



**ORS PSRS**  
**4th International Spine  
Research Symposium**

**October 23–27, 2017**

Split Rock Resort - Lake Harmony, Pennsylvania



**Monday, October 23, 2017**

- 2:00 pm - 9:00 pm      Arrival and Check-in
- 6:00 pm                  Dinner
- 7:30 pm - 7:40 pm      Welcome / Introductory Comments by Chair
- 7:40 pm - 9:30 pm      **KEYNOTE SESSION: DEVELOPMENT TO DISEASE**  
Discussion Leader: Irving Shapiro, PhD, Thomas Jefferson University, Philadelphia, PA  
*This session will introduce the theme of the meeting with a keynote talk.*
- 7:40 pm - 7:50 pm      Opening Remarks
- 7:50 pm - 8:25 pm      **Keynote Talk: Epigenetic Mechanisms of Aging and Senescence**  
**Keynote Speaker: Shelley Berger, PhD**  
Professor Daniel S. Ochs University Professor at University of Pennsylvania  
Faculty member in the Cell & Developmental Biology Department and the Genetics  
Department in the Perelman School of Medicine  
Faculty member in the Biology Department in the School of Arts and Sciences  
Director of the Epigenetics Program at Penn School of Medicine
- 8:25 pm - 8:40 pm      Discussion
- 8:40 pm - 9:15 pm      **Replenishment of Annulus Fibrosus Cells by Endplate Hypertrophic Chondrocytes in Intervertebral Disc Maintenance**  
Danny Chan, BSc, MSc, PhD, University of Hong Kong, PR China
- 9:15 pm - 9:30 pm      Discussion
- 9:30 pm – 10:30 pm      Welcome Reception

**Tuesday, October 24, 2017**

- 7:30 am - 8:30 am      Breakfast
- 9:00 am - 12:30 pm      **DISC BIOLOGY**  
Discussion Leaders: Mauro Alini, PhD, AO Research Institute, Davos, Switzerland and Zulma Gazit, PhD, Cedars Sinai Medical Center, Los Angeles, CA  
*This session will highlight the latest advances in disc development and cell biology.*
- 9:00 am - 9:10 am      Introduction by Discussion Leader
- 9:10 am - 9:35 am      **Role of Shh in the Postnatal Spine Development and Maintenance**  
Chitra Dahia, PhD, Hospital for Special Surgery, New York

9:35 am - 9:45 am	Discussion
9:45 am - 10:10 am	<b>CCN Proteins in the Intervertebral Disc</b> Cheryle Seguin, PhD, University of Western Ontario, Canada
10:10 am - 10:20 am	Discussion
10:20 am - 10:30 am	<b>The Enigmatic Carbonic Anhydrase 3: A Novel Nucleus Pulposus Marker and Abundant Antioxidant</b> Elizabeth Silagi, BS, Thomas Jefferson University, Philadelphia, PA
10:30 am - 10:35 am	Discussion
10:35 am - 11:05 am	Coffee Break
11:05 am - 11:30 am	<b>Novel functions of RNA-binding Protein HuR in Hypoxic Nucleus Pulposus Cells</b> Makarand Risbud, PhD, Thomas Jefferson University, Philadelphia, PA
11:30 am - 11:40 am	Discussion
11:40 am - 11:50 am	<b>TGF<math>\beta</math> utilizes Noggin to Determine Sclerotome Fate Decision in the Axial Skeleton</b> Ga I Joy Ban, BS, University of Alabama, Birmingham, AL
11:50 am - 12:00 pm	<b>The Role of TRP Channels in Mechanical Unloading/Loading of Intervertebral Disc Cells</b> Elena Cambria, MS, ETH Zurich, Zurich, Switzerland
12:00 pm - 12:10 pm	Discussion
12:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm – 6:00 pm	Poster Session I
6:00 pm	Dinner
7:30 pm – 9:30 pm	<b>DISC PATHOBIOLOGY</b> Discussion Leader: Lisbet Haglund, PhD, McGill University, Montreal, Canada <i>This session will highlight the latest advances in disc pathobiology.</i>
7:30 pm – 7:35 pm	Introduction by Discussion Leader
7:35 pm – 7:55 pm	<b>Degenerative Disc Disease: Review &amp; Recommendations from ISSLS</b> Michele Battie, PhD, University of Alberta, Alberta, Canada
7:55 pm – 8:05 pm	Discussion
8:05 pm – 8:30 pm	<b>The Ins and Outs of Intervertebral Disc Aging</b> Nam Vo, PhD, University of Pittsburgh, Pittsburgh, PA
8:30 pm – 8:40 pm	Discussion
8:40 pm – 9:05 pm	<b>Good Fences Make Good Neighbors: Disc/Vertebra Cross-talk with Low Back Pain</b> Jeffrey Lotz, PhD, University of California San Francisco, San Francisco, CA

- 9:05 pm – 9:15 pm Discussion
- 9:15 pm – 9:25 pm **Conditional Loss of Gpr126 Causes Scoliosis and Disc Degeneration in Mouse**  
Ryan S. Gray, PhD, University of Texas at Austin, Austin, TX
- 9:25 pm – 9:30 pm Discussion
- 9:30 pm – 10:30 pm Networking Reception

**Wednesday, October 25, 2017**

- 7:30 am - 8:30 am Breakfast
- 8:30 am Group Photo
- 9:00 am - 12:30 pm **PATHOBIOLOGY AND PAIN**  
Discussion Leaders: Neil Malhotra, MD, University of Pennsylvania, Philadelphia, PA and Gwendolyn Sowa, MD, PhD, University of Pittsburgh, Pittsburgh, PA  
*This session will discuss advances in our understanding of mechanisms promoting disc degeneration and pain generation.*
- 9:00 am - 9:10 am Introduction by Discussion Leader
- 9:10 am - 9:35 am **Intervertebral Disc Degeneration, Neuroplasticity and Low Back Pain: Lessons from Pre-Clinical Models**  
Laura Stone, PhD, McGill University, Montreal, Canada
- 9:35 am - 9:50 am Discussion
- 9:50 am - 10:15 am **Temporal Development of Neural-Behavioral Crosstalk in a Rodent Model of Painful Disc Degeneration**  
Lori Setton, PhD, Washington University in St. Louis, St. Louis, MO
- 10:15 am - 10:30 am Discussion
- 10:30 am - 10:40 am **Hypertrophy and Cell Fate Changes Underscore Spontaneous Disc Degeneration in SM/J Mice**  
Hyowon Choi, BA, Thomas Jefferson University, Philadelphia, PA
- 10:40 am - 10:45 am Discussion
- 10:45 am - 11:15 am Coffee Break
- 11:15 am - 11:25 am **Fullerol Alleviates Lumbar Radiculopathy via Antagonizing TNF- $\alpha$ -induced Ion Channel Activation, Calcium Signaling and Neuropeptide Release**  
Joshua Li, MD, PhD, University of Virginia, Charlottesville, VA
- 11:25 am - 11:35 am **Metabolic Reprogramming to a High Energy State Accompanies the Catabolic Phenotype of Human Senescent Disc Cells**  
Prashanti Patil, BS, University of Pittsburgh, Pittsburgh, PA
- 11:35 am - 11:45 am **Deletion of RAGE Significantly Blunts the AGEs- and HMGB1- Mediated Degeneration of the Intervertebral Disc**  
Simon Tang, PhD, Washington University in St. Louis, St. Louis, MO

11:45 am - 11:55 am	<b>Potential Involvement of Unfolded Protein Response in the Pathogenesis of Intervertebral Disc Degeneration</b> Nobuyuki Fujita, MD, PhD, Keio University School of Medicine, Tokyo, Japan
11:55 am – 12:15 pm	Discussion
12:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm – 6:00 pm	Poster Session I & II
6:00 pm	Dinner
7:30 pm – 9:30 pm	<b>TISSUE ENGINEERING</b> Discussion Leaders: Jerome Guicheux, DSc, PhD, University of Nantes, Nantes, France and Abhay Pandit, PhD, NUI Galway, Galway, Ireland  <i>This session will focus on novel strategies to create disc tissue substitutes, including novel biomaterials, bioreactors, and devices that mimic tissue physiology and pathophysiology.</i>
7:30 pm – 7:35 pm	Introduction by Discussion Leader
7:35 pm – 7:55 pm	<b>Annulus Fibrosus Injury, Repair, and Regeneration</b> James Iatridis, PhD, Icahn School of Medicine at Mount Sinai, New York, NY
7:55 pm – 8:05 pm	Discussion
8:05 pm – 8:30 pm	<b>Cell Migration into Degenerative Intervertebral Disc: The Good and the Bad</b> Sibylle Grad, PhD, AO Research Institute Davos, Switzerland
8:30 pm – 8:40 pm	Discussion
8:40 pm – 9:05 pm	<b>GDF6: A Biologic Offering a Dual Regenerative Approach for Intervertebral Disc Degeneration</b> Judith Hoyland, PhD, University of Manchester, Manchester, United Kingdom
9:05 pm – 9:15 pm	Discussion
9:15 pm – 9:25 pm	<b>Optimizing Microenvironmental Conditions for Physiologically Relevant Culture of Full Organ Disc Explants</b> Conor T. Buckley, PhD, Trinity College Dublin, Ireland
9:25 pm – 9:30 pm	Discussion
9:30 pm – 10:30 pm	Networking Reception

**Thursday, October 26, 2017**

7:30 am - 8:30 am          Breakfast

9:00 am - 12:30 pm	<p><b>DISC BIOMECHANICS AND IMAGING</b>  Discussion Leaders: Dawn Elliott, PhD, University of Delaware, Newark, NJ and Larry Bonassar, PhD, Cornell University, Ithaca, NY  <i>This goal of this session is to discuss advances in our understanding of the mechanisms by which cells sense mechanical perturbations and the role of altered mechanics to disc pathologies.</i></p>
9:00 am - 9:10 am	Introduction by Discussion Leader
9:10 am - 9:35 am	<p><b>Modes of Loading and Structural Changes Influence the Failure of the Disc</b>  Hans Joachim Wilke, PhD, University of Ulm, Ulm, Germany</p>
9:35 am - 9:45 am	Discussion
9:45 am - 10:10 am	<p><b>Nucleus Pulposus Cell Mechanobiology: Effects of Inflammation and Degeneration</b>  Nadeen Chahine, PhD, Columbia University, New York, NY</p>
10:10 am - 10:20 am	Discussion
10:20 am - 10:30 am	<p><b>Effects of Dynamic Loading on Solute Transport Across the Human Cartilage Endplate</b>  Aaron J. Fields, PhD, University of California, San Francisco, CA</p>
10:30 am - 10:35 am	Discussion
10:35 am - 11:05 am	Coffee Break
11:05 am - 11:30 am	<p><b>Embracing the Challenges of Translational Spine Research</b>  Marianna Tryfonidou, PhD, University of Utrecht, Utrecht, Netherlands</p>
11:30 am - 11:40 am	Discussion
11:40 am - 11:50 am	<p><b>Functional Restoration of Intervertebral Disc Biomechanics Following Neonatal Herniation Injury</b>  Olivia M. Torre, M.Eng., Icahn School of Medicine at Mount Sinai, New York, NY</p>
11:50 am - 12:00 pm	<p><b>In Vivo MRI Quantification of Human Disc Compression and Flexion/Extension</b>  Dawn M. Elliott, PhD, University of Delaware, Newark, DE</p>
12:00 pm - 12:10 pm	<p><b>Detection of Internal Tissue Disruptions within Injured Intervertebral Discs via Magnetic Resonance Elastography</b>  Benjamin A. Walter, PhD, The Ohio State University, Columbus, OH</p>
12:10 pm - 12:25 pm	Discussion
12:30 pm	Lunch
1:30 pm - 3:45 pm	Free Time
3:45 pm - 5:45 pm	Poster Session II
5:45 pm	Dinner
6:45 pm - 7:30 pm	<p>Business Meeting  <i>Nominations for the Next Chair and Discuss Future Site; Life Time Achievement Award Presentation</i></p>

7:30 pm - 9:30 pm	<b>ANIMAL MODELS, TRANSLATIONAL AND CLINICAL TRIALS</b> Discussion Leaders: Ashish Diwan, MD, PhD, University of New South Wales, Australia and Keita Ito, MD, PhD, Eindhoven University of Technology, Netherlands <i>Session co-sponsored by the ORS Spine Section</i>
7:30 pm - 7:35 pm	Introduction by Discussion Leader
7:35 pm - 7:55 pm	<b>Biological Repair of Intervertebral Discs: Adventures in Commercialization</b> Fackson Mwale, PhD, Jewish General Hospital, McGill University, Montreal, Canada
7:55 pm - 8:05 pm	Discussion
8:05 pm - 8:15 pm	<b>Cell Delivery in Collagen Gels Enhances Annulus Fibrosus Repair of the Sheep Spine In Vivo</b> Stephen Sloan Jr., BS, Cornell University, Ithaca, NY
8:15 pm - 8:25 pm	<b>Lentiviral CRISPR Epigenome Editing: A Potential Gene Therapy Strategy for Disc Degeneration</b> Niloofer Farhang, BS, University of Utah, Salt Lake City, UT
8:25 pm - 8:35pm	Discussion
8:35 pm - 9:00 pm	<b>Developing Regenerative Therapies for Disc Degeneration Targeting the Degenerate Niche</b> Christine Lemaitre, BSc, PGCert HE, PhD, FHEA, Sheffield Hallam University, Sheffield, UK
9:00 pm - 9:10 pm	Discussion
9:10 pm - 9:20 pm	<b>Quantitative Magnetic Resonance Imaging Correlates with Histological Grade in a Percutaneous Needle Injury Mouse Model of Disc Degeneration</b> Lachlan Smith, PhD, University of Pennsylvania, Philadelphia, PA
9:20 pm - 9:30 pm	Discussion
9:30 pm – 9:40 pm	Awards Ceremony
9:40 pm – 9:50 pm	Closing Remarks
9:50 pm – 10:50 pm	Networking Reception

**Friday, October 27, 2017**

7:30 am - 8:30 am	Breakfast
9:00 am	Departure