AOSPINE

Newsletter

"AOSpine is a truly international network of spine surgeons that offers the opportunity to exchange knowledge with members from all over the world."

Yan Wang
AOSpine Member Representative-elect

Editorial

The worldwide AOSpine community has grown to more than 6,500 members in 2018, an unprecedented number in the history of our organization. Klaus Schnake, outgoing AOSpine Community Development chairperson and the Editor-in-Chief of this newsletter, has done a fantastic job of sustainably growing our global community. In this issue, he shares his achievements and tells us what makes the AOSpine membership unique. Congratulations, Klaus, and a big thank you for the great job that you have done!

This edition of the newsletter also features a personal interview with Larry Lenke, one of the world's leading surgeons on spine deformity, whose work has made a profound impact on scoliosis treatment. He shares his inspirations, collaborations and his hope of building a legacy through shared learning.

With the vision of creating a truly global annual spine event, AOSpine's annual congress has experienced exponential growth since its inception in 2009. We are very proud to say today that the Global Spine Congress (GSC) is the place to find the latest and best international research and hear opinions from the global key opinion leaders. The event provides a unique platform to sharing knowledge and developing new approaches to the treatment of spinal disorders to help advance spinal care.

In this issue of the newsletter, you will find the AOSpine highlights of GSC Singapore, which took place in May 2018; a short interview with the newly elected AOSpine Member Representative Yan Wang (China); and stories about the Global Spine Journal Best Paper Award winner; the Global and Regional Educator of the Year Award winners; the Germàn Ochoa Traveling Fellowship Award winner Kenneth Cheung and the Fellows Alumni.

Also, in this edition, you will read about the achievements of outgoing Research Commission Chairperson and new AOSpine International Board Chair S Rajasekaran. During his term, he turned AOSpine into a premier knowledge provider in the field of spine surgery.

You'll also be able to read about Knowledge Forum Trauma's latest updates on the study defining treatment guidelines for thoracolumbar burst fractures, and the first spine oncology-specific patient-reported outcome measure published by Knowledge Forum Tumor.

AOSpine will face a number of changes in its governance after the

Trustees Meeting in July 2018, with new chairpersons in the Research Commission (Dino Samartzis), the Community Development Commmission (Norman Chutkan) and the AOSpine Middle East and Northern Africa Regional Board (Mohammad El-Sharkawi). With my term ending as the AOSpine International Board Chairperson, it's time for me to pass the reins to S. Rajasekaran. It has been the greatest honor and pleasure to serve as the chair of this outstanding organization. I cannot think of a better leader for this society than Raja.

He's a wonderful human being, an incredible person and a true humanitarian. I am proud to leave my position as the AOSpine International Board Chairperson with our organization in excellent condition. I wish Raja, Dino and Norman lots of success in their new positions, and I thank you for your support. I look forward to continuing to contribute to and serve AOSpine.

With best wishes,

Dan Riew
Chairperson,
AOSpine International

Larry Lenke—the ripple effect

He's one of the world's leading surgeons in spine deformity. Here, he discusses his belief in shared learning, tells why he has abandoned anterior approaches and explains why he had to say "no" three times to one of his early mentors and one of the founding members of the Scoliosis Research Society (SRS).

What made you chose spine deformity as your specialty and who was your biggest mentor?

The most influential person in my early career was Dr Ron DeWald, but in a very unusual way. During medical school, I spent a month on rotation with Dr DeWald at Rush University in Chicago and was amazed with what he was doing with deformed children and adults. I was particularly fascinated by thoracotomies and seeing all the organs being pushed out of the way to get to the spine. That's what attracted me to spine surgery—it was "real surgery".

Dr Dewald was also in charge of the residency program at Rush University and wanted me to go there for my residency, but Washington University in St. Louis called me half way through my interviews and said if I want the spot I have to decide immediately as it was a guaranteed spot in their Orthopedic Surgery residency. However, this meant turning down the opportunity with Dr Dewald. It took me a long time to work up the courage to call him and to decline the opportunity.

"When I started promoting posterior surgery for all spine deformities, my approach was somewhat unique at the time, but it was ultimately the right thing and I'm very proud of that. One

should never be afraid to go against the grain."

I became a resident at Washington University and started working with Dr. Keith Bridwell, who was Dr DeWald's protégé. And then the same thing happened again for my fellowship training. I interviewed with Dr Dewald and accepted a spot at his fellowship. I went back home to St. Louis and Dr Bridwell offered me a fellowship spot as he was planning to start a fellowship and I would be his first fellow. I wanted to stay in St Louis as I had just gotten married and my wife was going to do her internship in Hospital administration in St Louis in the same year, so we'd have spent the first year of our marriage apart. I had to call Dr DeWald and declined his offer for the second time, now as a fellow.

After my fellowship, Washington University offered me a staff position. I stayed there for twenty-five years. In 1999, Dr DeWald called me and asked me to consider coming to Rush university as an endowed Ronald L. Dewald professor of spine deformity surgery, the first endowed professorship exclusively devoted to spine deformity surgery. Obviously I was extremely honored by the offer, but my wife and my children didn't want to leave St.Louis at that time, so I had to again decline his offer. I have the greatest respect for Dr Dewald, and those three phone calls were some of the hardest I've ever had to make.

What is your most frequent surgery?

My most common operation now is a revision spine deformity surgery with a vertebral column resection (VCR). Since the year 2000, I do all approaches posteriorly. Even though I became a scoliosis surgeon because I was fascinated by the anterior approaches, I abandoned them. The reason was excessive patient morbidity. Now they're less invasive but back then, in the late 90s, they were too morbid for the patient. When I started promoting posterior surgery for all spine deformities, my approach was somewhat unique at the time, but it was ultimately the right thing and I'm very proud of that. One should never be afraid to go against the grain.

"When I look now at the Global Spine Congress 2018 program, many of the surgeons are people who I have trained or those who have visited me, and I had a little piece in their education, which makes me very proud."

How do you share your knowledge and expertise?

My fellows have been instrumental—much of the legwork for my clinical research is done by my fellows. Over 1000 surgeons from across the world have visited me. When I look now at the Global Spine Congress 2018 program, many of the surgeons are people who I have trained or those who have visited me, and I had a little piece in their education, which makes me very proud.

I can only treat one patient at a time, but if I can help other surgeons treat their patients better, then my outreach is exponential. I'm very fortunate to have the ability to vicariously help many patients through the fellows I've trained and the surgeons who visited me and then went back home and applied what they learned to help their patients.

Could you tell us more about what led to your creating the Lenke classification system?

One of the key components of my professional development was my involvement with the Harms Study Group, which was started back in the early 1990's by Randy Betz, Harry Shufflebarger and Juergen Harms, three of the leading scoliosis surgeons in the world, to discuss whether scoliosis should be treated posteriorly or anteriorly. Dr Bridwell had been asked to moderate a small meeting of these three surgeons, but couldn't make it, so I was invited instead. For eight hours my job was to run the slide projectors, and I just listened. The first thing they were both asked was "how would you classify this curve"—and the gold standard at that time was the King-Moe classification system. However, for over 90% of cases, they disagreed on classification. I was sitting there thinking how will they ever agree on how to treat scoliosis if they can't agree on what the classification is? By the end of the day, a light bulb went off in my head that we need a better classification system. I was invited me to be part of that study group, which still exists today. I used it as my platform to launch the Lenke classification system of scoliosis. Its publication in 1999 was a huge turning point in my academic career. In 2018 it's still the most widely used classification system for scoliosis worldwide.

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Can you tell us more about your activities with the AOSpine Knowledge Forum Deformity?

Our first project was Scoli-RISK 1, on which we now have an extension that we're going to follow five years postoperatively. Two years ago, we started the Prospective Evaluation of Elderly Deformity Surgery (PEEDS) study. Also, similar to scoliosis there's no common knowledge or classification of complications. Because of that, we're leading the effort to develop and validate a reliable system for categorizing and classifying various complications during and following adult spinal deformity surgery working with the International Spine Study Group (ISSG)—it will be a gold standard and a legacy we can be very proud of. Once you have a common language and classification,

so many things branch off from that basic foundation. This will be a huge contribution to spine surgery.

"We're leading the effort to develop and validate a reliable system for categorizing and classifying various complications during and following adult spinal deformity surgery working with the International Spine Study Group (ISSG)– it will be a gold standard and a legacy we can be very proud of."

I finished my chairmanship of the Knowledge Forum Deformity two years ago. Marinus de Kleuver took over and is doing a phenomenal job leading those efforts.

You have won numerous awards in your career. What achievement are you most proud of?

Getting the Scoli-RISK-1 study off the ground and completed to a two-year follow-up was definitely a career highlight. Michael Fehlings and I discussed starting a clinical trial using the promising neuroprotective agent Riluzole, but we soon realized there wasn't an accepted rate of neurological complication for scoliosis surgery. We had to go back to step one, which was to figure out the gold standard rate, and that became the Scoli-RISK 1 study. Without those discussions this would never have happened, Michael Fehlings deserves credit for that, as well as AOSpine and SRS for supporting this. Around the same time, I was appointed chair of the AOSpine Knowledge Forum Deformity, a select group of surgeons from around world who are the best academically minded in scoliosis and spine deformity work. I was privileged to be the first chair of that group. Collaboration is essential for the betterment of our profession. It was great to see these groups coming together and putting their own egos aside.

"Getting the Scoli-RISK-1 study off the ground and completed to a two-year follow-up was definitely a career highlight."

What's been the most interesting paper you've seen in the past year or so?

The GAP analysis published by Ahmet Alanay. It looked at how we evaluate patients' radiographs for complications after spine deformity surgery—how can we predict preoperatively who's at risk of mechanical and malalignment complications, which is an unsolved problem in spinal surgery. His analysis has been replicated and is an objective way of organizing and predicting who will have mechanical complications. Another is Dr. Chris Ames and others working on predictive analytics and modeling, including areas such as patient frailty and patient co-morbidities to predict who will do well with spinal surgery and who may not, through a more automated and objective way of selecting patients for this kind of surgery. I think that type of modeling is already playing a role in our specialty and will play a huge role going forward because even with radiographic indications for spine surgery, if you don't have the health, emotional and psychological wellbeing and other areas to predict a good outcome, you shouldn't have that surgery.

Outside of work, how do you unwind and maintain a work-life balance?

I've always been an exercise fanatic and work regularly with a trainer to try and keep in good shape. My family is also really important to me. I spend my free time with my lovely wife Beth and our three children, who are now in their 20s. I'm getting better at that now but I'm not a role model for leading a balanced life—as a busy clinician and academician, it seems like I spend more time trying to cope with the imbalance. However, I certainly wouldn't be where I am now without the support of my wife. Her love and her commitment has been the solid foundation for my career and my success. You can't be successful without having great people around you both at work and at home and I have had great people helping me at work as well throughout my entire career. I'm a very fortunate person.

"I certainly wouldn't be where I am now without the support of my wife. Her love and her commitment has been the solid foundation for my career and my success."

Why would you recommend someone become a member of AOSpine?

It's the largest group of spine surgeons in the world, with a truly global reach. Its educational resources are the best in the world, and the addition of the Knowledge Forum adds research credibility, which is an incredible combination. The more you put into it, the more you will get back.

BIOGRAPHY
LAWRENCE G. LENKE

- Professor of Orthopedic Surgery, Columbia University Dept. of Orthopedic Surgery
- Surgeon-in-Chief, The Daniel and Jane Och Spine Hospital at NewYork-Presbyterian/Allen
- Chief, Spine Division
- Co-Director, Adult and Pediatric Comprehensive Spine Fellowship

Dr. Lawrence G. Lenke is one of the world's foremost leaders in spinal deformity surgery. His world-renowned practice is devoted exclusively to spinal deformity surgery with an emphasis on complex reconstructive surgery in both children and adults for the treatment of various spinal deformities such as scoliosis, kyphosis, flatback syndrome and other major spinal imbalances, and spondylolisthesis.

He is generally regarded as the premier spinal deformity surgeon in the world, having developed the classification system for Adolescent Idiopathic Scoliosis (AIS) to which his name is now attached, and was designated as the most widely cited spinal deformity publication by the SRS at their 50th anniversary meeting in 2016.

After receiving his undergraduate degree from the University of Notre Dame and his MD from Northwestern University Medical School, Dr. Lenke completed his internship and residency training in Orthopaedic Surgery at Barnes-Jewish Hospital/Washington University School of Medicine. While at Washington University, he also completed his fellowship training in pediatric and adult orthopedic spine surgery.

He has been listed in America's Top Doctors for the past 10 years and Best Doctors in America the past 15 years. Dr. Lenke was honored with the North American Spine Society's 2013 Leon Wiltse Award for excellence in leadership and/or clinical research in spine care. Also in 2013, Dr. Lenke was listed in Orthopedics This Week as one of "The Top 28 Spine Surgeons in North America." He served as President of the Scoliosis Research Society from 2010-2011, whose single focus is the advancement of care in patients with spinal deformity.

Dr. Lenke's prolific academic career includes writing over 400 published peer-reviewed manuscripts, editing 5 textbooks on Spinal Surgery, writing more than 125 textbook chapters, chairing over 100 Spinal Surgery meetings and having been an invited Visiting Professor domestically and internationally over 100 times.

EDUCATION

1982 / B.S. Pre-Professional Studies, Summa cum Lauda, Phi Beta Kappa University of Notre Dame, Notre Dame, IN | **1986** / Doctor of Medicine, Alpha Omega Alpha Northwestern University Medical School, Chicago, IL

POSTDOCTORAL TRAINING

1986–1987 / Internship in General Surgery Washington University School of Medicine, St. Louis, MO | **1987–1991** / Residency in Orthopedic Surgery Washington University School of Medicine, St. Louis, MO | **1987–1991** / Residency in Pediatric Orthopedics Shriners Hospital for Children, Residency in Orthopedic Surgery | **1991–1992** / Fellowship in Pediatric & Adult Spinal Surgery Washington University School of Medicine, St. Louis, MO

BOARD CERTIFICATION

Diplomate of the Board, American Board of Orthopaedic Surgery

Klaus Schnake— growing the worldwide spine community

In this interview, he explains why he believes marketing and communications are important for surgeons, shares insights about the development of a new classification system for vertebral fractures, and discusses why fellowships are essential for personal development.

You are the outgoing chairperson of the Community Development Commission. Why did you apply for this position?

In the early days, community development used to be called scientific marketing. It was the marketing aspect that got me interested at the beginning. My wife had a big influence: She has an MBA and worked as a marketing manager at that time, which gave me some good insights. I found it pretty fascinating, particularly the strategy and the techniques behind it.

Many people are not aware of what community development is. How would you describe its role within AOSpine?

AOSpine's core activities are education and research. But no matter how great the educational concept or the research is, unless you have someone who communicates it and disseminates that information to the right target audience through the right channels, it's pretty much worthless because almost nobody will know about it.

"No matter how great the educational concept or the research is, unless you have someone who communicates it and disseminates that information to the right target audience through the right channels, it's pretty much worthless because almost nobody will know about it. That's where community development comes in."

That's where community development comes in: It's the facilitator of the outputs of research and education and manages marketing and communications initiatives within AOSpine, such as branding-related topics or streamlining of communication activities.

In addition, Community Development is in charge of the membership program.

People often tend to think that these are trivial activities. But I have learned that the people who think that often don't know anything about the skills needed to do this in a professional way.

When you were elected in 2015, what were your objectives and what do you consider your biggest achievements?

At the beginning in 2015, it was all about ensuring that people know what we are doing and what the purpose of community development is because it was regarded by many as something that's not necessary. My primary objective therefore was to create the awareness within AOSpine and the AO Foundation that community development is important because we can only survive as an organization if we look after our members and are in a constant dialogue with them.

We have achieved that. Today, community development activities are no longer questioned. I consider this my biggest achievement.

Of course, there are always things that can be improved. But I am very proud to say that we have come a long way and we have achieved a lot in the past three years. Some examples are the reduced fee for low-income countries, the loyalty program, automatic membership renewal, and the implementation of metrics.

"We are now working on a classification of osteoporotic vertebral fractures in the KF Trauma. Moving forward, we also are planning on a type of continuation of the project with an injury severity scale."

Member retention is also a very important topic for us. This is why we have established the ambassadors program. The program is, on one hand, a reward, a recognition for their activities and engagement and, on the other hand, it is the chance to keep them involved in the organization. There are only a few really committed people, and we realize that we need to look after them.

With around 6,500 members, AOSpine is the largest spine organization in the world. We managed to gain another 1,000 members since 2015, which is an overall increase of over 15 percent. That's substantial.

You were instrumental in establishing the member representative position in the AOSpine International Board. What was the idea behind this position?

Until 2016, there was only one way to join the international board: by working your way up through the country council, then the regional board, and then you could run for election for the international board. That classic career path takes a lot of time, around nine years, and excludes people who may be suitable for a board position but are scared away because of the politics and the long time frame.

The member representative position is different. Every member who fulfills the application criteria can run for that position. The members elect their representative democratically. Since we always have this election at the Global Spine Congress, and only attending voting members* are eligible to vote, the applicant from the region in which the congress is held is usually favored.

This is good because it ensures that it's not always the most solvent and well-known surgeons that are elected, but people who enjoy a lot of regional acceptance and who are committed to going the extra mile for the community.

This position is like a breath of fresh air as he or she does not represent a country or a commission and can articulate the needs of the members irrespective of regional or other interests.

This is one of the main differences between AOSpine and other organizations: AOSpine is a democratic organization.

Besides chairing the AOSpine Community Development Commission, you are also very active in the AOSpine Knowledge Forum (KF) Trauma. Can you tell us a bit more about that?

My activities there are mostly related to my personal history. I matured in classical surgery and traumatology. My current spectrum also very much includes degenerative spine surgery and deformities. When it comes to my everyday work, my range is very broad. However, my passion is spinal traumatology; that's where I have most of my experience and where I am strongly committed politically and scientifically in Germany. I was recommended to the AOSpine Knowledge Forum (KF) Trauma and acted from 2013 to 2015 as an associate. In 2015, I became an AOSpine KF Trauma Steering Committee member. We are now working on a classification of osteoporotic vertebral fractures in the KF. Moving forward, we also are planning on a type of continuation of the project with an injury severity scale.

"With around 6,500 members, AOSpine is the largest spine organization in the world. We managed to gain another 1,000 members since 2015, which is an overall increase of over 15 percent. That's substantial."

We are taking clinical and radiological aspects to decide how the patient will be treated. Once this is done, we'll work on a treatment recommendation. I'm responsible for this project because it is based on the related working group that I have led in Germany since 2012. I'm excited and proud to create an internationally valid classification and a treatment recommendation.

What advice do you have for young surgeons who are starting their careers?

I recommend doing a fellowship or even just short internships. In other words, do not only learn at your clinic but also take advantage of every opportunity outside your „home base" to develop further.

You learn so much from watching others, by discussing with peers and obtaining advice. It's a quantum leap in your individual development when you get to do that. The AOSpine membership offers great opportunities for that, even independent of the fellowship programs. Most of the surgeons do not mind if someone drops by for a short period of time. With the global network and contacts, it's fairly easy to do it, if you can afford it financially.

I also see a big opportunity in what the AOSpine Education Commission is currently establishing: hospital-based courses. So, instead of organizing a course that everybody needs to travel to and spend a lot of money, they go where the people are. I find that a positive development and see it as a great chance to improve your professional education and to network even with a smaller budget.

How did AOSpine support you personally or help you in your career development?

They gave me the chance to commit myself, to pass on my knowledge in spinal trauma as a faculty member and in the AOSpine KF Trauma. All of us who are involved with AOSpine share a joint interest and passion to improve spine care.

Thanks to my engagement, I have met so many people from all over the world and I have learned so much from them. I am very grateful for this. I am still fascinated to see how colleagues in other regions treat patients, the daily challenges they face and how they master the situation.

"Every member who fulfills the application criteria can run for the Member Representative position. The members elect their representative democratically. This is one of the main differences between AOSpine and other organizations: AOSpine is a democratic organization."

Here in Germany, we have a strong and stable spine community with a long tradition and we believe that what we are doing is fundamentally right. Sometimes, because of that, I believe that we are no longer open to other or new ideas. It's something that we must always keep in mind: staying open and knowing our own biases. Allow yourself to be open to other opinions and accept that things can be done differently. Seeing things from different points of view has contributed a lot to my personal development.

What do you recognize as the most valuable experience during your term as the AOSpine Community Development Commission Chairperson?

Being heavily engaged at the AO is time consuming, but when you are together with a group of people for several days and you discuss things very intensively, that also creates very strong bonds. A lot of personal friendships have developed over time, which otherwise I would never have had. That's what makes the AO special to me and I am very thankful for this.

I would also like to take the opportunity to thank the AOSpine Community Development team and my colleagues in the regions. I had the opportunity to work with a group of extremely professional and fascinating people and it was a very pleasant experience for me to lead this commission. I was backed up by a team that really got into it and took their jobs seriously. It's not always like that and it was a real highlight for me.

*AOSpine members that have been members for at least three consecutive years and who are present at the Global Spine Congress.

Governance changes and new ambassadors

AOSpine International Board—Governance changes

All Commission chairpersons will take over their new position after the Trustees Meeting in July 2018, except the Member Representative, who started his term at the Global Spine Congress Singapore in May 2018.

AOSpine International Chairperson
S. Rajasekaran (India), term July 2018–July 2021

Regional Board Middle East and Northern Africa Chairperson
Mohammad El-Sharkawi, term July 2018–July 2021

Research Commission Chairperson
Dino Samartzis (USA), term July 2018–July 2021

Community Development Commission Chairperson
Norman Chutkan (USA), term July 2018–July 2022

Member Representative
Massimo Balsano (Italy), term May 2018–May 2019

We wish everyone a successful term.

Meet the new AOSpine Member Representative-elect: Yan Wang

Yan Wang (China) was elected as the new Member Representative by the present voting members at the Global Spine Congress in Singapore. In his new role he will represent AOSpine members and their interests in the AOSpine International Board (AOSIB) and chair the Member Assembly at the Global Spine Congress.
All Commission chairpersons will take over their new position after the Trustees Meeting in July 2018, except the Member Representative, who started his term at the Global Spine Congress Singapore in May 2018.

He will join the AOSpine International Board as of their first meeting after the election without voting rights and start his official term as Member Representative with voting rights after the Global Spine Congress in Toronto 2019.

Yan Wang comments: "I am so honored and delighted to be elected as AOSpine member representative. AOSpine is a truly international network of spine surgeons that offers the opportunity to exchange knowledge with members from all over the world there is no doubt for me to get more involved in connecting with AOSpine members through AOSpine events and programs. I would like to express my gratitude to AOSpine for creating this great opportunity."

Prof. Wang is a citizen from China and serves as the chief surgeon of 301 Spine Center and 301 Orthopedics. Currently, he is the President of CAOS (Chinese Association of Orthopedic Surgeons) serving for over 120,000 Chinese orthopedic surgeons. He was the past president of COA (Chinese Orthopedic Association). He also continues his position as chairman of the Chinese Spine Society. Prof. Wang is very committed to making the opportunities to educate the next generation of spine surgeons and becoming an ambassador to bridge the members all over the world.
His vast expertise specializes in correction of spinal deformities. He recognized the need for and initially proposed a new spinal osteotomy method -VCD (Verterbral Column Decancellation) techniques and completed the book 'Spinal Osteotomy' which was published by Springer in 2014. Additionally, as the first author and co-responding author Prof Wang has published 98 peer reviewed manuscripts till now. Prof. Wang was elected as Deputy-editor of SPINE journal in 2008.

New AOSpine Ambassadors 2018

The AOSpine Ambassador initiative was successfully launched by the AOSpine International Board at the Global Spine Congress in Milan in 2017. The program aims to honor spine surgeons and researchers like you for outstanding contributions to AOSpine and to making it the leading society for the members of the global spine community.

By accepting the role of AOSpine Ambassador, you commit to representing the AOSpine values, promoting AOSpine as and its membership program, and collaborating on initiatives such as surveys and task forces upon request of the international or regional boards. The overall objective of these activities is to develop the AOSpine community and advance AOSpine's mission.


Mohamed Abdel-Wanis


Imad Ahmad


Khalid Alsaleh


Muhammed Assous


Amer Aziz


Massimo Balsano


John De Vine


Daniel Gelb

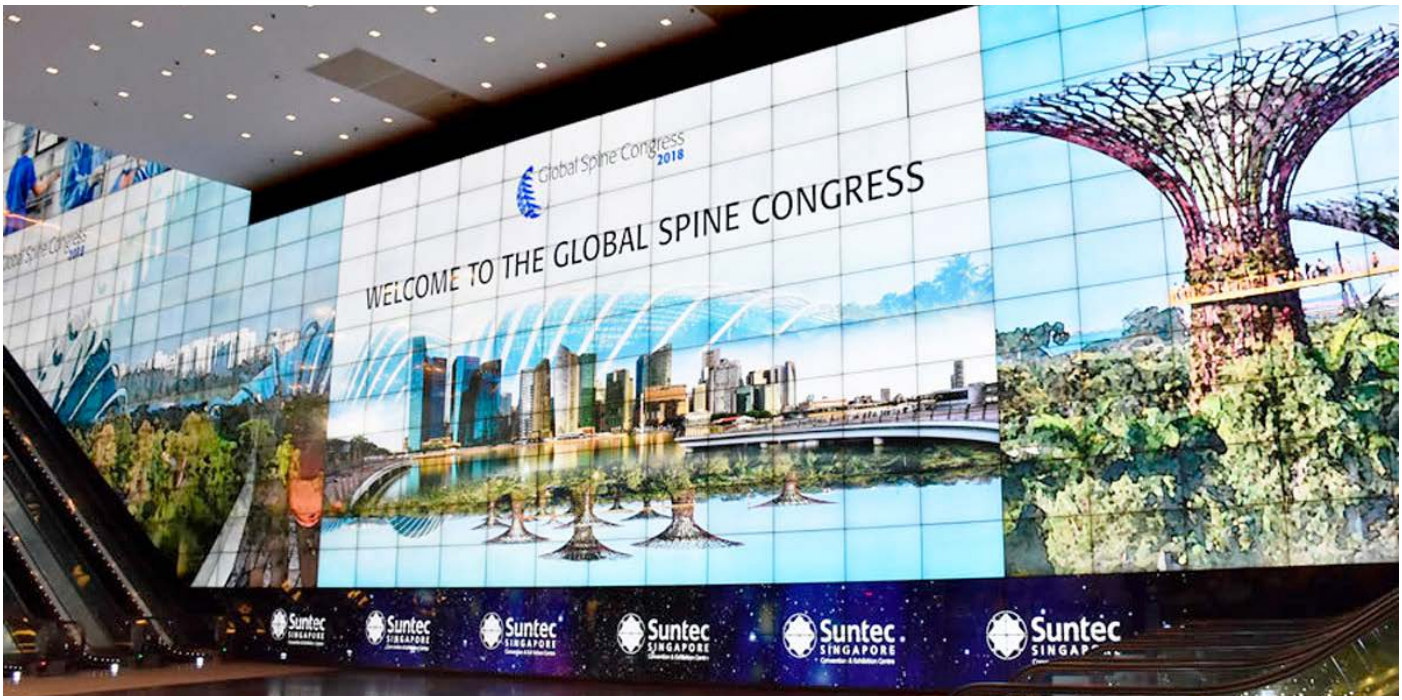

Ali Haghnegahdar


Carlos Tucci


Tim Yoon


Atik Uz Zaman


Zayed-al-Zayed



Another successful year for the Global Spine Congress

The Global Spine Congress (GSC) again successfully brought 1,700 spine professionals from all over the world to Singapore on May 2–5, 2018. Participants attended four days of GSC's scientific program showcasing the latest research, innovative techniques and cutting-edge technologies in spine surgery.

With the vision to create a truly global spine congress—gathering international speakers and participants, the GSC has experienced exponential growth since its inception in 2009. AOSpine's annual event provides a unique approach to sharing knowledge and developing new approaches to the treatment of spinal disorders to help advance spinal care and improve patient care.

Highlights from the GSC in Singapore:

- 1100 abstracts submitted
- 1700 international participants
- 171 expert speakers from 31 countries
- Symposia from 12 guest spine societies
- 46 sponsoring companies
- Scientific program which included pre-courses, AOSpine and society symposia

For the first time in GSC history, the scientific program featured three 1-day intensive cadaver workshops organized by the North American Spine Society (NASS). Also new this year, the GSC brought part of its scientific program straight to individual's homes, offices and hospitals through live streaming a select number of symposia.

With another successful year behind us, we now turn our attention to the next Global Spine Congress taking place in Toronto from May 15–18, 2019.

Don't miss this opportunity to submit your abstract and a chance to present your research to hundreds of spine specialists from all over the world.

The call to submit an abstract is open until September 15, 2018.

Take a look at the full list of categories and topics here: http://www.gsc2019.org/index.php/abstracts/abstract-submission

Abstracts accepted for the GSC appear in a special supplement to the Global Spine Journal—a great opportunity for you to have your work viewed worldwide in an internationally renowned spine publication.

Global Spine Journal—best paper and best reviewer award winners

Global Spine Journal Editors-in-Chief Jeffrey Wang, Jens Chapman and Karsten Wiechert presented the 2017 Global Spine Journal awards at Global Spine Congress in Singapore in May. The GSJ awards were given out to the top 2 papers published in 2017 and the top 2 reviewers of 2017. The criteria for Best Papers are as follows: only original research papers are considered, then the papers are looked at based on the quality of the work as well as the number of downloads and citations that the article has received.

The top two reviewers are chosen based on the amount of articles they reviewed in that year and the quality of the reviews they completed, cross referenced with their average R-score and the average amount of days it took them to complete their review.

All award winners receive a certificate as well as a cash prize. The corresponding authors on the top 2 papers receive a $400 cash prize and the top 2 reviewers receive $100 each.

The award winners are:

For Best Papers in 2017
Return to Play in Elite Contact Athletes After Anterior Cervical Discectomy and Fusion: A Meta-Analysis by Andrew C. Hecht, Samuel Overley, Sheeraz Qureshi, Wellington K. Hsu, Steven Andelman, Diana C. Patterson, Steven McAnany

Beyond Pelvic Incidence-Lumbar Lordosis Mismatch: The Importance of Assessing the Entire Spine to Achieve Global Sagittal Alignment By: Samuel K. Cho, Robert K. Merrill, Dante M. Leven, Joung Heon Kim

For Best Reviewers in 2017

Avery Buchholz
Philippe Bancel

If you are interested in becoming a reviewer for Global Spine Journal, please email your CV and areas of expertise to Danielle Lieberman at danielle.lieberman@med.usc.edu. If you are interested in submitting your research to Global Spine Journal, please visit mc.manuscriptcentral.com/gsjournal to submit your research and download instructions for authors. All of GSJ's content is available online at journals.sagepub.com/home/gsj.

Educational Award winners and Fellowship Alumni

Kenneth Cheung awarded Germán Ochoa Traveling Fellowship

The 'German Ochoa Traveling Fellowship' is aimed at senior AOSpine surgeons with a desire to act as ambassadors promoting AOSpine as a global community and a leader in spinal education.

Cheung comments: "German Ochoa was a dear friend. Being awarded a fellowship in his honor means a lot to me. We share ideals and passion in educating the next generation of spine surgeons, and the award is an additional impetus for me to continue this journey." During his fellowship, he plans to travel to Baku, Azerbaijan and Tibilisi, Georgia to teach, see patients and assist in surgeries.

Germán Ochoa
A founding member of AOSpine Latin America and the first chair-person of its Education Committee, in 2000 Germán Ochoa was elected as member of the AOSpine International Board for Education. He chaired the global AOSpine Education Commission 2011–2014. His involvement with AO Education for over 25 years speaks for his passion, immense experience in the academic field and exceptional contribution to bringing AO and AOSpine to the forefront of surgeon education.

Inspiration and Leadership—The Winners of the AOSpine Educator of the Year 2017 Awards

Nestor Fiore—AOSpine International Educator of the Year 2017 Award.

The AOSpine International Educator of the Year Award distinguishes a long standing and highly respected member of the AOSpine community who has demonstrated sustained and significant contribution to educational excellence.

The Review Committee consists of the current and past AOSpine Education Commission Chairpersons. The committee scores the nominees on their contribution to AOSpine education and their passion for surgeon education as well as their ambassadorial role within the community.

Nestor Fiore (BRA): "I consider the award an acknowledgment of my activities regarding the permanent changes in postgraduate medical education. It is very gratifying for me to be a member of this community that allows me to work in education, by contributing to the medical training universe for better patient care."

AOSpine Regional Educator of the Year 2017 Award winners:
Matti Scholz (Europe)
Amer Aziz (Middle East)
Abhay Nene (Asia Pacific)
Daniel Gelb (North America)
Luiz Gustavo Dal Oglio Da Rocha (Latin America)

Each winner has been honored by AOSpine for their leadership in educating surgeons. They are all experienced educators in their respective regions and act as AOSpine faculty at a local, national, and international level. They all share a passion for high-quality teaching with great motivation, inspiration and enthusiasm, and have demonstrated tremendous commitment in passing on their knowledge and experience to other spine surgeons.

The winners were announced at Global Spine Congress in Singapore.

Daniel Gelb

"I am extremely flattered to receive this award. AOSpine is the pre-eminent spine educational organization in the world. To be recognized by your peers for such an award is a great honor. This award inspires me to continue to improve spine education for North America and the world."

Abhay Nene

"To be selected as the regional educator of the year in a group that consists of the who's who of Spine - is an immense honour obviously.... but the best part is that this reward comes for doing what I love to do- teaching. I thank AOSpine for giving me a boost to continue teaching and learning in true AO style."

Amer Aziz

"AO spine truly recognises excellency in education and motivates to do even better. This award is like a boost and encourages me to continue giving my best for AO spine educational activities. A magnificent way to thank the AO spine faculty and has given me a great sense of pride."

Luiz Gustavo Dal' Oglio da Rocha

"The Regional Educator of the year award means not only the recognition of the role we play as faculty but also is a motivational way of stimulating those engaged with the AOSpine educational project. It's such a motivation to win this award!"

Matti Scholz

"After a long journey with AOSpine this award means a lot to me. It is a confirmation of my work done in the past and a motivation for the ongoing work in education of the future generation of spine surgeons."

Congratulations AOSpine Fellows Alumni Steering Committee

Fellows Alumni activities well received during the Global Spine Congress 2018.

In 2015 the AOSpine International Board considered that AOSpine's past fellows did not get the correct attention deserved after they had finished their fellowships and therefore tasked the AOSpine Education Commission to devise a plan to ensure all AOSpine fellows felt a valued part of the community after their fellowship experience.

In Dubai during the GSC 2016 the first dinner for past fellows was held and the concept of forming a Fellows Alumni was discussed. Out of this meeting a Fellows Alumni Steering Committee was formed with interested members from Europe and the Middle East. Tarek ElHewala, (Egypt), Harry Gebhard, (Switzerland), Cordula Netzer, (Switzerland) were the founding members with Rick Bransford (USA) and Kenny Kwan (Hong Kong) joining later in 2018.

In Milan at the GSC 2017 the alumni association was officially launched with a reception and exclusive scientific sessions for the members during the congress. After extensive research from the AOSpine Fellows Alumni Steering Committee they decided to hold a dinner in Singapore for all alumni members and AOSpine Ambassadors plus two sessions during the congress: one discussing the various pathways members of the organization can take to become more involved, and one providing a practical session on teaching techniques. All 3 activities were well received and in the future additional marketing will be done to optimize the experience for those who join.

The Fellows Alumni Steering Committee will continue to work towards offering more benefits to its alumni members and AOSpine would like to officially thank the founding members:

Tarek ElHewala

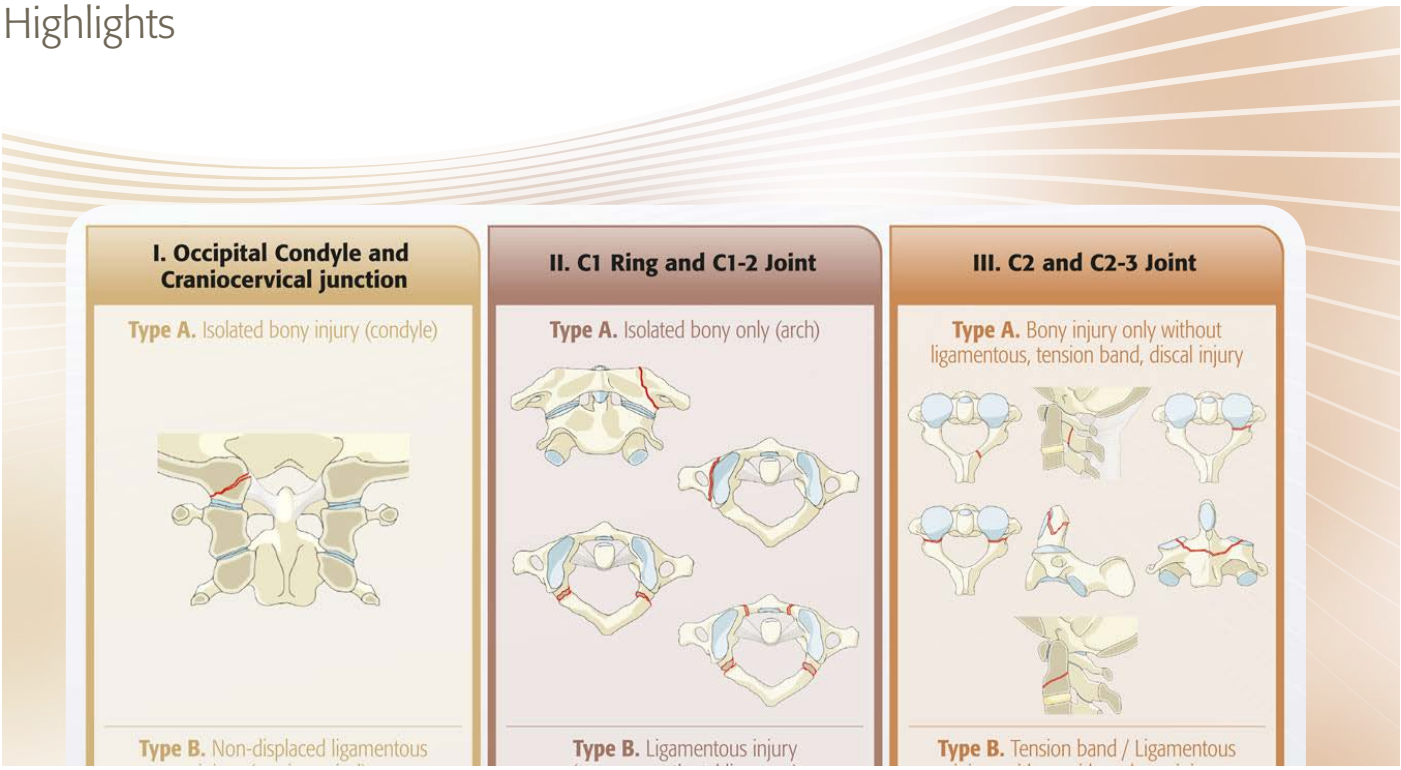
Harry Gebhard

Cordula Netzer

And the new members

Rick Bransford

Kenny Kwan



AOSpine launched the Upper Cervical Classification at the Global Spine Congress in Singapore

Watch the video with Alexander Vaccaro, download the toolkit and start using the classification today: www.aospine.org/classification

AOSpine Research Commission marches ahead with globalization and metrics assessment

The AOSpine Research Commission (AOSRC) has successfully developed AOSpine into a premier knowledge provider in the field of spine surgery. "The two new initiatives—globalization and devising rigorous metrics for evaluating performance in all spheres of activity—have improved the research commission's impact and output considerably," says outgoing AOSRC Chairperson Professor S. Rajasekaran. Working closely with the AOSpine Education and Community Development Commissions, the next phase is to disseminate and implement the findings to the spine community.

The five AOSpine Knowledge Forums (KF) are the main engines for clinical research—which rose to the forefront of AOSpine research in S. Rajasekaran's term—and are now integrated in the AOSRC through the KF Chairpersons. The KFs have evolved from a group of hand-picked key opinion leaders into truly international study platforms. From 37 clinical studies, the KFs have published 125 peer-reviewed articles and presented 240 abstracts in international conferences. In his new role as Chairperson of the AOSpine International Board, S. Rajasekaran will continue the globalization, to build our world-wide spine community, and to motivate universal research participation.

"The KFs have evolved from a group of hand-picked key opinion leaders into truly international study platforms."

AOSpine network fueling globalization

In recent years the AOSRC has witnessed a major change in how research projects have been implemented. The globalization initiative aims to respond to this shift and to produce more impactful research that is relevant to spine specialists globally.

Two years ago, the AOSpine International Board pledged one million Swiss Francs for new projects to promote globalization. A precondition was to involve more than one AOSpine Region and at least one

KF. From more than 30 proposals, funds were awarded to three clinical studies, which are now underway:

AOASD—Development of a novel adult spinal deformity classification; PEPSO—Understanding patient expectations and perceptions in spinal oncology; and SDIM—Spinal deformity intraoperating monitoring study.

Efforts are also underway to improve KF reach via global collaboration with prominent spine centers worldwide. The KF Tumor research and outcomes networks for metastatic and primary tumors (MTRON and PTRON) now involve 30 clinics and have attracted a group of 40 associates from all AOSpine Regions; and the KF Trauma Burst Fractures TLA3/4 study has 15 participating clinics from Asia-Pacific, North America, Europe, and the Middle East.

"The globalization initiative aims to produce more impactful research that is relevant to spine specialists globally."

With an extra impulse from the AOSRC's mentorship program where surgeons from across the world were introduced to hands-on research, globalization is becoming an organic process. Building on an initiative first developed by Dan Riew, the program was expanded by bringing entire surgical units into guided research projects. Five units, one from each region, were selected through an open call and participated in an international multicenter pilot study on "Inter-rater variability for CT based assessment of posterior ligament complex in thoracolumbar fractures (T11-12)". The results of the study will be published soon.

"Globalization is becoming an organic process."

The surgical units of five sites representing all five AOSpine Regions were selected to the Mentorship project in an open call. They successfully performed an international multicenter pilot study on "Inter-rater variability for CT based assessment of posterior ligament complex in thoracolumbar fractures (T11-12)."

Success that can be measured

To increase the quality and impact of AOSpine research and to add transparency and accountability, five years ago the AOSRC introduced strict self-evaluation metrics. "No such system can ever be completely foolproof, so we are constantly reviewing the indicators and finding new ways to measure performance and success. AOSpine hopes to lead and set an example through innovative initiatives like this," S. Rajasekaran adds. In addition to measuring achievements by number of publications or Impact Factor, the AOSRC has included evaluation of educational value, social impact, and for value for money.

"We are constantly reviewing the indicators and finding new ways to measure performance and success."

The final take-away from S. Rajasekaran's AOSRC meetings was defining priorities and hot topics for future research. "The current mantra is precision medicine and personalized spine care. Evolving low cost-high quality health care is also high on the agenda for the future," S. Rajasekaran explains. This will be achieved by continuing bench-to-bedside research, followed by dissemination into the community. "I am pleased to be able to pass on the legacy I inherited from Dan Riew to Dino Samartzis. Dino is an outstanding research personality known for his hard work, vision and integrity. There is no doubt that AOSRC will make further progress under his direction."

"The current mantra is precision medicine and personalized spine care."

Jens Chapman, Marcel Dvorak, S. Rajasekaran, Lorin Benneker, Frank Kandziora, Cumhur Öner (Chairperson), Klaus Schnake, Emiliano Vialle and María Alvarez Sánchez at the AOSpine Knowledge Forum Trauma Steering Committee meeting in Singapore, May 2018

Important goal for AOSpine study defining treatment guidelines for Thoracolumbar Burst Fractures—Eastern Europe and Middle East pacing patient recruitment

A study aimed at defining optimal treatment for thoracolumbar burst fractures in neurologically intact patients currently enrolled 117 patients, more than half the total sample needed to complete the study. A specific subgroup analysis will be performed on those cases classified with true equipoise. The AOSpine Knowledge Forum Trauma study is an example of successful research globalization and what mentorship at its best can lead to.

While burst fractures account for almost half of all thoracolumbar spine injuries, there is significant variability in care provided. "We all have experienced this", Principal Investigator (PI) Marcel Dvorak says. "Residents or fellows often recommend treatment that we would not necessarily consider; another attending may have treated what we consider to be a surgical fracture non-operatively. Even a case discussion at an AO meeting does not always results in a real consensus."

"We have all experienced the variations in care provided."

The controversy is fueled by studies pointing to different directions: some studies show increased patient satisfaction and positive socio-economic results with surgical treatment; others demonstrate improved outcomes and lower morbidity with non-surgical treatment.

AOSpine strives for best evidence-based care

To address the variations, the AOSpine Knowledge Forum Trauma is performing a prospective cohort analysis and investigating the clinical outcomes of treatment alternatives. The observational international multicenter study will investigate whether surgical compared to non-surgical treatment leads to a better clinical outcome during the first year after the primary treatment.

An additional analysis will look more specifically at a sub-group of patients, who—according to a blinded expert panel—would qualify for both surgical and non-surgical treatment due to clinical equipoise. In addition,

a cost-effectiveness analysis will be performed to define the social impact and to measure the health economic aspects for the different treatment options. A patient diary includes the Oswestry Disability Index and employment information with an indirect costs questionnaire. The diary will continue two years after treatment and all interventions and examinations are considered as standard of care.

"The AO is committed to collecting the evidence required to inform the best care for our patients."

The study group expects to finalize patient enrolment by the end of 2019 and get the first answers in a few years.

"What we need to do is to continue to rely on our personal experience and patient preference, but to infuse this with some carefully collected prospective outcomes data that can inform our discussions and decision making", Dvorak says. "Variation in clinical practice can be healthy, but when it occurs in the environment of a lack of objective patient-based outcomes, it can lead to over or under-treatment. The AO is committed to collecting the evidence required to inform the best care for our patients."

Global participation secures comprehensive sample

The participating sites were selected across the world through an open call to AOSpine members. A total of fifteen clinics representing four regions were finally included in the study: from Greece, the Netherlands, Romania, Spain, Switzerland, Egypt, Australia, India, Canada, and USA. "We included centers with different philosophies and everyone treats the patients as they think is best," co-PI Cumhur Öner explains. "We are following these patients using the same terminology and same outcome instruments to create parallel cohorts of similar injuries treated in different ways. We hope this will give us clarity and understanding to why there is such a variation."

"We hope this study will give us clarity and understanding to why there is such a variation."

In addition to Öner from the Netherlands, major contributors include Shanmuganathan Rajasekaran from India, and Mohammad El-Sharkawi from Egypt. El-Sharkawi's trauma center in Assiut receives 600 patients with thoracolumbar fractures each year, seven operating theatres running 24 hours a day through the week. Half of the injuries are caused by motor vehicle accidents. A high number of patients also come in after falling from heights on construction sites, due to poor safety measures. "Interestingly, in Switzerland we also get many high energy accidents, because we are so close to the mountains", Lorin Benneker adds. On the other hand, North America and Europe have a growing number of osteoporotic fractures, which is an exclusion criterion in the study and adds to the challenge in recruiting patients in these regions.

"No patient should have to make a decision based on anything but solid knowledge."

By far the biggest contingent of patients—including the milestone one hundredth patient—has been recruited by Cezar Popescu from the "Prof. Dr. N. Oblu Emergency Hospital" in Iasi, Romania. Popescu's department annually admits up to 80 patients with such fractures, and he addressed the difficulties involved in recruitment early. "We knew our teams must really be ready anytime to properly examine the potential candidates, to explain the terms to the patients and their families, and to get written acceptance."

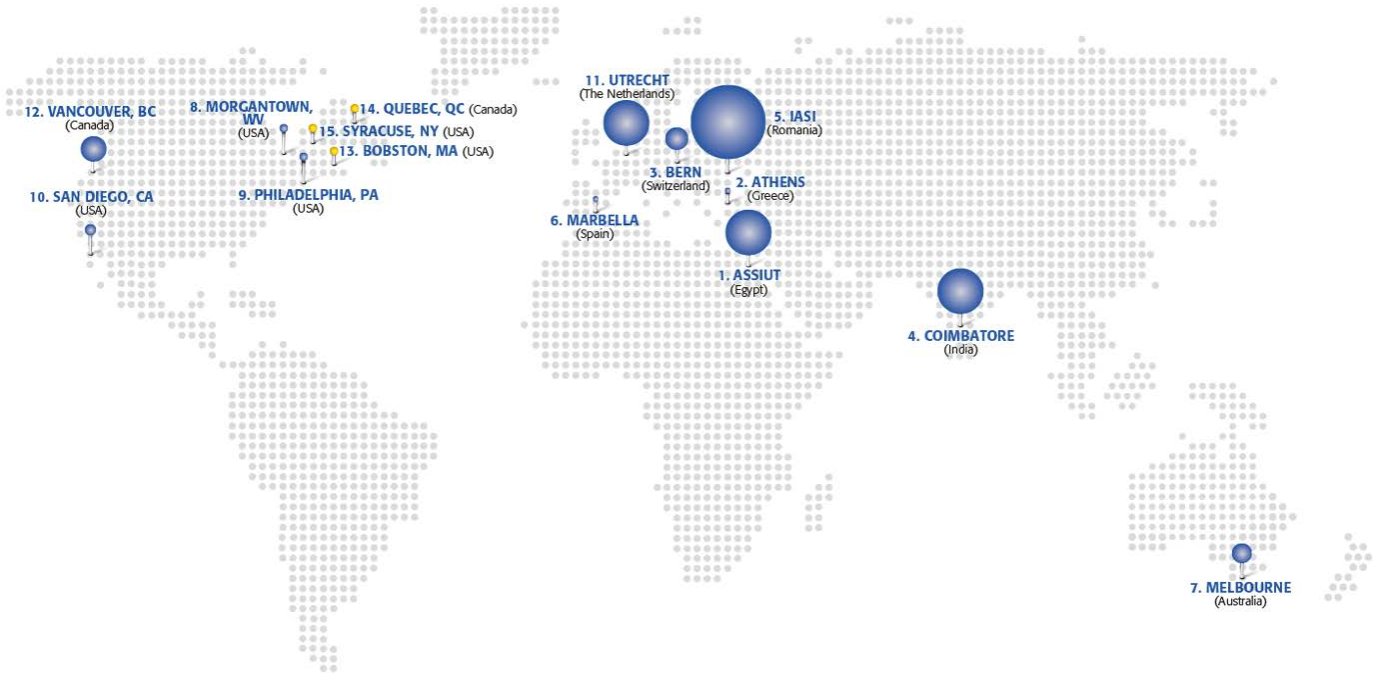
AOSpine programs open research to new centers

Popescu's career inclined towards research through a fellowship in spine surgery in Budapest, Hungary, with the reputable AOSpine Knowledge Forum Member Péter Pál Varga as mentor. El-Sharkawi got into AOSpine research when the Assiut University Hospitals participated in a Research mentorship program. AO Clinical Investigation and Documentation (AOCID) organized training sessions and the team learned hands on research in the mentored PAM study.

"We had some challenges to match our data collection to the PAM study, but we managed. When recruitment in the Thoracolumbar Burst Fractures AOSpine A3/A4 study was slow and some centers were not coping, we were excited to join", El-Sharkawi recalls confirming the clinical need. "This is a grey zone. If I decide a fracture is stable and the patient may be treated conservatively, for sure, before he reaches home, someone else will suggest surgery based on their experience", El-Sharkawi explains and says patients are more likely to accept surgery. "Surgery is not as risky as before, patients become suspicious with other treatment options. Only with solid data to rely on, we can make a change and avoid unnecessary surgery."

"If I decide the patient may be treated conservatively, for sure, before he reaches home, someone else will suggest surgery."

El-Sharkawi hopes for more opportunities to work with international organizations in studies such as the Thoracolumbar Burst Fractures AOSpine A3/A4, and opportunities to mentor younger surgeons in how to perform clinical studies.



1. Mohammad El-Sharkawi, Assiut University Hospitals, Assiut, Egypt
2. Spiros Pneumaticos, University of Athens, "KAT" Trauma Hospital, Athens, Greece
3. Lorin M. Benneker, Inselspital, Bern, Switzerland
4. S. Rajasekaran, Ganga Hospital, Coimbatore, India
5. Eugen Cezar Popescu, Prof. Dr. N. Oblu Emergency Hospital, Iasi, Romania
6. Ana María Cerván, Hospital Universitario Costa del Sol, Marbella, Spain
7. Jim Wee Tee, Alfred Health operating through the Alfred Hospital, Melbourne, Australia
8. John C. France, West Virginia University Department of Orthopaedics, Morgantown, WV, USA
9. Alexander R. Vaccaro, Rothman Institute, Philadelphia, PA, USA
10. Richard Allen, University of California, San Diego Medical Center, San Diego, CA, USA
11. Cumhur Öner, UMC Utrecht, Utrecht, the Netherlands
12. Marcel Dvorak, Vancouver General Hospital, Vancouver, BC, Canada
13. Stuart Hershman, Massachusetts General Hospital, Boston, MA, USA
14. Jérôme Paquet, Hospital l'Enfant Jesus, Centre Univeritaire de Quebec, Quebec, QC, Canada
15. William Lavelle, SUNY Upstate Medical University, Syracuse, NY, USA

The fifteen participating sites representing four AOSpine Regions are on target to enroll 208 patients by end of 2019. Pin size represents volume of patients recruited at study site. Yellow pins are study sites opening soon

The AOSpine Knowledge Forum Trauma sponsored study is performed with the AO Clinical Investigation and Documentation support. More information on the "Thoracolumbar burst fractures (AOSpine A3, A4) in neurologically intact patients: An observational, multicenter cohort study comparing surgical versus non-surgical treatment" -study can be found on: clinicaltrials.gov

For more information on KF Trauma and the ongoing studies, go to www.aospine.org/kf-trauma

AOSpine KF Tumor meeting during the Global Spine Congress in Singapore, May 2018

Improving spine cancer patients' quality of life—AOSpine validates the first spine oncology-specific patient-reported outcome measure

Health-related quality of life (HRQOL) questionnaires can be used to monitor a patient's general health status, a hospital's performance as a healthcare provider, or even an entire population's health over time. They can also help patients to understand what to expect with treatment. Until now, there has been nothing specific to measure the quality of life of people with spine oncology problems. To fill the need, the AOSpine Knowledge Forum (KF) Tumor validated and adapted the questionnaire. Using this tool, they will look for predictive factors and explore patient expectations, so that the questionnaire will not only evaluate, but serve to improve spine cancer patient's quality of life.

"This is quite an impactful accomplishment and a particularly challenging population to validate psychometrically", Principal Investigator (PI) Charles Fisher explains. "Like any outcome instrument, it allows us to test our interventions—be it radiation, medical, or surgical—to make sure the patient is improving. It will make us more confident in the evaluation of our interventions."

"It allows us to test our interventions to make sure the patient is improving."

The paper was published in Cancer* this Spring. Lead author, Anne Versteeg stresses the validated Spine Oncology Study Group Outcomes Questionnaire (SOSGOQ2.0) is a reliable measure and encourages clinicians to incorporate it into their practice. "We should use it in the spine oncology population to evaluate which patients are improving and who don't." Her advice is to use it in combination with a generic instrument, such as EQ-5D, SF-36, or PROMIS, so that it is easy to compare results to other studies and pathologies.

"Importantly, with the SOSGOQ2.0, we could see differences between patients within the population, which is what you want. Seriously disabled patients have lower scores compared to those who are doing better. With the SOSGOQ2.0, you can see the differences between them."

"By combining patient characteristics

and outcomes, we would like to be able to predict if a patient has a good chance of improving their quality of life or not."

EPOSO, the international, multicenter, prospective, observational study enrolled a diverse cohort of 238 patients with spinal metastases, including patients who underwent surgery and radiation therapy alone. The Cancer article stood out to the AOSpine Europe's Young Researcher Award judges, and Versteeg was awarded first place to support the translation of the questionnaire into different languages and to determine what constitutes a meaningful change for a patient. The research also won Best Paper Award at the 30th European Musculo-Skeletal Oncology Society meeting (EMSOS2017).

A framework for future studies

The SOSGOQ2.0 provides a framework for further studies. These include: economic evaluations, to develop an oncology utility; to assess patient expectations; to determine factors that are linked with improvement of quality of life after treatment; and to measure patient satisfaction.

KF Tumor wants to find out which patients respond well to treatment and which do not and plans to use this new tool to search for predictive factors. "By combining patient characteristics and outcomes, we would like to be able to predict if a patient has a good chance of improving their quality of life or not. For these patients, it's really about quality of life and how to improve their quality of life for their remaining time", Versteeg says.

"We are exploring also patient satisfaction with this tool."

The study group is further exploring patient satisfaction with this tool. In general, patients should be satisfied with their treatment. But as Versteeg points out, satisfaction is based on personal experience and expectations, which makes it difficult to measure. "Sometimes the patient can improve, but if they are not satisfied, that's also important to know. If they undergo an invasive surgical procedure and have to stay in hospital for weeks with a life expectancy of six months and they are not satisfied with the outcome … that's pretty harsh."

"It is equally important to continue to do studies using the instrument, to publish, and to present results at both spine meetings and cancer meetings, so that people know it is out there and see it is used."

The questionnaire is currently being validated in Hungarian and Dutch, it has been translated into German, and external parties have expressed interest to translate it into Thai and Russian. Fisher wants to see the SOSGOQ2.0 become the standard outcome measure for evaluating interventions in spine oncology. A broad working group including other disciplines—such as pain doctors and oncologists from outside AO—would stimulate general acceptance; other professional societies' endorsement would support finding consensus and development of universal guidelines. "It is equally important to continue to do studies using the instrument, to publish, and to present results at both spine meetings and cancer meetings, so that people know it is out there and see it is used."

This AOSpine sponsored study has been performed with AO Clinical Investigation and Documentation.

Download the patient-reported outcomes questionnaire SOSGOQ2.0 www.aospine.org

* Versteeg AL, Sahgal A, Rhines LD, Sciubba DM, Schuster JM, Weber MH, Varga PP, Boriani S, Bettegowda C, Fehlings MG, Clarke MJ, Arnold PM, Gokaslan ZL, Fisher CG, AOSpine KF Tumor. Psychometric evaluation and adaptation of the Spine Oncology Study Group Outcomes Questionnaire to evaluate health-related quality of life in patients with spinal metastases. Cancer 124(8): 1828–1838, 2018.

Read the full open access article in Cancer doi.org

More information on KF Tumor www.aospine.org/kf-tumor

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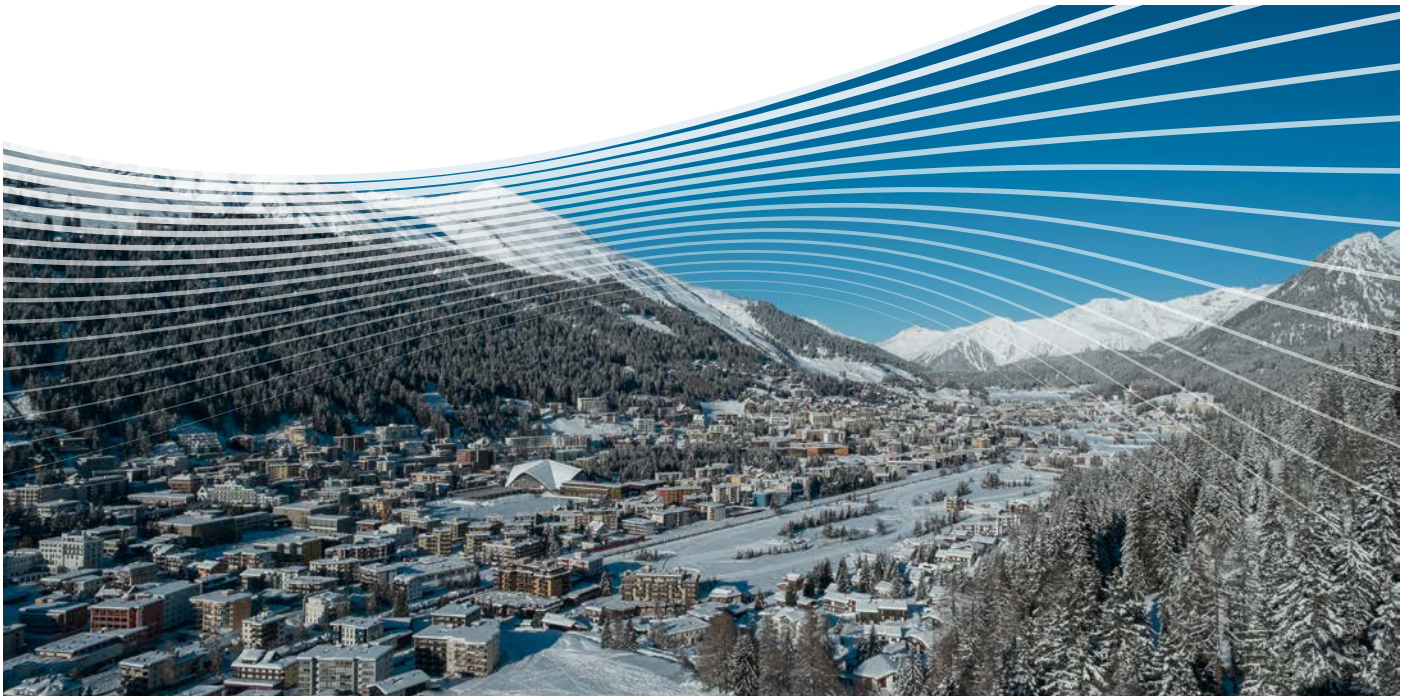

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Over the past few months, we have worked hard on improving and reworking the educational format of the courses to take them to the next level.

This year's Davos Courses, which will take place from 8–11 December 2018, will be entirely focused on minimally invasive spine surgery (MISS).

You will have the opportunity to register for three different courses, and:

- train the usage of the microscope
- train the usage of the endoscope
- work on percutaneous fixation

Each course contains two modules (microdecompression and endoscopy, endoscopy and percutaneous fixation, or microdecompression and percutaneous fixation), with both case discussions and hand's on sessions on a life-like simulator as well as online course preparations.

This will be an outstanding opportunity to train skills with world-renowned MISS experts, as always there will be ample time for discussions and networking.

Also, we will stage again "The good, the bad, the ugly—A case that taught me a lesson" discussions in the afternoon—a great chance to benefit from the experiences of others and to talk about best practices with your peers.

There are only a few seats left! Register now on www.aodavoscourses.org

Davos Courses Preliminary Program: http://aodavoscourses.org/files/davos-courses-2018-preliminary-program-21-june.pdf

We look forward to seeing you in December!