



44<sup>th</sup>  
Annual  
Meeting  
ATHENS GREECE

MAY 29

JUNE 02

FINAL PROGRAM



The International Society for the Study of the Lumbar Spine

## Program at a Glance

MONDAY MAY 29	TUESDAY MAY 30	WEDNESDAY MAY 31	THURSDAY JUNE 1	FRIDAY JUNE 2
<b>07:00-08:00</b> Program Committee Meeting	<b>07:00-07:45</b> <b>Breakfast</b>	<b>07:00-07:45</b> <b>Breakfast</b>	<b>07:00-07:30</b> <b>Breakfast</b>	<b>07:00-07:45</b> <b>Breakfast</b>
<b>08:00 -09:00</b> Membership Committee Meeting	<b>07:45</b> Welcome by Local Hosts & Program Chair	<b>07:45-08:45</b> Special Poster Session I	<b>07:30-09:30</b> Scientific	<b>07:45-08:45</b> Special Poster Session II
<b>08:00 -12:00</b> Focus Groups	<b>08:00-10:00</b> Scientific	<b>09:00-10:00</b> Scientific	<b>09:30-10:00</b> <b>COFFEE</b>	<b>09:00-09:30</b> Report of Focus Groups
<b>9:30-11:30</b> Strategy Group Meeting	<b>10:00-10:30</b> <b>COFFEE</b>	<b>10:00-10:30</b> <b>COFFEE</b>	<b>10:00-10:20</b> Fellowship and Awards	<b>09:30-10:00</b> Scientific
<b>12:00-15:00</b> ExCom Meeting	<b>10:30-11:30</b> Scientific	<b>10:30-11:00</b> Scientific	<b>10:20-11:30</b> The ISSLS Prize Papers	<b>10:00-10:20</b> <b>COFFEE</b>
<b>13:00-16:00</b> Focus Group	<b>11:30-12:00</b> Invited Lecture (Prof. Moussas)	<b>11:00-11:40</b> Presidential Address	<b>11:30-12:00</b> Invited Lecture (Prof. Askitopoulou)	<b>10:20-11:50</b> Scientific
<b>15:00-onward</b> Registration Opens	<b>12:00-13:30</b> <b>LUNCH</b>	<b>11:40-12:20</b> Harry Farfan Presidential Lecture (Prof. Korres)	<b>12:00-13:30</b> <b>LUNCH</b>	<b>11:50-12:10</b> Announcement – Best paper and poster awards/
<b>16:30-17:30</b> Women’s ISSLS	<b>13:30-15:20</b> Scientific	<b>13:00</b> Afternoon Outing	<b>13:30-15:00</b> Scientific	Closing remarks/ Meeting adjourned
<b>18:00-20:00</b> Welcome Reception	<b>15:20-15:50</b> <b>COFFEE</b>		<b>15:00-16:00</b> General Poster Session	<b>13:30-18:30</b> ISSLS-AOSpine Symposium - Sagittal Balance and its Implications in Spine Surgery (separate registration)
	<b>15:50-16:30</b> Scientific		<b>16:00-17:30</b> Scientific	
	<b>16:30-17:30</b> Symposium #1		<b>17:35</b> Second Business Meeting	
	<b>17:30-18.10</b> First Business Meeting		<b>19:00</b> Dinner Banquet	

## Dear Friends and Colleagues,

It is our esteemed honor to welcome you to the 44<sup>th</sup> Annual Meeting of the International Society for the Study of the Lumbar Spine (ISSLS) in Athens, Greece on May 29<sup>th</sup> to June 2<sup>nd</sup>, 2017.

Situated in Southern Europe and known as the “cradle” of Western civilization, Athens is located at the crossroads of three continents and has been a hub of many cultures. Throughout its near 6,000 years of history, Athens has played a seminal role in introducing the world to theatre, mythology, philosophy, science, medicine, and democracy. Equally important, the foundations of the spine discipline are deeply rooted in the annals of this country.

Athens is also a modern metropolitan center of incomparable charm and great interest. It is considered one of Europe’s safest capitals, known to have user-friendly transportation networks, an award-winning airport and port terminus, numerous world-class museums and archeological sites, hundreds of restaurants to satisfy every taste, endless markets and shopping opportunities, nightlife to cater to every desire, and a landscape fusing the breathtaking blue water of the sea with its mountainous terrain. In addition, Athens is the gateway to over 2,000 charming and unique Greek islands that consist of mesmerizing beaches and resorts, historical sites, and opportunities for rest and relaxation on the Mediterranean. Among this setting, our meeting will take place at the Hilton Hotel located in the center of the city and in a short distance from the Acropolis. It is also an excellent base to explore a lively city, numerous archaeological sites and many attractive locations.

The scientific program provides an excellent opportunity for prominent as well as younger researchers and clinicians to present their recent scientific findings. During the week, we will also offer two unique symposia, one focusing on translational and commercialization of research and the other on the pros and cons of minimally invasive lumbar spine surgery. We will have three eminent invited guest speakers that are sure to motivate and inspire. Furthermore, for the first time, ISSLS has partnered with AOSpine to offer a superb course helmed by an international faculty and leaders in the field addressing “Sagittal balance and its implications in spine surgery” to be held on Friday afternoon, June 2<sup>nd</sup>. Nestled among the scientific events, we will also provide a social program that will be exceptional and unforgettable, providing you an unparalleled opportunity to meet new friends and exchange ideas. For further convenience, the entire program will also be provided via our customized APP, which is available in both the Apple and Android online stores for easy download.

We look forward to welcoming you in person at the 44th Annual Meeting of ISSLS in Athens!

Sincerely,

Dimitris Kletsas and Dino Samartzis

### **Local Hosts**

Dr. Theodoros B. Grivas

Dr. Dimitris Kletsas

Dr. Thomas Patsiaouras

Dr. Odysseas Paxinos

Dr. Dino Samartzis

Dr. George Sapkas

Dr. Constantin Schizas

### **Organizing Committee**

## Dear Friends and Colleagues,

On behalf of the ISSLS executives, I would like to welcome you all to our 44<sup>th</sup> Annual Meeting at this historic city of Athens. This is the second year the scientific committee has adopted a new system for reviewing the abstracts, making the selection process more transparent and efficient. Credit must also go to the many volunteer reviewers. I hope you will enjoy the high-quality of the scientific presentations and participate actively in the discussions.

What you cannot afford to miss in the program are the Invited Lectures. We all know Greece has contributed tremendously to world science and history. It is with great honor that our local hosts Drs Dino Samartzis and Dimitris Kletsas have invited for us three top academicians to speak on Greek archeology, mathematics and medical ethics. I guarantee you these lectures will be the highlight of this meeting.

At the Award ceremony on June 1<sup>st</sup>, the ISSLS will be honoring one of our respected senior members with the life achievement award. Please join us then.

This year is the first time we will jointly conduct a half day post-meeting symposium with another society, AOSpine, when many local Greek surgeons who will also be joining. We hope this will provide an additional platform for interaction between our basic scientists and clinician members bringing our research work from the bench to the bedside. Please make sure you stay behind for this final part of OUR meeting.

See you in Athens.

Keith DK Luk

**President ISSLS 2016-17**

## WiFi

**Name of WiFi:** HHonors network

**Log-in:** ISSLS2017

Kindly note the following procedure for login with your access code:

- First, you need to turn on your Wi-Fi and connect to HHonors network.
- Then, you open your web browser and you should see the StayConnected welcome page; if not, type [www.hilton.com](http://www.hilton.com).

The steps you need to take on this page are:

1. Tick the box next to “I agree with general Terms and Conditions”
2. Enter the code that was issued for you (ISSLS2017)
3. Press “Connect” to acquire internet access.

## APP – ISSLS 2017

**All abstracts and information can be found this year in the ISSLS 2017 APP.**

**APP download instructions:**

**Option1:** Keyword search on iOS APP Store (ISSLS2017) OR Google Play Store (ISSLS2017)

**Option 2:** Scan the QR code (attached) using a QR scanner APP on your smartphones and you will be directed to the APP download link.

**Option 3:** APP URL is <https://crowd.cc/s/zCAA>. When you type this URL on your smartphone web browser, you will be automatically directed to the APP download link.

***All abstracts and information can be found in the ISSLS 2017 APP.***



## Monday – May 29, 2017

- 07:00-08:00            **Program Committee Meeting**  
(for program committee members only)  
Room: Executive Lounge
- 08:00-09:00            **Membership Committee Meeting**  
(for membership committee members only)  
Room: Executive Lounge

### 09:00- 12:00 FOCUS GROUP SESSION #1

- 08:00-12:00            **Degenerative Spinal Phenotypes Focus Group – Creating a common language to advance knowledge**  
*Contact persons: Michele Battié and Dino Samartzis*  
**COMBINED WITH**  
**International Taskforce on Diagnosis and Management of Lumbar Spinal Stenosis**  
*Contact persons: Christy Lane and Markus Melloh*  
Room: Erato B
- 09:30-11:30            **Strategy Group Meeting**  
Room: Erato A
- 12:00 - 15:00            **Executive Committee Meeting** (for ExCom members only)  
Room: Erato A

### 13:00-16:00 FOCUS GROUP SESSION #2

- 13:00-16:00            **Current Stem Cell Research in the Intervertebral Disc**  
*Benjamin Gantenbein and Daisuke Sakai*  
Room: Erato B
- 16:30 - 17:30            **Women's ISSLS**  
*Gwendolyn Sowa and Grace O'Connell*  
Room: Erato B
- 18:00 - 20:00            **Welcome Reception**  
Room: Terpsichore D

## Tuesday – May 30, 2017

07:45- 07:50 Welcome - Dino Samartzis and Dimitris Kletsas

07:50-08:00 Program Chairman - Yoshiharu Kawaguchi

### SESSION #1 DISC HERNIATION AND DEGENERATION

Moderators: Keith DK Luk and ST Yoon

- 08:00-08:05 1 A realistic disc herniation model employing complex motion and a micro-level damage analysis  
*Kelly Wade, Meredith Schollum, Ashvin Thambyah, Peter Robertson, Neil Broom; Germany*
- 08:07-08:12 2 Could disc wall structural abnormalities be responsible for herniation?  
*Kelly Wade, Nikolaus Berger-Roscher, Marija Josipovic, Volker Rasche, Fabio Galbusera, Hans-Joachim Wilke; Germany*
- 08:14-08:19 3 The effect of an anti-nerve growth factor (NGF) treatment by nerve root infiltration for lumbar disc herniation  
*Shinobu Seki, Miho Sekiguchi, Shin-ichi Konno; Japan*
- 08:21-08:30 *Discussion*
- 08:30-08:35 4 Development of lumbar disc degeneration in cadherin 2 mouse mutant  
*Changli Zhang, Foonlian Lim, Wai-Kit Tam, Tiffany Au, Kathryn Cheah, Kenneth Cheung, Victor Leung; Hong Kong*
- 08:37-08:42 5 Hyperosmolar overloading induces notochordal cell differentiation with osmosensitive aquaporin3 upregulation and altered N-cadherin and connexin-43 expression  
*Paolo E Palacio-Mancheno, Thomas W Evashwick-Rogler, Damien M Laudier, Devina Purmessur, James C Iatridis, USA*
- 08:44-08:49 6 Temeirolimus is a candidate of the optimal mTOR inhibitor for protecting human intervertebral disc nucleus pulposus cells  
*Yuji Kakiuchi, Takashi Yurube, yoshiki Takeoka, Masaaki Ito, Kenichiro Kakutani, Koichiro Maeno, Toru Takada, Yoshiki Terashima, Ryosuke Kuroda, Kotaro Nishida, Japan*
- 08:51-09:00 *Discussion*

### SESSION #2 DISC DEGENERATION

Moderators: Kazuhiro Chiba and Anne Mannion

- 09:00-09:05 7 Lumbar spine paraspinal muscle and intervertebral disc height changes in astronauts after long-duration spaceflight on the international space station  
*Douglas G Chang, Robert M Healey, JoJo V Sayson, Brandon R Macias, Dezba G Coughlin, Jeannie F Bailey, Scott E Parazyński, Jeffrey C Lotz, Alan R Hargens; United States*
- 09:07-09:12 8 Heterogeneous change in annulus fibrosus height after nucleotomy correlates with annulus strains orthogonal to the compressive loading axis  
*Amy Claeson, Showalter L Brent, Vresilovic J Edward, Malhotra R Neil, Elliott M Dawn; United States*

09:14-09:19	9	Temporal evolution of early degenerative changes in stressed lumbar intervertebral discs <i>Aseem Sharma, Kiran Sargar, Amber Salter; United States</i>
09:21-09:30		<i>Discussion</i>
09:30-09:35	10	Anabolic response of the intervertebral disc to exercise in humans <i>Daniel Belavy, Matthew Quittner, Nicola Ridgers, David Connell, Adnan Sheikh, Guy Trudel, Timo Rantalainen; Australia</i>
09:37-09:42	11	Potential involvement of unfolded protein response in the pathogenesis of intervertebral disc degeneration <i>Takeshi Fujii, Nobuyuki Fujita, Satoshi Suzuki, Kota Watanabe, Ken Ishii, Takashi Tsuji, Keisuke Horiuchi, Morio Matsumoto, Masaya Nakamura; Japan</i>
09:44-09:49	12	Involvement of autophagy in intervertebral disc degeneration and its possible contribution to the maintenance of notochordal cell homeostasis <i>Takashi Yurube, Hiroaki Hirata, Masaaki Ito, Yoshiki Terashima, Yuji Kakiuchi, Yoshiki Takeoka, Shingo Miyazaki, Kenichiro Kakutani, Koichiro Maeno, Toru Takada, Ryosuke Kuroda, Kotaro Nishida; Japan</i>
09:51-10:00		<i>Discussion</i>
10:00-10.30		<b>COFFEE</b>

### SESSION #3 DISC REGENERATION

*Moderators: James Iatridis and Kotaro Nishida*

10:30-10:35	13	Stem cell seeded injectable hydrogels for intervertebral disc regeneration in a preclinical animal model <i>Sarah E Gullbrand, Thomas P Schaer, Justin R Bendigo, Zosia Zawacki, George R Dodge, Edward J Vresilovic, Dawn M Elliott, Robert L Mauck, Neil R Malhotra, Lachlan J Smith; United States</i>
10:37-10:42	14	Combined biomaterials approach to repair the intervertebral disc <i>Daniela A Frauchiger, Silvan Heeb, Lorin M Benneker, Michael Wöltje, Benjamin Gantenbein; Switzerland</i>
10:44-10:49	15	Generation intervertebral disc-like cells from peripheral blood cells <i>Tie Liu, Yueying Li, Yong Hai; China</i>
10:51-11:00		<i>Discussion</i>
11:00-11:05	16	Transformation of the nucleus pulposus into connective tissue - a method for biologic fusion of a spinal segment? <i>Kjell Olmarker, Anders Lehmann, Sweden</i>
11:07-11:12	17	Cell carrier and disc degenerative state influence intervertebral disc response to stem cell treatment <i>Marianna Peroglio, Luzia Simone Douma, Tansinee Stephanie Caprez, Milena Janki, Lorin Michael Benneker, Mauro Alini, Sibylle Grad; Switzerland</i>
11:14-11-19	18	Human bone mesenchymal stem cells protect or activate nucleus pulposus cells by co-culture under hypoxia environment <i>Dike Ruan, Wei Ji, deli wang, Xiao-Chuan Li; China</i>
11:21-11:30		<i>Discussion</i>



**INVITED LECTURE #1***Moderator: Dimitris Kletsas*

11:30-12:00            Antikythera Mechanism: the oldest computer  
*Speaker - Professor Xenophon Moussas*  
*National Kapodistrian University of Athens, Greece*

12:00-13:30            **LUNCH**

**SESSION #4 Magnetic Resonance Imaging***Moderators: Scott Blumenthal and Peter Robertson*

13:30-13:35        19        Coexisting cervical and lumbar disc degeneration and associated MRI phenotypes: a large-scale population-based study  
*Cora HY Bow, Jaro Karppinen, Keith DK Luk, Kenneth MC Cheung, Dino Samartzis; Hong Kong*

13:37-13:42        20        Lack of significant diurnal T2-value changes in lumbar discs with axial loading during MRI (alMRI)  
*Leif Toren, Kerstin Lagerstrand, Helena Brisby, Hanna Hebelka; Sweden*

13:44-13:49        21        Lumbar high-intensity zones on MRI: imaging biomarkers for severe, prolonged low back pain and sciatica in a population-based cohort  
*Masatoshi Teraguchi, Jason Pui Yin Cheung, Jaro Karppinen, Hiroshi Hashizume, Keith Dip Kei Luk, Kenneth MC Cheung, Dino Samartzis; Japan*

13:51-13:56        22        Significance of the degenerative changes on lumbar plain magnetic resonance imaging in the diagnosis of low back pain in the general population The Wakayama Spine Study  
*Hiroshi Hashizume, Hiroshi Yamada, Hiroyuki Oka, Masatoshi Teraguchi, Hiroki Iwahashi, Takahide Sasaki, Kazunori Shinto, Shigeyuki Muraki, Ko Matsudaira, Akihito Minamide, Yukihiro Nakagawa, Noriko Yoshimura, Munehito Yoshida; Japan*

13:58-14:03        23        Classification criteria for neurogenic claudication caused by lumbar spinal stenosis  
*Stephane Genevay, Delphine Courvoisier, Kika Konstantinou, Francisco M Kovacs, Marc Marty, James Rainville, Michael Norberg, Jean-François Kaux, Thomas D Cha, Jeffrey N Katz, Steven J Atlas; Switzerland*

14:05-14:20            *Discussion*

## SESSION #5 LOW BACK PAIN

Moderators: Michele Battié and Jaro Karppinen

- 14:20-14:25 24 Risk factors for pediatric spinal pain  
*Julia Szita, Aron Lazary, Annamaria Somhegyi, Peter Pal Varga; Hungary*
- 14:27-14:32 25 Global consensus of low back pain outcome indicators for older adults  
*Arnold Wong, Dino Samartzis, Luciana Macedo, Paulo Ferreira, Manuela Ferreira; Hong Kong*
- 14:34-14:39 26 The prevalence of low back pain and its associated factors in patients with rheumatoid arthritis  
*Kazuto Miura, Osamu Morita, Toru Hirano, Kei Watanabe, Naoto Endo; Japan*
- 14:41-14:50 *Discussion*
- 14:50-14:55 27 Initial promis scores predict success of therapeutic spinal injections  
*Paul T Rubery, Jeff Houck, Molly Baumhauer, Clifford Everett, Rajeev Patel, David Speech, John Orsini, Judith Baumhauer; United States*
- 14:57-15:02 28 Bioactive dietary polyphenol preparation for preventing painful behavior associated with lumbar disc degeneration: an in-vivo rat model  
*Alon Lai, Thomas W Evashwick-Rogler, Jonathan Salandra, Lap Ho, Sam K Cho, Andrew C Hecht, Beth A Winkelstein, Giulio M Pasinetti, James C Iatridis; United States*
- 15:04-15:09 29 Matrix Metalloproteinase-12 activity in a neuropathic pain rodent model : impact on neuroinflammation response  
*Wing Moon Raymond Lam, Syeda Fabeha Husain, Tao Hu, Nagata Keiji, Sanjay Khanna, Kishore Bhakoo, Yulin Lam, Roger Chun Man Ho, Hee Kit Wong; Singapore*
- 15:11-15:20 *Discussion*
- 15:20-15:50 **COFFEE**

## SESSION #6 BASIC SCIENCE

Moderators: Jeffrey Lotz and Nam Vo

- 15:50-15:55 30 Disc height and tissue morphology restoration by cryopreserved human discogenic cell transplantation in a canine model  
*Jordy Schol, Daisuke Sakai, Hiraishi Syunsuke, Nukaga Tadashi, Masahiko Watanabe; Japan*
- 15:57-16:02 31 Molecular mechanisms of rhBMP-2 Induced inflammation: a rabbit spinal fusion chamber study  
*Tao Hu, Mathanapriya Naidu, Wing Moon Raymond Lam, Zheng Yang, Xiafei Ren, Felly Ng, Ramruttun Amit Kumarsing, Kim Cheng Tan, Kai Thong, Mariner Kwok, Stuart Boden Goodman, Cho Hong, James Goh, Hee Kit Wong; Singapore*
- 16:04-16:09 32 Inhibition of autophagy through ATG5 knock down induces apoptosis and senescence in human intervertebral disc cells  
*Masaaki Ito, Takashi Yurube, Kenichiro Kakutani, Koichiro Maeno, Toru Takada, Yoshiki Terashima, Yuji Kakiuchi, Yoshiki Takeoka, Ryosuke Kuroda, Kotaro Nishida; Japan*

- 16:11-16:16     33     Human senescent disc cells exhibit metabolic shift and imbalanced matrix homeostasis  
*Prashanti Patil, Gwendolyn Sowa, Nam Vo; United States*
- 16:18-16:30     *Discussion*

#### **SYMPOSIUM: TRANSLATION AND COMMERCIALIZATION**

*Moderator: Jeffrey Lotz*

- 16:30-16:45     Conflict of Interest: Lessons from a Personal Odyssey  
*Rowland G. Hazard; United States*
- 16:45-17:00     Partnering with industry: Is this right for you?  
*Jeffery Lotz; United States*
- 17:00-17:15     Regenerative medicinal products for low back pain: global regulatory affairs and industrialization  
*Daisuke Sakai; Japan*
- 17:15-17:30     *Discussion*

#### **FIRST BUSINESS MEETING**

- 17:30-18:10     *For Members Only*



**SESSION #8 TREATMENT FOR LBP**

Moderators: *Jeremy Fairbank and Serena Hu*

- 10:30-10:35      40      A prospective, randomized study of patient controlled epidural analgesia vs. patient controlled intravenous analgesia for postoperative pain control after lumbar fusions.  
*Todd Alamin, Alex Arzeno, Alicia Zagel, Maagnes Ith, Ivan Cheng, Serena Hu; United States*
- 10:37-10:42      41      Associations of neuropeptide  $\gamma$  genotype and circulating levels with response to epidural steroid injection in patients with axial low back pain  
*Wan Huang, Stephen Schaaf, Subashan Perera, Yvette Conley, Sara Ernst, Megan Cortazzo, Nam Vo, James Kang, Gwendolyn Sowa; United States*
- 10:44-10:49      42      Response to duloxetine in chronic low back pain: exploratory post hoc analysis of a phase 3, randomized, placebo-controlled trial in Japanese patients  
*Toshinaga Tsuji, Naohiro Itoh, Mitsuhiro Ishida, Toshimitsu Ochiai, Shinichi Konno; Japan*
- 10:51-11:00      *Discussion*

**PRESIDENTIAL ADDRESS - KEITH LUK**

- 11:00-11:40      Presidential Address - Keith Luk  
Introduction – Tim Yoon

**HARRY FARFAN PRESIDENTIAL LECTURE**

- 11:40-12:20      Introduction - Keith DK Luk  
Columns  
*Speaker - Professor Manolis Korres  
National Technical University of Athens  
Director, Acropolis Restoration Project*

**AFTERNOON OUTING**

## Thursday – June 1, 2017

### SESSION #9 BIOMECHANICS

Moderators: Tom Oxland and Hans-Joachim Wilke

- 07:30-07:35 43 What spaceflight teaches us about lumbar spine biomechanics  
*Jeannie F Bailey, Stephanie L Miller, Kristine T Khieu, Conor O'Neill, Robert Healey, Dezba Coughlin, Jojo V Sayson, Douglas G Chang, Alan R Hargens, Jeffrey C Lotz; United States*
- 07:37-07:42 44 Does the activation of deep and superficial lumbar multifidus differ during walking at different speeds and inclinations between younger and older adults?  
*Rebecca J Crawford, Leonardo Gizzi, Áine Ni Mhuiris, Angela V Dieterich, Deborah Falla; Switzerland*
- 07:44-07:49 45 Paraspinal muscle passive stiffness remodels in direct response to spine stiffness: a study using the ent1 deficient mouse  
*Kelsey Gsell, Derek Zwambag, Dale Fournier, Cheryle Seguin, Stephen Brown; Canada*
- 07:51-08:00 *Discussion*
- 08:00-08:05 46 Lumbosacral orientation in reference to gravity line shifts posteriorly with aging  
*Kazuhiro Hasegawa, Masashi Okamoto, Shun Hatsushikano, Haruka Shimoda, Kei Watanabe, Masayuki Ohashi; Japan*
- 08:07-08:12 47 Visualization and pathological characteristics of cartilage and subchondral bone change in lumbar facet joint in OVX mouse model using propagation-based phase-contrast computed tomography  
*Hongbin Lu, Jianzhong hu, Yong Cao; China*
- 08:14-08:19 48 Changes in combined hydrostatic and osmotic pressure alter metabolic turnover in nucleus pulposus cells in vitro  
*Shuichi Mizuno, Kaori Kashiwa, James D Kang; United States*
- 08:21-08:30 *Discussion*

### SESSION # 10 ENDPLATE

Moderators: Ashish Diwan and S Rajasekaran

- 08:30-08:35 49 Vertebral endplate defect as initiating factor for Modic change in the general population  
*Juhani H Määtä, Marinko Rade, Maxim B Freidin, Olavi Airaksinen, Jaro Karppinen, Frances MK Williams; Finland and UK*
- 08:37-08:42 50 P.acnes may be a key factor of Modic changes, a clinical and in vitro study  
*Fengdong Zhao, Shengyun Li, Xuyang Zhang, Zhi Shan, Junhui Liu, Tianming Yu; China*
- 08:44-08:49 51 Propionibacterium acnes incubation in the discs can result in time-dependent Modic changes: a long term rabbit model  
*Zhi Shan, Xuyang Zhang, Shengyun Li, Tianming Yu, Junhui Liu, Fengdong Zhao; China*
- 08:51-09:00 *Discussion*

09:00-09:05	52	Multi-dimensional assessment of vertebral endplate breaks on MRI: implications in spine degeneration and pain/ disability <i>Uruj Zehra, Jason Pui Yin Cheung, Cora Bow, Dino Samartzis, Hong Kong</i>
09:07-09:12	53	Who played the important role in the degeneration of rats disc, the nucleus pulposus mesenchymal stem cells age-related changes? <i>Deli Wang, China</i>
09:14-09:19	54	Resistin promotes CCL4 expression through toll-1 like receptor-4 and activation of the P38-MAPK and NF-kb signaling pathways: implications for intervertebral disc degeneration <i>Jianru Wang, Hui Liu, Zemin Li, Zhaomin Zheng; China</i>
09:21-09:30		<i>Discussion</i>
09:30-10:00		<b>COFFEE</b>

### FELLOWSHIP AWARD CEREMONY

*Moderator: Tim Yoon*

10:00-10:05		Announcement of the ISSLS Clinical Travelling Fellowship <i>Introduction: Wilco Peul</i> Presentation of Spine Young Investigator Award – <i>Kevin Spratt</i> Reduced spinal cord movement with the straight leg raise test in patients with lumbar intervertebral disc herniation <i>Marinko Rade et al, Finland</i>
10:05-10:20		Wiltse Lifetime Achievement Award Ceremony <i>Introduction: Jeremy Fairbank</i>

### ISSLS PRIZE AWARD CEREMONY

*Moderator - Björn Rydevik*

10:20-10:30		Introduction and Award Ceremony
10:30-10:40	55	<b>ISSLS Prize - Basic science</b> Intervertebral disc/bone marrow cross-talk with modic changes <i>Stefan Dudli, David Sing, Serena S Hu, Sigurd H Berven, Shane Burch, Vedat Deviren, Ivan Cheng, Bobby KB Tay, Todd Alamin, Ma Agnes Martinez Ith, Eric M Pietras, Jeffrey C Lotz; Switzerland</i>
10:40-10:50		<i>Discussion</i>
10:50-11:00	56	<b>ISSLS Prize - Bioengineering science</b> Automation of reading of radiological features from magnetic resonance images (MRI's) of the lumbar spine without human intervention is comparable with an expert radiologist <i>Jeremy Fairbank, Amir Jamaludin, Meelis Lootus, Timor Kadir, Andrew Zisserman, Jill Urban, Michele Battié, Iain McCall, Genodisc Consortium; United Kingdom</i>
11:00-11:10		<i>Discussion</i>

11:10-11:20 57 **ISSLS Prize - Clinical science**  
Is infection the possible initiator of disc disease? An insight from proteomic analysis  
*Rajasekaran Shanmuganathan, Chitraa Tangavel, Siddharth N Aiyer, Sharon Miracle Nayagam, M Raveendran, Naveen Luke Demonte, Pramela Subbaiah, Rishi Kanna, Ajoy Prasad Shetty, K Dharmalingam; India*

11:20-11:30 *Discussion*

## INVITED LECTURE #2

*Moderator: Dino Samartzis*

11:30-12:00 Hippocratic Ethics: is the Hippocratic Oath relevant to contemporary medicine?  
*Professor Helen Askitopoulou*  
*University of Crete, Greece*

12:00-13:30 **LUNCH**

## SESSION #11 SURGERY FOR DEGENERATIVE DISC DISEASE

*Moderators: Robert Gunzburg and Shinichi Konno*

13:30-13:35 58 Surgical outcomes of posterior lumbar interbody fusion in patients over 80 years of age.  
*Masayuki Furuya, Yunitaka Nagamoto, Hiroyuki Aono; Japan*

13:37-13:42 59 Time to remove our rose-tinted glasses: a candid appraisal of the relative success of surgery in over 4'500 patients with degenerative disorders of the lumbar spine, hip or knee  
*Anne F Mannion, Franco Impellizzeri, Michael Leunig, Dezsö Jeszszky, Daniel Haschtmann, Stefan Preiss, Tamas F Fekete; Switzerland*

13:44-13:49 60 Adjacent segment degeneration after lumbar total disc replacement: 5-year results of a multicenter, prospective, randomized study with independent radiographic assessment  
*Scott L. Blumenthal, Richard D. Guyer, Donna D. Ohnmeiss, Jack E. Zigler; United States*

13:51-14:00 *Discussion*

## SESSION # 12 SURGICAL COMPLICATIONS

*Moderators: James Kang and Teija Lund*

14:00-14:05 61 Previous surgery significantly increases the risk of both surgical and general complications during surgery for degenerative disorders of the lumbar spine  
*Anne F Mannion, Pascal Zehnder, Francois Porchet, Dezsö Jeszszky, Frank S Kleinstück, Tim Pigott, Emin Aghayev; Switzerland*

14:07-14:12 62 Risk factors for poor patient-reported QOL outcomes after PLIF: an analysis of two-year follow-up  
*Takahiro Makino, Takashi Kaito, Hiroyasu Fujiwara, Yohei Matsuo, Hirotsugu Honda, Yusuke Sakai, Shota Takenaka, Hideki Yoshikawa, Kazuo Yonenobu; Japan*



- 14:14-14:19 63 Local application of vancomycin powder decreases the amount of bacteria in the operative field and leads to less incidence of surgical site infection  
*Hirohito Takeuchi, Itaru Oda, Shigeki Oshima, Masaru Suzuki, Masanori Fujiya; Japan*
- 14:21-14:30 *Discussion*
- 14:30-14:35 64 Revision surgery of symptomatic pseudarthrosis after lumbar fusion: a viable treatment option?  
*Markus Loibl, Siegmund Lang, Frank Kleinstück, Tamas Fekete, Dezsö Jeszenszky, Anne F Mannion, Daniel Haschtmann; Switzerland*
- 14:37-14:42 65 The change of pain catastrophizing in patients with spine surgery  
*Ho-Joong Kim, Joon-Hee Park; South Korea*
- 14:44-14:49 66 Planned two stage corrective spinal surgery for adult spinal deformity does not increase the risk of complication compared to one stage surgery  
*Tomohiro Hasegawa, Daiske Togawa, Yu Yamato, Sho Kobayashi, Go Yoshida, Shin Oe, Tomohiro Banno, Yuki Mihara, Yukihiro Matsuyama; Japan*
- 14:51-15:00 *Discussion*

#### GENERAL POSTER SESSION

15:00-16:00 *Refreshments will be served*

#### SESSION #13 SPINAL STENOSIS & SPONDYLOLISTHESIS

*Moderators: Koichi Sairyo and David Wong*

- 16:00-16:05 67 A comparison of non-surgical treatment methods for patients with lumbar spinal stenosis  
*Michael J Schneider, Carlo Ammendolia, Donald Murphy, Ronald Glick, Sara Piva, Elizabeth Hile, Dana Tudorascu, Sally Morton; United States*
- 16:07-16:12 68 Deterioration in qol caused by lumbar spinal stenosis: a study of disease specific characteristics (lumbar spinal stenosis diagnosis support tool: disto-project)  
*Hiroshi Kobayashi, Miho Sekiguchi, Koji Yonemoto, Tatsuyuki Kakuma, Kinshi Kato, Kazuyuki Watanabe, Takuya Nikaido, Koji Otani, Shoji Yabuki, Shin-ichi Kikuchi, Shin-ichi Konno; Japan*
- 16:14-16:19 69 Is reduction better than arthrodesis in situ in surgical management of low-grade spondylolisthesis? -a system review and meta analysis  
*Xuedong Bai, Jiahai Chen, Dike Ruan, Deli Wang; China*
- 16:21-16:26 70 When and how often spondylolisthesis occurs in patients with or without spondylolysis  
*Yasuchika YA Aoki, Go GK Kubota, Hiroyuki HF Fukuchi, Takayuki TS Sakai, Atsuya AW Watanabe, Takayuki TN Nakajima, Makoto MT Takazawa, Shiro SS Sugiura, Seiji SO Ohtori, Kazuhisa KT Takahashi, Noriyuki NY Yanagawa; Japan*
- 16:28-16:40 *Discussion*

Thursday June 1

### **CURRENT APPROACHES TO DISCECTOMY: ENDOSCOPIC AND OPEN**

*Moderator: Yoshiharu Kawaguchi*

- 16:40-17:00                    **The King James IV Professorship Lecture**  
Transforaminal lumbar endoscopic discectomy and decompression: Review of  
techniques and supporting evidence  
*Alastair Gibson*
- 17:00-17:20                    **Counterpoint:** When are “open” spine techniques for the lumbar spine  
preferred?”  
*Helena Brisby*
- 17:20-17:30                    *Discussion*

### **SECOND BUSINESS MEETING**

- 17:35-18:00                    *For Members Only*

### **DINNER BANQUET**

- 19:00-23:00                    Dinner Banquet



- 10:27-10:32 75 Comparative analysis of over-correction, ideal-correction, and under-correction of lumbar lordosis for adult spinal deformity: analysis of 458 consecutive patients at a tertiary spinal deformity center  
*Junseok Bae, Alexander A Theologis, Bobby Tay, Shane Burch, Sigurd Berven, Praveen Mummaneni, Dean Chou, Christopher Ames, Vedat Deviren; South Korea*
- 10:34-10:39 76 The adult deformity surgery complexity index (ADSCI): a valid tool to quantify the complexity of posterior adult spinal deformity surgery and predict postoperative complications  
*Ferran Pellisé, Alba Vila-Casademunt, Susana Núñez-Pereira, Montse Domingo-Sàbat, Joan Bagó, Xavier Vidal, Ahmet Alanay, Emre Acaroglu, Frank Kleinstück, Ibrahim Obeid, Francisco Javier Perez-Grueso, Virginie Lafage, Shay Bess, Christopher Ames, Anne F Mannion, European Spine Study Group (ESSG); Spain*
- 10:41-10:50 *Discussion*
- 10:50-10:55 77 Global alignment and proportion (GAP) score: development and validation of a new method of analyzing spinopelvic alignment to predict mechanical complications after adult spinal deformity surgery  
*Cağlar Yilgor, Nuray Sogunmez, Louis Boissiere, Yasemin Yavuz, Ibrahim Obeid, Frank Kleinstuck, Francisco J. Sanchez Perez-Grueso, Emre Acaroglu, Ferran Pellise, Anne F Mannion, Ahmet Alanay, European Spine Study Group ESSG; Turkey*
- 10:57-11:02 78 Lumbar spine alignment in 6 common postures - A ROM analysis with implications for deformity correction  
*Hwee Weng Dennis Hey, Eugene Tze-Chun Lau, Kimberly-Anne Tan, Joel Louis Lim, Denise Choong, Leok-Lim Lau, Ka-Po Gabriel Liu, Hee-Kit Wong; Singapore*
- 11:04-11:09 79 Targeted therapy of low back pain in elderly de novo degenerative lumbar scoliosis  
*Kiyotaka Yamada, Yoshinori Fujimoto, Toshio Nakamae, Takeshi Hiramatsu, Takashi Hashimoto, Osami Suzuki, Yuji Tsuchikawa; Japan*
- 11:11-11:20 *Discussion*

**SESSION #16 MINIMUM INVASIVE SURGERY***Moderators: Constantin Schizas and Hans Jörg Meisel*

- 11:20-11:25 80 Comparison of the clinical outcomes of minimally invasive decompression with those of minimally invasive decompression and fusion in patients with degenerative spondylolisthesis with instability -MEL versus CBT-PLIF with a minimum follow-up of 2 years  
*Kazunori Hayashi, Hiromitsu Toyoda, Hidetomi Terai, Masatoshi Hoshino, Akinobu Suzuki, Shinji Takahashi, Koji Tamai, Shoichiro Ohyama, Yusuke Hori, Hiroaki Nakamura; Japan*
- 11:27-11:32 81 Interspinous dynamic stabilization adjacent to fusion versus double-segment fusion for degenerative lumbar diseases: minimum three years follow-up  
*Yong Hai, Xiaolong Chen; China*

- 11:34-11:39      82      A comparative study between open and percutaneous posterior fixation surgeries for effects of the performance status, activities of daily living, and quality of life in patients with spinal metastasis  
*Takashi Yurube, Kenichiro Kakutani, Koichiro Maeno, Toru Takada, Yoshiki Terashima, Masaaki Ito, Yuji Kakiuchi, Yoshiki Takeoka, Shingo Miyazaki, Yoshitada Sakai, Ryosuke Kuroda, Kotaro Nishida; Japan*
- 11:41-11:50      *Discussion*

**ANNOUNCEMENT - BEST PAPER AND POSTER AWARDS**

11:50-12:00

**CLOSING REMARKS – TEIJA LUND**

12:00-12:10

## Friday – June 2, 2017

### ISSLS - AOSPINE SYMPOSIUM – SAGITTAL BALANCE AND ITS IMPLICATIONS IN SPINE SURGERY

- A Separate Registration Is Required to attend the Symposium

13:30-13:35	Welcome address <i>Dino Samartzis</i>
13:35-13:55	Historical overview and concepts of sagittal alignment/balance and clinical applications <i>Virginie Lafage</i>

### SAGITTAL BALANCE IMPLICATIONS FOR TREATMENT OF SPINAL DEFORMITIES

*Moderators: Thomas Patsiaouras and Theodoros B. Grivas*

13:55-14:15	Adolescent idiopathic scoliosis <i>Keith Luk</i>
14:15-14:35	Adult spinal deformity <i>Vedat Deviren</i>
14:35-14:55	High-grade spondylolisthesis <i>Panagiotis Korovessis</i>
14:55-15:15	Pedicle subtraction osteotomy: are the complications worth the results? <i>Rune Hedlund</i>
15:15-15:30	<i>Discussion</i>
15:30-15:40	<b>COFFEE</b>

### SAGITTAL BALANCE IMPLICATIONS FOR TREATMENT OF DEGENERATIVE CONDITIONS

*Moderators: Odysseas Paxinos and Yoshiharu Kawaguchi*

15:40-16:00	Degenerative disc disease: are we creating a deformity or fixing a deformity? <i>Serena Hu</i>
16:00-16:20	Degenerative spondylolisthesis <i>Panagiotis Korovessis</i>
16:20-16:40	State of the art on total disc replacement and its role in sagittal balance reconstruction <i>Christoph Siepe</i>
16:40-16:55	<i>Discussion</i>

### CHALLENGES AND FUTURE DIRECTIONS IN SAGITTAL BALANCE AND SPINE SURGERY

*Moderators: Keith Luk and Serena Hu*

16:55-17:15	Proximal junctional kyphosis <i>Robert Hart</i>
17:15-17:35	Age-specific parameters and considerations in management <i>Virginie Lafage</i>

17:35-17:55	Cervical alignment <i>Virginie Lafage</i>
17:55-18:15	Spine / hip and knee relationships: when everything goes wrong <i>Marc-Antoine Rousseau</i>
18:15-18:30	Discussion
18:30	Concluding remarks <i>Serena Hu</i>

## SPECIAL POSTER SESSION #1

### SP #1A DISC BIOLOGY

Wednesday, May 31, 2017 at 07:45-08:45

Moderators: *Dimitris Kletsas and Jill Urban*

- SP01 Is dynamic surface electromyography topography an indication of low back pain?  
*Naifu Jiang, Keith Dip-Kei Luk, Yong Hu, Hong Kong*
- SP02 Use of the limiting dilution method for the isolation of nucleus pulposus mesenchymal stem cells (NPMSCS) and the effects of plating density on biological characteristics and plasticity  
*Linghan Lin, Yachao Zhao, Zhiwei Jia, Yaohong Wu, Deli Wang, Dike Ruan, China*
- SP03 Real-time monitoring of glucose consumption of intervertebral disc cells in 3d culture  
*Daniela A Frauchiger, Rahel D May, Andreas K Koch, Lorin M Benneker, Benjamin Gantenbein, Switzerland*
- SP04 Human mesenchymal stem cells pre-treated with IL-1 $\beta$  and stimulated with BMP-3 growth factor enhance chondrogenesis in vitro  
*Daphne DH Hingert, Helena HB Barreto Henriksson, Helena HB Brisby, Sweden*
- SP05 Effect of geometry on human lumbar intervertebral disc six degree of freedom mechanics  
*John DeLucca, Dhara Amin, Edward Vresilovic, John Costi, Dawn Elliott; United States*
- SP06 Even mild degeneration of the lumbar spine is associated with a loss of the hydrostatic behavior of the intervertebral disc  
*David Volkheimer, Fabio Galbusera, Christian Liebsch, Hans-Joachim Wilke; Germany*

### SP#1B LUMBAR DISC HERNIATION

Wednesday, May 31, 2017 at 07:45-08:45

Moderators: *Joo Han Kim and Miho Sekiguchi*

- SP07 Does an annular puncture influence the herniation pathway? an in vitro mechanical and structural investigation  
*Vonne M van Heeswijk, Ashvin Thambyah, Peter A Robertson, Neil D Broom; New Zealand*
- SP08 Diabetes' negative impact on radiculopathy induced by application of nucleus pulposus onto DRG in spontaneous diabetic rats  
*Takuya Kameda, Miho Sekiguchi, Yoichi Kaneuchi, Shinichi Konno; Japan*
- SP09 Reduced neural movement with the straight leg raise test in patients with lumbar intervertebral disc herniation  
*Marinko Rade, Janne Pesonen, Mervi Könönen, Jarkko Marttila, Michael Shacklock, Ritva Vanninen, Markku Kankaanpää, Olavi Ariksinen; Finland*
- SP10 Defect size and lumbar reherniation: identifying the high-risk patient  
*Nikolaus Koegl, Mark Arts, Frederic Martens, Javier Fandino, P. Douglas Klassen; United States*
- SP11 The effect of repeated bending and axial rotation motions on internal disc strains and risk of herniation in degenerated human cadaver lumbar discs  
*John J Costi, Karsta Heinze, Pawel P Skuza, Brian JC Freeman; Australia*
- SP12 Q-space imaging is a novel technique to evaluate intervertebral disc degeneration  
*Daisuke Nakashima, Nobuyuki Fujita, Junichi Hata, Takeo Nagura, Kanehiro Fujiyoshi, Hideyuki Okano, Masahiro Jinzaki, Morio Matsumoto, Masaya Nakamura; Japan*



**SP #1C LOW BACK PAIN**

Wednesday, May 31, 2017 at 07:45-08:45

Moderators: *Hiroshi Hashizume and Gianluca Vadalá*

- SP13 Risk factors related to the severity of pain intensity in non-specific low-back pain patients of southern China  
*Zhaomin Zheng, Hua Wang, Jianru Wang, Hui Liu, Zemin Li; China*
- SP14 Productivity impairment among workers in Japan with chronic low back pain  
*Hiroki Sato, Ko Matsudaira, Toshinaga Tsuji, Jeffrey Vietri; United States*
- SP15 Intervertebral disc heterogeneity with mri histograms - potential markers in patients with low back pain?  
*Hanna Hebelka, Christian Waldenberg, Helena Brisby, Kerstin Lagerstrand, Sweden*
- SP16 A pilot study comparing an online back pain triage algorithm with clinical assessment  
*Gruffydd O Perks, Scott D Middleton, Sarah J MacInnes, Kirsten Lord, J.N. Alastair Gibson; United Kingdom*
- SP17 Lumbosacral Orthoses for preventing the onset of low back pain among healthy hospital nurses: a randomized controlled trial  
*Hongbin Lu, Jianzhong Hu, Yong Cao, Jing Qu; China*
- SP18 Identification of a NMR biomarker for Propionibacterium acnes infected intervertebral discs  
*Sergey Magnitsky, Stefan Dudli, Xinyan Tang, Joycelyn Diaz, Steve Miller, Jim Peacock, Jeffrey Lotz; United States*

**SP #1D SPINAL STENOSIS**

Wednesday, May 31, 2017 at 07:45-08:45

Moderators: *Helena Brisby and Orso Osti*

- SP19 Analysis of factors influencing ligamentum flavum thickness in lumbar spine - a radiological study of 1070 levels in 214 patients  
*Ganesen Sudhir, Saikrishna Gadde, Karthik Kailash; India*
- SP20 Hyperlipidemia is associated with idiopathic spinal epidural lipomatosis  
*Shinichi Ishihara, Nobuyuki Fujita, Mitsuru Yagi, Kota Watanabe, Takehiro Michikawa, Yuji Nishiwaki, Yasuyuki Fukui, Keisuke Horiuchi, Masaya Nakamura, Morio Matsumoto, Ken Ishii; Japan*
- SP21 10 year follow-up of lumbar spinal stenosis in the community. Part 1: time course of lumbar spinal stenosis symptom.  
*Koji Otani, Shinichi Kikuchi, Takahiro Igari, Miho Sekiguchi, Takuya Nikaido, Kazuyuki Watanabe, Kinshi Kato, Hiroshi Kobayashi, Shoji Yabuki, Shinichi Konno; Japan*
- SP22 10 year follow-up of lumbar spinal stenosis in the community. Part 2: relationship between lumbar spinal stenosis symptom and dural tube compression on mri  
*Koji Otani, Shinichi Kikuchi, Takahiro Igari, Miho Sekiguchi, Takuya Nikaido, Kazuyuki Watanabe, Kinshi Kato, Hiroshi Kobayashi, Shinichi Konno; Japan*
- SP23 Effectiveness and limitations of decompression without fusion for lumbar spinal stenosis with degenerative spondylolisthesis: can a higher slipping rate affect surgical outcomes?  
*Akira Miyauchi, Tadayoshi Sumida, Hideki Manabe, Nobukazu Okimoto, Toru Yoshioka, Yoshifumi Fuse, Shin-ichi Saka; Japan*

- SP24 Relationships between preoperative psychological factors and patient-reported outcomes in patients with lumbar spinal stenosis  
*Tomoko Kitagawa, Mamoru Kawakami, Yuyu Ishimoto, Masatoshi Teraguchi, Masakazu Minetama, Masahumi Nakagawa, Daisuke Fukui; Japan*

### SP #1E FUSION SURGERY

Wednesday, May 31, 2017 at 07:45-08:45

Moderators: Moon Park and Odysseas Paxinos

- SP25 Histological analysis of bone regeneration with different doses of rhBMP-2 in an ovine lumbar interbody fusion model  
*Hans Jörg Meisel, Katharina KS Siegrist, Johannes JS Seeger, Christian CH Hohaus; Germany*
- SP26 Early reduction of ligamentum flavum after posterior fusion without neural decompression for unstable degenerative lumbar spondylolisthesis  
*Hiromi Ataka, Tomoihiro Miyashita, Kei Kato, Hiromitsu Takaoka, Takaaki Tanno; Japan*
- SP27 BMP-2 carrier and interbody spinal fusion outcome: rabbit spinal fusion chamber study on BMP antagonist  
*Tao Hu, Mathanapriya Naidu, Zheng Yang, Wing Moon Raymond Lam, Xiafei Ren, Felly Ng, Ramruttun Amit Kumarsing, Ming Wang, Kim Cheng Tan, Kai Thong, Mariner Kwok, Stuart B. Goodman, Cho Hong, James Goh, Hee Kit Wong; Singapore*
- SP28 Balancing bone resorption and overzealous bone growth in lumbar interbody fusion with RhBMP-2 in the sheep model- A question of dose and/or concentration?  
*Hans Jörg HJM Meisel, Gerlinde GH Heil, Christian CH Hohaus; Germany*
- SP29 Creating lordosis in transforaminal and posterior lumbar interbody fusion (TLIF/PLIF) “ The impact of surgical technique” a controlled cadaveric study  
*Peter Robertson, Will D Armstrong, Daniel L Woods, Jeremy J Rawlinson; New Zealand*
- SP30 Factors affecting the bony union of the defects in the pars interarticularis of L5 unilateral spondylolysis  
*Hayato Ishitani, Takato Aihara, Naoki Ishigaki, Jun Kurokawa; Japan*

## SPECIAL POSTER SESSION #2

### SP #2F PARAVERTEBRAL MUSCLE, MUSCULOSKELETAL MODEL

Friday, June 2, 2017 at 07:45-08:45

Moderators: *Itaru Oda and Gwendolyn Sowa*

- SP31 Manually defining regions of interest when quantifying paravertebral muscles fatty infiltration from axial magnetic resonance imaging: a proposed method for the lumbar spine with anatomical cross-reference  
*Rebecca J Crawford, Jon Cornwall, Rebecca Abbott, James M Elliott; Switzerland*
- SP32 Lumbar paravertebral muscle fatty infiltration: relationship of distribution patterns to demographics, disability and pain  
*Rebecca J Crawford, Thomas Volken, Áine Ni Mhuiris, Cora Bow, James M Elliott, Markus Melloh, Dino Samartzis; Switzerland*
- SP33 Do sitting postures really affect spinal biomechanics of asymptomatic individuals?  
*Arnold YL Wong, Alan KH Lam, Alex WM Chau, Keith CK Kwan, HT Cheung, PM Chan; Hong Kong*
- SP34 Axial loading during mri induces significant effects on vertebral endplate T2-values - A feasibility study on patients with low back pain  
*Hanna Hebelka, Andreia Miron, Helena Brisby, Kerstin Lagerstrand; Sweden*
- SP35 Ascorbic acid attenuates multifidus muscles injury and atrophy after posterior lumbar spine surgery by suppressing inflammation and oxidative stress in a rat model  
*Zhi-Jun Hu, Pan Tang, Zi-Ang Xie, Xu Jia Jia-Qi, Gu Jia-Ming, Lin Xian-Feng, Huang Kang-Mao, Wang Ji-Ying, Fan Shun-Wu; China*
- SP36 Correlation of preoperative lumbar paraspinal extensor muscle conditions with severity of degenerative flat back and its improvement after corrective fusion surgery  
*Jung Hwan Lee, Sang-Ho Lee; South Korea*

### SP #2G MIS, COMPLICATION, MISCELLANEOUS

Friday, June 2, 2017 at 07:45-08:45

Moderators: *Alastair Gibson and Akihito Minamide*

- SP37 Minimally invasive decompression surgery for lumbar spinal stenosis with degenerative scoliosis: predictive factors of radiographic and clinical outcomes  
*Akihito Minamide, Munehito Yoshida, Hiroki Iwahashi, Andrew K Simpson, Hiroshi Yamada, Hiroshi Hashizume, Yukihiro Nakagawa, Hiroshi Iwasaki, Shunji Tsutsui, Ryohei Kagotani; Japan*
- SP38 The Impact of Hypertension on the Occurrence of Postoperative Spinal Epidural Hematoma Following after Single Level Microscopic Posterior Lumbar Decompression Surgery  
*Yasushi YF Fujiwara, Bunichiro BI Izumi, Takahiro TH Harada, Takayuki TS Shima, Hideki HM Manabe; Japan*
- SP39 Assessment of the anybody full body musculoskeletal model in computing spine loads at lumbar level: comparison with in vivo values obtained during exercise tasks  
*Tito Bassani, Elena Stucovitz, Zhihui Qian, Matteo Briguglio, Fabio Galbusera; Italy*
- SP40 How effective is MIS-TLIF in the surgical treatment of lumbar degenerative diseases?: a comparative study with open PLIF procedure  
*Masumi Iwabuchi, Jun Komatsu, Hironari Fukuda, Mutsumi Shimazaki, Osamu Shirado; Japan*

- SP41 Comparison of Microendoscopic Discectomy with Transforminal Percutaneous Endoscopic Discectomy in Lumbar Disc Herniation: Results of a Randomized Controlled Trial  
*Zhi-Jun Hu, Xiang-Qian Fang, Gang Liu, Wen-Bin Xu; China*
- SP42 Variation in procedural utilization for lumbar spine disorders in fee-for-service vs salaried healthcare systems in the United States  
*Andrew Schoenfeld, Christopher Bono; United States*

### SP #2H OPERATIVE OUTCOME

Friday, June 2, 2017 at 07:45-08:45

Moderators: *Hiroyuki Aono and Ulrich Berlemann*

- SP43 The effect of 1- or 2- level posterior lumbar interbody fusion on global sagittal balance  
*Jae Hwan Cho, Chang Ju Hwang, Dong-Ho Lee, Choon Sung Lee; South Korea*
- SP44 Surgical outcomes of pedicle screw with cortical bone trajectory compared with conventional trajectory for patients with lumbar spinal stenosis: a 1-year follow-up study  
*Yuyu Ishimoto, Mamoru Kawakami, Masatoshi Teraguchi, Shin-ichi Nakao, Keiji Nagata, Tomoko Kitagawa, Nami Moriguchi; Japan*
- SP45 Two year follow-up after percutaneous interspinous process device for lumbar spinal stenosis in a prospective case-serie of patients with severe co-morbidities  
*Adad Baranto, Hanna Hebelka Bominger, Christian Hagelberg, Per Wessberg, Klas Halldin, Helena Brisby; Sweden*
- SP46 Patient reported outcomes following spinal surgery for degenerative disc disease, disc herniation, spondylolisthesis and spinal stenosis  
*Greg McIntosh, Hamilton Hall, Raja Rampersaud, Charles Fisher, Neil Manson, Ken Thomas; Canada*
- SP47 Comparative study of 1-year clinical outcomes using robot-assisted pedicle screw fixation and freehand technique in posterior lumbar interbody fusion: a prospective, randomized controlled trial  
*Ho-Joong Kim, Jin S. Yeom, Bong-Soon Chang, Choon-Ki Lee; South Korea*
- SP48 What is the appropriate timing of patient-rated follow-up after surgery for degenerative disorders of the lumbar spine?  
*Tamas Fekete, Daniel Haschtmann, Hans-Jürgen Becker, Frank Kleinstück, Dezső Jeszenszky, Peter Banczerowski, Anne F Mannion; Switzerland*

### SP #2I SPINAL STENOSIS, TUMOR INFECTION

Friday, June 2, 2017 at 07:45-08:45

Moderators: *Vedat Deviren and Jon Lurie*

- SP49 NELL-1 combined with bone marrow aspirate concentrate in a polyelectrolyte complex based construct enhances posterolateral spinal fusion in rabbits  
*Ling Liu, Wing Moon Raymond Lam, Ming Wang, Mathanapriya Naidu, Felly Ng, Xia Fei Ren, Kang Ting, Chia Soo, James Cho Hong Goh, Hee Kit Wong; Singapore*
- SP50 Preoperative knowledge test feedback intervention (KTFI) increases patients' knowledge level - a randomized controlled trial in 100 spinal stenosis patients  
*Jukka Kesänen, Teija Lund, Helena Leino-Kilpi, Liisa Montin, Pauli Puukka, Kirsi Valkeapää; Finland*

- SP51 Boot camp programs for lumbar spinal stenosis: a randomized controlled trial comparing outcomes following a comprehensive versus a self-directed - non-surgical approach  
*Carlo Ammendolia, Pierre Côté, Y. Raja Rampersaud, Danielle Southerst, Brian Budgell, Claire Bombardier, Gillian Hawker; Canada*
- SP52 Effectiveness of decompression surgery for lumbar spinal stenosis in patients aged 80 years and older  
*Kazuyuki Watanabe, Koji Otani, Takuya Nikaido, Kinshi Kato, Hiroshi Kobayashi, Shoji Yabuki, Shin-ichi Kikuchi, Shin-ichi Konno; Japan*
- SP53 Clinical efficacy of minimally invasive direct lateral interbody fusion for adult spinal deformity  
*Young-Hoon Kim, Jae-Won Lee, Kee-Yong Ha, Sang-Il Kim, South Korea*
- SP54 Lower extremities motor function of the L2 nerve root transection cases in total spondylectomy  
*Naoki Takahashi, Hideki Murakami, Satoru Demura, Satoshi Kato, Katsuhito Yoshioka, Noriaki Yokogawa, Takashi Ota, Noritaka Yonezawa, Takaki Shimizu, Hiroyuki Tsuchiya; Japan*

### SP #2J SPINAL ALIGNMENT

Friday, June 2, 2017 at 07:45-08:45

Moderators: Jason Cheung and Mamoru Kawakami

- SP55 The effect of parity on age-related degenerative changes in sagittal balance  
*Jeannie F Bailey, Frances MK Williams, Patrick F Curran, Jeffrey C Lotz, Patricia A Kramer; United States*
- SP56 Importance of tailoring surgical strategies to preoperative pelvic incidence (PI) in adult spinal deformity: a comparative analysis of 138 patients with high PI and low PI  
*Alexander Theologis, Junseok Bae, Corinna Zygourakis, Shane Burch, Dean Chou, Sigurd Berven, Praveen Mummaneni, Bobby Tay, Christopher Ames, Vedat Deviren; United States*
- SP57 An analysis of radiographic parameters comparison between lumbar spine latericumbent and full-length lateral standing radiographs  
*Ke Gong, Xueyu Hu, Zhiwei Yang, Zhe Wang, Zhuojing Luo; China*
- SP58 Spino-pelvic sagittal imbalance as a risk factor for adjacent segment disease after single-segment PLIF  
*Tomoya TM Matsumoto, Shinya SO Okuda, Takafumi TM Maeno, Tomoya TY Yamashita, Tsuyoshi TS Sugiura, Motoki MI Iwasaki; Japan*
- SP59 The incidence of pleural fluid and its associated risk factors following posterior corrective spinal fusion in patients with adolescent idiopathic scoliosis  
*Kazunori Hayashi, Hidetomi Terai, Hiromitsu Toyoda, Akinobu Suzuki, Masatoshi Hoshino, Shinji Takahashi, Koji Tamai, Shoichiro Ohyama, Hiroaki Nakamura, Japan*
- SP60 Pharmacometrics for changing behaviors induced by lumbar facetectomy and repeated cold stress in rats  
*Daisuke Fukuj, Mamoru Kawakami; Japan*

## GENERAL POSTER SESSION

Thursday, June 1, 2017 at 15:00-16:00, drinks and snacks will be served

- GP001 Gait analysis of lumbar spinal stenosis using a wireless inertial measurement unit  
*Kengo Fujii, Naotaka Mamizuka, Yasuaki Ohtaki, Tetsuya Abe, Masashi Yamazaki; Japan*
- GP002 Lumbar spine shape as a biomarker of lumbar disc degeneration: a preliminary analysis  
*Janet A Deane, Anastasia V Pavlova, Adrian K P Lim, Richard M Aspden, Alison H McGregor; United Kingdom*
- GP003 Superior cortical screw in lumbar spine: - a biomechanical and micro-structure based study - in osteoporotic human vertebrae  
*Tianming Yu, Xuyang Zhang, Junhui Liu, Shengyun Li, Zhi Shan, Shunwu Fan, Fengdong Zhao; China*
- GP004 The mechanism of thoracolumbar burst fracture may be related to the basivertebral foramen  
*Xuyang Zhang, Tianming Yu, Shengyun Li, Fengdong Zhao; China*
- GP005 The changes of sagittal spino-pelvic morphology in long-time loading Chinese persons compared with the non-loading  
*Xuyang Zhang, Tianming Yu, Bao Huang, Maiwulanjiang Mamuti, Fengdong Zhao, Shunwu Fan; China*
- GP006 An increased change in the posterior pelvic inclination from the supine to standing position in elderly osteoarthritis of the hip is associated with the sagittal spino-pelvic alignment  
*Tadatsugu Morimoto, Masatsugu Tsukamoto, Tomohito Yoshihara, Kasumasa Maeda; Japan*
- GP007 Kinematic and kinetic indices for lumbar spine stability in subjects with recurrent low back pain  
*Paul Sung, Pamela Danial; United States*
- GP008 In vitro experiment analyzing the influence of the rib cage on human thoracic spine stability by stepwise reduction of the single structures  
*Christian Liebsch, Nicolas Graf, Konrad Appelt, Hans-Joachim Wilke; Germany*
- GP009 The effect of compressive loading on the delamination strength of the annulus fibrosus  
*Joshua Clayton, Diane Gregory; Canada*
- GP010 The effect of short duration low back vibration on pain developed during prolonged standing  
*Diane Gregory, Analyssa Cardenas, Renée Lurie, Stephanie Cimino, Stephen Brown; Canada*
- GP011 Resonance frequency analysis of pedicle screw stability: a cadaveric study with micro-CT  
*Daisuke Nakashima, Takeo Nagura, Ken Ishii, Hiromasa Kawana, Masahiro Jinzaki, Morio Matsumoto, Masaya Nakamura; Japan*
- GP012 Postural influence on lumbosacral sagittal alignment - what is the "ideal" fusion alignment?  
*Avinash G. Patwardhan, Saeed Khayatzadeh, Antonio Faundez, Robert M. Havey, Leonard I. Voronov, Alexander J. Ghanayem, Jean-Charles Le Huec; United States*
- GP013 Targeting the low back improves return to play in athletes with functional hamstring disorders  
*Georgios Kakavas, Christopher J Colloca, Mostafa A Hegazy, Nikos Malliaropoulos; Greece*
- GP014 Tidemark avulsions are a highly prevalent form of endplate damage  
*Jennifer Bailey, Britta Berg-Johansen, Ellen C Liebenberg, Aaron J Fields, Jeffrey C Lotz; United States*
- GP015 Machine learning for the analysis of medical images of the spine  
*Fabio Galbusera, Tito Bassani, Maike Seyfried, Margarita Darminow, Meinrad Beer, Annette Kienle, Frank Niemeyer, Hans-Joachim Wilke; Italy*

- GP016 Biomechanical loads on the lumbar spine during simulated wheelchair pushing  
*Eric B. Weston, Safdar Khan, William S. Marras; United States*
- GP017 Biomechanical push-pull limits that protect the lumbar spine  
*William S. Marras, Eric B. Weston, Jonathon Dufour, Gregory G. Knapik, Safdar Khan, Ehud Mendel; United States*
- GP018 Thickness of the ligamentum flavum is associated with the total content of advanced glycation end products (AGEs) in lumbar spinal stenosis patients  
*Hiroto Makino, Yoshiharu Kawaguchi, Mitsuru Saito, Shoji Seki, Taketoshi Yasuda, Kayo Suzuki, Yasuhito Yahara, Kenta Watanabe, Yoshikuni Kida, Keishi Marumo, Tomoatsu Kimura; Japan*
- GP019 *Measuring participation in chronic back pain patients - the 5-item pain disability index*  
*Ashley B McKillop, Carroll L.J, Dick B.D., Battié M.C.; Canada*
- GP020 Altered intervertebral disc mechanics in vivo after 60D bed-rest  
*Daniel L Belavy, Ulf Gast, Darius Gerlach, Albert Gollhofer, Markus Gruber, Timo Rantalainen, Jörn Rittweger, Jochen Zange, Dieter Felsenberg, Gabriele Armbrecht; Australia*
- GP021 Postoperative change in sagittal spinopelvic alignment and low back pain after total hip arthroplasty  
*Kazuya Kishima, Keishi Maruo, Toshiya Tachibana, Fumihiko Arizumi, Kazuki Kusuyama, Shinichi Yoshiya; Japan*
- GP022 Radiographic factors and diagnostic indicator of the onset of lumbosacral foraminal stenosis  
*Yoshio Shinozaki, Yohji Ogura, Yoshiomi Kobayashi, Yohei Takahashi, Jun Ogawa; Japan*
- GP023 The correlation between sagittal spinopelvic alignment and degree of lumbar degenerative spondylolisthesis.  
*Kazuyoshi Nakanishi, Nobuhiro Tanaka, Naosuke Kamei, Shinji Kotaka, Mitsuo Ochi, Nobuo Adachi; Japan*
- GP024 Validation of new technique for assessing the muscle activity of the psoas major using diffusion-weighted magnetic resonance imaging  
*Yu Okubo, Koji Kaneoka, Atsushi Imai, Kiyotaka Hasebe, Naoto Matsunaga, Paul Hodges; Japan*
- GP025 Biomechanical advantages of robot-assisted pedicle screw fixation in posterior lumbar interbody fusion compared to free-hand technique in a prospective randomized controlled trial - perspective for patient-specific finite element analysis  
*Ho-Joong Kim, Jin S. Yeom, Bong-Soon Chang, Choon-Ki Lee; South Korea*
- GP026 Co-activation of trunk muscles during hip extension movements  
*Kiyotaka Hasebe, Yu Okubo, Hiroshi Akuzawa, Atsushi Imai, Koji Kaneoka; Japan*
- GP027 Diastasis recti and trunk muscle function in women at one-year postpartum  
*Nicole F Hills, Ryan B Graham, Linda McLean; Canada*
- GP028 Spinal tissue loading created by different methods of spinal manipulative therapy (SMT) application  
*Martha Funabashi, François Nougrou, Martin Descarreaux, Narasimha Prasad, Gregory Kawchuk; Canada*
- GP029 Effect of lumbar disc fusion on adjacent segment disc deformation: an in-vivo patient analysis pre and post fusion surgery  
*Thomas D Cha, Kamran Z Khan, Yan Yu, Jing sheng, Tsung-Yuan Tsai, Kirkham B Wood, Guoan Li; United States*
- GP030 The role of L5-S1 intervertebral disc shape in the progression of a bilateral spondylolytic defect at L5 to spondylolisthesis: a biomechanical investigation using finite element analysis  
*Vivek Ramakrishna, Uphar Chamoli, Naomi Tsafnat, Ashish D Diwan; Australia*

- GP031 A computed tomography analysis of S2 alar-iliac and iliac screws: comparison using Hounsfield unit value along screw pathway  
*Masatsugu Tsukamoto, Yuichiro Abe, Masaki Terakawa, Yasushi Yanagibashi, Takahiko Hyakumachi, Shigenobu Satoh; Japan*
- GP032 Nucleus implant geometry significantly influences bending stiffness of the human lumbar motion segment: a finite element modelling study  
*Uphar Chamoli, Johannes Goldmann, Naomi Tsafnat, Ashish D Diwan; Australia*
- GP033 Cortical bone vs traditional trajectory pedicle screws: a combined compression and flexion biomechanical analysis  
*Chase Bennett, Tyler Johnston, Anthony Behn, Todd Alamin; United States*
- GP034 Differential patient responses to spinal manipulative therapy and their relation to spinal degeneration and post-treatment changes in disc diffusion  
*Arnold YL Wong, Eric C Parent, Sukhvinder S Dhillon, Narasimha Prasad, Dino Samartzis, Gregory N Kawchuk; Hong Kong*
- GP035 Can a lumbar interspinous stabilisation device provide adequate support to allow spinal fusion: a biomechanical test  
*Niall J A Craig, Werner Schmoelz, Ana Spicher; United Kingdom*
- GP036 Anatomical study of psoas major muscle on sagittal MRI  
*Masayoshi Iwamae, Teruo Kita, Kazushi Takayama, Hideki Sakanaka, Hiroaki Nakamura, Yoshiki Yamano; Japan*
- GP037 Interspinous process implants causes wear of the spinous processes in patients treated for spinal stenosis - an experimental biomechanical study with comparison to clinical cases  
*Adad Baranto, Christian Hagelberg, Jonas Hvannberg, Lars Ekström, Klas Halldin, Helena Brisby, Sweden*
- GP038 Lumbar lordosis of spinal stenosis patients during intraoperative prone positioning  
*Seung-Hwan Lee, Su-Keon Lee, South Korea*
- GP039 Kinematic analysis of spino-pelvic-rhythm using a dynamic flat panel detector  
*Katsuhito Yoshioka, Hideki Murakami, Satoru Demura, Satoshi Kato, Noritaka Yonezawa, Naoki Takahashi, Takaki Shimizu, Hiroyuki Tsuchiya, Japan*
- GP040 Paravertebral muscle volume in patients with lumbar degenerative scoliosis  
*Takashi Tamura, Yoshi Kawaguchi, Hiroto Makino, Taketoshi Yasuda, Shoji Seki, Kayo Suzuki, Yasuhito Yahara, Kenta Watanabe, Tomoatsu Kimura, Japan*
- GP041 NFkB Decoy Oligodeoxynucleotide Injected into normal rabbit intervertebral discs remains in the discs at least 4 weeks and restored puncture-induced degenerated rabbit intervertebral discs with long term analysis  
*Kenji Kato, Shingo Miyazaki, Mary E Lenz, Takahiro Nakazawa, Toshinori Yamamoto, Robert L Sah, Koichi Masuda; United States*
- GP042 Disc degeneration through axial loading on the lumbar spine: a rabbit model  
*Xuedong Bai, Dike Ruan, Deli Wang; China*
- GP043 Biological characteristics and potential of nucleus pulposus derived stem cells in human degenerative intervertebral disc with different Pfirrmann grade  
*Xiao-Chuan Li, Xuedong Bai, Yahong Wu, Ziming Guo, Wei Ji, Deli Wang, Dike Ruan; China*



- GP044 MR evaluation of the characteristics of the intervertebral disc in subjects after a single traumatic event: cervical spine.  
*Charlotte Van Langenhove, Thiebault Saveyn, Lennart Jans, Jan K Van Meirhaeghe, Koen Verstraete; Belgium*
- GP045 Scale up and in vivo evaluation of a disc-like angle ply structure (DAPS) for total disc replacement in a preclinical large animal model  
*Sarah E Gullbrand, Beth G Ashinsky, Dong Hwa Kim, John T Martin, Thomas P Schaer, Dawn M Elliott, Lachlan J Smith, Robert L Mauck, Harvey E Smith; United States*
- GP046 Investigation of influence by different hydrogel features and growth hormone on the direction of human mesenchymal stem cells into the chondrogenic lineage  
*Axelia AH Hansson, Anna AW Wenger, Helena HB Barreto Henriksson, Susan SL Li, Bengt BJ Johansson, Helena HB Brisby, Sweden*
- GP047 Role of semaphorin 3A in intervertebral disc degeneration  
*Yuichiro Y Mima, Nobuyuki N Fujita, Satoshi S Suzuki, Takeshi T Fujii, Kota K Watanabe, Ken K Ishii, Takashi T Tsuji, Takeshi T Miyamoto, Morio M Matsumoto, Masaya M Nakamura; Japan*
- GP048 Stimulation of mitogen-activated protein kinases by cyclic tensile stress in human annulus fibrosus cells induces the expression of pro-inflammatory genes  
*Harris Pratsinis, Adamantia Papadopoulou, Cornelia Neidlinger-Wilke, Marco Brayda-Bruno, Hans-Joachim Wilke, Dimitris Kletsas; Greece*
- GP049 A possible role of the terminal complement complex TCC in intervertebral disc degeneration  
*Cornelia Neidlinger-Wilke, Helga Joos, Taryn Saggese, Helena Brisby, Helena Barreto Henriksson, Michael Ruf, Thomas Barth, Uwe M Mauer, Anita Ignatius, Rolf Brenner; Germany*
- GP050 Identification of intracellular sources of reactive oxygen species in intervertebral discs under inflammatory condition  
*Yingchao Han, Gwendolyn Sowa, James Kang, Nam Vo; United States*
- GP051 The effect of capacitively coupled electrical stimulation on human intervertebral disc cells from discs of different degrees of degeneration  
*Zili Wang, Steven Presciutti, William Hutton, Tim Yoon; United States*
- GP052 Sound the 'alarmin:' disc degeneration and toll-like receptors in mice and men  
*Emerson Krock, Magali Millecamps, Jean A Ouellet, Laura S Stone, Lisbet Haglund; Canada*
- GP053 The effect of the intervertebral disc environment on the specific phenotype of senescent nucleus pulposus cells  
*Anastasios Kouroumalis, Eleni Mavrogonatou, Harris Pratsinis, Olga D Savvidou, Panayiotis J Papagelopoulos, Dimitris Kletsas; Greece*
- GP054 Proteomic profile of herniated intervertebral lumbar disc  
*Rajasekaran Shanmuganathan, Chitraa tangavel, Siddharth Aiyer, Shraon Nayagam, Raveendran Muthurajan, Naveen Luke, Dharmalingam K; India*
- GP055 Comparative protein profiling of degenerative intervertebral disc and disc herniations using proteomics  
*Rajasekaran Shanmuganathan, Chitraa tangavel, Siddharth Aiyer, Shraon Nayagam, Raveendran Muthurajan, Naveen Luke, Dharmalingam K; India*
- GP056 Follistatin-like protein 1 has an anti-inflammatory effect on the notochordal nucleus pulposus cell line, U-CH1-N  
*Ryuichi Watanabe, Nobuyuki Fujita, Kota Watanabe, Ken Ishii, Takashi Tsuji, Keisuke Horiuchi, Takeshi Minamoto, Masaya Nakamura, Morio Matsumoto; Japan*

- GP057 Biological characteristics and potential of nucleus pulposus derived stem cells in human degenerative intervertebral disc with different pfirrmann grade  
*Xiao-Chuan Li, Xuedong Bai, Yao-Hong Wu, Zi-Ming Guo, Jia-Hai Chen, deli wang, Dike Ruan; China*
- GP058 Stimulation of primary human osteoblasts and human stromal cells with the BMP antagonists gremlin and noggin  
*Rahel D May, Adel Tekari, Daniela A Frauchiger, Lorin M Benneker, Sandro Kohl, Benjamin Gantenbein; Switzerland*
- GP059 Three-dimensional characterization of the morphology changes in the intervertebral disc and endplate and their cross talk during aging: a propagation phase contrast synchrotron CT study  
*Hongbin Lu, Jianzhong Hu, Yong Cao; China*
- GP060 Ultrastructural analysis of annulus fibrosus elastic fibers using a rapid matrix digestion technique  
*Javad Tavakoli, John J Costj; Australia*
- GP061 Different types of senescence lead to a similar transcriptional regulation of catabolic and inflammatory genes in human intervertebral disc cells  
*Sotirios-Spyridon Vamvakas, Eleni Mavrogonatou, Dimitris Kletsas; Greece*
- GP062 Controlled release of celecoxib from polyesteramide microparticles in a canine pre-clinical intervertebral disc degeneration model  
*Anna Tellegen, Martijn Beukers, Imke Jansen, Guy CM Grinwis, Nina Woike, George Mihov, Björn P Meij, Laura B Creemers, Marianna A Tryfonidou; Netherlands*
- GP063 The role of TGFβ<sub>1</sub>/CCL3/4 in reversing IVDD and relieving pain  
*Zhaomin Zheng, Jian Zhang, Jianru Wang; China*
- GP064 Enhanced myofibroblast activity in human and rat disc degeneration  
*Yan Peng, Fengjuan Lv, Kenneth Cheung, Victor Leung; Hong Kong*
- GP065 Small molecule antagonist of C-C Chemokine Receptor 1 can reduce disc inflammation in the rabbit model  
*Po-Hsin Chou, Peng Shi, Cheng-Li Lin, Yibao Zhao, Li Zhang, Ana Chee, Howard S An, USA*
- GP066 High-resolution mri enables non-invasive size determination of hernia-like nodules formed after experimental disc puncture in the rat  
*Daniel Jonsson, Mikael Montelius, Kjell Olmarker, Sweden*
- GP067 Effect of disc dimensions on diffusion of solutes in healthy human intervertebral discs  
*Naresh-Babu J, Arun-Kumar Viswanadha, Aruna Priyadarsini, Neelima G, India*
- GP068 Effect of exogenous nitric oxide on proteoglycan metabolism of disc cells in vitro  
*Shigeru Kobayashi, Takahiro Asai, Adam Meir, Jill Urban, Japan*
- GP069 To study the efficacy of treatment algorithm in the management of postoperative discitis  
*Mandar D Borde, Shekhar Y Bhojraj, Premik B Nagad, Priyank Patel, Akshay Gadiya, Tanay Prabhoo; India*
- GP070 Half an hour's effect of the jackknife stretch on the flexibility of the leg and trunk: a comparative study  
*Naoki Ishigaki, Takato Aihara; Japan*
- GP071 Postural change effects on T1 pelvic angle and other spino-pelvic alignment in adult spinal deformity are less than those in nondeformity: criterion-related validation study  
*Kazunori Hayashi, Hidetomi Terai, Shinji Takahashi, Masatoshi Hoshino, Hiromitsu Toyoda, Akinobu Suzuki, Koji Tamai, Shoichiro Ohyama, Yusuke Hori, Hiroaki Nakamura; Japan*

- GP072 Relationship between fear of movement and health related quality of life in patients with chronic pain  
*Petteri P Koho, Hannu H Kautiainen, Heikki H Hurri; Finland*
- GP073 New global classification of radiological imaging for lesions of the lumbar spine . Development and feasibility  
*Josef J. Assheuer, Federico F. Balagué, Walter W Kaufmann, Ronald R Reisner, Farhad F Forutan; Germany*
- GP074 Predictive risk factors for stenosis in the thoracic and lumbar spines of patients with cervical myelopathy  
*Moon Soo Park, Ho Guen Chang, Tae-Hwan Kim, Jae Keun Oh, K. Daniel Riew; South Korea*
- GP075 Sagittal alignment based on end vertebrae according to different age groups  
*Moon Soo Park, Seong-Hwan Moon, Ho Guen Chang, Tae-Hwan Kim, Jae Keun Oh, Jae-Hyuk Shin; South Korea*
- GP076 Cervical spondylolisthesis combined with lumbar spondylolisthesis  
*Moon Soo Park, Seong-Hwan Moon, Ho Guen Chang, Tae-Hwan Kim, Jae Keun Oh, K. Daniel Riew; South Korea*
- GP077 Two-year follow-up of physical therapy versus surgical therapy for patients with lumbar spinal stenosis  
*Masakazu Minetama, Mamoru Kawakami, Yuyu Ishimoto, Keiji Nagata, Masatoshi Teraguchi, Tomoko Kitagawa, Tadashi Sumiya, Takahiro Miyake, Yoshio Yamamoto, Masafumi Nakagawa, Nana Sakon, Toshiko Matsuoka; Japan*
- GP078 Gender difference of dynamic postural steadiness during one leg standing in older adults with recurrent low back pain  
*Paul Sung, Pamela Danial; United States*
- GP079 Characteristics of patients with lumbar facet syndrome showing efficacy of lumbar flexion exercise  
*Kazuji Aoki, Toru Uehara, Shota Yamada, Atsushi Inada, Nobuharu Suzuki; Japan*
- GP080 Prospective study of characteristics of low back pain in adolescent patients with early-stage spondylolysis evaluated by questionnaire  
*Shiro Sugiura, Yasuchika Aoki, Oyama Takato, Takeshi Toyooka, Tetsuo Shiga, Tohru Ishizaki, Yasumi Kiguchi, Tetsuya Otsuki, Ayako Kote, Yasutaka Omori, Akito Takata, Yasushi Suwazono, Kazuhisa Takahashi, Seiji Ohtori, Satoru Nishikawa; Japan*
- GP081 Safety and efficacy of aggressive exercise therapy for patients with early-stage spondylolysis  
*Shiro Sugiura, Yasuchika Aoki, Oyama Takato, Takeshi Toyooka, Tetsuo Shiga, Tohru Ishizaki, Yasumi Kiguchi, Tetsuya Otsuki, Ayako Kote, Yasutaka Omori, Akito Takata, Kazuhisa Takahashi, Seiji Ohtori, Satoru Nishikawa; Japan*
- GP082 Secular changes of lumbar canal dimensions in western switzerland: an MRI study  
*Constantin Schizas, Jean-Aybert Collinot, Patrick Omoumi, Jean-Baptise Ledoux, Fabio Becce; Switzerland*
- GP083 Magnetic resonance imaging of anterior thoracolumbar vertebral endplate lesions in young gymnasts  
*Makoto Urushibara, Takato Aihara, Kenji Hatakeyama, Juntaro Ohuchi; Japan*
- GP084 Lumbar degenerative kyphosis with conservative treatment : do clinical symptoms and radiological parameters progress?  
*Whoan Jeang Kim, Kun Young Park, Shann Haw Chang, Kyung Hoon Park, Jae Won Lee; South Korea*
- GP085 Prevalence and related clinical factors of thoracic ossification of the ligamentum flavum - A CT-based cross-sectional study  
*Sang-Il Kim, Kee-Yong Ha, Young-Hoon Kim; South Korea*

- GP086 Recent trends in gender- and age-specific rates of vertebral fractures: a computed tomography-based study  
*Go Kubota, Yasuchika Aoki, Hiroyuki Fukuchi, Atsuya Watanabe, Takayuki Nakazima, Makoto Takazawa, Noriyuki Yanagawa, Kazuhisa Takahashi, Seiji Ohtori; Japan*
- GP087 Evaluation of prognostic factors and a modification to the modified Tokuhashi Score in patients with spinal metastases from breast cancer  
*Jonathan Tan, Kimberly Anne Tan, Lay Wai Khin, Aye Sandar Zaw, Dennis Hey, Naresh Kumar; Singapore*
- GP088 Functional assessment of lumbar nerve roots using direct coronal single-shot turbo spin-echo diffusion tensor imaging - Application to patients with bilateral spinal canal stenosis showing unilateral neurological symptom -  
*Takayuki Sakai, Yasuchika Aoki, Masami Yoneyama, Noriyuki Yanagawa; Japan*
- GP089 Detecting stress at the sacrum with bone single-photon emission computed tomography/computed tomography after instrumented lumbar fusion  
*Sang-Il Kim, Young-Hoon Kim, Kee-Yong Ha; South Korea*
- GP090 The influence of histologic subtype in predicting survival of lung cancer patients with spinal metastases  
*Kimberly Anne Tan, Jonathan Tan, Lay Wai Khin, Aye Sandar Zaw, Dennis Hey, Naresh Kumar; Singapore*
- GP091 Relation between residual low back pain and local/global spinal alignment in osteoporotic vertebral compression fracture  
*Akira Iwata, Masahiro Kanayama, Fumihiko Oha, Yukitoshi Shimamura, Tomoyuki Hashimoto, Norimasa Iwasaki; Japan*
- GP092 Factors influencing adherence to non-surgical treatment for individuals with lumbar spinal stenosis: a qualitative study  
*Allyn M Bove, Andrew D Lynch, Carlo Ammendolia, Michael J Schneider; United States*
- GP093 A validation study of 3D MRI sequences for the qualitative and quantitative assessment of lumbar spinal stenosis  
*Constantin Schizas, Gianluca Fetz, Yerly Jerome, Omoumi Patrick, Laudato Aniello, Jean-Baptiste Ledoux, Fabio Becce; Switzerland*
- GP094 Extra foraminal selective nerve root block - a novel technique for management of lumbar radiculopathy  
*Naresh-Babu J, Arun-Kumar Viswanadha, Aruna Priyadarsini, Neelima G, India*
- GP095 Trans-lateral recess versus paramedian interlaminar epidural injection for lumbar degenerative disc disease  
*Min-Seok Kang, Suk-Ha Lee, Tae-Hoon Kim; South Korea*
- GP096 Prevalence and characteristics of sacroiliac joint pain in high school baseball players  
*Kinshi Kato, Kenichi Otoshi, Shoji Yabuki, Koji Otani, Takuya Nikaido, Kazuyuki Watanabe, Hiroshi Kobayashi, Ryoji Tominaga, Takahiro Kaga, Takahiro Igari, Yoichi Kaneuchi, Ryohei Sato, Ryosuke Mashiko, Shin-ichi Kikuchi, Shin-ichi Konno; Japan*
- GP097 Psychological stress response in relation to musculoskeletal pain in high school baseball players  
*Kinshi Kato, Kenichi Otoshi, Shoji Yabuki, Koji Otani, Takuya Nikaido, Kazuyuki Watanabe, Hiroshi Kobayashi, Ryoji Tominaga, Takahiro Kaga, Takahiro Igari, Yoichi Kaneuchi, Ryohei Sato, Ryosuke Mashiko, Shin-ichi Kikuchi, Shin-ichi Konno; Japan*

- GP098 Characterizing the course of low back pain after osteoporotic vertebral fracture: a hierarchical cluster analysis of the prospective cohort study  
*Hiromitsu Toyoda, Shinji Takahashi, Masatoshi Hoshino, Kazushi Takayama, Ryuichi Sasaoka, Tadao Tsujio, Hiroyuki Yasuda, Fumiaki Kanematsu, Hiroshi Kono, Hiroaki Nakamura; Japan*
- GP099 Effect of exercise using an innovative device for the abdominal trunk muscles in patients with chronic low back pain  
*Satoshi Kato, Hideki Murakami, Satoru Demura, Katsuhito Yoshioka, Naoki Takahashi, Noritaka Yonezawa, Takaki Shimizu, Hiroyuki Tsuchiya; Japan*
- GP100 Metabolic syndrome affects accumulation of lumbar epidural fat  
*Shinichi Ishihara, Nobuyuki Fujita, Kouichirou Azuma, Osahiko Tsuji, Naruhito Nagoshi, Mitsuru Yagi, Kota Watanabe, Takashi Tsuji, Ken Ishii, Masaya Nakamura, Morio Matsumoto; Japan*
- GP101 Who contributed the most to the spine surgery literature ? Publication rates of the abstracts presented at the annual meetings of the North American Spine Society between 2009 and 2012  
*Murat S Eksi, Emel E Ozcan-Eksi; Turkey*
- GP102 Evaluation of lumbar paraspinal muscle atrophy in patients with sarcopenia  
*Nobuyuki Fujita, Koichiro Azuma, Shinichi Ishihara, Osahiko Tsuji, Narihito Nagoshi, Mitsuru Yagi, Kota Watanabe, Takashi Tsuji, Masaya Nakamura, Morio Matsumoto, Ken Ishii; Japan*
- GP103 Pre-treatment goal clarity: validity and association with rehabilitation outcomes for people disabled by chronic low back pain  
*Kelly R Esposito, Kevin F Spratt, Elizabeth S Ossen, Rowland G Hazard; United States*
- GP104 Core muscle weakness is the key risk factor of functional disability in patients with degenerative lumbar disease  
*Jae-Ho Yang, Su Bong Chae, Sang-Youn Lim, Kil-Hyeong Lee, Seung-Hwan Lee, Ho Kang, Jee-Hye Kim, Young-Mi Kang, Yong-Kwan Jeon, Seong-Hwan Moon, Hwan-Mo Lee; S Korea*
- GP105 Participation of orthopedists in hematopoietic malignancies  
*Yu Toda, Tadatsugu Morimoto, Tomohito Yoshihara, Kazumasa Maeda, Motoki Sonohata, Masaaki Mawatari; Japan*
- GP106 Clinical efficacy of percutaneous endoscopic lumbar annuloplasty and nucleoplasty for treatment of patients with discogenic low back pain  
*Jung Hwan Lee, Sang-Ho Lee; South Korea*
- GP107 Satisfaction scores and patient reported outcomes following spinal surgery and non-operative care  
*Greg McIntosh, Hamilton Hall, Tom Carter, Charles Fisher, Ken Thomas, Raja Rampersaud, Neil Manson; Canada*
- GP108 Diagnostic capability of "Spine paindetect" to screen for neuropathic pain caused by spinal disorders  
*Takuya Nikaïdo, Masahiko Sumitani, Miho Sekiguchi, Mika Kawaguchi, Shoji Yabuki, Shinichi Konno; Japan*
- GP109 Interplay among pain intensity, sleep disturbance and emotion in patients with non-specific low back pain  
*Zhaomin Zheng, hua wang, Jianru Wang, Hui Liu, Zemin Li; China*
- GP110 The traction spur is associated with intervertebral vacuum phenomenon and modic change  
*Kazuki Muranaka, tadatsugu morimoto, Masatsugu Tsukamoto, Tomohito Yoshihara, Kazumasa Maeda, Motoki Sonohata, Masaaki Mawatari; Japan*
- GP111 Predictive factors for low back pain development in healthcare students: a systematic review  
*Arnold YL Wong, Kelvin CK Lam, Jean-Maxime Coran; Hong Kong*

- GP112 The prevalence of spinopelvic misalignment in individuals with refractory low back pain and association with MRI findings  
*Sibel Demir, Hemra Cil, Zachary McCormick, Sigurd Berven; United States*
- GP113 Efficacy of ankle brachial index in determining peripheral arterial occlusive disease in patients with lumbar spinal stenosis  
*Si Young Park, Seung Woo Suh, Jae Young Hong, Hyun Min Lee; South Korea*
- GP114 Quality of life of patients with osteoporotic vertebral compression fractures  
*Si Young Park, Ys Soo Park, Hyoung Yeon Seo, Jae Chul Lee, Ki Chan An, Byung Joon Shin, Tae Wook Kang, Ho Jin Jung; South Korea*
- GP115 Structural vertebral endplate nomenclature and etiology: a study by the ISSLS Spinal Phenotype Focus Group  
*Uruj Zehra, Cora Bow, Jeff Lotz, Frances MK Williams, Rajasekaran S Shanmuganathan, Jaro Karppinen, Keith DK Luk, Michele Battiè, Dino Samartzis; Hong Kong*
- GP116 A study on the difference of clinical results between unilateral and bilateral lumbar spondylolysis in adolescent patients  
*Kenji Hatakeyama, Takato Aihara, Makoto Urushibara, Atsushi Kojima; Japan*
- GP117 How does the sexual function change after lumbar spinal fusion?  
*Yukitoshi Shimamura, Masahiro Kanayama, Michiko Horio, Ai Yamaguchi, Atsunori Yuasa, Fumihiko Oha, Tsutomu Endo, Takamasa Watanabe, Hiroyuki Hara, Tomoyuki Hashimoto, Kazuo Kaneko; Japan*
- GP118 Investigation on physical activity participation, attitude and preference of female patients 50 years and older with degenerative lumbar spinal disease  
*Jae-Ho Yang, Su Bong Chae, Sang-Youn Lim, Kil-Hyeong Lee, Young-Mi Kang, Jee-Hye Kim, Yong-Kwan Jeon, Seong-Hwan Moon, Hwan-Mo Lee; South Korea*
- GP119 Intradiscal application of a PCLA-PEG-PCLA hydrogel loaded with Celecoxib for the treatment of back pain: a translational approach  
*Anna R Tellegen, Nicole Willems, Martijn Beukers, Guy CM Grinwis, Saskia GM Plomp, Mike De Leeuw, Maarten Van Dijk, Laura B Creemers, Marianna A Tryfonidou, Björn P Meij; Netherlands*
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*Yusuke Miyashima, Teruo Kita, Kazushi Takayama, Masayoshi Iwamae, Akito Yabu, Hideki Sakanaka, Yoshiki Yamano, Hiroaki Nakamura; Japan*
- GP121 The cost impact of a precise mechanical diagnosis for low back pain: a comparison with usual community care  
*Ronald Donelson, Kevin Spratt, Richard Gray, Mark Miller, Steve McClellan, Boscoboy Miranda, Michael Morgan, Eric Gatmaitan; United States*
- GP122 Progression of lumbar paraspinal muscle atrophy following bilateral botulinum toxin injections in a rabbit model  
*John M. Popovich, Jr., Joshua D. Hubert, Emma L. Klosterman, Anne Tonson, Ronald A. Meyer, Steven P. Arnoczky; United States*
- GP123 The profile of low back pain patients who attend the emergency department and their reasons for doing so  
*Gregory N Kawchuk, Kyria Slomp, Mallory McNiven, Michael E Kawchuk; Canada*
- GP124 Human cartilaginous endplate discontinuities: flash MRI for potential clinical diagnostics  
*Kyle D Meadows, Amy A Claeson, John F DeLucca, John M Peloquin, Edward J Vresilovic, Dawn M Elliott; United States*

- GP125 The natural history of idiopathic scoliosis during growth: a meta-analysis  
*Francesca Di Felice, Fabio Zaina, Sabrina Donzelli, Stefano Negrini; Italy*
- GP126 Peak scoliosis brace can reduce pain in adults with painful scoliosis: six months results from a prospective cohort pilot study  
*Fabio Zaina, Martina Poggio, Sabrina Donzelli, Francesca Di Felice, Stefano Negrini; Italy*
- GP127 Scoliosis-specific exercises reduce bracing rate in adolescents with idiopathic scoliosis. End growth results of an everyday clinics prospective cohort controlled study  
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## ACKNOWLEDGEMENT

We wish to acknowledge the following ISSLS members who have been a great help in reviewing the abstracts submitted for the ISSLS annual meeting in Athens, Greece, May 29-June 2, 2017.

Alastair Gibson	Hans-Joachim Wilke	Nam Vo
Alison McGregor	Heikki Hurri	Nobuhiro Tanaka
Arnold Wong	Hiroshi Hashizume	Orso Osti
Ashish Diwan	Hiroataka Haro	Paul Bishop
Asseem Sharma	Hiroyuki Aono	Richard Guyer
Atsushi Fujiwara	Jacek Cholewicki	Robert Gunzburg
Avinash Patwardhan	Jan Van Meirhaeghe	Rowland Hazard
Benjamin Gantenbein	Jaro Karppinen	Sally Roberts
Björn Strömqvist	Jason Pui Yin Cheung	Satoshi Ogihara
Bradley Weiner	Jill Urban	Shinichi Konno
Carmen Vleggeert-Lankamp	John Cunningham	Shoji Yabuki
Christine Cedraschi	John D Lurie	Simon Brumagne
Christopher Bono	John Glaser	Stephane Genevay
Cornelia Neidlinger-Wilke	Jong-Beom Park	Steven Atlas
Daisuke Togawa	Josef Assheuer	Tom Oxland
Daniel Haschtmann	Kazuhide Inage	Toru Hasegawa
David Wilder	Kazuhiro Chiba	Toshio Nakamae
David Wong	Kazuhiro Hasegawa	Tsuyoshi Kato
Dawn Elliott	Kazuhisa Takahashi	Ulrich Berlemann
Dike Ruan	Kazuyuki Watanabe	Viktor Bartanusz
Dong-Gune Chang	Kevin Spratt	Wilco Jacobs
Douglas Wardlaw	Luigi Aurelio Nasto	William Donaldson
Drew Bednar	Mamoru Kawakami	Yong Hai
Edward Vresilovic	Marinko Rade	
Fabio Galbusera	Masayuki Miyagi	
Fabio Zaina	Michael Mayer	
Federico Balagué	Michael Schneider	
Grace O'Connell	Miho Sekiguchi	
Gwendolyn Sowa	Mohammed Mossaad	
Hans Meisel	Moon Park	











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