surgeons Outcomes and Tips  
Alexander S. Bailey, MD

**4:35** Research on Emerging Solutions that Decrease Opiates  
Lawrence Poree, MD and Steven Falkowski, MD

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**3:35-5:05 p.m.**

**Abstract Presentations:**  
Thoracolumbar Surgery V  
Room W471ab  
Moderator: Michael D. Daubs, MD

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**3:35** 177. Chronicity of preoperative opioid usage predicts patient satisfaction, return to work, and achieving ODI MCID up to two years after lumbar fusion: Analysis from the Michigan spine surgery improvement collaborative (MSSIC)  
Hesham M. Zakaria, MD

**3:41** 178. Metastatic spine disease: Should patients with short life expectancy be denied surgical care?  
Nicolas Dea, MD, MSc, FRCSC

**3:47** 179. Predictors of clinical outcome following surgery for lumbar spinal stenosis: A study of postoperative pain and disability trajectories  
Neil A. Manson, MD, FRCSC

**3:53** 180. Is outpatient anterior lumbar fusion (ALIF) safe? An analysis of 30-day outcomes  
Jeremy A. Jones, MD

**3:59** Discussion

**4:14** 181. Sequential changes in lumbar lordosis and segmental stability following lateral interbody cage placement, smith-peterson osteotomy, and anterior longitudinal ligament release  
Amy Claeusen, PhD

**4:20** 182. Radiation exposure in posterior lumbar fusion: A comparison of CT image-guided navigation, robotic assistance and intraoperative fluoroscopy  
Aaron J. Buckland, MBBS, FRACS

**4:26** 183. Patient outcomes following short-segment lumbar fusion are not affected by PI-LL mismatch  
Srikanth Divi, MD

**4:32** 184. Comparison of standalone lateral lumbar interbody fusion and open laminectomy and postolateral instrumented fusion in the treatment of adjacent segment disease following previous lumbar fusion surgery  
Arash Sayari, BS, MD

**4:38** 185. Reoperation rates after single-level lumbar disectomy in the military health system  
Donald R. Fredericks Jr., MD
4:44 186. Cost-effectiveness of the Coflex interlaminar stabilization device: Evidence for increasing physician reimbursement
Jared D. Ament, MD, MPH

4:50 Discussion

3:35-5:05 p.m.

Abstract Presentations:
Spinal Deformity III
Room W470b
Moderator: Robert F. McLain, MD

3:35 187. The impact of the lower instrumented level on outcomes in cervical deformity surgery
Peter G. Passias, MD

3:41 188. ‘Soft landing’: Can hooks at the upper instrumented level prevent proximal junctional kyphosis and proximal junctional failure in adult spinal deformity?
Comron Saifi, MD

3:47 189. A data-driven approach to assessment of sagittal alignment: Defining the spinopelvic ratio’s impact on clinical outcomes in adult spinal deformity patients
Alan H. Daniels, MD

3:53 190. Preoperative opioid therapy poorly controls pain in non-revision adult spinal deformity (ASD) and increases risk for chronic postoperative opioid usage
Breton Line, BS

3:59 Discussion

4:15 191. Operative treatment for thoracic adult scheuermann kyphosis: Preoperative disability and surgical outcomes
Shay Bess, MD

4:21 192. Use of BMP for adult spinal deformity surgery: Patterns of usage and changes over the past decade
Mathieu Bannwarth, MD

4:27 193. Comprehensive alignment planning (CAP) for adult spinal deformity (ASD) more effectively predicts surgical outcomes and proximal junctional kyphosis than previous classifications
Renaud Lafage, MSc

4:33 194. Outcomes of surgical treatment for 138 patients with severe sagittal deformity at a minimum two-year follow up
Justin K. Scheer, MD

4:39 195. Residual curve and truncal shift impact patient satisfaction after surgery for AIS
Majd Marrache, MD

4:45 196. Longitudinal changes of the sagittal plane after posterior spinal fusion of adolescent idiopathic scoliosis in Lenke 5 and 6 from baseline to two-year follow up
Mostafa H. El Dafrawy, MD

4:51 Discussion

3:35 197. Prevalence of isthmic and degenerative lumbar spondylolisthesis: analysis of 882 CT scans
Andrew Y. Liu, MD

3:41 198. Utility of repeat cervical spine MRI in patients with documented cervical degeneration
Grant R. McChesney, MD

3:47 199. Identifying the source of neck pain with single photon emission computed tomography/computed tomography (SPECT/CT)
John E. Nolan III, MD

3:53 200. Development and validation of a radiographic classification of lumbar lateral listhesis for predicting radicular leg pain in adult scoliosis
Kirkham B. Wood, MD

3:59 Discussion

4:15 201. Utility of neutral sitting lateral radiographs for assessment of lumbar segmental instability in lumbar spondylolisthesis: A prospective study
Saihu Mao, PhD

4:21 2017 Research Grant
NF1 and KEAP1 mutations are correlated to increased rates of local failure after radiation therapy for spine metastases from non-small cell lung cancer
Erik Anderson, MD, PhD

4:27 202. Radiologic criteria to predict injury of transverse atlantal ligament in unilateral sagitally split fracture of C1 lateral mass
Jong-Beom Park, MD, PhD

4:33 203. Cobb angle measurement reliability using low-dose radiographs in early-onset idiopathic scoliosis
Tristan Langlais, MD, MSc

Avani S. Vaishnav, MBBS

4:45 205. Can imaging characteristics on MRI predict the acuity of a lumbar disc herniation?
Srikanth Divi, MD

4:50 Discussion
Surgical Symposium: Lateral Approach Spine Surgery (Co-sponsored with the Society of Lateral Access Surgery)
Skyline Ballroom W375ab
Moderator: William R. Taylor, MD

Faculty provide an overview of lateral approaches, as well as address techniques and specific procedures, how to obtain fusion and prevent subsidence in LLIF, complications and avoidance, and advanced techniques for deformity and corpectomy.

3:40 Introduction and History of Lateral “How We Got Here”
Luiz Pimenta, MD, PhD

3:45 Technique and Specific Lateral Approaches, “LLIF Includes Many Procedures”
Jim A. Youssef, MD

3:55 Neuromonitoring and LLIF, “What do We Really Need”
Tyler G. Smith, MD

4:00 Complications and Avoidance in Lateral, “Posterior is not Risk Free”
Luiz Pimenta, MD, PhD

4:10 OLIF
Neel Anand, MD

4:20 Obtaining Fusion/Preventing Subsidence in LLIF, “What's New and Necessary”
Shane Burch, MD

4:30 Single Position Lateral, “What are the Options”
William R. Taylor, MD

4:40 Advanced Techniques, “Deformity and Corpectomy”
Juan S. Uribe, MD

4:50 Discussion, Questions and Answers

Surgical Innovation Lab Workshops: SUR
SI-BONE
Yellow Theater & Orange Lab (The Learning Place) 1315

DePuy Synthes, A Johnson & Johnson Company
Green Theater (The Learning Place) 1320

RIWOspine
Blue Theater (The Learning Place) 1325

Resident, Fellow and Program Directors’ Reception RE
W375cde Lobby

NASS is proud to announce the 17th Annual Resident, Fellow and Program Directors’ Reception at the 34th Annual Meeting. This reception provides an opportunity for residents, fellows and potential fellows to mingle with each other and the program directors in a casual setting while enjoying beer, wine and hors d’oeuvres with colleagues.
PARTICIPATE IN OPEN FORUM DIALOGUES
WITH KEY OPINION LEADERS
ON CRITICAL SPINE ISSUES
AND SCIENTIFIC CONTROVERSIES.

16TH EVIDENCE + TECHNOLOGY SPINE SUMMIT

February 19-22, 2020
Park City’s Canyons Village, Utah
FRIDAY, SEPTEMBER 27

6:30-8:00 a.m.
Continental Breakfast
F2 Lobby

7:00 a.m.-5:00 p.m.
Attendee Registration
F2 Lobby

7:00-8:45 a.m.
Surgical Technique Cadaver Demonstrations: Endoscopic Spine Surgery
Skyline Ballroom W375ab
Faculty: Michael Y. Wang, MD

Michael Y. Wang, MD, FACS, will cover key points on endoscopic surgery, and perform a lumbar endoscopic decompression and interbody fusion. Dr. Wang is chief of neurosurgery at the University of Miami Hospital, where he also serves as spine neurosurgery fellowship director and professor of the departments of neurosurgery and rehab medicine.

NASS would like to thank Joimax Inc. for their generous support of this technique demonstration.

7:30-8:55 a.m.
Surgical Symposium: Complications Avoidance and Management Strategies
Skyline Ballroom W375c
Moderators: Patrick C. Hsieh, MD, MS and Thomas E. Mroz, MD

7:30 Lessons Learned in Adult Deformity Surgery
Lawrence G. Lenke, MD

7:45 CSF Leaks: How to Avoid and Best Management Strategies
Daniel K. Resnick, MD, MS

8:00 Complications Avoidance and Management in Anterior Cervical Spine Surgery
K. Daniel Riew, MD

8:15 Prevention Strategies and Management for Neurological Complications in Complex Spine Surgery
Tyler R. Koski, MD

8:30 Complication Management in Lateral Transpsoas Interbody Fusion
Michael Y. Wang, MD

8:45 Discussion, Questions and Answers

Didactics
7:00 Welcome and Introduction
Allen S. Chen, MD, MPH

7:05 Basic Fluoroscopy and Lumbar Spine Anatomy
Zachary McCormick, MD

7:15 Technique and Evidence Base for Lumbar Medial Branch Blocks and Intraarticular Facet Joint Injections
Byron J. Schneider, MD

7:30 Technique and Evidence Base for Lumbar Transforaminal Epidural Steroid Injections
David R. O’Brien, Jr., MD

7:45 Technique and Evidence Base for Sacroiliac Joint Injections
Alison A. Stout, DO

8:00 Procedural Risks and Safety
Michael B. Furman, MD, MS

8:15 Break

Hands-on Skills Lab (All Faculty)
8:30 Lumbar Medical Branch Blocks
9:30 Lumbar Transforaminal Epidural Steroid Injections
10:30 Sacroiliac Joint Injections; Intra-articular Facet Injections
11:30 Open Cadaver Time; Questions and Answers
12:00 Course Adjourns

7:00 a.m.-12:00 p.m.
Ticketed Hands-on Course: Basic Fluoroscopic Guided Lumbar Spinal Injections
Gold Theater, Yellow Lab (The Learning Place)
Moderators: Allen S. Chen, MD, MPH; Zachary McCormick, MD and Byron J. Schneider, MD

In this half-day intensive course, faculty involved with the NASS Interventional Spine and Musculoskeletal Medicine (ISMM) Fellowship Program will discuss lumbar spinal injection techniques and patient selection, as well as provide hands-on cadaveric training for lumbar epidural steroid injections, lumbar medial branch blocks, and sacroiliac joint injections. Residents and fellows are highly encouraged to attend, though all providers are welcome as space allows.
7:30-9:00 a.m.

**Surgical Symposium: A Global Perspective on Spine Trauma**
Skyline Ballroom W375d
Moderators: John G. Finkenberg, MD and Jau-Ching Wu, MD

7:30  Indonesian Spine Society
The Regenerative Potential of Secretome in the Treatment of Spinal Cord Injury ASIA A chronic phase
Bambang Darwono, MD, PhD

7:40  GEER
Thoracolumbar Trauma Classification
Teresa Bas, MD, PhD

7:50  Kuwait Spine Society
Trauma in Ankylosed Spine: Special Consideration
Abdulaziz Al-Mutair, MD, FRCSC

8:00  SILACO
Surgical Treatment of Thoracolumbar Fractures
Juan Sebastian De la Torre, MD

8:10  Association of Spinal Surgeons of India (ASSI)
Management Strategies in Neglected Spinal Trauma
Dr. Neeraj Gupta

8:20  Israel Spine Society
Aggressive Treatment of Thoracolumbar Fractures in the Elderly
Gad J. Velan, MD

8:30  Taiwan Neurosurgical Spine Society
Updates in Treatment of Spinal Cord Injury: Emerging Therapeutics in Spinal Cord Injury
Henrich Cheng, MD, PhD

8:40  ArabSpine
Cortical Bone Trajectory Screw in Degenerative and Traumatic Disorders: A Systemic Review and Meta-Analysis
Mohamed Abd El-Salam Wafa, MD

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7:30-8:55 a.m.

**Medical Symposium: The Utility of Functional Analysis in Patients Afflicted With Spinal Disorders**
Room W471ab
Moderators: Ram Haddas, PhD, MSc, MEng and Isador H. Lieberman, MD, FRCSC, MBA

Functional analysis can help validate patient reported success following surgical intervention, as well provide fundamental understanding of the effects of surgical intervention on balance and mobility. In this symposium, faculty will evaluate the utility of functional analysis as an objective outcome measure in patients with spinal disorders before and after surgical intervention.

7:30  Introduction
Isador H. Lieberman, MD, FRCSC, MBA and Ram Haddas, PhD, MSc, MEng

7:38  Practice Gap: What Do the Radiographs Tell Us and What Do They Not Tell Us
Bassel G. Diebo, MD

7:50  Tools in Function Analysis
Erin M. Mannen, PhD

8:02  The Correlation of Functional Analysis Parameters and Outcome Questionnaires
Peter B. Derman, MD, MBA

8:14  The Use of Function Analysis as Part of My Clinic: How Functional Analysis Can Help Me in My Practice
Isador H. Lieberman, MD, FRCSC, MBA

8:26  How We Can Make It Part of Standard of Care
Ram Haddas, PhD, MSc, MEng

8:38  Discussion, Questions and Answers

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7:30-8:55 a.m.

**Abstract Presentations: Spinal Deformity IV**
Room W470b
Moderator: Zoher Ghogawala, MD, FACS

7:30  206. Does ACR result in greater morbidity than LLIF alone when treating adult spinal deformity?
Robert K. Eastlack, MD

7:36  207. Two and three year outcomes of minimally invasive and hybrid correction of adult spinal deformity
Robert K. Eastlack, MD

7:42  208. Predictors of superior recovery kinetics in adult cervical deformity correction: An analysis using a novel area under the curve methodology
Peter G. Passias, MD
7:48  209. Global spinal deformity from the upper cervical perspective: What is “abnormal” in the upper cervical spine?  
Peter G. Passias, MD
7:54  Discussion
8:09  210. Comparing and contrasting the clinical utility of sagittal spine alignment classification frameworks: Roussouly versus SRS-Schwab  
Peter G. Passias, MD
8:15  211. Defining a surgical invasiveness threshold for major complications following adult spinal deformity surgery  
Brian J. Neuman, MD
8:21  212. Giving patients the info they want: Practical answers to FAQs for shared decision making in ASD surgery  
Jeffrey L. Gum, MD
8:27  213. Adult spinal deformity patients with a decline in certain activities of daily living are likely to fail nonoperative treatment  
Andrew B. Harris, BS
8:33  214. Adult spinal deformity surgery does not prevent return to work among employed patients but more invasive surgery may delay the return  
Brian J. Neuman, MD
8:39  Discussion
7:30-10:00 a.m.  
Resident/Fellow Education Pathway: Transition to Practice II: Essential Skills for Starting Practice  
Room W470a  
Moderator: Andrew J. Schoenfeld, MD

Faculty will address the most daunting and critical periods in the life of a physician— from finding a job, and negotiating opportunities for success to clinical and practice-based challenges and pitfalls.

7:30  Introduction  
Andrew J. Schoenfeld, MD
7:40  Surgical Coding and Documentation  
Sandeep N. Gidvani, MD
8:00  Office Coding and Documentation  
Andrew J. Schoenfeld, MD
8:15  Interacting with Industry, Including Ethics  
Avery L. Buchholz, MD, MPH
8:30  Working with Hospital Administrators/Externals Contracts  
Sandeep N. Gidvani, MD
8:45  Networking  
Marilyn L. Gates, MD
9:00  Getting Involved with NASS and Other Organizations  
Elizabeth Yu, MD
9:15  Work Life Balance  
Khoi D. Than, MD
9:30  Discussion, Questions and Answers

8:00-10:00 a.m.  
Surgical Innovation Lab Demos:  
Terumo BCT
Autologous Biologics: The Role of Bone Marrow Concentrate in Tissue Healing  
Orange Lab (The Learning Place) 1310
Medacta  
Blue Lab (The Learning Place) 1325

8:00 a.m.-1:00 p.m.  
Exhibitor Registration  
F2 Lobby

8:45-10:30 a.m.  
Surgical Technique Cadaver Demonstrations: MIS Tubular Decompression  
Skyline Ballroom W375ab  
Faculty: John C. Liu, MD

John C. Liu, MD, a professor of clinical neurological surgery at the Keck School of Medicine and co-director of the University of Southern California Spine Center at Keck Medicine of the University of Southern California, will address Minimally Invasive Tubular Decompression and TLIF as well as demonstrate an MIS Tubular Decompression and MIS TLIF with Percutaneous Pedicle Screws.

NASS would like to thank Medtronic for their generous support of this technique demonstration.

8:55-9:00 a.m.  
NASS Working for You: Advocacy  
Skyline Ballroom W375c
In this symposium, faculty will discuss available fixation options and their alternatives, address the biomechanics of loading at the lumbosacral junction and define the optimal length and diameter for S2-AI screws.

9:00 Introduction to the Problem and the Panelists
David Polly, MD

9:03 History of Pelvic Fixation and Why it is Important
Christopher I. Shaffrey, MD

9:13 Techniques and Strategies for Screw Placement
Ronald A. Lehman, MD

9:23 Biomechanics of Pelvic Fixation
Bryan W. Cunningham, PhD

9:38 SI Joint Biomechanics and Fixation
David Polly, MD

9:43 Case Presentations
Christopher I. Shaffrey, MD

9:53 Discussion, Questions and Answers
David Polly, MD

It is critical that physicians and other frontline health care practitioners discriminate between signs and symptoms caused by spinal pathology and those caused by other conditions. In this interactive forum, faculty will discuss cases with challenges inherent in treating patients who present with conditions that masquerade as spinal disorders including where visceral organ systems and non-spinal musculoskeletal and neurological disorders mimic spinal conditions. Additionally, faculty will address utilizing clinical examination techniques as well as imaging and ancillary testing to screen for comorbid disorders. Attendees will be encouraged to share their thoughts to help lead to more effective interventions for patients.

9:00 Introduction/Welcome
Evan Johnson, DPT

9:05 Musculoskeletal Masqueraders
Evan Johnson, DPT

9:15 Neurological Masquerader
Rick Placide, MD, PT

9:25 Organ System Masquerader
Rick Placide, MD, PT

9:35 Case Presentations with Audience Responses
Rick Placide, MD, PT and Evan Johnson, DPT

9:55 Discussion, Questions and Answers
Now more than ever, policymakers negatively influence the delivery of patient care in our health system by creating barriers and obstacles. Because of this burden on the health provider, the volunteer advocate has become a critical element to NASS' public policy efforts. Faculty will prepare participants to engage with their lawmakers while sharing first-hand accounts of successful NASS advocates.

9:00 Introduction to Citizen Advocacy
9:05 Value of the Citizen Advocate’s Voice
9:10 Getting Lawmakers to Listen
9:20 Legislator Engagement: What to Expect
9:30 Storytelling: Its Science & How to Be Effective
9:40 Experts in the Field: Hearing from NASS’ Leading Advocate Voices
   John G. Finkenberg, MD and Philip L. Schneider, MD
9:55 Discussion, Questions and Answers

9:00-10:10 a.m.

Surgical Symposium:
A Global Perspective on Degenerative Lumbar Spine
Room W470b
Moderators: Edward J. Dohring, MD and Aloysius B. Darwono, MD, PhD
9:00 Japanese Society for Spine Surgery and Related Research (JSSR)
   Chemonucleolysis with Recombinant Human MMP-7
   Hirotaka Haro, MD, PhD
9:10 Korean Minimally Invasive Spinal Surgery Society
   Treatment of Spinal Stenosis in the Elderly
   Sung-Bum Kim, MD, PhD
9:20 Sudanese Spine Society
   Management of Lumbar Juxtafaect Cysts
   El Fatih Bashir El Malik, MBBS, FRCSEd, FRCS(SN), FACS
9:30 Pakistan Spine Society
   What is New in Bone Substitute
   Muhammad Tariq Sohail, MD, PhD, FRCS
9:40 Israel Spine Society
   Topic TBD
   Gad J. Velan, MD

9:50 Ukrainian Spine Society
   Paravertebral Muscles: What Does This Mean for Spinal Fusion
   Volodymyr Radchenko, MD, PhD

10:00 Taiwan Neurosurgical Spine Society
   Outcomes of Dynamic Stabilization for Lumbar Degenerative Spondylolisthesis
   Wen-Cheng Huang, MD, PhD

9:00 a.m.-1:30 p.m.

Technical Exhibition
F1 & F2 Exhibit Hall

Practice and Employer Meet & Greet
West Central Lobby

Registered practices and employers will be available at the Career Center booth for 30-minute time slots to answer questions, give advice, and promote their practice or open positions. There will be an updated schedule of presenters available daily at the booth.

10:00-10:30 a.m.

Networking Break Beverage Service
The Learning Place & Lounge

Poster Grand Rounds
The Learning Place

Gray Theater

P2. MiRNA-seq analysis of human vertebrae provides insight into the mechanism underlying GIOP
   Xiang Yu, PhD

P17. Effect of bone marrow mesenchymal stem cell combined with concentrate growth factor (CGF) on postmenopausal bone defects
   Xiang Yu, PhD

Pink Theater

P26. Are we better at preventing PJK today? A comparison of incidence 5-7 years later
   Han Jo Kim, MD

P28. Bone mineral density t-score is an independent predictor of significant blood loss in adult spinal deformity surgery
   Andrew B. Harris, BS

Purple Theater

P39. Teriparatide treatment improves bone quality in the lumbar spine out of proportion to DEXA changes
   Anthony L. Mikula, MD
P40. Teriparatide treatment improves bone quality in the vertebral body out of proportion to the pedicles and lamina of the lumbosacral spine as measured by Hounsfield units
Anthony L. Mikula, MD

White Theater

P22. Lumbar intervertebral spacer with cement augmentation of endplates and integrated screws as a fixation device in an osteoporotic model: An in vitro kinematic and load-to-failure study
Rayshad Oshtory, MD, MBA

P21. Lumbar percutaneous pedicle screw breach rates: A comparison of robotic navigation versus conventional techniques
Jaykar R. Panchmatia, MA, MD, FRCS (Tr & Orth)

P25. Analysis of cage stability and interbody pressure distribution in compression of cortical bone trajectory fixation
Sho Fujiwara, MD

10:30 a.m.-12:00 p.m.

Surgical Symposium:
Augmented Reality, Virtual Reality and Artificial Intelligence: Are We There Yet?  
Skyline Ballroom W375c
Moderator: Michael Steinmetz, MD

In this symposium, participants will learn about the difference between augmented reality (AR) and virtual reality (VR), recent advances in the AR/VR platforms, artificial intelligence (AI) platforms including Alexa and Google Home, technological limitations and future advances.

10:30 Overview of AR and VR
Michael P. Steinmetz, MD

10:35 Augmented Reality in Screw Placement
Karthik Madhavan, MD

10:55 Virtual Reality for Back Pain Patients
James Thomas, PT, PhD

11:15 Augmented Reality Assisted Robotics
Jang W. Yoon, MD, MSc

11:35 VR Enabled Simulators with Haptic Feedback Capabilities in Spine Surgery Education
Ufuk Aydinli, MD

11:55 Discussion, Questions and Answers

10:30 a.m.-12:00 p.m.

Integrated Symposium:
A Look at Medicare for All Prospects, the Legacy of the ACA and the Path Forward for American Health Care

Room W471ab
Moderator: Philip L. Schneider, MD
Political Commentator: David Axelrod

Health care remains one of the top issues voters will consider when casting their ballots in the 2020 Presidential elections. The election results will affect the ability of Democrats and Republicans to reach consensus on legislation intended to stabilize the health insurance markets, provide further access to care and improve quality while lowering costs. Faculty will address the current Medicare for All proposals and examine their relevance to spine care providers’ ability to deliver high quality care to patients.

10:35 Medicare for All Debate—Impact on Spine Specialists and Patients
Moderator: Philip L. Schneider, MD, NASS Advocacy Council Chair
Panelists: John G. Finkenberg, MD, NASS Board of Directors; David A. Wong, MD, NASS Past President

11:10 Witness to History: Leadership Lessons from a Presidential Advisor
Guest Speaker: David Axelrod, Senior Political Commentator, CNN, and Host of The Axe Files; Director, University of Chicago Institute of Politics; Senior Advisor to President Barack Obama (2009-2011)

A respected journalist, political strategist and award-winning ad maker, David Axelrod is perhaps best known as the architect of President Barack Obama’s improbable four-year march from the Illinois State Senate to the White House. As senior advisor to the President, Axelrod was a key figure in shaping and selling the administration’s agenda and legislative priorities, including passage of the Affordable Care Act. From his unique vantage point, Axelrod will share the leadership lessons he learned working in the West Wing and analyze the major issues of the day.
10:30 a.m.-12:00 p.m.

**Abstract Presentations:**

**Spinal Deformity V**  
Room W470b  
Moderator: Pranay B. Patel, MD, MS

- **10:30** 222. PI and age-optimal alignment within the fusion in ASD surgery improves outcomes and minimizes mechanical failures?  
  Themistocles S. Protopsaltis, MD

- **10:36** 223. Surgery for severe pediatric spinal deformity has a significant rate of revision: A prospective multicenter cohort study  
  Munish C. Gupta, MD

- **10:42** 224. Does Roussouly type affect revision surgery rates for proximal junctional kyphosis (PJK) and adjacent segment degeneration (ASD) after fusion for adult scoliosis?  
  Hui Bitting Ruan, MD

- **10:48** 225. Global alignment and proportion score does not predict proximal junctional kyphosis  
  Elizabeth L. Lord, MD

- **10:54** Discussion

- **11:09** 226. The high versus limited screw density group in posterior fusions for adolescent idiopathic scoliosis: Use of the Spine Tango registry to supplement the evidence from randomized control trials  
  Xie En, MD

- **11:15** 227. Does baseline substance use predict subsequent development of mental health disorders in adolescent idiopathic scoliosis patients?  
  Neil V. Shah, MD, MS

- **11:21** 228. Does interbody fusion protect against rod failure in the lower lumbar spine after long fusions to the sacrum: A comparative analysis of adult spinal deformity patients  
  Mostafa H. El Dafrawy, MD

- **11:27** 229. A call to “Own the Bone”: Osteoporosis is a predictor for two-year outcomes after adult spinal deformity surgery  
  Bassel G. Diebo, MD

- **11:33** 230. Impact of poor mental health on clinical outcomes in surgically treated adolescents idiopathic scoliosis patients  
  Majd Marrache, MD

- **11:39** 231. Adult spinal deformity patients who undergo staged surgery within three months have equivalent timeline to functional recovery as those with non-staged surgery  
  Andrew B. Harris, BS

- **11:45** Discussion

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10:30 a.m.-12:00 p.m.

**Abstract Presentations:**

**Cervical Spine Surgery V**  
Room W470a  
Moderator: John G. DeVine, MD

- **10:30** 232. Importance of sagittal alignment in cervical spondylotic myelopathy: An observational study from the Canadian Spine Outcomes and Research Network  
  Nicolas Dea, MD, MSc, FRCSC

- **10:36** 233. Does postoperative physical therapy improve patient-reported outcomes at one-year following cervical spine surgery?  
  Emily R. Oleisky

- **10:42** 234. The residual arm numbness after laminoplasty for the patients with cervical spondylotic myelopathy  
  Masayoshi Iwamae, MD

- **10:48** 235. Refining risk-adjustment for bundled payment models in cervical fusions: An analysis of Medicare beneficiaries  
  Azeem T. Malik, MBBS

- **10:54** 236. Laminoplasty versus laminectomy and fusion for multi-level cervical spondylotic myelopathy with increased signal intensity on magnetic resonance imaging  
  Jia Nan Zhang, MD

- **11:00** Discussion

- **11:15** 237. Robotic-guided placement of cervical pedicle screws: Feasibility and accuracy  
  Isador H. Lieberman, MD, FRCSC, MBA

- **11:21** 238. Same day surgical intervention dramatically minimizes complication occurrence and optimizes perioperative outcomes for central cord syndrome  
  Peter G. Passias, MD

- **11:27** 239. Prospective analysis of functional outcome of single stage surgical treatment for symptomatic tandem spinal stenosis  
  Manoj Singrakhia, MD

- **11:33** 240. Spinopelvic alignment and successful outcomes following cervical deformity correction  
  Themistocles S. Protopsaltis, MD

- **11:39** 241. Towards a cervical deformity-specific outcome instrument: Use of the patient-generated index to capture the disability of cervical deformity  
  Themistocles S. Protopsaltis, MD

- **11:45** Discussion
FRIDAY, SEPTEMBER 27

10:30 a.m.-12:00 p.m.

Interdisciplinary Spine Forum: Obesity and Diabetes: Impact on the Spine and Evidence-Based Management Strategies
Skyline Ballroom W375d
Moderator: Carrie Diulus, MD

It is imperative that spine providers understand the impact of obesity and diabetes. Faculty will discuss the impact of metabolic syndrome on spine conditions/ degeneration and treatment outcomes, dietary strategies to have a positive impact on these conditions, strategies on heart disease and lipids, as well as how to implement these recommendations.

10:30 Impact of Metabolic Syndrome on Spine Conditions and Treatment Outcomes
Carrie Diulus, MD

10:50 Dietary Strategies: What Does the Science Show?
Andrew Koutnik, PhD

11:10 What Spine Providers Need to Know About Dietary Strategies and Heart Disease
James McCarter, MD, PhD

11:30 Putting Strategies into Practice in a Clinical and Hospital Setting; Outcome Data
Mark Cucuzzella, MD

11:50 Discussion, Questions and Answers

10:45 a.m.-12:00 p.m.

Surgical Technique Cadaver Demonstrations: Minimally Invasive Lateral Interbody Fusion
Skyline Ballroom W375ab
Faculty: Juan S. Uribe, MD

Juan Uribe, MD, chief of the division of spinal disorders, Volker Sonntag chair of spine research, and vice chairman of neurosurgery at Barrow Neurological Institute, will provide an overview of Minimally Invasive Lateral Approaches for Interbody Fusion and Corpectomy and demonstrate Minimally Invasive Transpsoas Lateral Interbody Fusion technique.

NASS would like to thank NuVasive for their generous support of this technique demonstration.

11:00 a.m.-1:00 p.m.

Surgical Innovation Lab Demos: IND

SI-BONE
Orange Lab (The Learning Place) 1310

Medacta
Blue Lab (The Learning Place) 1325

11:00 a.m.-1:30 p.m.

P.U.R.E. (Ticketed Hot Lunch)
Booth 938

12:00-1:00 p.m.

Complimentary Boxed Lunch (Medical Attendees Only)
Technical Exhibition Booth 1838

SpinePAC Luncheon
W375cde Lobby

Professional Headshots
West Central Lobby

Be sure to stop by the Career Center booth in the West Lobby to get a professional headshot photo taken and emailed to you after the conference.

12:00-1:00 p.m.

Solution Showcase: Legally Mine: Lawsuit Prevention, Asset Protection, Medical License Protection & Tax Reduction
Red Theater (Booth 1538)

12:55-1:00 p.m.

NASS Working for You: Payor Policy Review Committee Update
Skyline Ballroom W375c
Cervical spine deformity in the adult patient can be severely disabling and reconstructive surgery is associated with high complication rates. Faculty will discuss research findings from the International Spine Study Group designed to help surgeons and medical providers identify radiographic parameters in the cervical spine most associated with pain and disability, utilize surgical techniques to safely correct cervical deformities, and avoid common complications associated with cervical deformity surgery.

1:00 Introduction
Shay Bess, MD

1:03 The Impact of Standing Regional Cervical Sagittal Alignment on Outcomes and Critical Measures for Cervical Deformity
Virginie Lafage, PhD

1:16 The Role of Spinal Osteotomies for Cervical Deformity
Christopher P. Ames, MD

1:29 Treatment of Rigid versus Flexible Cervical Deformity
Robert K. Eastlack, MD

1:42 Questions and Answers
Faculty

1:47 Early and Late Complications Associated with Adult Cervical Deformity Surgery
Han Jo Kim, MD

2:00 Can We Define and Avoid Clinically Relevant DJK in Cervical Deformity Surgery?
Themistocles S. Protopsaltis, MD

2:13 Anticipated Surgical Outcomes for Adult Cervical Deformity: How Does It Compare to Traditional Adult Spinal Deformity?
Peter G. Passias, MD

2:26 Conclusions
Shay Bess, MD

1:00-2:30 p.m.

Abstract Presentations: Trauma and Biomechanics II
Room W471ab
Moderator: Norman B. Chutkan, MD, FACS

1:00 242. Degenerate-disc Infection Study with Contaminant Control (DISC): Application of a proposed histological scoring system
Ralph J. Mobbs, MD, FRACS

1:06 243. The effect of sacroiliac fusion and pelvic fixation on rod strain in thoracolumbar fusion constructs: A biomechanical investigation
Charles A. Sansur, MD

1:12 244. Mismatch between rod bending and actual postoperative lordosis in short lumbar arthrodesis with poly axial screws
Abdollah Y. Moufid, MD

1:18 245. Comprehensive biomechanical profile of anterior column realignment for minimally invasive deformity correction
Jakub Godzik, MD

1:24 Discussion

1:39 246. Comparison of biomechanical stability and rod strain between anterior column alignment and pedicle subtraction osteotomy
Jakub Godzik, MD

1:45 247. Predicting mortality following traumatic cervical spinal cord injury in the elderly
Daniel Banaszek, MD, FRCSC

1:51 248. Early versus late spine surgery in severely injured patients: Which is the appropriate timing for surgery?
Ricardo Rodrigues-Pinto, MD, PhD

1:57 249. Traumatic subaxial cervical facet joint dislocation: Predictors of spinal cord injury and surgical failure
Ricardo Rodrigues-Pinto, MD, PhD

2:03 250. Interspinous process distraction compared to nonoperative care for moderate lumbar degenerative disc disease: Results of the FDA IDE clinical trial
Matthew F. Gornet, MD

2:09 251. Additive manufactured Ti-6Al-4V/polyetheretherketone composite porous cage for interbody fusion: Bone growth and biocompatibility evaluation in a porcine model
Meng Huang Wu, MD

2:15 Discussion
1:00-2:30 p.m.

Abstract Presentations: Spinal Deformity VI
Room W470b
Moderator: John C. Liu, MD, USC

1:00  252. Incidence of PJK with pedicle screws at upper instrumented vertebrae in posterior spinal fusion for adolescent idiopathic scoliosis
    Yoji Ogura, MD

1:06  253. Factors associated with chronic opioid use in preoperative opioid nonusers following adult spinal deformity surgery
    Andrew B. Harris, BS

1:12  254. 3D spinal alignment, thoracic volume and pulmonary function in surgical correction of AIS: A five-year follow up study
    Aaron J. Buckland, MBBS, FRACS

1:18  255. Preoperative opioid dosage and duration are associated with increased long-term opioid use after adult spinal deformity surgery
    Mark Ren, BS

1:24  Discussion

1:39  256. What is actually happening inside the “cone of economy”?: An innovative method to quantify the “cone of economy”
    Ram Haddas, PhD, MSc, MEng

1:45  257. A simpler, modified frailty index weighted by complication occurrence correlates to pain and disability for adult spinal deformity patients
    Peter G. Passias, MD

1:51  258. The pelvic tilt response to ASD correction depends on PI, age, and alignment
    Themistocles S. Protopsaltis, MD

1:57  259. Under-contoured proximal rod: A potential risk factor of PJK in Scheuermann's kyphosis
    Michael Grelat, MD

2:03  260. How much correction is possible? Minimally invasive multilevel lateral lumbar interbody fusion combined with posterior column osteotomy using stiff rod (6.35 mm cobalt chrome) in adult spinal deformity surgery as compared with pedicle subtraction osteotomy
    Sang Kyu Im, MD

2:09  261. Appropriateness of decompression without fusion in patients with degenerative scoliosis: Findings from the RAND/UCLA appropriate use criteria study
    Michael D. Daubs, MD

2:15  Discussion

1:00-2:30 p.m.

Interdisciplinary Spine Forum: Point-Counterpoint: Is it Necessary or Possible to Make a Specific Diagnosis?
Skyline Ballroom W375d
Moderator: Robb Russell, DC

Is a tissue-specific diagnosis possible or even necessary to manage low back pain or is it a non-specific condition? What role do provocative tests play in making a diagnosis and how does this affect the choice of evidence-based treatment recommendations? Attend this one-hour, point-counterpoint presentation and participate in the discussion.

1:00  Introduction and Polling Question
    Robb Russell, DC

1:05  First Presenter
    Martin Underwood, MD

1:25  Moderator/Audience Questions

1:30  Second Presenter
    Mike Schneider, DC, PhD

1:45  Moderator/Audience Questions

1:50  Rebuttals
    Questions from Presenters and/or Audience
    Mike Schneider, DC, PhD and Martin Underwood, MD

1:00-2:45 p.m.

Surgical Technique Cadaver Demonstrations: Cervicothoracic Osteotomy for Cervical Kyphosis
Skyline Ballroom W375ab
Faculty: K. Daniel Riew, MD

K. Daniel Riew, MD will address Cervical Deformity and Correction Techniques and demonstrate a Cervicothoracic Osteotomy for Correction of Cervical Kyphosis. Dr. Riew is professor of orthopedic surgery at Columbia University Medical Center's College of Physicians and Surgeons in New York City, co-chief, Spine Division, director of Cervical Spine Surgery and co-director of the Columbia Spine Fellowship.

NASS would like to thank DePuy Synthes for their generous support of this technique demonstration

Room W470a
Chair: Matthew Smuck, MD

This inaugural symposium features leadership from both North American Spine Society and Spine Intervention Society. The unique panel of speakers represents thought leaders, influencers, and leading researchers in the field of interventional spine care.

1:00 Welcome and Introduction
Allen S. Chen, MD, MPH and Matthew Smuck, MD

1:05 Outcomes: Why it Matters What We Measure
Matthew Smuck, MD

1:20 A Dual Selective Analgesic Strategy: Molecular and Anatomic Specificity
Timothy P. Maus, MD

1:35 The Long-Term Safety Profile of Provocation Discography: An Evidence-based Update and Practice Implications
Zachary McCormick, MD

1:50 Our Practice Patterns: What We Are Doing and Why
Byron J. Schneider, MD

2:05 Minimally Invasive Treatment of Lumbar Spinal Stenosis
Aaron Calodney, MD

2:20 Discussion, Questions and Answers

2:35 Break

2:55 Update on New Non-Vertebral Radiofrequency Techniques: Sacroiliac Joint and Genicular Radiofrequency
Alison A. Stout, DO

Scott Kreiner, MD

3:25 Is it Discogenic or Endplate Pain? Treatment Options Past and Present
David R. O’Brien Jr., MD

3:40 The Answer to Most Clinical Questions
Michael B. Furman, MD, MS

3:55 Discussion, Questions and Answers

2:30-2:55 p.m.
Networking Break Beverage Service
Level 4 Foyer

3:00-4:00 p.m.
Surgical Symposium: Management Models for Complex Spine Surgery
Skyline Ballroom W375c
Moderator: Sigurd H. Berven, MD

With an increasingly older and sicker population, more extensive spine surgery has become a reality. These extensive surgeries remain a major challenge for hospital systems as care for such patients is very resource intensive and prone to complications. In this symposium, faculty will explore the economics of major spine surgery in a changing health economics system and compare different management models and their impact potential on patient outcomes.

3:00 Introduction and Description of Challenges in the Management of Complex Spine
Jens R. Chapman, MD

3:05 Complex Spine Surgery: Defining the Expected and Observed Complications
John Street, MD, PhD

3:14 Economics of Complex Spine Surgery: Physician, Hospital and Payor Perspectives
Sigurd H. Berven, MD

3:23 Payment Reform in Complex Spine Surgery
Jens R. Chapman, MD

Isador Lieberman

3:41 Surgeon-Driven Complex Spine Care: The New York Model

3:50 Discussion: Creating an Optimal Care System for Complex Spine Surgery: What Does It Take?
All Faculty
3:00-4:00 p.m.

Abstract Presentations:  
**Cervical Spine Surgery VI**  
Room W471ab  
Moderator: Joshua E. Heller, MD

3:00  262. Do large increases in disc space height have consequences after ACDF?  
Bryce Basques, MD, MHS

3:06  263. Insulin dependence and 30-day outcomes following posterior cervical fusions: An analysis of the ACS-NSQIP database  
Azeem T. Malik, MBBS

3:12  264. Economic impact of revision operations for adjacent segment disease of the cervical spine  
Alexander A. Theologis, MD

3:18  265. Novel C1-2 loop-suture technique for securing interlaminar bone graft during atlanto-axial arthrodesis: Surgical technique and outcomes  
Robert Koffie, MD, PhD

3:24  2019 Resident and Fellow Research Award Winner  
266. Angiotensin-II type-1 receptor blockers (ARBs) and angiotensin-converting enzyme inhibitors (ACEIs) display opposite fusion rates in cervical spine  
Alexander Perdomo-Pantoja, MD

3:30  267. One stage atlantoaxial pedicle screw fixation for unstable atlas burst fracture  
Wei-yu Jiang, MD

3:36  268. Neuroanatomical categorization of motor evoked potential (MEP) alerts during cervical spine surgery and associated risk for new neurologic deficit (NND): Retrospective analysis of 40,919 procedures  
Bryan Wilent, PhD, DABNM

3:42  Discussion

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3:00-4:00 p.m.

Interdisciplinary Spine Forum:  
**Friend or Foe? Rethinking Advanced Imaging for the 21st Century**  
Skyline Ballroom W375d  
Moderator: R. Christopher Reudink, PA-C, Cert MDT

Diagnostic Imaging is a potent, yet often misunderstood tool in the evaluation and management of spine patients and its utilization does not ensure improved outcomes for patients. Faculty will seek to clarify these concerns through a review of emerging evidence in the field during this interactive symposium.

3:00  Introduction: Diagnostic Imaging for the Patient with Spine Related Disorders as it Relates to the NASS Mission  
R. Christopher Reudink, PA-C, Cert MDT

3:05  Waste and Potential Harm of Inappropriate Imaging: An Insurers Perspective  
Brian Justice, DC

3:20  Strategies for Advanced Imaging of the Complex Post-Surgical Patient: Common and Atypical Presentations  
Mark Mikhail, MD

3:35  Limitations of and Overreliance upon Diagnostic Imaging  
Rick Placide, MD, PT

3:50  Review of Case Examples for Panel/Audience Discussion; Closing  
Panel
3:00-5:05 p.m.

**Surgical Technique Cadaver Demonstrations:**
**Spinal Deformity Correction**
Skyline Ballroom W375ab
Faculty: Lawrence G. Lenke, MD

Lawrence G. Lenke, MD, will discuss Osteotomies for Spinal Deformity Correction and perform a Complex Osteotomy for Spinal Deformity Correction. Dr. Lenke is professor of orthopedic surgery, chief, division of spinal surgery, director, spinal deformity surgery, co-director, Adult and Pediatric Comprehensive Spine Surgery Fellowship, Columbia University, Dept. of Orthopedic Surgery, surgeon-in-chief at The Daniel and Jane Och Spine Hospital at New York-Presbyterian/Allen.

NASS would like to thank Medtronic for their generous support of this technique demonstration.

4:05-5:05 p.m.

**Surgical Symposium:**
**Cervical Surgery: Proximal Junctional Kyphosis Following Long TL Fusions**
Skyline Ballroom W375c
Moderator: K. Daniel Riew, MD

In this symposium, faculty will address the causes of proximal junctional kyphosis (PJK) at the cervicothoracic junction, predictive and avoidance strategies and surgical treatments.

4:05  Introduction
K. Daniel Riew, MD

4:10  Etiology of the Problem
Christopher P. Ames, MD

4:21  Questions and Answers
Faculty

4:25  How to Avoid
Christopher I. Shaffrey, MD

4:36  Questions and Answers
Faculty

4:40  Case Discussions
K. Daniel Riew, MD, Christopher P. Ames, MD, Christopher I. Shaffrey, MD

5:00  Discussion, Questions and Answers

4:05-5:05 p.m.

**Abstract Presentations:**
**Cervical Spine Surgery VII**
Room W471ab
Moderator: Shay Bess, MD

4:05  275. The effect of the distal level or proximal level on post-laminoplasty loss of cervical vertebra lordosis
Jinsong Zhou, MD

4:11  276. Factors associated with cost of 30-day and 90-day readmissions following anterior cervical discectomy and fusion: Insights from the Nationwide Readmissions Database
Anshit Goyal, MD

4:17  277. What are the major drivers of outcomes in cervical deformity surgery?
Peter G. Passias, MD

4:23  278. The impact of older age on functional recovery after surgical decompression for degenerative cervical myelopathy: Results from an international, multicentre, prospective dataset in 757 patients
Jamie R. Wilson, MbChB, FRCS

4:29  279. Cervical corpectomy versus 2-level discectomy: A comparative study of 100 patients
Ricardo Rodrigues-Pinto, MD, PhD

4:35  280. Two attending surgeons improve outcomes of anterior cervical discectomy and fusion
Stuart Changoor, MD

4:41  281. C5 palsy and neurological complications after cervical spine surgery
Dominic J. Carusillo

4:47  Discussion
Abstract Presentations: Complication Avoidance
Room W470b
Moderator: Michael Y. Wang, MD

4:05 282. Vertebral Hounsfield unit is a better predictor of pedicle screw loosening than the t-score of DXA in patients with lumbar degenerative diseases
Da Zou, MD

4:11 2019 Resident and Fellow Research Award Winner
283. The efficacy and cost-effectiveness of photodynamic therapy in prevention of surgical site infection
Daniel Banaszek, MD, FRCSC

4:17 284. The cost effectiveness of an ICU outreach program on adverse events after spine surgery
Daniel Banaszek, MD, FRCSC

4:23 285. The impact of postoperative neurologic complications on recovery kinetics in cervical deformity surgery
Peter G. Passias, MD

4:29 286. Early adoption of enhanced recovery after surgery protocol following ASD surgery is not associated with decreased in-hospital opioid use
Ehsan Jazini, MD

4:35 287. T1 tilt and clavicle angle are the best predictors of postoperative shoulder balance in AIS patients: A review of 347 cases
Vishal Sarwahi, MD

4:41 288. Bone mineral density mapping of iliosacral region: The use of Hounsfield units to optimize trans-sacral screw trajectory
Donald R. Fredericks Jr., MD

4:47 Discussion

Interdisciplinary Spine Forum: Value Models in Spine Care
Skyline Ballroom W375d
Moderator: Robert Turner, DPT, OCS

This is a follow up to last year’s presentation on Value Models in Spine Care. Faculty will discuss national value models including the value model used at the Mayo Clinic as well as provide updated data regarding utilization of the Direct Access Spine Care Pathway at Hospital for Special Surgery. Participants are encouraged to ask questions regarding the economics of their spine value models.

4:05 Introduction of Panel and Topic
Robert Turner, DPT, OCS

4:10 Value Models in Spine Care
Catherine MacLean, MD, PhD

4:25 The Mayo Spine Model
Michael Halasy, DHSc, PA-C, MS

4:40 Direct Access by a Physical Therapist
Robert Turner, DPT, OCS

4:55 Discussion, Questions and Answers
Orthopedic spine specialists and neurosurgeons are the designated medical specialists to evaluate, treat and protect athletes participating in contact sports. Despite the association of behavior, mood and cognitive symptoms, it is still unclear how factors such as first exposure to football, duration of play, player position, cumulative hit and linear/rotational acceleration of hits modify the risk of developing CTE. Faculty will review the background of concussions and CTE as well as sports-related cervical spine injuries, discuss current monitoring of head trauma and concussion protocol, and provide an update about the NFL position on Amateur and Professional Player Protection.
**Abstract Presentations: Cervical Spine Surgery VIII**  
Room W470a  
Moderator: Paul Park, MD

9:00  296. Upper thoracic versus mid-thoracic lower instrumented endpoints have similar radiographic and clinical outcomes in cervical deformity patients  
Han Jo Kim, MD

9:06  297. Preoperative extension lateral cervical radiographs are associated with osteotomy type, approach and postoperative cervical alignment following cervical deformity surgery  
Eric O. Klineberg, MD

9:12  298. Predicting the magnitude of DJK following cervical deformity correction  
Ethan W. Ayres, MPH

9:18  299. Does increasing body mass index (BMI) correlate with adverse outcomes following posterior cervical fusions? An analysis of the NSQIP database  
Azeem T. Malik, MBBS

9:24  300. Continued inpatient care following elective anterior cervical discectomy and fusion (ACDF) increases the risk of 30-day readmissions and post-discharge complications  
Azeem T. Malik, MBBS

9:30  301. The cost-effectiveness of antibiotic infection prophylaxis in same-day anterior cervical discectomy and fusion  
Gregory J. Kirchner, MPH

9:36  **2016 Research Grant**  
The severity of preoperative A1c and predicting postoperative complications in spine surgery  
Tomoko Tanaka, MD, FAANS

9:42  Discussion

**10:00-10:30 a.m.**  
**Networking Break Beverage Service**  
Level 4 Foyer

**10:30 a.m.-12:00 p.m.**  
**Surgical Symposium: Emerging Technologies in Spine Surgery: Essentials of Navigation and Robotics**  
Room W471ab  
Moderators: Doniel Drazin, MD, MA and J. Patrick Johnson, MD

As spine surgery and associated technology continues to rapidly advance, there remains a tremendous need for continued education of current and future spine surgeons. Faculty will explore the new advances in the field of emerging technologies in spine surgery and provide participants with the current state of the art in the use of technology for treating spinal pathology. Topics include intraoperative imaging, navigation, robotics, and combinatorial strategies using advanced technologies.

10:30  **Welcome, Introductions, Course Overview**  
Doniel Drazin, MD, MA and J. Patrick Johnson, MD

10:30  **Learning Curves and System Integration in Spinal Navigation**  
Terrence T. Kim, MD

10:45  **MIS Incorporating Navigation: Key Concepts**  
Neil R. Malhotra, MD

11:00  **Navigation in Spinal Deformity: Pearls and Pitfalls**  
David W. Polly, Jr., MD

11:15  **Robotics in Spine Surgery: Past and the Present**  
Nicholas Theodore, MD

11:30  **How to Incorporate Robotics into Your Operating Room**  
Isador H. Lieberman, MD

11:45  **Where is the Future of Spine Surgery Headed?**  
Michael Y. Wang, MD
Abstract Presentations: Perioperative Care
Room W470b
Moderator: Hitesh P. Mehta, MD, PhD

10:30 302. The efficacy of ketamine for improvement of postoperative pain control in adolescent patients undergoing spinal fusion surgery for idiopathic scoliosis
Noah M. Walters, BS

10:36 303. Intravenous ketorolac substantially reduces opioid use following lumbar spinal fusion: Early results of a randomized, double-blinded, placebo controlled trial
Sravisht Iyer, MD

10:42 304. Disturbed sleep is associated with worse health outcomes after spine surgery
Majd Marrache, MD

10:48 305. Differences between postoperative narcotic prescriptions in outpatient lumbar spine surgery between the United States and France
Houssam Bouloussa, MD, MS

10:54 Discussion

11:09 306. Opioid-limiting legislation effectively decreases 30-day opioid utilization following anterior cervical decompression and fusion
Daniel Reid, MD, MPH

11:15 307. Zero PCA is an achievable target for postoperative rapid recovery management of AIS patients
Vishal Sarwahi, MD

11:21 308. Surgical site infection after lumbar fusion surgery: Risk factors and the preventive new technology
Xie En, MD

11:27 309. Patient reported allergies: A marker of preoperative pain and disability in elective spine surgery
Keith W. Lyons, MD

11:33 310. Compared to patients’ preoperative expectations, surgeons’ preoperative expectations more often correspond to patient-reported fulfillment of expectations two years after lumbar surgery
Carol A. Mancuso, MD

11:39 311. Assessment of the effect of implementation of enhanced recovery after surgery program in spinal surgical procedures: A retrospective study
Ehsan Saadat, MD

11:45 Discussion

Abstract Presentations: Spinal Deformity VII
Room W470a
Moderator: Christopher I. Shaffrey, MD

10:30 312. Residual lumbar hyperlordosis is associated with worsened hip status five years after CP scoliosis correction
Aaron J. Buckland, MBBS, FRACS

10:36 313. Risk factors for increased length of stay, reoperation, and readmission following adult spinal deformity surgery in the elderly
Alexander A. Theologis, MD

10:42 314. Distraction-based growth rods fixation versus active apex correction: What do the correction parameters say?
Aakash Agarwal, PhD

10:48 315. Sequential correction with satellite rods in severe rigid thoracic scoliosis
Saihu Mao, PhD

10:54 316. Is there a correlation between cobb angle and pulmonary function tests in severe scoliosis patients with respiratory impairment and treated by posterior vertebral column resection?
Jing-Ming Xie, MD

11:00 Discussion

11:12 317. Postoperative new shoulder imbalance in severe thoracic scoliosis treated with PVCR: Risk factor analysis and countermeasure
Jing-Ming Xie, MD

11:18 318. Severe pediatric deformity surgery had frequent IOM alerts but a low rate of permanent deficits at two years
Munish C. Gupta, MD

11:24 319. Minimally invasive surgery for neuromuscular scoliosis: A case control study of 140 consecutive patients
Vishal Sarwahi, MD

11:30 320. Effect of supine alignment on postoperative sagittal alignment following ASD surgery
Jonathan Elysee

11:36 321. Evaluation of global alignment and proportion score in an independent adult spinal deformity database
Munish C. Gupta, MD

11:42 322. Equilibrating SRS sagittal deformity grades with the PROMIS physical health domain in adult spinal deformity
Peter G. Passias, MD

11:48 Discussion

Meeting Adjourns
WITH SINCERE APPRECIATION

The North American Spine Society thanks the following companies for their support of the NASS 34th Annual Meeting.

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The exhibition is open from 9:00 a.m. – 5:00 p.m. on Wednesday and Thursday and 9:00 a.m. – 1:30 p.m. on Friday.

For a detailed view of the products and services that are offered by each company, search on the NASS mobile app. Search for NASS Spine in the Apple App Store or Google Play to download the app.

The exhibit listing is as August 29, 2019. Please check the NASS mobile app for a complete list including companies added after this date.
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Aegis Spine, Inc. was founded to bring about change and innovation. We strive to be the leading manufacturer in the medical devices market by prioritizing excellent service and support to our clients, who are regarded as family. Aegis Spine is always in pursuit of innovative ideas and new technologies in the ever-changing industry.

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Astura Medical was formed in 2014 with the objective of creating a disciplined, multi-phased approach to developing, manufacturing, and distributing medical devices. With surgeon input and feedback at every stage of development, Astura has created an extensive line of devices of the highest quality and sleekest design. Astura has established itself as one of the fastest growing companies in spine today, with annual revenue growth of 312% in 2017 and 104% in 2018.

Atlas Spine creates, manufactures, and markets minimally invasive implant and instrument systems for the treatment of various pathologies of the spine. Our mission is to develop and market the most innovative, cost-effective, and clinically efficacious spinal implant systems available. By working intimately with some of today's top spine surgeons Atlas is building its reputation as an innovator in the spine implant industry and forging the future of spine care.

Augmedics develops xvision™ – an Augmented-Reality Headset display for spine surgery. xvision allows surgeons to see the patient’s anatomy through skin and tissue, as if they had “X-Ray Vision”. Based on Augmedics’ patented technology, the xvision system can project the patient’s anatomy, in real time, directly onto the surgeon’s retina, with surgical precision and outstanding depth perception.

Aurora Spine offers a rich and diverse product portfolio for both the “Screwless Procedure” and the more traditional spinal procedures. These products include ISP devices, titanium coated interbody cages, biologics, plates, pedicle screw systems, cervical stand-alone implant, and surgical instruments.

Autocam Medical is a contract manufacturer of precision-machined implants and instruments for surgical applications. We offer a value-added approach to high-precision manufacturing with specialties in CNC milling, turning and cutter grinding. Our product specialties include bone screws & plates, fixation devices, surgical drivers, drill bits, and other cutting instruments. As a uniquely collaborative partner, our OEM customers rely on us as a valuable part of their supply chain.
Avalign Technologies designs, manufactures, and delivers the highest quality, precision-machined instruments, implants, and delivery systems for a wide variety of surgical and medical specialties around the world. From proprietary implant coatings to German-made instruments, Avalign is a leading full-service manufacturer known for consistent and sophisticated production and supply chain management. This year, Avalign is excited to announce its newest acquisition, Integrated Medical Solutions!

Axial Medical is a Contract Manufacturer that solves the three major purchasing dilemmas: Price, Delivery and Quality. Our 40,000-square foot headquarters is located just outside of Philadelphia, Pennsylvania. The facility was designed and custom built in 2014 around the needs of the medical device industry. With over over 40, 5-axis CNC machines and state-of-the-art metrology equipment, we’re able to handle all your manufacturing needs.

Axis Spine Technologies is focused on elegant simplicity. NASS will be our first event and we are excited to present our first implant platform. We believe it offers; unmatched intra-operative solutions, advanced grafting options and a design philosophy that maximises correction capabilities and minimises post-op subsidence. Please come and experience our VR platform to better understand what this technology could bring to you. Thank you for your time and we hope to see you in Chicago!

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 Lead-free Eyewear, X-Ray 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 #2316 or at our web site www.barriertechnologies.com

Axial Spine Technologies designs, manufactures, and delivers the highest quality, precision-machined instruments, implants, and delivery systems for a wide variety of surgical and medical specialties around the world. From proprietary implant coatings to German-made instruments, Avalign is a leading full-service manufacturer known for consistent and sophisticated production and supply chain management. This year, Avalign is excited to announce its newest acquisition, Integrated Medical Solutions!

Baxter Healthcare develops & markets spinal solutions that combine expandable implants with novel delivery systems. Luna® XD is an in-situ, multi-expandable interbody implant with posterior delivery, ALIF-sized footprint, lordosis & bone grafting after expansion. Orbit™ is a minimally-invasive discectomy system with mechanized, articulating and rotating instruments enabling rapid, high-volume removal of diseased disc tissue and endplate preparation. Stop by booth #2516 for more information.

Berkeley Advanced Biomaterials specializes in the research, development, and manufacturing of high-quality, cost-effective skeletal repair resorbable biomaterials. The company offers a complete range of bone graft solutions including synthetic HAP/TCP/Collagen Strips, Putty, and Granules as well as allograftsolutions including Advanced Mineralized Graft (AMG), DBM Putty, Cancellous Sponge, Structural Allografts, and Cancellous Chips.
Since 1916, Biedermann has been working with world-class surgeons to solve clinical challenges through the development of next-generation technology. As the inventors of the first ever polyaxial pedicle screw, Biedermann Motech has changed the way spinal surgery has been treated for the last 30 years. Today, the company has over 100 employees in the US and in Europe focused on innovation, research and development, manufacturing, and sales in the spine industry.

Biedermann Motech
www.biedermann.com

Bioventus LLC
www.BioventusSurgical.com
At Bioventus Surgical, we are driven to advance the science and surgical performance of orthobiologics with a comprehensive portfolio of clinically efficacious and cost-effective solutions. Our comprehensive portfolio of surgical orthobiologics offers a wide variety of bone graft solutions to meet the needs of any surgeon across a broad range of patient needs, procedures, and hardware selection.

Bone Bank Allografts
www.bonebank.com
Bone Bank Allografts is the distributor of the SteriGraft® line of high quality bone and soft tissue allografts to medical professionals. The company has been in existence for over 20 years and has helped doctors and their patients with over 1 million successful transplantations.

Biocomposites, Ltd.
www.biocomposites.com
At Biocomposites, we are distinct in that our team of specialists is singularly focused on the development of innovative calcium compounds for surgical use. Our innovative products are at the forefront of calcium technology and range from bone grafts to matrices that can be used in the presence of infection. We are proud to be driving improved outcomes across a wide range of clinical applications, in musculoskeletal infection, trauma, spine and sports injuries, for surgeons and patients alike.

Biogennix
www.biogennix.com
Biogennix™ is a fully-integrated osteobiologic company headquartered in Irvine which develops, manufactures, and distributes proprietary bone graft substitutes used in bone fusion procedures. Learn more at biogennix.com.

Biologica Technologies
www.biologicatechnologies.com
Biologica Technologies is a company fully dedicated to improving patients’ lives and the health care providers’ experience through innovative biologic solutions. Our core, proprietary technology, ProteiOS® growth factor, possesses the largest amount of non-recombinant osteoinductive, angiogenic and mitogenic growth factors on the market today.

BPB MEDICA
www.biopsybell.it
BPB MEDICA is an over 50-years-experience Italian manufacturing Company. We manufacture: PERCUTANEOUS DISCECTOMY DEVICE, KYPHOPLASTY KIT, VERTEBROPLASTY KIT, MESENCHIMAL CELLS KIT FROM BONE MARROW OR ADIPOSE TISSUE – AVOIDING CENTRIFUGE. Our services are: FINISHED PRODUCTS, PRIVATE LABELING, O.E.M., CUSTOMIZED PRODUCTS. Our Certifications include: CE and FDA

Brainlab
www.brainlab.com
Brainlab develops, manufactures and markets software-driven medical technology with the aim of optimizing patient treatments. Core products revolve around less-invasive image guided surgery technology, more accurate and effective radiation therapy, and integration through planning and collaboration systems that brings patient data and physicians together. www.brainlab.com
BRAMISS - Brazilian Minimally Invasive Spine Surgery Society  
www.abcmic.com

BRAMISS is an independent Society that has 350 members, manages a Fellowship Program with NASS and works with other medical entities in order to facilitate and standardize the MIS procedures along the private and public health care systems and also divulges MIS possibilities of treatment for patients through regular media. BRAMISS organizes two main events: COMINCO and SIMINCO. We are also focused on continuing education, graduate education, specialization courses and hands on courses.

Brazilian Spine Society  
www.coluna.com.br

The Brazilian Spine Society is formed by Neurosurgeons and Orthopedists and conducts educational courses. BSS is represents about 1,100 Brazilians spine surgeons (orthopedists and neurosurgeons). Founded in 1994, it operates in the areas of continuing education and medical update. It has 23 accredited training services for spine surgeons in Brazil and a scientific journal called Coluna / Column with three international bibliographic indexations. The Brazilian Congress of Column is held every 2 years. The current president is Dr. Aluízio Augusto Arantes Jr.

BREMER GROUP COMPANY (THE)  
www.bremergroup.com

For 25+ years, you have relied on our clinically proven VertAlign® Spinal Support System for effective TLSO & LSO external spinal stabilization, from “immobilization through support” on your patients. Whether for post-surgical or trauma stabilization or, now more than ever, pain relief/conservative care, the unique, patented VertAlign system allows for a “select and apply,” molded, rigid, gender-specific orthoses at the point of patient care, resulting in timely, effective spinal care.

Buxton BioMedical inc.  
www.buxtonbio.com

No Quantum Leaps in High Technology On turbulent seas of hi-tech companies Their ominous messages Of latest “truths”, or dire consequences For the wary and weary, prepare your defenses! 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 & simple solutions to the plethora of problems still plaguing product performance in everyday surgeries

C&A Tool  
www.catool.com

Contract Manufacturer of Spinal Implants and Instruments. Be sure to ask about our Laser Sintering capabilities for Rapid Prototyping.

Camber Spine  
www.cambermedtech.com

Dedicated to creating surgeon-designed, minimally invasive solutions for the treatment of complex spinal pathology. With innovative designs, state of the art manufacturing, and an acute sensitivity to patient anatomy - Camber Spine is making quantum leaps in spinal fusion. Focused on the mechanical fusion properties of 3D-printed implants and the importance of roughened surface technology, Camber is launching implant designs which provide immediate stability and promote mechanical fusion.

Capstone Surgical Technologies  
capsurgtech.com

Captiva Spine, Inc.  
www.captivaspine.com

Captiva Spine supports spine surgeons, tenured distributors, and healthcare facilities in providing patients progressive spinal care with an obsessive focus on quality. We strive to create and maintain sincere, honest, collaborative relationships. Valuing relationships, above all else, fosters the mutual trust and openness needed for Captiva Spine to be a conduit of high quality, smart, elegant, and intuitive patient solutions. Captiva Spine – Strength Through Connections.

CarboFix Orthopedics, LLC  
www.carbo-fix.com

CarboFix Orthopedics Ltd. specializes in orthopedic implants made of, non-metal, continuous carbon fibers reinforced polymer (CFR-PEEK). In addition to trauma nails & plates, the company has developed the CarboClear™ Pedicle Screws & Rods made out of Carbon Fibers. The system advantages include minimal artifacts in CT & MRI, advantageous in radiation therapy (including proton therapy), superior fatigue strength & optimal modulus of elasticity.

Care Surgical  
www.care-surgical.com

Care Surgical offers a full range of prone positioning cushions to provide comfort and support to patients during surgical procedures. We offer a variety of prone arms, legs, hips, thighs, chest and face cushions, including the CS Prone Face Cushion with reusable helmet and mirror. Our full range of high quality spine table supports pad covers & cushions and kits were developed with OR staff, focusing on patient safety, comfort and high quality, while being mindful of lowering overall cost.
CellRight Technologies is the leader in the development and manufacture of verified osteoinductive regenerative orthopedic matrices. The matrices provide a delivery vehicle for current and future cellular therapies such as PDGF, BMA, PRP, antimicrobial agents and other growth factors. CellRight Technologies is the manufacturer of MatrixCelllect 100 DBM Putty, FlexIT, Matrix OI sponge-like collagen scaffold, ConCelltrate 100 and Matrix IQ decellularized human dermis intended for homologous use.

CellRight Technologies

www.cellregenixus.com

CellRight Technologies

www.cellregenixus.com

CENTINEL SPINE.

At Booth #2424, Centinel Spine will highlight its latest anterior column reconstruction technologies and its recently announced partnership with one of the most winning professional athletes of all time, Tiger Woods. Centinel Spine is the largest privately-held spine company focused on anterior column reconstruction. The company provides the most robust and clinically-proven Total Disc Replacement and Integrated Interbody portfolios in the world, backed by over 30 years of clinical success.

Centinel Spine

www.centinelspine.com

ChoiceSpine is a privately held spine company located in Knoxville, TN, that offers a breadth of innovative and surgeon focused systems that are designed to be safe, efficient, and easy-to-use. By working closely with physicians and maintaining service-focused distribution, we will continue to bring technically-superior spinal products to the market.

ChoiceSpine

www.choicespine.com

Cerapedics is an advanced orthobiologics company with the only biologic bone graft in spinal applications that incorporates a small peptide (P-15) as an attachment factor. i-FACTOR® Peptide Enhanced Bone Graft (P-15/ABM) is only the second FDA PMA approved bone graft on the market, and it’s novel mechanism of action (Attract, Attach, Activate) has shown to be statistical superiority to local autograft through an IDE trial on single-level ACDFs in overall clinical success at one year.

Cerapedics, Inc.

www.cerapedics.com

Cerapedics, Inc.

www.cerapedics.com

Clariance is a spinal device company focused on designing, manufacturing and marketing innovative solutions for the treatment of spinal disorders, based in France with US headquarters in Chicago. Driven by surgeon’s expertise, Clariance provides advanced surgical applications with a fundamental priority in advancing patient outcomes.

Clariance

www.clariance-spine.com

CMF Medicon Surgical Inc.

www.cmfmedicon.com

Collegen Matrix

www.CollagenMatrix.com

At Collagen Matrix we are passionate about advancing the science of tissue repair and regeneration. We are the driving force in the design, development and manufacturing of advanced collagen and mineral based medical devices. At NASS 2019 we will feature our new OssiMend® Bioactive Moldable Bone Graft Matrix and our collagen dural repair and regeneration portfolio of products. We are seeking global distributors and partnerships with established medical device companies.

Compulink Healthcare Solutions

www.compulinkadvantage.com

A leader in all-in-one EHR and Practice Management solutions for orthopaedics, Compulink’s Advantage SMART Practice® uses artificial intelligence to improve clinical and financial results.
ConnectSx provides a suite of web and mobile tools purpose built to bring transparency and efficiency to the complex surgical inventory supply chain. Whether you need to track critical data like UDI and expiration, chain of custody, device use, and case details, or deliver timely product knowledge and support to members of your team, we have the tools to support your organization. You can download free versions of our apps on iTunes, or learn more about us https://connectsx.com

ControlRad is a privately held medical technology company developing innovative products that dramatically reduce the radiation exposure from fluoroscopically guided procedures (FGP) for patients and healthcare professionals. ControlRad’s products are designed to improve safety without compromising image quality or workflow. ControlRad is headquartered in Atlanta, Georgia, and has engineering development facilities in Kfar Saba, Israel. For more information, visit www.controlrad.com.

CoreLink, known as The Source for Spine™, internally manufactures more than 99% of its broad portfolio of spinal implant systems and leverages this vertically integrated expertise through collaboration and a dedication to empowering the performance of its surgeons and the improvement of the lives of their patients. Be a part of something at The Source.

IntraSPINE is for the non-fusion market; a dynamic interlaminar device made of a silicone core covered with polyester. Its innovative shape allows to preserve a full range of motion while respecting the physiological lordosis. In 2014, a ligament correction system, NAJA, was introduced during the EUROSPINE meeting in Lyon. NAJA is not FDA approved. For more information on our products, please visit www.cousin-biotech.com or contact the spine team on spine@cousin-biotech.com

CPI Global is a full service contract research organization specializing in the conduct of clinical research in both the Pre-market and Post market medical device settings. We constantly strive to do our part to ensure treatments that can truly make a difference in the lives of patients are given the best chance to do so.

CTE Solutions has supplied spinal orthopedic OEM’s for over 30 years by building enduring partnerships with customers and strives for a culture of excellence with integrity. CTE Solutions is the leader in spinal rod manufacturing and offers single-source solutions for Polyaxial screws, plates related implants and instruments ranging from prototypes to production quantities. CTE Solutions is ISO 13485 certified, FDA registered and accredited with Japan as a foreign medical device manufacturer.

CTL Amedica Corporation is a forward thinking medical device design, development and manufacturing company aiming to become a leader in the medical device industry. Combining in-house manufacturing and a robust R&D Center of Excellence further advances us from the competition. Our team works closely with end users to imagine and construct multifaceted implants and instruments that ultimately become works of art. Learn how Science, Mathematics and Technology blend to create the CTL experience.

Cuattro is proud to introduce the new Cuattro ONE long format detector for full spine and full leg length studies. This new 17” x 51” detector provides full images in 12 seconds, significantly reducing long format study times and avoiding necessary retakes versus conventional DR Stitching solutions. Cuattro’s innovative Digital Radiography platforms also include both full room and retrofit solutions for Orthopedic, Hospital, Urgent Care and Family Practice applications.

curasan develops, manufactures and markets biomaterials and medical devices in the field of bone and tissue regeneration, wound healing and osteoarthritis therapy. As a pioneer and global technology leader in the growing field of regenerative medicine, curasan is specialized primarily on biomimetic bone grafting materials for dental, oral/maxillofacial, orthopedic and spinal applications.
Cutting Edge Spine, LLC.  
www.cuttingedgespine.com
Cutting Edge Spine (CES) was the 1st to market in the US with a lumbar form made of Invibio's peek-optima™ HA enhanced material and has since added a cervical interbody system. CES will be commercializing several other systems in the near future; inclusive of the world’s first ‘HA-NANO’ coated SI fusion system, stand alone ALIF, and DLIF. CES has a strong proprietary position relative to futuristic 3D printed 'porous screw' technologies that are currently being developed for orthopedics.

DiFusion Technologies, Inc.  
www.difusiontech.com
DiFUSION Technologies, Inc. is an advanced biomaterials manufacturer located in Houston Texas. DiFUSION has developed multiple patent pending MITA Technologies (Metallic Ion Therapeutic Agents) for antimicrobial, cellular repair, tissue regeneration, bone growth, scaffold construction and increased angiogenesis. We have 2 current platform polymers for antimicrobial - CleanFuze and osteoconductive - ZFUZE fully developed and ready for market.

Danco Anodizing  
www.danco.net
Danco provides anodizing of titanium implants and aluminum medical instruments and devices. Finishing capabilities include mechanical deburring, hand polishing, graining, blasting and electro polishing: Low Friction Chrome Coating (LFCC) provides cosmetic and functional improvement to surgical instruments. Marking methods incorporate laser, silk-screen and Full Color Deep Image (R) anodizing techniques. Danco maintains production facilities in Arcadia, CA and Warsaw, IN with R&D support in CA.

DeGen Medical, Inc.  
www.degenmedical.com
DeGen Medical is a dynamic medical device company dedicated to providing surgeons with innovative products engineered to improve quality of life for patients with complex spinal disorders. World-class quality implants, coupled with intuitively designed instrumentation, provide a complete package to promote superior surgical outcomes. Our passion to advance spine-care solutions is driven by clinical insights and feedback, sound research, and science-based design.

DePuy Synthes  
www.depuyspine.com
DePuy Synthes Companies, part of the Johnson & Johnson Medical Devices Companies, provides one of the most comprehensive orthopaedics portfolios in the world. DePuy Synthes Companies solutions, in specialties including joint reconstruction, trauma, craniomaxillofacial, spinal surgery and sports medicine, are designed to advance patient care while delivering clinical and economic value to health care systems worldwide. For more information, visit www.depuysynthes.com.

ECA Medical Instruments  
ecamedical.com
ECA Medical is the industry leading designer and manufacturer of precision single use torque limiting instruments and sterile pack, surgery ready instrument kits for orthopaedic and spine implant procedures. ECA offers a wide range of off the shelf and validated torque limiters from .112 Nm to 13Nm and a sterile Cervical One™ instrument kit that is surgery ready to support ACDF procedures.
EDGe Surgical, Inc. - Digital Surgical Instruments
www.edgesurgical.com

EDGe Surgical's Spine Awl-in-one-Tap (TM) is the first and only completely single-use system for creating posterior pedicle screw-hole pathway. The Awl-in-one-Tap (TM) combines several features including EDGe's patented real-time digital measurement capabilities, a leading awl-tap tip, and their Nerve-NAV (TM) technology which offers a real-time, surgeon-driven EMG neuromonitoring system. The system can be used in open & MIS procedures. ALL these features are together in a disposable package.

Electrolizing Corporation of Ohio
www.ECofOhio.com

The Electrolizing Corporation of Ohio has been in metal finishing for 70-plus years. We provide chrome plating, aluminum anodization, and titanium anodization for the most rigorous and regulated markets: Medical, Nuclear, Military, and Aerospace. We have been recognized as one of the Top Shops by Products Finishing magazine for all five years the list has been issued. We focus on quality and service for our customers. ECO is registered to ISO 9001:2015.

Element Materials Technology
www.element.com

With over 190 laboratories worldwide and more than 6,700 experts, Element offers product evaluation and mechanical testing services to medical device manufacturers. We exist to help all of our customers make certain that the materials and products they make are safe, quality, compliant and ultimately fit for purpose using our 200 years of testing experience and our global testing capabilities.

Elevation Spine Inc.
www.elevationspine.com

Elevation Spine is a medical device manufacturer of a cutting-edge, anterior fusion platform called Saber Technology. Saber Technology was designed to improve patient outcomes while providing surgeons with a simple high-tech approach to spinal fusions. The first product within the Saber family, Saber-C, is a system comprised of a zero-profile, anterior cervical plate that accepts multiple spacer material options and provides single-step integrated-fixation.

elliquence, LLC.
www.elliquence.com

elliquence, LLC manufactures patented Radiowave technology with innovative devices for orthopedic, neurosurgery, and pain management applications. Surgi-Max® permits precise tissue preservation, non-adherent bipolar effects and surgical versatility. Disc-FX® Discectomy System, Trigger-Flex® bipolar handpiece and a full line of endoscopic spine instruments are examples of elliquence surgical accessories. elliquence focuses on sparing healthy tissue while precisely treating pathology.

Elsevier
www.elsevierhealth.com

Elsevier is a world-leading provider of information solutions that enhance the performance of science, health, and technology professionals, empowering them to make better decisions, and deliver better care.

Empirical Testing Corp.
www.empiricaltech.com

We Are The Testing and Regulatory Experts! Reduce time to market with Empirical! TESTING: - ISO/IEC 17025:2005 Accredited - Widest scope of ASTM/ISO accredited mechanical testing - Trusted reputation for over 20 years REGULATORY: - All regulatory support: review, deficiency response, & compilation - Quality Systems development & improvement - Audit services by ASQ Certified Quality Auditor (CQA) - RAPS trained and/or certified (RAC) - Expertise in U.S. and International regulatory clearance & approval.

Enova Illumination
www.goenova.com

Enova Illumination is the leading manufacturer of premium headlight products for all types of procedures with illumination from 30,000 to 225,000 lux. Enova also offers a new premium line of custom through-the-lens loupes. Our products are designed to offer light weight, comfortable, durable magnification and lighting options. At Enova we strive for the best customer service and are dedicated to enhancing and enlightening the world with life-changing vision and illumination technologies.

EOS Imaging
www.eos-imaging.com

EOS imaging offers low dose 2D/3D full body and weight-bearing imaging, 3D modeling of patient X-ray images for non-surgical treatment, 3D web-based patient-specific surgical planning, and integration of surgical plans into the operating room that collectively bridge the entire spectrum of care from imaging to post-operative assessment capabilities for spine surgery.

ESAOTE NORTH AMERICA
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.esaote.com
Evonik Corporation
medical.vestakeep.com/product/medical/en
Evonik, a global leader in specialty polymers, develops biomaterials for permanent implant and temporary contact devices for the orthopedic and spine markets. Evonik’s VESTAKEEP® PEEK (polyetheretherketone) products demonstrate exceptional biocompatibility and biostability and are used in a wide range of spinal implants and instrumentation. VESTAKEEP® PEEK is referenced in numerous spine 510(k) clearances and is on file at the FDA with a comprehensive Master File.

Fusion5
www.fusion5.us
Fusion5—ranked nationally as the #1 orthopedic Convener of orthopedic PGPs based on episode volume under management builds partnerships in the commercial and Medicare fee-for-service markets to maximize value-based care opportunities, implement simplified and sustainable solutions, and improve outcomes in an evolving healthcare landscape.

FzioMed, Inc.
www.fziomed.com
FzioMed develops and commercializes absorbable surgical biomaterials based on its patented polymer science, for use in surgical applications including spine, orthopedics, tendon, peripheral nerve, gynecology and general surgery.

G21 S.r.l.
www.g-21.it
G21 is a leading developer and manufacturer of bone cements and acrylic resins with years experience in orthopedics, oncology orthopedics and minimal invasive spine surgery. We are proud to affirm our unique and complete range of products for spine minimally invasive procedure, in particular our high viscosity acrylic resin V-Steady developed for vertebroplasty and kyphoplasty, our minimal invasive kyphoplasty kit 11 Gauge and our new line Flex Drill and Flex Filler.
GE Healthcare
www.gehealthcare.com
GE Healthcare is a leading provider of medical imaging, monitoring, and life science technologies. GE Healthcare enables precision health in diagnostics, therapeutics, and monitoring through intelligent devices, data analytics, applications, and services to help providers, researchers, and life sciences companies in their mission to improve outcomes for patients around the world.

Genesys Spine
www.genesysspine.com
Genesys Spine is a growing medical device company. Being privately held, Genesys can make decisions quickly and adapt to the changing marketplace. As a team, we are highly responsive and dedicated to providing service and support to our customers, ensuring patient satisfaction and positive results. We are dedicated to servicing the surgeon and the surgeon's effort to support the patient.

Globus Medical
www.globusmedical.com
Globus Medical, Inc. is a leading musculoskeletal solutions company based in Audubon, PA. The company was founded in 2003 by an experienced team of professionals with a shared vision to create products that enable surgeons to promote healing in patients with musculoskeletal disorders. For more information on Globus Medical's innovation visit us at GlobusMedical.com.

GPI Prototype and Manufacturing Services LLC
www.gpiprototype.com
GPI Prototype and Manufacturing Services has been providing metal 3d printing services since 2008. We offer a variety of metals including aluminum, stainless steels, titanium, inconel and cobalt chrome. Six metal additive manufacturing machines are currently on site including: 2x EOS M270, 2x EOS M280, and 2x EOS M290. GPI is pleased to be ISO 9001:2015, ISO 13485:2003, and AS9100D certified as well as ITAR & FDA registered.

GS Medical
www.gsmedicalusa.com
A leader in the surgical spine industry, GS Medical is a supplier of spinal implants and instrumentation, and provider of high-quality surgical solutions. Our mission is simple: improve the treatment and quality of life for patients with debilitating back and neck pain by creating state-of-the-art, intuitive spine products. Through effective development, refined engineering and process, GS Medical has successfully launched many new platforms that focus on reproducible results and cost reduction.

gSource LLC
www.gsource.com
gSource—the Orthopedic and Spinal Source for Surgical Instruments—produces instruments used throughout the world by many leaders and innovators in spine and orthopedics. From custom designs to off-the-shelf patterns, gSource is committed to putting the finest instruments into the hands of surgeons and their teams.

HansBiomed USA, Inc.
www.hansbiomed.com
HansBiomed USA is a leading bio-engineering company that manufactures different types of orthobiologics such as DBM, allograft and synthetic. HansBiomed has the largest bio-engineering research institute in Asia and have received 510(k) approval for DBM products. As the first tissue bank established in Korea, HansBiomed has been developing a variety of biologic products and are currently selling to more than 30 different countries.

HD LifeSciences
www.hdlifesciences.com
Utilizing high-definition 3D printing, Hive™ Interbody Fusion Devices all feature a Soft Titanium® lattice core with HD's 4 evolutionary technologies - reduced stiffness, better imaging, bony on-growth and in growth.

Health Outcome
www.healthoutcome.org
Health Outcome provides musculoskeletal patients with an online PT and exercise program. The patient is matched with a licensed Physical Therapist. The PT communicates with the patient using a secure mobile app; assigns specific exercise videos, answers questions and provides encouragement. The program is directed by renowned spine physicians and shows an average of 50% improvement with over 500 patients. It is branded for your clinic and provides a significant revenue source with $0 cost.

Hensler Surgical Technologies
www.henslersurgical.com
Hensler Surgical Products was Founded in February 2010. Hensler Surgical Products 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 orthopedic and neurosurgical field. Since 2010, Hensler Surgical has brought to market the Hensler Bone Press, Premier disposable bipolar, and the Hensler Bone Collector.
HIGHPOWER Validation Testing & Lab Services  1725
www.highpowervtls.com

HIGHPOWER is a leading validation and testing laboratory, focusing on reusable medical devices that require instructions for use for proper cleaning, packaging and sterilization procedures. Our knowledgeable team works diligently to provide full service support to our clients throughout each phase of device design, validation and regulatory approval. With every major FDA cleared sterilization process in-house, let HIGHPOWER become an extension of your team and help bring your device to market!

HOLO SURGICAL, Inc.  4133
holosurgical.com

HOLOSURGICAL® clinically-tested ARAITM surgical navigation provides real-time 3D anatomical visualization for autonomous patient-specific presurgical planning, intraoperative guidance, and postsurgical data analytics combining Augmented Reality and Artificial Intelligence technology. ARAITM digital surgery guidance system leverages the power of Deep Learning with proprietary neural networks trained on medical imagery of thousands of patients to achieve perfect surgical implant placements.

Hoogland Spine Products GmbH  3624
www.max-more.com

Hoogland Spine Products GmbH is the developer and provider of the maxmorespine® endoscopic system for minimally invasive spine surgery. Our proven endoscopic methods allow surgeons to operate with minimal anatomical and surgical trauma through a single small incision, under local anesthetic and on an outpatient basis. Our maxmorespine® system is a patented system for all lumbar herniated discs, especially L5-S1. The maxmorespine® system provides a safer approach and greater precision.

icotec ag  3727

icotec, a Swiss company, designs and manufactures nonmetallic spinal implants made from carbon-fiber-reinforced PEEK (Carbon/PEEK). Carbon/PEEK breaks barriers in radiotherapy: it enables artifact-free CT/MRI images for accurate delineation of critical structures and accelerated dose planning. During radiotherapy, Carbon/PEEK is radiolucent, enables homogenous doses, and avoids shielding and scattering. Radiation therapy during tumor treatment is no longer limited by metallic implants.

IHI Ionbond Inc  4008
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.

illuminaid  1827

Implanet  4708
www.implanet.com

Jazz System - Solutions to complex spinal pathologies through the use of Band Technology: Screw protection in poor quality bone Kyphosis restoration Complex spine construct protection Sagittal balance in AIS

Indonesian Spine Society  3313

Indonesian Spine Society (ISS) is committed to sustaining multidisciplinary doctors who become members of Indonesian Medical Association, who are dedicated to excellence in the field of spine care. ISS is started on 2004 holding an annual meeting combined with ISMISS, and in the last 4 years since 2016 holding an annual meeting combined with NASS, ISMISS and IOSS, named NASSISMISS

Innovasis  2309
www.innovasis.com

Innovasis is committed to the constant innovation of Spinal Implants and other related products. We Innovate. We Involve. We Invent.

Innovative Sterilization Technologies, LLC  4424
www.iststerilization.com

The ONE TRAY® Sealed Sterilization Container provides the best solutions for increased surgical efficiencies and elimination of OR delays by sterilizing medical devices in 80% less time than traditional wraps or containers. Not having to reprocess wet packs or torn wraps, and seamlessly customizing any set to the surgeon's preference, results in more surgeries and less down time.
In'Tech Medical  
www.intech-medical.com

Founded in France in 2000, In'Tech Medical is a global leading contract-manufacturer of surgical instruments, implants, delivery systems & silicone overmold. Powered by 800 employees across the USA, Europe & Asia-Pacific, InTech is a premiere engineering powerhouse, capable of delivering manufacturing solutions anywhere, at any time, to the benefit of medical device companies worldwide. With its innovative portfolio of turn-key designs, InTech is in the business of accelerating time-to-market.

International Instruments  
www.myjjonline.com

JJ International Instruments is a leader in designing & manufacturing high quality Surgical Instruments in India since 1999. JJ has successfully launched their products in USA market at AAOS 2013 in Chicago. JJ takes great pride in their extensive range of instruments offered for General Orthopaedic, Spine, Hand, Micro surgeries along with Neuro, Uro, Cardio Thoracic and General Surgeries. Visit booth # 4700 and experience their innovative instruments with INTERNATIONAL QUALITY @ INDIAN PRICE!

International Musculoskeletal Society (I.M.S.)  
www.neareastspine.org

The International Musculoskeletal Society (I.M.S.) is a not for profit organization committed to improve patient care with for patient with pain and disability caused by orthopedic, spinal and neurological disorder by promoting the most advanced medical techniques and Technologies. Each year, I.M.S. hosts its Annual Conference utilizing lectures and hands-on workstations.

IntraNerve  
www.intranerve.com

IntraNerve Neuroscience (INN) is a national leader in high performance neuroscience services. INN is Joint Commission accredited in Ambulatory Care – Telehealth. We offer intraoperative neuromonitoring, neurotelemetry/cEEG, remote physician oversight, and IOM/EEG/cEEG interpretation. Our Neurologists/Epileptologists, Technologists, and IT support are dedicated to providing care and assistance around the clock, 24/7/365.

Intrinsic Therapeutics, Inc.  
www.in-thera.com

The Barricaid device is designed to close large defects in the annulus, which often lead to disc reherniation and/or disc collapse following discectomy surgery. The Barricaid allows surgeons to perform a limited nucleotomy in patients, by offering a secure closure to those presented with a large defect.

Invibio Biomaterial Solutions  
www.invibio.com

Invibio Biomaterial Solutions continues to revolutionize spinal device design by offering the implantable polymer, PEEK-OPTIMA™ HA Enhanced, integrated, not-coated, with hydroxyapatite (HA), an innovative choice for medical applications where early bone ongrowth is required. With 20 years of clinical history and ~9M PEEK-OPTIMA™ devices implanted worldwide, Invibio is driven by clinical need and our customers’ desire to continually improve patient outcomes.

Isto Biologics  
www.istobiologics.com

Isto Biologics is focused on offering evidence-based solutions for bone regeneration and cell therapy to help improve patient outcomes. The company’s best-in-class product offerings include the industry-leading Magellan® Autologous Concentration System, InQu®, a Bone Graft Extender & Substitute, and Influx®, a line of natural bone graft material.

IZI Medical Products  
www.izimed.com

IZI Medical Products, LLC develops minimally invasive diagnostic and therapeutic spine solutions to restore patients’ quality of life. Our spine product offerings include vertebroplasty, vertebral compression fracture solutions and vertebral augmentation systems. We embrace the legacy of the Osteo-site portfolio acquired from Cook Medical, as well as the recently added Kiva® and Blazer® systems acquired from Benvenue Medical. We look forward to working together to improve patient care.

Jade Precision Medical Components  
www.jademed.com

At JPMC, we do more than provide the medical device industry with the highest quality implants, instruments and components on time; we provide manufacturing solutions. JPMC develops strategic partnerships to meet our clients’ needs, such as prototyping for labs and testing, new product launches into the market and contracted capacity for full production requirements. JPMC is the manufacturing partner you need to launch your next big project.

Japanese Society for Spine Surgery and Related Research (JSSR)  

The 49th Annual Meeting of the Japanese Society for Spine Surgery and Related Research (JSSR2019) will be held in Nagoya, Japan, April 16-18, 2020. This meeting specializing spine is the largest in Japan and approximately 3,000 people including oversea doctors participate every year. JSSR2020 is English-based meeting, so all sessions and debates will be held in English. http://www.congre.co.jp/jssr2020/
<table>
<thead>
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<th>Company Name</th>
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<tr>
<td>JALEX Medical</td>
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<td><a href="http://www.jalexmedical.com">www.jalexmedical.com</a></td>
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<td>JALEX Medical offers a one-stop-shop when it comes to Class I &amp; Class II product development &amp; regulatory services. Our team of biomedical engineers, regulatory &amp; quality management specialists work under one roof to provide your organization with a streamlined &amp; client centered approach to commercialization. We are dedicated to organizations with big ideas, but who are short on internal development resources. Contact us at 216-307-6299 or <a href="mailto:info@JALEXMEDICAL.COM">info@JALEXMEDICAL.COM</a></td>
<td></td>
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<tr>
<td>Jewel Precision</td>
<td>4809</td>
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<td><a href="http://www.jewelprecision.com">www.jewelprecision.com</a></td>
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<tr>
<td>Jewel Precision began manufacturing innovative custom sterilization case systems in 1984. Jewel Precision's experience in sterilization case manufacturing gives us an edge in developing distinctive systems with a combination of material choices, finishes, and product housing features.</td>
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<td>joimax</td>
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<td><a href="http://www.joimax.com/us">www.joimax.com/us</a></td>
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<td>joimax® is the leading developer and marketer of complete systems for endoscopic minimally invasive spinal surgery. We offer TESSYS® (transforaminal), iLESSYS® (interlaminar), and CESSYS® (cervical) for decompression procedures, MultiZYTE® for Pain Therapy, and EndoLIF® and Percusys® for minimally invasive endoscopic assisted stabilizations. Visit <a href="http://www.joimax.com">www.joimax.com</a> today to learn more and to view our extensive calendar of endoscopic spine training and education programs available worldwide!</td>
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<tr>
<td>KCI</td>
<td>4528</td>
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<td>mykci.com</td>
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<td>KCI, an Acelity Company, the most trusted brand in advanced wound care, is committed to developing innovative healing solutions for customers and patients across the care continuum. Our unsurpassed product portfolio delivers value through solutions that speed healing and lead the industry in quality, safety and customer experience.</td>
<td></td>
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<tr>
<td>Kirwan Surgical Products Inc.</td>
<td>3717</td>
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<td><a href="http://www.ksp.com">www.ksp.com</a></td>
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<td>Kirwan Surgical Products is an industry leader in the development of electrosurgical and nonstick bipolar specialty products for microsurgical indications including neurosurgery, spine surgery, ophthalmology, otolaryngology, plastic and reconstructive surgery, and orthopaedic surgery. Visit <a href="http://www.ksp.com">www.ksp.com</a>.</td>
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<tr>
<td>Kleiner Device Labs</td>
<td>2034</td>
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<td><a href="http://www.kleinerlabs.com">www.kleinerlabs.com</a></td>
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<td>Kleiner Device Labs is showcasing its recently announced KG 2™, a single-insertion, integrated cage and graft cannula system. The company is also previewing several additional new products anticipated for early next year. KDL creates unique spinal surgical tools that make procedures faster and easier for surgeons, and improve outcomes for patients, hospitals and insurers.</td>
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<tr>
<td>Korean Minimally Invasive Spinal Surgery - KOMISS</td>
<td>3311</td>
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<td><a href="http://www.krossbio.com">www.krossbio.com</a></td>
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<td>Koros USA Inc.</td>
<td>2924</td>
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<tr>
<td><a href="http://www.korosusa.com">www.korosusa.com</a></td>
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<td>Koros USA designs and distributes state of the art surgical instruments. Our most popular best sellers include the Cervical Black Belt, Lumbar Super Slide and Lateral Retractors, along with our rotating Osteopunch &amp; Ejector Punch Plus rongeurs and a variety of many more fine instruments. Koros specializes in cervical, spine, micro discectomy, lumbar and anterior fusion.</td>
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<tr>
<td>Kuros Biosciences</td>
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<td><a href="http://www.kurosbio.com">www.kurosbio.com</a></td>
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<td>Everyone with an interest in Spine research is talking about the “what” of surface topography &amp; bone formation; Kuros are the first to figure out the “why”. With over 30 peer-reviewed publications on surface-driven bone formation, we’re confident as leaders in the science of orthobiology. 150 years cumulative research has delivered a bone graft that harnesses osteoimmunology to provide uniform, strong, stable and reliable fusions. Visit us at our booth to find out more about MagnetOs bone graft.</td>
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<tr>
<td>Kyocera Medical Technologies, Inc.</td>
<td>5019</td>
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<td><a href="http://www.kyocera-medical.com">www.kyocera-medical.com</a></td>
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<td>Kyocera Medical Technologies presents a complete line of cervical &amp; lumbar cages with proprietary Tesera® porous titanium structure, engineered for bone on-growth &amp; ingrowth, with load sharing bone interfaces and bone-like modulus of elasticity. Today we offer multiple systems for Anterior Cervical and Anterior Lumbar fusions in both traditional and standalone variants, as well as PLIF, TLIF and Lateral variants, all with multiple footprints and lordotic angles. Learn more at booth 5019 at NASS</td>
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Kyocera SGS Medical Division
www.kyocera-sgstool.com

Kyocera SGS Precision Tools (KSPT) Medical Division is a 20+ year engineering and contract manufacturer of orthopedic cutting devices and dental tools with various coatings and finishing requirements. Our engineers are experienced with domestic and international OEM and tier suppliers. KSPT Medical Division is FDA Registered and ISO 13485 Certified.

Legally Mine
www.legallymineusa.com

Legally Mine is the largest, most respected, experienced, and comprehensive Asset Protection and Lawsuit Prevention company in America. We provide specialized consulting, packages and tools to help businesses, practices and individual medical professionals manage their risk of a lawsuit. We proactively work to protect each doctor's medical license from being tarnished in any way, and with our structure in place, we save thousands of dollars in taxes every single year for each of our clients.

LEICA MICROSYSTEMS INC.
www.leica-microsystems.com

Leica Microsystems surgical microscopes are designed with input from surgeons to meet evolving needs, create unique value, and help improve patient outcomes. Our latest surgical microscope, the Leica M530 OHX, provides clear visualization into deep cavities, market-leading 600 mm working distance, and an ergonomic design to support a comfortable working position and reduce musculoskeletal strain.

LH Medical Corporation
www.lhindustries.com

LH Medical, an LH Industries Company. A worldwide leader of Medical Device Outsourcing Services specializing on Orthopedic, spine, extremity and total joints. LH provides Expertise to our Partners Manufacturing High Quality Implants and Instrumentation. From General Instruments to Complex Mechanical Assemblies. LH Machines all types of Metals, Plastics and Peek. LH Medical, a Competent Qualified forward thinking Contract Manufacture providing Answers and Solutions to our Client’s Needs.

Life Instrument Corporation
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. Please stop by Booth 4300 to see our wide array of cervical, lumbar and micro instruments.

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.

LifeLink Tissue Bank
www.lifelinktb.org

LifeLink Tissue Bank, the largest not-for-profit tissue bank in the Southeast, is an industry leader in providing allografts recovered and processed with the most stringent safety standards. LifeLink offers a complete range of traditional grafts, sports medicine grafts and milled LifeGraft spinal allografts.

LifeNet Health
www.lifenethealth.org

LifeNet Health helps to save lives, restore health and give hope to thousands of patients each year. We are the world’s most trusted provider of transplant solutions, from organ procurement to new innovations in bio-implant technologies and cellular therapies—a leader in the field of regenerative medicine, while always honoring the donors and healthcare professionals that allow the healing process.

Lowell, Inc.
www.lowellinc.com

Lowell is the premier partner for the development and production of technologically advanced, implantable medical devices and instruments. We capture design intent and convert it to manufacturability through communication, anticipation and the drive to meet and exceed your requirements.

Lumenis
www.lumenis.com

Lumenis, the world’s largest surgical laser company, provides minimally invasive solutions for Spine, Gynecology, ENT, Urology and General Surgery. A rich assortment of CO2 and Holmium laser products is available for a variety of spinal pathologies, including microdiscectomy (MED) and endodiscectomy (PELD). Brands: Lumenis® MOSES™ pulse 120H, UltraPulse® duo, Holmium and CO2 range of end and side-firing fibers.
LumitexMD
www.lumitexmd.com
Lumitex designs and develops new lighting systems using best-in-class techniques, practices, software modeling and quality systems to create innovative solutions and looks to new and existing lighting systems. We use an unbiased approach to technology selection to provide customers with the best solution for their needs using technology from a variety of partners and suppliers. We apply more than 50 years’ experience to solve customers’ lighting challenges. www.lumitexmd.com 800-969-5483.

Macom
www.macominstrumental.com.br
Founded in 1993, Macom Surgical Instruments is a genuine Brazilian company. It's mission is to offer the best and most precise surgical instruments, fulfilling market needs.

Market Scope LLC
www.market-scope.com
Market Scope reports on the orthopedic industry, tracking trends, making market forecasts, and reporting on the latest news. We have been an industry leader in the ophthalmic market for over 20 years and have recently added orthopedics to our portfolio. We're unique in the fact that all of modeling, analyzing, and reporting are done by our in-house team of industry experts. We take great pride in our reputation as an objective third-party that helps clients stay informed and make good decisions.

Marox Corporation
www.marox.com
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 mill/turn, CNC Swiss turning, additive manufacturing (Ti powder), CNC wire EDM, and assemblies. We process titanium, implantable grade PEEK, cobalt chrome, stainless steel and many other materials. ISO 13485, ISO 9001, AS9100D and FDA registered.

MCRA, LLC
www.mcro.com
MCRA, LLC is a highly specialized, medical device consulting firm and CRO serving the worldwide orthopedic and spine industries. MCRA’s team of experts is committed to executing successful regulatory, clinical, quality assurance, healthcare compliance and reimbursement strategies. MCRA works with companies at all stages of development, whether they are single-product companies or companies with multiple technologies.

Medability GmbH
www.medability.de
Medability is the technology leader in MISS VR/AR simulators. It is a German company, which develops and produces high-end surgical simulators that enable medical training in a safe environment. So that actual surgeries can be performed on real patients with confidence.

Medacta International
www.medacta.com
Medacta is an international company specialized in joint replacement, spine surgery and sports medicine. Its revolutionary approach, focusing on minimally invasive solutions and personalized medicine, have advanced the standard of care with several spine solutions. The MySpine platform, along with MC-Midline Cortical guides, is a 3D printed patient matched solution that, together with the M.U.S.T. Screw System, the MectaLIF Ti-coating family of interbody fusion devices, creates a complete system.

Medfix
www.medfix.com
The Medfix® product portfolio offers a total instrument solution to spine surgery focusing on a full line of spine retractor systems, disc preparation systems and procedure specific instrumentation. We are able to service our clients with short lead times, financing options, large stock availability as well as competitive pricing. All Medfix® products are manufactured in the United States and Germany. Our focus is cost reduction without compromising quality.

Medicrea
www.medicrea.com
Through the lens of predictive medicine, Medicrea leverages its proprietary software analysis tools with big data and machine learning technologies supported by an expansive collection of clinical and scientific data. The Company is well-placed to streamline the efficiency of spinal care, reduce procedural complications and limit time spent in the operating room. With 185 employees worldwide, the Company has an ultra-modern manufacturing facility in Lyon, France.

MEDIFLEX SURGICAL PRODUCTS
www.mediflex.com
Since 1969, Mediflex has been the worldwide leader in table mounted holding and positioning systems for all surgical specialties. FlexArm™ and StrongArm™ systems provide unparalleled versatility, flexibility and surgical efficiency as they offer rigid stabilization of spine retractors, endoscopes, instruments and/or devices - which eliminates an assistant. Mediflex specializes in OEM table mounted holding and positioning systems. www.mediflex.com – info@mediflex.com – 631.582.6424
Medin Technologies
www.medin.com
Medin Technologies, Inc. is the largest, focused supplier of sterilization cases, trays, and accessory products. Our strategy is to provide exceptional engineering support services, vertically integrated manufacturing processes, reduced lead-times, and a company wide commitment to stringent quality requirements. We are FDA and ISO13485 registered working with aluminum and stainless steel as well as thermoformed and machined plastics.

Meditech Spine, LLC
www.meditechspine.com
Meditech Spine is an innovative organization that partners with industry leaders to design, develop, and distribute medical devices that make a positive difference in the marketplace. Since the introduction of the Talos® line of lumbar and cervical interbody implants, Meditech has continued to enhance its line of products with the introduction of PEEK-OPTIMA® HA Enhanced for its interbody family along with the CURE Anterior Cervical and Anterior Lumbar Plating systems.

Medmix Systems AG
www.medmix.ch
We are a leading supplier of mixing and application systems for the global medical device industry. We make it look easy to respond to clinical challenges by developing unique, efficient and user-friendly delivery systems for biomaterials. We offer a broad range of OEM products that allow you to reduce time to market and to keep investment low. We enjoy partnering with medical device teams around the world to develop innovative customer specific solutions.

Medtronic
www.medtronic.com
Medtronic
We believe in applying the full power of technology for better patient outcomes. In addition to alleviating pain, restoring health, and extending lives, we work in partnership with others to create seamless, more efficient care. Learn how we're taking healthcare Further, Together at Medtronic.com. Visit booth #4611 to learn more about our innovative solutions.

Medtronic - Titan Spine
www.titanspine.com
In June of 2019, Medtronic acquired Titan Spine, Inc who offers the most comprehensive titanium interbody portfolio and is a leader in surface technology. Titan Spine began the surface technology revolution for interbody fusion devices over a decade ago with the introduction of its full line of Endoskeleton™ interbody devices featuring its proprietary textured surface. The company's next-generation, award-winning surface, nanoLOCK™, is a titanium FDA-cleared nanotechnology for the spine, and it has sole access to the CMS new technology code for fusions utilizing nanotextured interbody devices. Medtronic is committed to continuing to advance the science of surface engineering to enhance the treatment of various pathologies of the spine that require fusion. Visit Medtronic booth #4611 to learn more or the Titan-focused booth #4624 to take a deeper dive with an expert on the science and technology behind nanoLOCK

Medyssey
www.medyssey.com
Medyssey designs, develops, manufactures and markets products for the surgical treatment of spine disorders through novel instrumentation and advanced orthobiologic solutions designed to improve spinal fusion rates, preservation of mobility and clinical outcomes.

Metal Craft and Riverside Machine & Engineering
www.MCandRS.com
Metal Craft and Riverside Machine & Engineering provide in-house medical device and implant manufacturing from start to finish. Specializing in close tolerance contract manufacturing, their services include DFM assistance, prototyping, and short through long run production capabilities. Primary and secondary manufacturing capabilities in-house ensure all aspects of your project are finished with upmost quality. FDA registered and a Women Owned Small Business. Check them out at www.MCandRS.com.

Mighty Oak Medical
www.mightyoakmedical.com
FIREFLY Patient-Specific Pedicle Screw Navigation Guides have successfully navigated over 4000 screws in OR's across the United States. This exciting use of 3D printed technology based on a patient specific surgical plan is saving time, reducing the use of inter operative fluoroscopy and improving accuracy of screw placement. Mighty Oak Medical is working to reduce the friction points that impede the adoption of Navigation technology in spinal fusion surgery. Navigate, don't complicate.
At Millstone, we get it. We believe quality drives patient success. That’s why we’ve perfected the capabilities medical device manufacturers need to get to market. Today we offer post-manufacturing and aftermarket services to 50+ customers, including some of the top 10 orthopedic companies in the world. We offer clean room packaging, medical device specific warehousing, finished goods distribution, loaner kit management, and reverse logistics services—all with an unparalleled focus on quality.

MiRus was launched in 2016, bringing novel material and software solutions to spine and orthopaedic surgery. MiRus has created a comprehensive platform centered around our proprietary MoRe® alloy to create the world’s smallest, strongest and biologically superior implants. We also address the demands of today’s healthcare environment with an integrated platform of pre-operative planning and risk assessment tools, a breakthrough navigation system and post-operative monitoring and risk mitigation.

Misonix is a world leader in developing ultrasonic surgical devices for hard and soft tissue removal. The Misonix BoneScalpel is a unique ultrasonic osteotome for tissue-selective bone dissection that encourages en-bloc bone removal and refined osteotomies while sparing elastic soft tissue structures. Many leading surgeons have praised the BoneScalpel to be one of the most important advancements to enter spine surgery this decade.

Mizuho OSI improves the surgical experience through advanced patient positioning. With products like the Trios® Table, ProAxis® Table and Levô™ Head Positioning System, surgeons can better anatomically align the patient’s spine intraoperatively with the touch of a button. Since introducing the first dedicated Spinal Surgery Table in 1992, the company has revolutionized the industry to provide surgeons with improved surgical access, unobstructed imaging and enhanced safety. Stop by Booth #4216!

Mobius Imaging is the premier developer and supplier of best-in-class mobile largest bore diagnostic, interventional and intraoperative CT imaging systems. Its Airo® 32 slice mobile, wide bore CT System provides intraoperative imaging in spinal surgery, optimizing surgical workflow during navigated procedures and improving overall accuracy during hardware placement.

Modernizing Medicine® and its affiliated companies empower orthopedists with a suite of mobile, specialty-specific solutions that transform how healthcare information is created, consumed and utilized to increase practice efficiency and improve patient outcomes. modmed® Orthopedics includes EMA®, the orthopedic-specific EHR system, Practice Management, Revenue Cycle Management and Analytics.

Headquartered in Edison, New Jersey, MTF Biologics has spent more than 30 years honoring donated gifts by developing innovative, effective allograft solutions to help people heal. From orthopedics to wound care to plastic and reconstructive surgery, we have become a force in scientific progress and patient advocacy. For more information, visit www.mtfbiologics.org.

MW Medical Solutions develops specialized products for the medical and pharmaceutical industries, including precision wire forms, metal stampings, a wide variety of spring designs, tubular components, and related product assemblies. We have established a global reputation for advanced products, best-in-class manufacturing, and exceptional engineering support.

N2 Biomedical is a leading provider of surface modification services to orthopedic, spinal, and cardiovascular device manufacturers. Our specialty is in providing solutions to improve surface characteristics such as enhanced bone ingrowth through nano-texturing and anti-microbial property, improved biocompatibility, thromboresistance, increased wear and scratch resistance, reduced friction, corrosion resistance, product differentiation, as well as enhanced electrical and optical properties.
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<td>Nadia International, Inc.</td>
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<td><a href="http://www.ronadro.com">www.ronadro.com</a></td>
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<td>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 7800 surgeons in 79 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 &quot;HEALING HANDS II&quot; created for the world’s Spine Surgeons.</td>
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| NeuroStructures, Inc.        | 2127         |
| www.neurostructures.com      |              |
| NeuroStructures is dedicated to advancing orthopedics and neurosurgery through the discovery and development of quality, innovative implantable surgical solutions that restore patient quality of life. Our expertise in designing medical devices and our ability to effectively collaborate with surgeons, allow us to develop less invasive products, and provide optimal clinical results. Please visit us on our website at www.neurostructures.com or download the NeuroStructures App to discover more. |

| Nanovis, LLC                 | 4235         |
| nanoviscinc.com              |              |
| Nanovis is a platform technology-driven growth company committed to helping surgeons and hospitals achieve excellent fixation and infection outcomes using advanced nanotechnology platforms. Its Nano FortiCore® interbodies are designed with a unique and proprietary bio-ceramic enhanced titanium nanotube surface which offers the best aspects of fixation, visualization, and durability. Nanovis’ developmental infection technology platforms promise to offer much-needed bactericidal solutions. |

| Neo                          | 1730         |
| www.neo-medical.com          |              |
| Neo is a Swiss medical device company focused on developing transformational approaches to spinal fusion technology for value-based healthcare. We are dedicated to enabling all peri-operative stakeholders to improve economic value while pursuing outcome excellence in thoracolumbar fusion procedures. |

| Neuro Enterprises            | 2814         |
| www.neuroenterprises.com     |              |
| NeuroEnterprises, LLC manufactures and sells innovative surgical instruments and disposable devices. Our flagship product is the ChicagoTip, a self cleaning disposable suction. We design new instruments and make functional improvements on exiting instruments to improve surgical techniques and enhance overall surgical outcomes. Our engineering and product design teams work directly with surgeons to improve on the design and functionality of instruments currently used daily in the operating rooms. |

| NeuroPro Spinal Jaxx, Inc.   | 5415         |
| www.spinaljaxx.com          |              |
| NeuroPro Spinal Jaxx, Inc. is a research, development and distribution company specializing in next generation expandable lumbar interbody fusion devices. The Spinal Jaxx patented technology is a leap forward from the technology of competing expandables available on the market today. Spinal Jaxx has received FDA clearance. http://www.spinaljaxx.com/ www.spinaljaxx.com |

| NeuroStructures, Inc.        | 2127         |
| www.neurostructures.com      |              |
| NeuroStructures is dedicated to advancing orthopedics and neurosurgery through the discovery and development of quality, innovative implantable surgical solutions that restore patient quality of life. Our expertise in designing medical devices and our ability to effectively collaborate with surgeons, allow us to develop less invasive products, and provide optimal clinical results. Please visit us on our website at www.neurostructures.com or download the NeuroStructures App to discover more. |

| NeuroPro Spinal Jaxx, Inc.   | 5415         |
| www.spinaljaxx.com          |              |
| NeuroPro Spinal Jaxx, Inc. is a research, development and distribution company specializing in next generation expandable lumbar interbody fusion devices. The Spinal Jaxx patented technology is a leap forward from the technology of competing expandables available on the market today. Spinal Jaxx has received FDA clearance. http://www.spinaljaxx.com/ www.spinaljaxx.com |

| NeuroStructures, Inc.        | 2127         |
| www.neurostructures.com      |              |
| NeuroStructures is dedicated to advancing orthopedics and neurosurgery through the discovery and development of quality, innovative implantable surgical solutions that restore patient quality of life. Our expertise in designing medical devices and our ability to effectively collaborate with surgeons, allow us to develop less invasive products, and provide optimal clinical results. Please visit us on our website at www.neurostructures.com or download the NeuroStructures App to discover more. |

| NeuroPro Spinal Jaxx, Inc.   | 5415         |
| www.spinaljaxx.com          |              |
| NeuroPro Spinal Jaxx, Inc. is a research, development and distribution company specializing in next generation expandable lumbar interbody fusion devices. The Spinal Jaxx patented technology is a leap forward from the technology of competing expandables available on the market today. Spinal Jaxx has received FDA clearance. http://www.spinaljaxx.com/ www.spinaljaxx.com |
NN Life Sciences combines advanced engineering and production capabilities with in-depth materials science expertise to design and manufacture a diverse range of reusable and single-use surgical instruments, implantable components, and cases and trays to leaders in the world-wide medical device marketplace. We create a partnership with our clients to bring innovation and world-class quality from the inception of a project to its completion.

Nordson Medical is a global expert in the design, development, and manufacturing of complex medical devices and component technologies. The company's expertise includes graft delivery devices, catheters and cannulae, engineered shafts, medical balloons, medical tubing, heat-shrink tubing, fluid management solutions, delivery systems, Nitinol components, and polymer solution casting technology.

Norman Noble Inc. manufactures orthopedic devices and implants to customer specifications in compliance with FDA regulations and ISO 13485:2016. 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.

We are a Solutions Partner filling your service/product needs: *Product design of implants/instrumentation *Regulatory/FDA/IP/Quality systems support *Full Website/Marketing/Branding/SEO services *Contract Manufacturing *Silicone grip rubber handles/screwdrivers *Hand-crafted German instrumentation *Torque Limiting devices with an industry best 3yr calibration cycle *Single-Use products *Implant/Instrument sterilizing trays *Full procedure instrument trays-Cervical/Lumbar retractor and curette sets

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.


Our mission is to transform surgery, advance care and change lives. We develop minimally disruptive, procedurally integrated solutions for spine, designed to deliver reproducible and clinically-proven surgical outcomes. The Company's portfolio includes access instruments, implantable hardware, biologics, software systems for surgical planning, navigation and imaging solutions, magnetically adjustable implant systems for spine and orthopedics, and intraoperative monitoring service offerings.

Nuvectra® is a neuromodulation company committed to helping physicians improve the lives of people with chronic conditions. Nuvectra's Algovita® SCS system is approved in the United States and Europe for the treatment of chronic intractable pain of the trunk and/or limbs. To learn more about Nuvectra and our technologies, visit www.nuvectramed.com.

Oerlikon Balzers is one of the world's leading suppliers of surface technologies that significantly improve the performance and durability of precision components as well as tools for the metal and plastics processing industries. Extremely thin and exceptionally hard coatings. Worldwide, more than 1'100 coating systems are in operation at Oerlikon Balzers facilities and its customers. Oerlikon Balzers operates a dynamically growing network of more than 100 coating centres in 35 countries.

Omnia Medical collaborates with surgeons to develop best in class, clinically relevant spinal instrumentation in a cost-conscious environment. Products from Omnia Medical include; TiBrid, PsIF, Boxcar, Rotary, CeLLogix, FloLogix, and DBLogix, including a number of exciting products in development.
As a leader of medical device outsourcing services, Orchid has experience with both fusion and motion preserving technologies as well as standard open procedure instruments and complex, high precision, minimally invasive instrumentation. In addition to our design and manufacturing services, our proprietary coating technologies, including Titanium on PEEK and UHMWPe, set us apart.

Organogenesis offers a portfolio of bioactive and acellular biomaterials products in advanced wound care and surgical biologics, including orthopedics and spine. Organogenesis's versatile portfolio is designed to treat a variety of patients with repair and regenerative needs.

Allograft implants for spinal fusion and bone void filler applications. Allograft offerings include traditional, osteobiologics, soft tissue, machined grafts, and custom implants.

Ortho Spine Partners is a consulting firm focused on assisting companies commercialize their products using unique strategies and years of personal relationships. Our mission is to help our clients reduce the time to revenue and increase market adoption by introducing them to top surgeons and distributors around the country as well as the national contracting firms.

Connecting orthopaedic doctors, companies, reps, & information like never before. Access help from colleagues. Archive & share important cases through the forum. Connect to the right rep/company & find surgical technique guides 24/7 with one click. Research, compare, review, rate orthopaedic products/reps, & save contact info for online messaging. Find links to news, journals, orthopaedic society pages, jobs, or register for a conference, on your time. Find us @ Booth #2135 & www.doortoaxis.com

Orthofix is a global medical device company focused on musculoskeletal healing products and value-added services aimed at improving patients' lives by providing superior reconstruction and regenerative musculoskeletal solutions to physicians worldwide. Headquartered in Lewisville, Texas, the Company has two strategic business units including our global spine organization who will showcase premier products from our spine portfolio while highlighting the cervical spine at this event.

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.

OSC is a consortium of companies offering manufacturing solutions for the medical device industry. We are a one-stop shop for OEMs with needs ranging from raw material to finished and packaged products. Four members: EZM - K-wires, round bars, profiles, flats and sheets Forecreu - Cannulated bars in stainless steels and titanium alloy for instruments and implants HTI - Ti & HA coating, technical ceramics, cleaning & packaging Sayan - Design and manufacture of orthospine instruments and implants

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.

ORTHOREBIRTH USA is proud to present ReBOSSIS: a biosynthetic, fibrous scaffold ideal for cell infiltration, retention, and colonization. Created by a novel and proprietary electrosprinning process, ReBOSSIS is a highly absorbent, cohesive, and perfectly moldable osteogenic material, with the ideal consistency to fit and fill bony voids or gaps.
ORTHOWORLD Inc.

www.orthoworld.com

Founded in 1992, ORTHOWORLD® is the only provider of strategic intelligence in the world solely focused on the global orthopaedic market. Its singular mission is helping orthopaedic companies and individuals improve their performance. Highly specialized product offerings such as ORTHOWORLD Membership, ORTHOFLASH®, BONEZONE® and OMTEC® empower industry participants to respond to challenges, maximize opportunities and more aggressively expand their orthopaedic businesses.

OSARTIS GmbH

www.osartis.de

OSARTIS is a medical device company in Germany. The company is focusing on development, registration, production and sales of medical biomaterials and PMMA bone cements for orthopaedics, trauma and spinal surgery. Product portfolio consists of PMMA bone cements and associated accessories e.g. mixing systems as well as biomaterials. The international distribution of OSARTIS brands occurs solely via trading partners, while in Germany OSARTIS sells directly to hospitals and purchasing groups.

Osseus Fusion Systems

www.osseus.com

Osseus is a pioneering medical device firm focused on developing advanced technology for minimally invasive spine surgery. Our teams of forward-thinking surgeons, bright-minded engineers and visionary product managers design systems aimed at enhancing patient outcomes and changing healthcare for the better.

OSSimTech Inc.

www.ossimtech.com

OSSimTech offers an innovative, high-fidelity training platform in open spinal surgery. By mixing virtual reality with authentic haptic response, Sim-Ortho(TM) delivers a cutting-edge solution for the acquisition of both hands-on experience and practical decision-making skills across a wide variety of open-spine surgeries. Sim-Ortho(TM) is the future of simulation training for both orthopaedic and neurosurgical residents and for new-skills acquisition for established surgeons.

Osso VR

www.ossovr.com

Osso VR is the leading, validated virtual reality surgical training platform designed for surgeons, sales teams, and hospital staff of all skill levels. Our award-winning training solutions offer highly realistic hand-based interactions in immersive training environments, and objective performance tracking through our proprietary analytics platform. With the Osso VR Collaborative Training solution, individuals can train with their team or peers in the same virtual OR, from anywhere in the world.

OsteoNovus

www.osteonovus.com

OsteoNovus Inc. is an orthopedic medical device company focused on the development of synthetic biomaterials. Our breakthrough synthetic bone graft technology is now available as NovoGro Putty for use in orthopedic and spine surgery. NovoGro Putty grows robust bone in just six weeks with excellent handling properties. The OsteoNovus team is committed to improving the surgical experience and patient outcomes by providing the most advanced synthetic bone grafts on the market.

Oxford Performance Materials

www.oxfordpm.com

OsteoFab Technology accelerates the speed at which implants are designed, manufactured, and cleared for sale. The OsteoFab platform combines design, material, 3D printing, quality, and regulatory clearance into one streamlined process. The result is a faster and more predictable path to market. OPM has FDA clearances for the following products: OsteoFab Patient Specific Cranial Device OsteoFab Patient Specific Facial Device SpineFab VBR System

Pacific Instruments

www.pacificinstruments.biz

Our global reach, throughout the US, Pacific Rim, and Europe, provides you a valuable partner and instrument expert to help you with your instrumentation needs. As your partner and instrument expert, we help you streamline your instrument needs and provide technical design assistance for your projects. Our superior quality assurance program (ISO 13485:2016) shows you “true value” of the instrumentation process as you can focus on your core business. We look forward to meeting you at Booth 3014.

Paonan Biotech Co., Ltd.

www.biomech-spine.com

Paonan Biotech was founded in 1985. Founder Mr. Benny Yeh has 35 years’ experience in orthopedic and spine medical product developing and marketing. His achievement becomes a representative in orthopedics and spine industry of Taiwan. Paonan R&D follow the spirit of the founder, seeing “Minimally Invasive, Simplified Surgical Procedures, Dynamic Fusion, and Enhance Post-operative Outcome” as objective. Now, our products have been marketed to more than 30 countries in Asia, America, and Europe.

Paradigm BioDevices

www.paradigmbiodevices.com

Paradigm BioDevices, Inc. specializes in novel spinal technologies including Interplate™, a system based solution to simple and complex spinal care; and the QuickDraw Bone Harvester® for harvesting and collecting autogenous bone graft.
At Pfizer, we apply science and our global resources to bring therapies to people that extend and significantly improve their lives. Every day, Pfizer colleagues work across developed and emerging markets to advance wellness, prevention, treatments and cures that challenge the most feared diseases of our time.

We are manufacturer of Spinal Implants and Orthopedic Implants our success key is Honesty, Mutual understanding and collaboration with all our customers, bringing advanced design and efficient product yet keeping operation with our system simple and quick. We have a vast production capacity due to our techniques and production personnel experience. For making the spinal implants we are the one!

Supporting An Adaptive, Flexible, Advanced Manufacturing Operation: With a history of innovation and a critical understanding of how to bridge the gap between engineering and manufacturing, we’re able to meet the rigorous demands of a global orthopedic marketplace. By maintaining a culture of continuous improvement, LEAN manufacturing disciplines and integrating continuous improvement efforts with value stream partnerships, we can adapt our business to fit our customer’s needs, precisely.

Precision Medical Technologies
Precision Medical Technologies, Inc. is a contract manufacturer of orthopedic implants and instruments with a focus on spine, extremities, trauma and sports medicine. We are ISO 13485:2003 Certified. Our Implant and Instrument divisions have their own separate Quality Engineering, Production Engineering, and Operating Management. The Instrument Division operates out of the Warsaw and Rome City facilities, while the Implant Division is only located at the Warsaw facility.

Precision OS
Precision OS is a software company specializing in virtual reality surgical simulation for orthopedic surgeons.

Precision Spine Inc.
Precision Spine, makers of the Reform® Pedicle Screw System, will showcase our Made in the USA portfolio of innovative spine solutions. Discover the patented MD-Vue™ Lateral System, comprised of MD-Vue™ Retractor, AccuFit® Lateral Plate and ShurFit® Interbody Cage, Reli™ SP Plus Spinous Plating System, ShurFit® ACIF 2C Ti and HA Coated Cervical Cage, SureLOK™ MIS 3L Pedicle Screw System and the Reform® POCT System for Occipital Cervical Thoracic Fixation. Visit Precision Spine at Booth 3016.

PrinterPrezz
PrinterPrezz is the first medifacturing™ company in the world, where ideas become reality, blending medical innovation with advanced design and manufacturing resources. We help customers at every stage of the innovation life cycle from early concept development to volume production.

Promimic AB
Promimic’s state-of-the-art nanotechnology creates a unique bioactive surface on any implant. HAnano Surface is a 20 nanometer (.02 micrometer) thin implant surface modification composed of crystalline hydroxyapatite (HA) particles, which have the same shape, composition, and structure as HA found in human bone. HAnano Surface has proven to accelerate bone growth in over 30 in vivo and in vitro studies with over 150,000 clinical applications to date.
Protech Medical

Products MADE IN THE USA. Protech Medical is a high quality radiation safety apparel manufacturer. Our focus on custom tailored solutions combined with personalized professional service is a hallmark of our family owned business. Protech’s innovation and elevated service separates us from the competition. To learn more, visit the leading manufacturer of Radiation Safety Products at booth 1428 or contact us: 561.627.9769 | sales@protechmed.com

Providence Medical Technology

Providence Medical Technology, Inc. is a privately-held medical device company focused on innovative solutions for cervical spinal conditions. The company has pioneered a proprietary approach to cervical fusion and has developed surgical instrumentation and implants that offer unique benefits to the $2 billion worldwide cervical spine market. The Providence family of shipped-sterile, single-use products includes CORUS Spinal Instrumentation System, CAVUX® cages, and ALLY® bone and facet screws.

Puracon GmbH

For more than 10 years, puracon has been a Full Service Supplier for cleaning, packaging, sterilization and logistics of implants and instruments. Our solutions include standardized and customized packaging concepts. Customers appreciate our up to 7-year shelf life, just-in-time service and uncompromising quality. With our Consulting Services in medical device certification & validation as well as our Logistic Services, including Loaner Set Management, we create additional value. www.puracon.com

Qsight, a division of Guidepoint Global

Qsight (a division of Guidepoint) offers clients with high-value, actionable market intelligence. With exceptional coverage of U.S. Ortho market, Qsight provides timely insights from proprietary sources including some of the most differentiated and powerful data available. Qsight Pulse – outstanding market intelligence tracking detailed purchasing behavior from thousands of healthcare facilities. Qsight Tracker – monthly longitudinal survey data from 2,300+ physicians across various specialties.

Radius Pharm

Radius Pharm

Radsources

Radsources is leader in subspecialized MRI interpretation with a consistent group of fellowship-trained musculoskeletal & neuroradiologists. Radsources customers enjoy high quality MRI studies, direct access to our radiologists and reliable results. Because of our clinical success, Radsources developed ProtonPACS, a PACS specifically engineered to overcome the challenges most users face with other systems. We are uniquely positioned to provide expertise in all aspects of radiology imaging.

Ranfac Corp.

Ranfac Corp. manufactures the patented Marrow Cellution Bone Marrow Aspiration Systems, which overcome the limitations of traditional bone marrow needles by allowing the user to aspirate in a measured and controlled manner over a large geography inside the marrow space, while restricting peripheral blood infiltration. Our bone grafting kits include a tool to extract intact bone dowels, providing autograft in a minimally invasive manner without sacrificing cellular quality.

Raylytic GmbH

Our web-based platform UNITY, facilitates a seamless and straight-forward collection of clinical data directly from the patient (patient reported outcomes) and its automated analysis. Using specialized modules that have already received FDA or CE approval, UNITY also evaluates medical imaging data (X-rays, CTs) with high precision using artificial intelligence. The combination of different data silos enables a holistic analysis and new insights into the treatment of diseases.

Relax Retractors

Relievant Medsystems, Inc.

Relievant Medsystems, a medical device company focused on solutions for chronic low back pain (CLBP), developed the Intracpect Procedure – a minimally invasive procedure targeting the basivertebral nerve for the relief of CLBP The Intracpect Procedure is supported with two Level I randomized controlled trials demonstrating durable relief, clinical significance and consistent outcomes in subjects with CLBP The Intracpect System is FDA 510(k) cleared and commercially available in the US.
RIWOspine, A Richard Wolf Company 3824
www.riowospine.com
Richard Wolf Spine Endoscopy is now RIWOspine to better address the unique needs of the spine endoscopy community, with a global emphasis on innovation and education. We retain the resources of Richard Wolf, as well as a rich history of innovation in spine endoscopy, including the first instrument sets and techniques for transfornaminal, interlaminar, cervical, stenosis, and rhizotomy. Visit us at booth #3824 for the latest in spine endoscopy.

Ronin Surgical Corp. 4707
www.RoninSurgical.com
Ronin Surgical Corp. — makers of the X5 Surgical Headlight System. The wireless X5 is the lightest, brightest, longest-running operating room surgical headlight on the market. Schedule your free trial or mission trip loaner today at +1.415.226.9414 or Contact@RoninSurgical.com. Ronin Surgical: Designed Without Compromise.

Rose Micro Solutions 4409, 2124
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 to see our NEW Line of “TTL” Loupes. You’ll love the Optics! Visit us online @ www.rosemicrosolutions.com or call 716-608-0009. Make sure you stop by and say Hi to the “ROSE” Brothers!

Rose plastic medical packaging USA LLLP 4702
www.rose-medipack.com
Rose plastic medical packaging develops, produces and sells worldwide intelligent plastic packaging products for medical engineering, dental, healthcare, laboratory and diagnostics. Choose the best solution from our diverse standard tubes, boxes, cassettes and cases or let us work with you to develop your own special packaging requirement.

RosmanSearch, Inc. 1718
www.rosmansearch.com
RosmanSearch is a Neurosurgery, Neurology and APP recruitment firm. We place quality providers with quality practices nationwide. We are the only search firm with dedicated teams specializing in neuroscience. Our mission is to be the best, the most expert, and the one that is known for quality—every time!

RTI Surgical 3815, 5416
www.rti.com
RTI Surgical is a leading spine company with a highly regarded portfolio of hardware, biologic and synthetic-based spinal implants. RTI offers both novel and established spine therapies such as the Simmetry® system for sacroiliac joint fusion, the coflex® Interlaminar Stabilization® device for lumbar spinal stenosis, the award-winning Fortilink® IBF Systems with TETRAfuse® 3D Technology, ViBone® Viable Bone Matrix, and comprehensive hardware solutions that address multiple spinal disorders.

Saudi Spine Society 3214
SaudiSpine.org/en
The Saudi Spine Society is a non-profit organization, which was established in 2015, to promote excellence in spine care by running an efficient, transparent multidisciplinary society that nurtures a collaborative community of practice of spine practitioners who disseminate high-quality research, and conduct innovative educational activities for the public and the professionals.

Sawbones 3112
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 3725
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.

SeaSpine 5011, 4838, 4840
www.seaspine.com
SeaSpine is a global medical technology company focused on the design, development and commercialization of surgical solutions for the treatment patients suffering from spinal disorders. SeaSpine has a comprehensive portfolio of orthobiologics and spinal instrumentation solutions to meet the varying combinations of products that neurosurgeons and orthopedic spine surgeons need to perform fusion procedures on the lumbar, thoracic and cervical spine.
### EXHIBITOR DIRECTORY

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#### Seawon Meditech

Seawon Meditech was founded in 2008 based on the experience and infrastructure accumulated by our outstanding research personnel, Seawon meditech Research Institute is gaining public recognition, while aiming to become the best in the world in the field of digital convergence technology as well as fundamental technology related to the surface of medical device. We have a global network of partners in over 30 countries across Europe, Asia, Middle East and Africa.

#### Seikagaku - SKK

Seikagaku is a R&D focused pharmaceutical company specializing in glycoscience. Its investigational product, SI-6603, is under Phase 3 clinical trial in the US, investigated for the indication of LDH. SI-6603 has a potential to become a treatment option for the patients who have not responded to other conservative treatments, such as steroids, NSAIDs, or non-opioid analgesics, and those who are candidates for surgery. It is approved for the treatment of LDH in Japan, launched in August 2018.

#### Shandong Weigao Orthopaedic Device Co., Ltd

WEIGAO ORTHOPAEDIC DEVICE CO., LTD is China’s best spine products/services supplier. As a leading medical company in China, we work with research institutions developing innovative technology, assist top hospitals offering effective treatment solutions, relieve suffering patients from their pains and restore their health. Dedicated to global medical and health course, engaged with top surgeons and companies worldwide, we’re now seeking for opportunities to work with partners all over the world.

#### Shanghai Reach Medical Instrument Co., Ltd.

Shirley Ryan AbilityLab, formerly the Rehabilitation Institute of Chicago (RIC), is the global leader in physical medicine and rehabilitation for adults and children with the most severe, complex conditions — from traumatic brain and spinal cord injury to stroke and amputation. Shirley Ryan AbilityLab expands leadership in the field that began at RIC in 1953 — its care and research designated the "No. 1 Rehabilitation Hospital in America" by U.S. News & World Report every year since 1991.

#### Silaco

The Iberian Latin American Spine Society, SILACO, was created in 1991 with the idea of strengthening the ties between member countries and exchanging experiences with a common languages. It is made up of the Spanish Spine Society, GEER, the Portuguese Spine Society and the Spine Societies of 20 Latin American countries and they hold a biannual every two years with the alternation of two in Latin America and one in Spain. Among its objectives is to stimulate the creation and maintenance of continuing education programs, and to assist in the scientific development of the participants in their respective countries. We believe it is important that SILACO work as a large family and promoting academic and social relationships in an open and effective manner. This integration has been increasing over time and this is reflected in the increasing participation in the meetings.

#### Shukla Medical

Shukla Medical is a universal implant removal company. Our objective is to simplify revision surgery by offering uniquely designed tools and techniques that target the removal of Cervical, Thoracic and Lumbar hardware, pedicle screws, and broken and stripped screws. For more information on the Xtract-All®, call 888-4-SHUKLA (888-474-8552) or visit www. ShuklaMedical.com

#### SIGNS Medizintechnik GmbH

Innovative high-end implants made in Germany: For more than 25 years, SIGNUS has been the experienced specialist in the surgical spine care sector. Family-owned SIGNUS offers the comprehensive product range of cervical spine to SIG sacroiliac joints, which are manufactured at the nearby production site. In addition to Europe (CE) and the USA (FDA), we sell our certified implants throughout the world on every continent. ST-Line® by SIGNUS offers highest technology structural titanium implants.
Silony Medical Corp.  1713
us.silony-medical.com
Clinically driven concepts – Welcome to Silony Medical! We are proud of our - Made in Germany – which symbolises high quality in manufacturing and engineering. We are a young company –not burdened by the past . Thus, Silony is not constrained by obsolete corporate structure; we are open to build new and enduring partnerships to achieve mutual goals . This enables us to include fresh thinking and the ultimate flexibility to meet the ideas and needs of our users.

Simplify Medical, Inc.  4419
www.simplifymedical.com
Simplify Medical is focused on bringing to market the next generation cervical artificial disc for 1 & 2-levels, using MRI compatible materials- Ti coated PEEK endplates with ceramic core, disc heights as low as 4mm and mobile-bearing design. Simplify Medical is located in Sunnyvale, California. To learn more, visit www.simplifymedical.com.

Sintea Plustek  3716
www.sinteaplustek.com
Established in 1987 near Milano, Italy, Sintea Plustek develops several innovative spine systems for the treatment of a broad range of spinal disorders. Sintea Plustek’s engineering capabilities allow for advanced research and projects to meet the needs of patients and spine surgeons. Our products line include Posterior/Lateral Cervical/Dorso/Lumbar System, Interbody Spacers, and Cement Dispenser. We are currently in USA, Europe, and Latin America. We are looking forward to hear more from you.

Sites Medical  5413
www.sitesmedical.com
SITES Medical is an orthopedic technology development company focused on meaningful innovations for the evolving marketplace. Our first technology to reach the marketplace through our OEM partners is OsteoSync, a highly porous titanium ingrowth material that is clinically proven and cost-effective. This platform technology can be used as a standalone material, allowing bone to grow through the entire implant or attached to various substrates as desired. Other technologies are under development.

SMTP Technology  4002
www.smtpmed.com
The SMTP XDB80A Ultrasonic Osteotome is the leading brand in the target field. SMTP is the only company participated in the establishment of the Industry Standard on Ultrasonic Bone Tissues Surgical Equipment.

SOLCO BIO MEDICAL CO.,LTD  1913
www.solco.co.kr
Solco Biomedical is a manufacturer and global supplier of spinal implants and instrumentation focused on developing innovative surgical solutions. We are dedicated to exploring cost-contained approaches and less-invasive surgical options that provide optimal outcomes for the surgeon and patient.

Southern Spine, LLC  2105
www.southernspine.net
Southern Spine features the StabiLink® MIS Interlaminar Spinal Fixation System along with the innovative, patented PG® Precision Guided Inserter/Compressor that redefines ease of use. The StabiLink® System is the new standard in minimally invasive spinal fusion providing the missing link between conservative therapy and more traditional invasive spinal fusion procedures. The StabiLink® Interlaminar System has the most anatomical selections and should be a part of every surgeon’s armamentarium.

Spinal Balance  3427
www.spinalbalance.us
Spinal Balance presents Libra®, a technically advanced pre-sterilized pedicle screw system with the ability to prevent cross contamination intra-operatively. Our package guards the implant during handling and delivery, is easy to open and extremely intuitive to use. A major benefit of our package is its ability to act as a guide for loading the screwdriver, making that key step effortless. Using Libra saves time, money, eliminates direct handling of the implant and reduces the workload at SPD.

Spinal Elements  2611, 4038
www.spinalelements.com
Spinal Elements is a leading designer, developer, and manufacturer of surgical solutions for spinal disorders headquartered in Carlsbad, California. Spinal Elements’ mission is to improve the lives of those who rely on our technology by being a trusted provider of innovation, quality, service, and value to those delivering care to spine surgery patients. We will continue to surround core differentiated technologies with supportive products and services to provide complete surgical solutions.

Spinal Simplicity, LLC  4108
www.spinalsimplicity.com
Spinal Simplicity is dedicated to the creation of innovative simple solutions to treat complex spinal and orthopedic conditions through three distinct product platforms: Minimally Invasive Lumbar Fusion, Cervical Fusion and Extremities The Minuteman®G3 MIS Fusion Plate System, can be implanted through a MIS Lateral or MIS Posterior approach, reducing the trauma to healthy tissue without compromising fixation. The Minuteman®G3 has FDA clearance and is now for sale in the United States.
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Spine Innovation Expandable TLIF provides stability without compromising safety or efficacy. In-situ rotation and expansion provides restoration of disc height and lordosis.

Spine Wave is an innovation leader in expandable fusion and minimally invasive fixation technology with a broad product and intellectual property portfolio. Our comprehensive solutions address posterior, anterior, lateral, thoracolumbar fixation, and cervical spine procedures. Our portfolio includes the Velocity®, Leva® and StaXx® expandable devices; the True Position® Pivoting Spacer; the Sniper®, CapSure® PS3 and Annex® fixation systems; and the Proficient® and Paramount® cervical systems.

Spineart is one of the fastest growing privately held spine companies, with a leading position in the European market and representation in more than 55 countries worldwide. Spineart established its US presence in 2009, providing to distributors, hospitals and surgeons a unique offer: Sterile-packed, barcoded implants and a compact set philosophy. Spineart introduced clinically validated technologies in Minimally Invasive Surgery, Motion Preservation, Fusion, Biologics, and Fractures Treatment.

Founded in 2017, SpineEX, Inc, is a global technology company committed to improving patient outcomes through innovation. SpineEX, Inc has developed Sagittae®, the first fully adjustable, expandable lateral lumbar interbody cage with independent control of height and lordosis; giving surgeons the freedom to adjust the implant in-situ to the patient’s specific anatomy.

Leveraging the Less Exposure Surgery (LES) philosophy, AxioMed & SpineFrontier set a new standard of outpatient care providing better results for surgeons & patients. SpineFrontier’s LES technologies are created in collaboration with surgeons resulting in faster operating times, less blood loss & psoas-sparing techniques, optimizing patient recovery. AxioMed’s Freedom® Disc is a one-piece next generation viscoelastic total disc replacement that facilitate pain relief & restoration of motion.

SpineGuard provides tools equipped with DSG™ (Dynamic Surgical Guidance) Technology to enhance spinal surgery. Devices built with DSG Technology give real-time audio and visual feedback to improve the implant placement accuracy. These devices have assisted spine surgeons in accurately placing pedicle screws in approximately 70,000 spinal procedures around the world. Visit www.spineguard.com for more information.

SPINENDOS as a German manufacture and innovator, we produce and supply professional endoscopic instruments for minimally invasive spine surgery. We are committed and focused on innovative technologies, systems and methods for endoscopic minimally invasive spinal and arthrosis surgery. Spinendos is one of the most professional suppliers for global spinal endoscopy products.

Spineology, an 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.

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 is now completed with a minimally invasive system. 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.
SpineWeek
www.spine.org

We are pleased to announce SpineWeek from 27 April to 1 May, 2020 in Melbourne. The idea to have a joint meeting bringing together several spine societies at the same time and at the same place originated around the turn of the century. The increase of participants coming from Asia was remarkable over the past Meetings. This incited the SpineWeek committee to move east for the 2020 SpineWeek meeting, and we are pleased to announce the meeting in Melbourne on 27 April – 1 May 2020.

St. Teresa Medical Inc.
www.stteresamedical.com

St. Teresa Medical has developed a novel hemostatic sealant dressing called SURGICLOT. The company is nearing completion of its human clinical with great results. CE marking is expected in Q1 2016. SURGICLOT will be the only approved treatment for cancellous bone bleeding. The dressing dissolves in seconds to minutes and leaves nothing behind but a robust clot to seal the injury. The company will market and distribute its products through strategic partners in the OUS and US markets.

Stability Biologics
www.stabilitybio.com

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.

Structure Medical
structuremedical.com

Since 2004, Structure Medical has been a leading manufacturer of spine, trauma and arthroscopic medical implant products used to treat problems with the musculoskeletal system. These medical devices make a profound difference in the lives of patients suffering from trauma, tumors, sports injuries, degenerative diseases and congenital orthopedic conditions.

Stryker
www.stryker.com

Stryker is one of the world’s leading medical technology companies and, together with our customers, is driven to make healthcare better. We offer innovative products and services in Orthopaedics, Medical and Surgical, and Neurotechnology and Spine that help improve patient and hospital outcomes.

SURFACE DYNAMICS
www.eurocoating.biz

We are a global one-stop shop contract manufacturer for orthopedic, trauma, spine and dental markets and a recognized expert in plasma spray coatings and additive manufacturing technologies in the medical field. We provide services and products to orthopedic OEMs and we are able to assist our customers during all stages of their manufacturing journey. With bases established in Europe, North America, and Asia, we support them wherever they may be located and be responsive to their demands.

SurGenTec
www.surgentec.com

SurGenTec is a privately owned medical device company based out of Boca Raton, FL that strives to bring the next level of technology to the spine and orthopedic industry. SurGenTec develops and manufactures innovative products with patient and surgeon safety at the heart of everything we do. Our product development team is dedicated to creating intuitive solutions to improve the quality of life for patients.

Surgeons Capital Management
ces-home.com/PLIP

SCM is a wealth management firm with over 50 years of experience in healthcare. SCM focuses on the creation, management, protection, and distribution of wealth for surgeons around the country. We specialize in creditor and asset protection, tax-advantaged distribution, and wealth and estate strategies for high net worth individuals. We oversee all financial aspects of private practices including buy/sell for partners, disability buyouts, pension creation, practice management, and group benefits.

SurgiTel
www.surgitel.com

SurgiTel's mission is to offer customers the best in vision, comfort and ergonomics. Our patented lightweight optics and LEDs, coupled with Oakley frames, means all-day-comfort for the clinician. SurgiTel's unmatched loupe declination angle means your body is in the correct ergonomic position, reducing pain and the risk of injury. Our loupe mounted SurgiCam Pro digital video camera and our PrismPro loupe line (5.5x-8.0x) can only be seen at SurgiTel.

SURGIVISIO
www.surgivisio.com

Surgivisio redefines minimally invasive spine surgery procedures with its all-in-one 2D/3D imaging AND real-time navigation platform. Reliable: a patented technology that significantly increases accuracy. Fast, intuitive, and automatic: 5 minutes to start navigating, including the complete patient registration procedure, 3D image acquisition and reconstruction. Low x-ray radiation: Up to 4 times fewer images than needed by existing systems to complete a 3D reconstruction.
Synergy Biomedical
www.synergybiomedical.com
Synergy Biomedical is a privately-held medical device company focused on bringing advanced biomaterial based products to the orthopedic and spinal surgery markets. Synergy has developed next-generation bone graft technology based on an innovative, spherical form of bioactive glass. Synergy’s BioSphere particles have been engineered to maximize the bone healing potential of bioactive glass.

Tangible Solutions, Inc
www.tangiblesolutions3d.com
Tangible Solutions is a contract manufacturer of 3D Printed Titanium Orthopedic Implants. It’s all we do. Tangible offers end-to-end management of device manufacturing, and regulatory support.

TeComet, Inc.
www.tecomet.com
The global capacity to deliver the most difficult challenges with unparalleled industry expertise and superior capabilities. TeComet produces forged, cast and machined orthopedic implants, precision surgical instruments, sterilization cases/trays and photochemical etched products. Additional specialization exists through innovative product development, TeComet Standard Products, LaunchQuick™ Development Center and our Total Solutions® approach where we manage the entire product launch cycle.

Terumo
www.catsmart.us
CATSmart Continuous Autotransfusion device: The Fresenius CATSmart is an autotransfusion system for intraoperative processing of blood from wounds as a consequence of surgery or trauma. The blood from wounds, which is anticoagulated and collected in a sterile reservoir, is processed in a continuous washing process to obtain washed packed red cells for reinfusion to the patient.

Terumo BCT
www.terumobct.com/biologics
Terumo BCT is a global leader in blood component, therapeutic apheresis and cellular technologies, offering more than 30 years of cell processing expertise and a comprehensive range of solutions that cover the continuum of cell therapy—from autologous biologics to cell therapy manufacturing. As a leader in innovation with established global reach, we are shaping the future of cell therapy.

TheraCell, Inc.
www.theracellinc.com
TheraCell - regenerative medicine company with a demineralized bone allograft fiber products and oxygenated grafts based on its patented technology. Our demineralized bone fiber products (DBF) provide a 100% cortical bone graft that is osteoinductive, osteoconductive, and provides a unique nano-topography fiber surface. The TheraFuze DBF™ platform includes: TheraFuze DBF™ Fiber Mat, TheraFuze DBF™ Fiber Syringe, TheraFuze DBF™ Fiber Plus, TheraFuze DBF™ Fiber Boat, TheraFuze DBF™ Fiber Sheet.
Thompson Surgical Instruments, Inc.
www.thompsonsurgical.com
Thompson is a leader in spine exposure and the original manufacturer of the table-mounted retractor. We understand the value of exposure in surgery and are dedicated to providing innovative, high quality systems that deliver safe, versatile, and low-profile retraction. From MIS to open, we offer unlimited customization and safe, independent, retraction. Our table mounted retractors are ideal for Cervical, Anterior Lumbar, Posterior Lumbar, and MIS Posterior Lumbar exposures.

Tobra Medical
www.tobraomedical.com
Tobra Bone Basket ~ “Bone Collection Made Easy”. The 1st drilled bone collection device that maximizes autograft collection, easy to use, efficient, and provides autograft bone with great handling characteristics. This patent protected product utilizes a mesh basket filtration system to collect drilled autograft bone while not interrupting surgery. Great for patient fusion and for facility in helping to reduce costly bone substitutes. Please visit Booth #4602 for “Bone Collection Made Easy”

Townsend Design / Thuasne USA
www.thuasneusa.com
Quinn Medical offers a full line of spinal bracing products featuring their flagship, the SLEEQ Spinal Compression Brace. SLEEQ's elegant, easy-to-use, & patient friendly design offers best-in-class comfort for improved patient compliance & outcomes. While universal size braces are now industry standard, the patented SLEEQ technology offers unmatched ease of adjustment & adaptability for optimum fit, function & comfort. The Eclipse Cervical Collar advances cervical care & comfort to a new level.

Triangle
www.trianglemfg.com
Triangle is a contract manufacturer of high-performance medical devices. Family owned since 1955, our world-class design and manufacturing engineers, programmers, prototype technicians, and quality assurance experts tackle complex challenges for the world’s leading OEMs. Focusing on exceptional quality, innovation and regulatory requirements, Triangle leverages years of experience for clients, bridging design development and product realization, becoming the strongest link in their supply chain.

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www.trfectamed.com
Trifecta Medical is a dedicated Case & Tray supplier. The Trifecta Medical team has a long history of leadership and innovation; particularly regarding design, quality and delivering fast and on time. Trifecta Medical's customized case, tray and caddy systems ensure validation, support and protect your implants and instruments. We also assist your product team to make sure your delivery systems stand apart from your competition.

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Tyber Medical, a private label original equipment manufacturer (OEM), is creating new pathways to regulatory approved implants and instruments for orthopaedic companies, distributors, and hospital organizations. Tyber Medical designs and develops class II orthopedic systems; verifies and validates those systems using a QSR and ISO 13485 certified quality system; and pursues and maintains both US (FDA 510(k)) and OUS (CE Mark) regulatory approvals. For more information, visit www.tybermedical.com

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For over 150 years, UBS has been committed to bringing its global resources to bear on the portfolios of high net worth individuals to help them achieve their wealth management goals. Customized solutions are delivered by The Tate Group who is uniquely aligned to help give clients the confidence in reaching their goals no matter what the environment.

Ukrainian Spine Society
www.smiss.kh.ua
UKRAINIAN SPINE SOCIETY (Society for Minimal and Instrumented Spinal Surgery) is a public organization that promotes the development of domestic medical science, recognition of its priority directions, unification of the efforts of the members of the Organization in solving urgent practical problems of health care in the direction of minimally invasive and instrumental surgery spine. We invite you to attend the 18th INTERNATIONAL SYMPOSIUM on MINIMAL INVASIVE AND INSTRUMENTED SURGERY OF THE SPINE at the Sytenko Institute of Spine and Joint Pathology. Successful development of spinal surgery in Ukraine during recent years is the result of dedicated work and activity of NASS/ISMISS Members. We will be happy to see you at our Meeting in Kharkiv, Ukraine. Volodymyr Radchenko, M.D.

United Kingdom Spine Societies Board-UKSSB
www.ukssb.com
Striving to improve Spine Care in the UK The United Kingdom Spine Societies Board (UKSSB) is an organisation composed of National Spinal Societies: - British Association of Spine Surgeons (BASS) - Society for Back Pain Research (SBPR) - British Scoliosis Society (BSS) - British Association of Spinal Cord Injury Specialists (BASCIS) - National Back Pain - Clinical Network (NBP-CN) The UKSSB facilitate collaborative working between the above spinal societies for the benefit of the UK population
We are dedicated to administering a nationwide network of professional services associated with neuromonitoring. We establish, organize, and advise for one of several service models that comply to high ethical standards, as well as national rules and regulations designed with the surgeons and physicians as the focus of providing patient care. We bring extensive experience and professionalism to every operating room and customize our design and support to your individual needs and concerns.

The University of Tennessee Physician Executive MBA, internationally accredited and top ranked since its inception in 1998, is offered exclusively for physicians seeking leadership skills and knowledge. This 1-year-long EMBA incorporates: four one-week residency periods, Internet-based distance learning, a physician network of 700+ alumni, CME and personalized leadership development.

The Vertiflex® Procedure is a broadly indicated, clinically proven, minimally invasive solution designed to deliver long-term relief from the pain associated with lumbar spinal stenosis (LSS). The procedure is intended to help restore mobility and improve quality of life for LSS patients. For more information, visit www.vertiflex.com.

Vivex Biologics, Inc. strives to create treatment options and solutions that will improve clinical, surgical and therapeutic patient care through innovation. Vivex focuses on core products and new technologies to meet the ever-growing biologic needs of surgeons and patients while continuing our 45-year history of serving and honoring both tissue donors and recipients. Together, Vivex and UMTB have distributed more than 2 million tissue allografts worldwide to better serve the needs of patients.

Vorzeigen is a supplier of world class Sterilization Cases, Surgical Instruments and Implantable components to orthopedic device companies worldwide. We design, develop and produce products for all segments of the medical device market.
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**Xenco Medical**

www.xenomedical.com

Xenco Medical is an American medical technology company committed to disruptive innovation for the purposes of creating safer, more efficient surgical environments. Through its line of sterile packaged, disposable spinal systems, Xenco Medical seeks to transform the standard of surgical care by eliminating the challenges of current surgical instrumentation processing. Xenco Medical has recently launched The ASC CerviKit, a compact ASC delivery platform for its disposable ACDF system.

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**Xtant Medical**

www.xtantmedical.com

XTANT MEDICAL IS FOCUSED ON THE DESIGN, DEVELOPMENT, AND COMMERCIALIZATION OF A COMPREHENSIVE PORTFOLIO OF ORTHOBIOLOGICS AND SPINAL FIXATION SYSTEMS. At Xtant, quality is first in everything we do. Visit our booth to learn more and see our brand new products, fit for fusion!

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The medical technology business of ZEISS offers a comprehensive line of surgical microscopes and loupes that uncompromisingly enhance visualization during spine surgery. ZEISS supports spine surgeons in seeing more by ensuring optical precision, flexibility, fast OR setup and ease of use for surgeon, assistant, and OR staff.

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For a detailed view of the products and services that are offered by each company, search on the NASS mobile app. Search for NASS Spine in the Apple App Store or Google Play to download the app.
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