



# 2020 ANNUAL MEETING

FEBRUARY 8 – 11, 2020  
PHOENIX, ARIZONA

## PROGRAM BOOK



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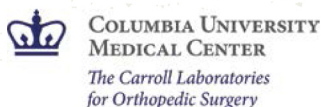


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# WELCOME TO THE ORS 2020 ANNUAL MEETING

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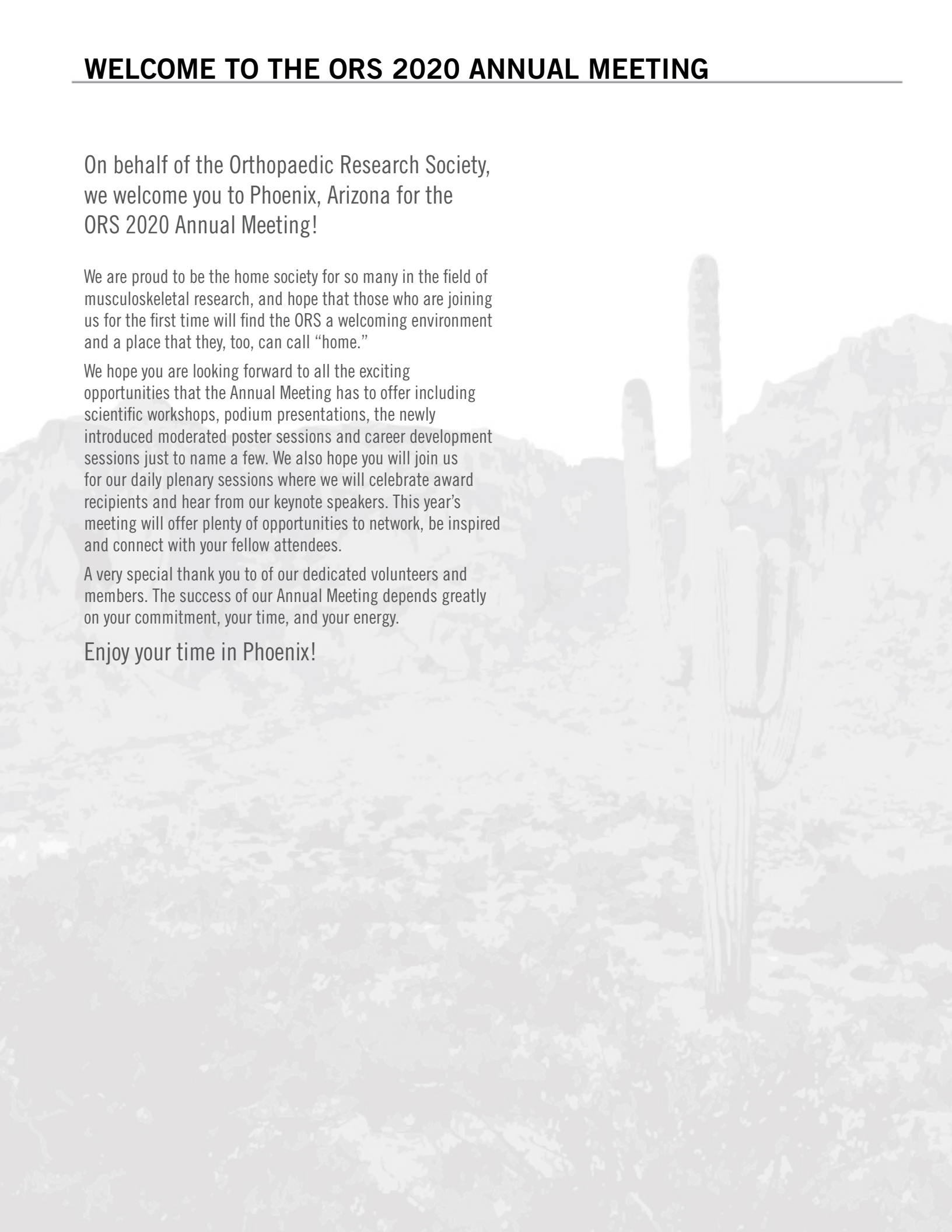
On behalf of the Orthopaedic Research Society,  
we welcome you to Phoenix, Arizona for the  
ORS 2020 Annual Meeting!

We are proud to be the home society for so many in the field of musculoskeletal research, and hope that those who are joining us for the first time will find the ORS a welcoming environment and a place that they, too, can call “home.”

We hope you are looking forward to all the exciting opportunities that the Annual Meeting has to offer including scientific workshops, podium presentations, the newly introduced moderated poster sessions and career development sessions just to name a few. We also hope you will join us for our daily plenary sessions where we will celebrate award recipients and hear from our keynote speakers. This year’s meeting will offer plenty of opportunities to network, be inspired and connect with your fellow attendees.

A very special thank you to our dedicated volunteers and members. The success of our Annual Meeting depends greatly on your commitment, your time, and your energy.

Enjoy your time in Phoenix!





# Schedule

## Exhibit and Poster Hall (North Building, 300 Level)

North Hall A–C, Phoenix Convention Center—Innovation Theater, Moderated Poster Theaters, Seating and Lounges, Refreshment Breaks and Concession Sales

Saturday, February 8	10:00 AM–7:00 PM
Sunday, February 9	10:00 AM–4:00 PM
Monday, February 10	10:00 AM–7:00 PM
Tuesday, February 11	9:00 AM–1:45 PM

## Speaker Ready Room (North Building, 200 Level)

North 223, Phoenix Convention Center

Friday, February 7	2:00 PM–6:00 PM
Saturday, February 8	7:30 AM–5:30 PM
Sunday, February 9	7:30 AM–6:00 PM
Monday, February 10	7:30 AM–5:30 PM
Tuesday, February 11	7:30 AM–2:00 PM

## Registration (North Building, 300 Level)

North Hall A–C Foyer, Phoenix Convention Center

Friday, February 7	12:00 PM–7:00 PM
Saturday, February 8	6:45 AM–5:30 PM
Sunday, February 9	7:15 AM–6:00 PM
Monday, February 10	7:00 AM–5:30 PM
Tuesday, February 11	7:45 AM–2:00 PM

# Poster Sessions

## POSTER SESSION 1

### Poster Pick-Up & Set-Up

Exhibit & Poster Hall (North A–C)

Friday, February 7	2:00 PM–6:00 PM
Saturday, February 8	6:45 AM–8:00 AM

### Poster Viewing

Saturday, February 8 10:15 AM–11:15 AM  
(Authors required at EVEN numbered posters)

Saturday, February 8 5:30 PM–7:00 PM  
(Poster Session 1 Reception)

Sunday, February 9 10:15 AM–11:15 AM  
(Authors required at ODD numbered posters)

Sunday, February 9 3:00 PM–4:00 PM

### Poster Tear-Down

Sunday, February 9 6:15 PM–6:45 PM

## POSTER SESSION 2

### Poster Pick-Up & Set-Up

Exhibit & Poster Hall (North Hall A–C)

Monday, February 10 7:00 AM–8:00 AM

### Poster Viewing

Monday, February 10 10:15 AM–11:15 AM  
(Authors required at EVEN numbered posters)

Monday, February 10 5:30 PM–7:00 PM  
(Poster Session 2 Reception)

Tuesday, February 11 9:00 AM–10:00 AM  
(Authors required at ODD numbered posters)

Tuesday, February 11 12:15 PM–1:45 PM

### Poster Tear-Down

Tuesday, February 11 1:45 PM–2:45 PM

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Meniscus Shoulder & Elbow Skeletal Muscle Spine	
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This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the American Academy of Orthopaedic Surgeons and the Orthopaedic Research Society. The American Academy of Orthopaedic Surgeons is accredited by the ACCME to provide continuing medical education for physicians.

The American Academy of Orthopaedic Surgeons designates this live activity for a maximum of 41.5 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Following the meeting, a link to the CME Claim Form will be added to the CME page on the 2020 Annual Meeting website. Once the claim form is completed, you will receive a CME Certificate by email.

## SAFETY TIPS

### DO:

- Travel with only the credit card and ID cards you will use.
- Check that the lock works and that the door closes securely in your hotel room. Put the chain or deadbolt on the door after entering the room.
- Walk with another person. Single targets are the most likely victims of crime.

### DON'T:

- Wear your badges outside.
- Walk in dark, isolated areas, such as closed plazas.

Children 16 years of age and under are not permitted to enter the exhibit and poster hall or the session rooms at any time. No supervision is offered.

## MEETING OBJECTIVES

- To present the best available research from all disciplines of musculoskeletal research.
- To promote the exchange of ideas and encourage collaborations in orthopaedic research.
- To encourage promising and emerging areas in musculoskeletal research including basic science education and research strategies by use of forums, workshops, special sessions and special interest meetings.

## FDA

All drugs and medical devices used in the United States are administered in accordance with Food and Drug Administration (FDA) regulations. These regulations vary depending on the risks associated with the drug or medical device, the similarity of the drug or medical device to products already on the market, and the quality and scope of clinical data available. Some drugs or medical devices demonstrated at this 2020 Annual Meeting of the Orthopaedic Research Society may have not been cleared by the FDA or have been cleared by the FDA for specific purposes only. The FDA stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice. Orthopaedic Research Society policy provides that “off label” uses of a drug or medical device may be described in the Orthopaedic Research Society’s CME activities so long as the “off label” use of the drug or medical device is also specifically disclosed (i.e., it must be disclosed that the FDA has not cleared the drug or device for the described purpose). Any drug or medical device is being used “off label” if the described use is not set forth on the product’s approved label.

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The materials presented at the 2020 Annual Meeting of the Orthopaedic Research Society have been made available by the Orthopaedic Research Society for educational purposes only. The material is not intended to represent the only, nor necessarily best, method or procedure appropriate for the medical situations discussed, but rather is intended to present an approach, view, statement or opinion of the faculty, which may be helpful to others who face similar situations. The Orthopaedic Research Society disclaims any and all liability for injury or other damages resulting to any individual attending the meeting and for all claims, which may arise out of the use of the techniques demonstrated therein by such individuals, whether these claims shall be asserted by physician or any other person. No reproduction of any kind, including audiotapes and videotape, may be used in any portion of the ORS Annual Meeting. The ORS reserves all of its rights to such material, and commercial reproduction is specifically prohibited.

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# ORS CODE OF CONDUCT

The Orthopaedic Research Society is committed to ensuring a safe and welcoming environment for all participants at the ORS Annual Meeting.

**We expect all participants at the ORS Annual Meeting to abide by this ORS Code of Conduct.**

- Exercise consideration and respect in your speech and actions
- Refrain from demeaning, discriminatory, or harassing behavior and speech
- Be mindful of your surroundings and of your fellow participants
- Alert ORS staff if you notice a dangerous situation, someone in distress, or violations of this ORS Code of Conduct, even if they seem inconsequential

## Unacceptable behaviors include

- Harmful or prejudicial verbal or written comments or visual images related to gender, sexual orientation, race, religion, disability, or other personal characteristic
- Inappropriate use of nudity and/or sexual images in public spaces (including presentation slides)
- Deliberate intimidation, stalking, or following
- Harassing photography or recording
- Sustained disruption of talks or other events
- Unwelcome and uninvited attention or contact

Unacceptable behavior from any participant at ORS Annual Meeting, including attendees, sponsors, exhibitors, contractors, volunteer leaders, vendors, venue staff and anyone with decision-making authority, will not be tolerated.

# POSTER CATEGORIES

POSTER CATEGORIES	POSTER SESSION 1 #'s	POSTER SESSION 2 #'s
Biomaterials	525–566	1409–1450
Board of Specialty Society (BOS) Best Posters	BOS1–BOS4	BOS1–BOS4
Bone	790–921	1670–1799
Business Innovation Competition (BIC)	BIC1–BIC9	BIC1–BIC9
Cartilage and Synovium	567–679	1451–1562
Clinical Studies	1357–1408	2240–2290
Foot and Ankle	1263–1285	2145–2167
Guest Nation–Australia	GN1–GN2	GN1–GN2
Hand and Wrist	1245–1262	2127–2144
Hip	1121–1191	2002–2074
Imaging	1286–1303	2168–2185
Infection	1304–1331	2186–2213
International Combined Orthopaedic Research Society (ICORS) Best Posters	ICORS1–ICORS9	ICORS1–ICORS9
Intervertebral Disc	975–1014	1855–1895
Knee	1015–1120	1896–2001
Late Breaking Posters	2301–2404	2405–2507
Meniscus	680–696	1563–1578
Moderated Posters	365–524	365–524
NIRA Finalists	136–176	136–176
Shoulder and Elbow	1192–1244	2075–2126
Skeletal Muscle	765–789	1645–1669
Spine	922–974	1800–1854
Tendon and Ligament	697–764	1579–1644
Tumors	1332–1356	2214–2239

## FRIDAY, FEBRUARY 7

### 8:00 AM–5:30 PM

Room: North 226

#### The Art of Grantsmanship Part II—Practical Skills

Course Directors: Stavros Thomopoulos, PhD and Kurt Spindler, MD

With support from MTF Biologics

Part II of our popular grant writing course! This interactive workshop includes a Specific Page Aims Lab providing participants with the opportunity to prepare and revise a specific aims page, the most important page of the grant application, with expert faculty. A subset of grants submitted by registrants will be reviewed during a LIVE Mock NIH Study Section. Don't miss out on the networking and mentoring opportunities and the real time feedback you will receive from faculty and NIH officers.

The Art of Grantsmanship Part I (online lectures) enrollment for 2020 is now open.

Visit [www.ors.org/learnors-grantsmanship](http://www.ors.org/learnors-grantsmanship) for more information.

Additional registration fee required.

### 1:00 PM–5:00 PM

Room: West 301 D



#### ORS ISFR Scientific Meeting

**This meeting is open to ORS ISFR Section members only**

Section Officers: Chelsea Bahney,

PhD; Beth Bragdon, PhD; Chantal Chenu, PhD; Louis Gerstenfeld, PhD; Melanie Haffner-Luntzer, PhD; David Hak, MD, MBA, FACS; Kurt Hankenson, DVM, PhD; Amy Hoang-Kim, PhD; Francis Lee, MD, PhD; Ralph Marcucio, PhD

This meeting will kick off with a plenary session focusing on the timely topic of pain management. With the recent crisis in opioid use, the issue of pain management is at center stage in medicine. Understanding pain and developing new therapies to treat this debilitating problem is essential. Three plenary speakers will provide insight into the mechanisms and management of pain after bone fracture to address this issue. Student/trainee short talks selected from abstracts that were submitted to ORS will follow. A career development session designed to facilitate discussion about the responsibilities and role of peers reviewing manuscripts and grants and how to respond to common and unusual critiques will conclude the meeting.

### 2:00 PM–6:00 PM

Exhibit & Poster Hall (North Hall A–C)

**Poster Session 1 Poster Pick-Up & Set-Up**

### 2:00 PM–6:00 PM

Room: West 301 BC



#### ORS Preclinical Models Section Workshop: Planning, Preparing, Conducting and Reporting of Preclinical Studies

Section Officers: D. Joshua Cohen, MD;

Aimee Colbath, DVM, MS, DACVS; Jeremiah Easley, DVM; Laurie Goodrich, DVM, PhD; Kurt Hankenson, DVM, PhD; Michael Lehmiche, MS; Uma Sankar, PhD; Stephan Zeiter, DVM, PhD, DipECLAM

With support from MTF Biologics

The ORS Preclinical Models Section is excited to offer a half day workshop for student/trainees. The workshop will include keynote and short talks from students/trainees.

Additional registration fee required.

### 5:45 PM–6:45 PM

North Hall A–C Foyer

#### Student/Trainee Meet & Greet: Speed Collaborating Organized by the ORS Associate Members Forum

This annual session serves as a networking event for students/trainees that aims to foster collaboration, specifically bringing together young members from different institutions.

Targeted Audience: undergraduate students, graduate students, residents, post-docs, and fellows.

Additional registration fee required.

## SATURDAY, FEBRUARY 8

### 6:45 AM–8:00 AM

Exhibit & Poster Hall (North A–C)

**Poster Session 1 Poster Pick up**

### 7:00 AM–8:00 AM

Innovation Theater, Exhibit & Poster Hall (North Hall A–C)

#### Perfecting the ORS Annual Meeting Experience

This interactive session, moderated by a panel of experienced ORS members, will help Annual Meeting attendees make the most of their meeting experience and will provide an outline of meeting enhancements.

## 8:00 AM–9:00 AM Scientific Sessions

Time	Podium Session 1 Hip—Biomechanics and Disease Moderators: Philip Noble, PhD and Stefaan W. Verbruggen, PhD	Podium Session 2 Biomaterials for Drug Delivery Moderators: Christopher Damien, PhD and Juan Taboas, PhD	Spotlight Session 3 Bone Adaptation to Reproduction, Spaceflight, and Estrogen Deficiency Moderators: Hiromu Ito, MD, PhD and Kenneth Kozloff, PhD	Podium Session 4 Shoulder—Clinical Studies Moderators: Jeff Bischoff, PhD and Katie Reuther, PhD	Podium Session 5 Foot and Ankle—Biomechanics and Outcomes Moderators: William Ledoux, PhD and Bart Lubberts, MD, PhD
Room	West 301 A	West 301 BC	West 301 D	North 221	North 222
8:00 AM	Paper No. 1 <b>The Efficacy of Core Decompression for Early-Stage Steroid-Induced Osteonecrosis of the Hip in Rabbits: Comparison of Gender Differences</b> Masahiro Maruyama; Tzuhua Dennis Lin; Chi-Chun Pan; Hunter Storaci; Nicolas Ivan Kaminow; Chi-Wen Lo; Monica Romero Lopez; Masaya Ueno; Takeshi Utsunomiya; Ning Zhang; Zhenyu Yao; Seyedsina Moeinzadeh; Elaine Lui; Michiaki Takagi; Stuart B. Goodman; Yunzhi Peter Yang	Paper No. 7 <b>Bone-Targeted Drug Delivery Platform for the Treatment of S. Aureus Osteomyelitis</b> Caleb Ford; Thomas Spoonmore; Scott Guelcher; James Cassat	<b>SPOTLIGHT SPEAKER</b>  <b>X. Sherry Liu, PhD</b> <b>Understanding Functional Adaptation of Maternal Bone to Reproduction and Lactation</b>	Paper No. 16 <b>Associations of Preoperative Patient Mental Health, Sociodemographic and Clinical Characteristics with Baseline Pain, Function and Satisfaction in Patients Undergoing Primary Total Shoulder Arthroplasty</b> Sambit Sahoo; Kathleen A. Derwin; Alexander Zajichek; Vahid Entezari; Peter B. Imrey; Joseph P. Iannotti; Eric T. Richthetti	Paper No. 22 <b>Evaluation of Different Hindfoot Kinematics According to Various Shoe-types During Walking Using Bi-planar Fluoroscopy</b> Seungbum Koo; Cong-Bo Phan; Kyoung Min Lee
8:10 AM	Paper No. 2 <b>Biomechanical Analyses of Reconstruction Techniques of Massive Tumor-Induced Bone Loss in the Peri-Acetabular Region</b> Montana T. Morris; Alex Moushey; Kareme D. Alder; Alana M. Munger; Kenneth Milligan; Courtney Toombs; Devin Conway; Zichen Hao; Lu Li; Steven M. Tommasini; Francis Y. Lee	Paper No. 8 <b>New Antibacterial Coating for Titanium Revision Prostheses Does Not Compromise Bony Integration</b> Svenja EC Stein; Larissa Kruck; Daniela Warnecke; Anita Ignatius; Lutz Duerselen		Paper No. 17 <b>Do Pre-operative and Post-Operative Glenoid Retroversion Influence Outcomes After Reverse Total Shoulder Arthroplasty?</b> Drew A. Lansdown; Edward C. Cheung; Weiyuan Xiao; Austin Lee; Alan L. Zhang; Brian T. Feeley; C. Benjamin Ma	Paper No. 23 <b>Joint Congruency and Distance Analysis of the Subtalar Joint During Weight-bearing</b> Rich J. Lisonbee; Nicola Krahenbuhl; Alexej Barg; Beat Hintermann; Charles L. Saltzman; Andrew E. Anderson; Amy L. Lenz
8:20 AM	Paper No. 3 <b>Development Of Uni- and Biaxial Mechanical Tests To Simulate Femoral Strain in the Implanted Femur During Gait</b> Xiang Chen; Casey Myers; Chadd Clary; Ryan J. DeWall; Bryan Fritz; Paul Rulkötter	Paper No. 9 <b>Hydroxyapatite: A Recruiting Platform for Bone Targeted Drugs</b> Deepak Bushan Raina; Yang Liu; Hanna Isaksson; Magnus Tägil; Lars Lidgren		Paper No. 18 <b>Impact of Operative Time on Short-Term Adverse Events Following Total Shoulder Arthroplasty</b> Kevin Kashanchi; Alireza Nazemi; David E. Komatsu; Edward D. Wang	Paper No. 24 <b>In Vivo Kinematics of the Healthy Ankle Using Weight-Bearing CT</b> Richard Obert; James Clancy; Mark Myerson; Daniel Lee; Laura Brinker; Mathew R. Anderle
8:30 AM	Paper No. 4 <b>Comparison of in Silico Muscle Forces During Stairs Tasks in Patients Before and After Surgical Correction for Cam Fais</b> Danilo S. Catelli; Bruno L.S. Bedo; Paul E. Beaulé; Mario Lamontagne	Paper No. 10 <b>Optimally Charged Cationic Carriers Enable Targeted and Sustained Growth Factor Delivery in Human Cartilage</b> Yamini Krishnan; Yun Jung Yang; Si-Eun Kim; Bradley D. Olsen; Paula T. Hammond; Alan J. Grodzinsky	Paper No. 13 <b>The Effect of Long Term Space Flight on Bone Growth and Quality</b> Ming C. Chan; Hannah R. Childs; Yizhong Hu; Edward X. Guo; Helen H. Lu; Stephen Doty	Paper No. 19 <b>Proteome Characterization of Tendon and Bursa in Rotator Cuff Disease</b> Brittany P. Marshall; Rajesh Soni; Stavros Thomopoulos; David Kovacevic	Paper No. 25 <b>Segmental Foot Kinematics Before and After Resection of Tarsal Coalition</b> Korey D. Partenhimer; Karen M. Kruger; Gerald F. Harris; Haluk Altirk; Joseph J. Krzak
8:40 AM	Paper No. 5 <b>Serum Metal Ions and Adverse Local Tissue Reaction in Metal-on-Polyethylene Total Hip Arthroplasty</b> Matthew J. Snyder; Margaret A. Weber; Margaret M. Sims; Clair N. Smith; Brian R. Hamlin; Anton Y. Plakseychuk; Timothy J. Levison; Anthony M. DiGioia; Kenneth L. Urish	Paper No. 11 <b>Epha2 Ligand-functionalized Microparticles for Targeted Delivery of Chemotherapeutic Drugs Against Osteosarcoma</b> Zhenggang Wang; Shuang Liang; Anmin Chen	Paper No. 14 <b>Estrogen Deficiency Increases Mineralization and Pro-osteoclastogenic Potential of Osteoblasts in Hydrogels Under Cyclic Loading</b> Syeda Masooma Naqvi; Juan Alberto Panadero Pérez; Vatsal Kumar; Anneke Verbruggen; Laoise McNamara	Paper No. 20 <b>Inducible Endogenous Stem Cells Within Human Rotator Cuff Muscle to Promote Muscle Regeneration After Rotator Cuff Repair</b> Brian Feeley; Meng Yao Liu; Xiaohe Zhang; Carlin Lee; Mya Aung; Hubert Kim; Xuhui Liu	Paper No. 26 <b>Objective Mechanical Measures Predict Post-traumatic OA Risk After Intra-articular Fracture of the Calcaneus</b> Kevin N. Dibbern; Karan Rao; Molly Day; J. Lawrence Marsh; Donald D. Anderson
8:50 AM	Paper No. 6 <b>Three-Dimensional Quantitative Acetabular Rim Morphology Evaluation in Patients with Borderline Dysplastic Hip</b> Tohru Irie; Alejandro A. Espinoza Orías; Tomoyo Y. Irie; Shane J. Nho; Daisuke Takahashi; Norimasa Iwasaki; Nozomu Inoue	Paper No. 12 <b>3D Printed Microheater Sensor-Integrated, Drug-encapsulated Microneedle System for Pain Management</b> Li Xiao; Mengtian Yin; Li Jin; Baoxing Xu; Xudong Li	Paper No. 15 <b>Osteocytic Connexin 43 Deficiency Prevents Cortical but not Cancellous Bone Loss from Unloading and Amplifies Unloading-Induced Muscle Loss</b> Michael Friedman; Yue Zhang; Camilla Reina Maroni; Caleb Ryan; Henry Donahue	Paper No. 21 <b>Acromial Humeral Distance May not be a Good Indication of Functional Outcomes and Patient-Reported Outcomes Following Arthroscopic Superior Capsular Reconstruction</b> Gillian Kane; Clarissa LeVasseur; Alexandra S. Gabrielli; Adam Popchak; James Irrgang; William Anderst; Albert Lin	Paper No. 27 <b>Return to Play Amongst NFL Offensive And Defensive Skill Positions After Achilles Tendon Rupture</b> Ansab Khwaja; Aditya Manoharan; Dane Barton



**9:15 AM – 10:15 AM**

Room: West 301 A

**ORS 2020 Opening Session**

Moderator: James Iatridis, PhD

**Recognition of ORS 2020 Guest Nation: Australia****Keynote Speaker: Dr. Robert Langer**

Dr. Langer is an Institute Professor at the Massachusetts Institute of Technology (MIT). He has written over 1,450 articles, which have been cited over 285,000 times and his h-index of 265 is the highest of any engineer in history. He has more

than 1,350 issued and pending patents worldwide. His patents have licensed or sublicensed to over 350 companies. He served as Chairman of the FDA's Science Board from 1999–2002. His over 220 awards include both the United States National Medal of Science and the United States National Medal of Technology and Innovation, the Charles Stark Draper Prize (considered the engineering Nobel Prize), Albany Medical Center Prize, the Wolf Prize for Chemistry, the Millennium Technology Prize, the Priestley Medal (highest award of the American Chemical Society), the Gairdner Prize and the Lemelson-MIT prize for being "one of history's most prolific inventors in medicine."

He holds 34 honorary doctorates, including honorary degrees from Harvard and Yale. Dr. Langer is one of the very few individuals ever elected to the National Academy of Medicine, the National Academy of Engineering, the National Academy of Sciences and the National Academy of Inventors.

Following his presentation, Dr. Langer will be available at the ORS Lounge in the Exhibit & Poster Hall for a meet and greet from 10:15 AM–11:15 AM.

**10:15 AM – 11:15 AM**

Exhibit &amp; Poster Hall (North Hall A–C)

**Exhibit & Poster Session 1 Poster Viewing**

Authors at EVEN numbered posters

**10:25 AM – 11:05 AM**

Exhibit &amp; Poster Hall (North Hall A–C)

**Moderated Poster Presentations****Moderated Poster Session 1****Knee 1**

Moderator: Arielle Fischer, PhD

Innovation Theater (North Hall A–C)

**10:25 AM****Poster No. 454**

Changes In Patellofemoral Joint Morphology During Skeletal Growth And Maturation Are Not Sex-Dependent

Shayan Hosseinzadeh; Martha M. Murray; Ata M. Kiapour

**10:29 AM****Poster No. 457**

Tibiofemoral Cartilage Contact Pressure Are Higher In Female Than Male Athletes During Landing, Hence More Prone To The Development Of Osteoarthritis: A Dynamic Finite Element Study Based On 90th Percentile Models

Deniz Erbulut; Sara Sadeqi; Vijay Goel

**10:33 AM****Poster No. 458**

Characterizing The Metabolic Profile Of The Infrapatellar Fat Pad From Osteoarthritic Knees

Alex B. Lee; Aaron M. Stoker; Shelby Y. Salisbury; James A. Keeney; James L. Cook

**10:37 AM****Poster No. 462**

In Vitro Effects Of Macrophages On Common Orthopaedic Implant Alloys

Griffin M. Heise; Caitlin Black; Brian Morrow; Richard Smith; William Mihalko

**10:41 AM****Poster No. 463**

ACL Size But Not Signal Intensity Is Influenced By Sex, Body Size And Knee Anatomy

Samuel C. Barnett; Martha M. Murray; Braden C. Fleming; Ata M. Kiapour

**10:45 AM****Poster No. 465**

Biomechanical Improvements At The Hip And Ankle After High Tibial Osteotomy

Gemma M. Whatling; Paul R. Biggs; David W. Elson; Andrew Metcalfe; Chris Wilson; Cathy Holt

**10:49 AM****Poster No. 466**

Mitigating Pro-inflammatory Responses Of Articular Cartilage With Hyperosmolar Saline

Lasun O. Oladeji; Aaron M. Stoker; James P. Stannard; James L. Cook

**10:53 AM****Poster No. 467**

Effects Of Bone Quality On Initial Fixation Of Cementless Tibial Tray In Total Knee Arthroplasty

Brooke Fritts; Mohsen Sharifi Renani; Yashar Behnam; Chadd Clary

**10:57 AM****Poster No. 468**

Who Has The Greatest Effect On Hospital Lengths Of Stay After Total Knee Arthroplasty: The Hospital, The Surgeon, Or The Patient?

Peter A. Gold; Luke J. Garbarino; Hiba K. Anis; Nipun Sodhi; Max Willinger; Jonathan Danoff; Sreevathsa Boraiah; Vijay J. Rasquinha; Michael A. Mont

**11:01 AM****Poster No. 469**

Does Intermittent Catheterization Compared To Indwelling Catheterization Decrease The Risk Of Periprosthetic Joint Infection Following Total Knee Arthroplasty?

Luke Garbarino; Peter Gold; Hiba Anis; Nipun Sodhi; Benjamin Schaffler; Max Willinger; Jonathan Danoff; Sreevathsa Boraiah; Vijay Rasquinha; Michael Mont

## Moderated Poster Session 2

### Spine

Moderator: John Martin, PhD

Moderated Poster Theater 1 (North Hall A–C)

#### 10:25 AM **Poster No. 436**

Endplate Volumetric Bone Mineral Density Measured By Quantitative Computed Tomography As A Predictive Measure Of Severe Cage Subsidence After Standalone Lateral Lumbar Fusion  
Ichiro Okano; Conor Jones; Stephan N. Salzmänn; Oliver C. Sax; Colleen Rentenberger; Jennifer Shue; John A. Carrino; Andrew A. Sama; Frank P. Cammisia; Federico P. Girardi; Alexander P. Hughes

#### 10:29 AM **Poster No. 437**

Dual-energy Computed Tomography Estimates Of Vertebral Bone Mineral Densities Are Better Predictors Of Fracture Properties When Compared To Single-energy Metrics  
Simon Cataño Jimenez; Sebastian Saldarriaga; Christopher Chaput; Hugo Giambini

#### 10:33 AM **Poster No. 438**

A Machine Learning Approach To Identify The Primary Features Of In Vivo Disc Degeneration  
Beth G. Ashinsky; Chao Wang; Sai A. Mandalapu; Edward D. Bonnevie; Stephen Pickup; Lin Han; Robert L. Mauck; Harvey E. Smith; Sarah E. Gullbrand

#### 10:37 AM **Poster No. 439**

Sex Dependent Effects Of Leptin Receptor Deficiency And Western Diet On The Spine In A Type 2 Diabetes Mouse Model  
Devorah M. Natelson; Alon Lai; Divya Krishnamoorthy; Rob C. Hoy; James C. Iatridis; Svenja Illien-Jünger

#### 10:41 AM **Poster No. 440**

High-fat Diet Compromises Vertebrae And Intervertebral Disc Structure In Mice With Distinct Sex-differences And Partial Protection With Deletion Of Receptor For Advanced Glycation End-products  
Danielle N. D'Erminio; Divya Krishnamoorthy; Alon Lai; Robert C. Hoy; Devorah Natelson; Damien Laudier; Svenja Illien-Jünger; James C. Iatridis

#### 10:45 AM **Poster No. 441**

Interplay Between Progranulin And C5a/c5ar1 Signaling In Spinal Cord Injury  
Wenyu Fu; Guodong Sun; Jinlong Jian; Chuan-ju Liu

#### 10:49 AM **Poster No. 442**

Development Of High-throughput Assay To Screen Potential Drugs To Protect Blood-brain Spinal Cord Barrier Identifies Berberine As Neuroprotection Drug For Spinal Cord Injury  
Yuki Suzuki; Ken Kadoya; Takeshi Endo; Yuki Matsui; Yuen Rufe; Tsuyoshi Asano; Katsumi Maenaka; Shinsuke Nakagawa; Norimasa Iwasaki

#### 10:53 AM **Poster No. 443**

How Does Spinopelvic Mobility And Sagittal Functional Cup Orientation Affect Patient Reported Outcome 1 Year After Total Hip Arthroplasty—A Prospective Diagnostic Cohort Study  
Moritz M. Innmann; Christian Merle; Paul E. Beaulé; George Grammatopoulos

#### 10:57 AM **Poster No. 444**

Three-dimensional Gait Analysis In Patients With Lumbar Degenerative Scoliosis  
Norihiko Takegami; Koji Akeda; Junichi Yamada; Tatsuya Iwasaki; Akihiro Sudo

#### 11:01 AM **Poster No. 445**

Nusinersin Does Not Mitigate Hip And Spine Pathoanatomy In Spinal Muscular Atrophy Patients  
Michael Troy; Patricia Miller; Basil Darras; Brian Snyder

## Moderated Poster Session 3

### Bone 1

Moderator: Robert Zondervan, PhD

Moderated Poster Theater 2 (North Hall A-C)

#### 10:25 AM **Poster No. 412**

In Vivo Effects Of Treadmill Running And Unilateral Tibial Loading On Breast Cancer Induced Osteolytic Lesions In Bone  
Shubo Wang; Shaopeng Pei; Jerahme Martinez; Lidan You; Liyun Wang

#### 10:29 AM **Poster No. 414**

Exploring Hox Gene Function On The Maintenance Of Skeletal Stem Cells  
Kevin Leclerc; Laura Palma; Philipp Leucht

#### 10:33 AM **Poster No. 415**

Conditional Deletion Of Wnt5a In Committed Osteoclasts Results In Bone Loss Through Decreased Bone Formation  
Joseph L. Roberts; Christopher W. Kinter; Lorenzo M. Fernandes; Martha E. Diaz-Hernandez; Abul Arif; Hicham Drissi

#### 10:37 AM **Poster No. 423**

Propranolol Reverses Impaired Fracture Healing Response Observed With Selective Serotonin Reuptake Inhibitor Treatment  
Sooyeon Lee; Madeleine Z. Wong; Hannah P. Litwa; Rivka Ihejirika; Anne Marie Josephson; Danielle Markus; Lindsey H. Remark; Nury L. Yim; Kevin Leclerc; Ruchi Tejwani; Vivian Bradaschia-Correa; Philipp Leucht

#### 10:41 AM **Poster No. 424**

Validation Of Image-based Structural Assessment Of Ovine Tibial Fracture Healing With Biomechanical Testing  
Peter Schwarzenberg; Salim Darwiche; Karina Klein; Brigitte von Rechenberg; Hannah L. Dailey

## SATURDAY, FEBRUARY 8 (continued)

10:45 AM

Poster No. 425

Clearance Of Senescent Cells Promotes Bone Fracture Healing In Aged Mice By Inhibiting Tgfbeta-mediated Degradation Of Pdgfrbeta In Callus Mesenchymal Progenitors  
Hengwei Zhang; Jun Zhang; Tao Wu; Brendan Boyce; Lianping Xing

10:49 AM

Poster No. 426

Controlling Callus Localization In Fuzzy Logic Bone Fracture Healing Models With A Proximity Function  
Tianyi Ren; Peter Schwarzenberg; Hannah Dailey

10:53 AM

Poster No. 427

Inflammatory Signals Upregulate Ngf To Drive Re-innervation And Re-ossification During Bone Repair  
Carolyn Ann Meyers; Seungyong Lee; Takashi Sono; Stefano Negri; Jiajia Xu; Yiyun Wang; Zhu Li; Sarah Miller; Leslie Chang; Yongxing Gao; Liliana Minichiello; Thomas L. Clemens; Aaron W. James



10:57 AM

Poster No. 429

Implant Stiffness And Peri-prosthetic Bone Changes In The Rat Model: Structural And Mechanical Outcomes  
Mengzhen Yan; Rema Oliver; Christos Christou; Matthew Pelletier; Mark Hoffman; William Walsh

11:01 AM

Poster No. 434

In Vivo Assessment Of A Novel Ceramic-binding Tethered BMP-2 Delivered On A Ceramic Fiber Carrier In The Five-centimeter Chronic Caprine Tibial Defect Model  
Viviane Luangphakdy; Yi Arnold; Elizabeth Pluhar; Nicolas Piuze; Hannah Simmons; Luis alvarez; George Muschler



# ORS 2020 GUEST NATION

The ORS is thrilled to announce that **Australia** has been selected as the 2020 Guest Nation. The Guest Nation Program honors our colleagues in Australia and recognizes their contributions to the field of musculoskeletal research and orthopaedic care.



Stop by the **Guest Nation booth** in the exhibit and poster hall to say hello to representatives from Australia.





## 11:15 AM–12:15 PM Scientific Sessions

Time	Podium Session 6 Knee—Anatomy, Biomechanics and Reconstruction Moderators: John Elias, PhD and Edward Wojtyś, MD	Podium Session 7 Pathological and Morphological Events in Osteoarthritis Moderators: Rhima Coleman, PhD and Tannin Schmidt, PhD	Podium Session 8 Bone—Osteocytes Moderators: Chelsea Heveran, PhD and Matthew Silva, PhD	Podium Session 9 Epidemiology Moderators: Kharm Foucher, MD, PhD and Clifford Les, DVM, PhD	Spotlight Session 10 Cellular and Molecular Mechanisms in Tendon Pathology Moderators: Matthew Fisher, PhD and Martha M. Murray, MD
Room	West 301 A	West 301 BC	West 301 D	North 221	North 222
11:15 AM	Paper No. 28 <b>ACL Injured and Female Subjects Have a Smaller Anteroposterior Length of the Lateral Tibial Plateau</b> Sene K. Polamalu; Volker Musahl; Richard E. Debski	Paper No. 34 <b>Characterization of the Nociceptive, Inflammatory, and Endocannabinoid System Response in a Mouse Model of Acl Rupture-Induced Post-traumatic Osteoarthritis</b> Phillip Rzeczycki; Lucas Junginger; Samuel Goldman; Lindsey Lammlin; Stephen Redding; Gus Rosania; Daniel Clauw; Tristan Maerz	Paper No. 40 <b>Osteocytic Sptbn1 Deficiency Inhibits Post-Wounding Cell Viability and Causes a Blunted Mechanotransduction Response Following Mechanical Loading</b> Mackenzie Hagan; Nicholas Cantu; Victor Piedra; Kanglun Yu; Rachel Roberts; Eric Stokes; Sarah Bass; Mohamed Awad; Mohammed Elsalanty; Daniel Perrien; Mark W. Hamrick; Paul McNeil; Meghan E. McGee-Lawrence	Paper No. 46 <b>Epidemiology of Pediatric Physal Fractures</b> Minami K. Yamamura; Patrick Carry; Kaley Holmes; Alicia Phillips; Brandon Ogilvie; Nancy Hadley Miller; Karin A. Payne	<b>SPOTLIGHT SPEAKER</b>  <b>Hani A. Awad, PhD</b> <b>Emerging Paradigms in Tendon Healing</b>
11:25 AM	Paper No. 29 <b>A Genetic Variant in A GDF5 Knee Enhancer Underlies Osteoarthritis Risk Through Developmental Changes in Knee Anatomy</b> Terence D. Capellini; Zun Liu; Ata M. Kiapour; Jiaxue Cao; Siddharth Yarlagadda; Jakob Sieker	Paper No. 35 <b>T-Lymphocytes Exacerbate Joint Destruction in Experimental Osteoarthritis</b> Eric M. Link; Francisco J. Carrillo-Salinas; Carrie K. Hui Mingalone; Pilar Alcaide; Li Zeng	Paper No. 41 <b>Osteocyte PCM Turnover is Accelerated Under In Vivo Mechanical Loading / Unloading with a Novel "Click-Chemistry" Imaging Technique</b> Shaopeng Pei; Jerahme Martinez; Shubo Wang; Ashutosh Parajuli; Lucas X. Lu; Catherine B Safran; Liyun Wang	Paper No. 47 <b>Effect of Medical and Functional Needs on Costs of Geriatric Hip Fracture Care</b> Caroline Thirukumaran; Paul Rubery; Yue Li; Benjamin F. Ricciardi; Daniel A. Mendelson	
11:35 AM	Paper No. 30 <b>Valgus High Tibial Osteotomy Reduces Osteoarthritis in the Anteromedial Tibial Plateau in an Ovine Model of Partial Medial Anterior Meniscectomy</b> Tamás Oláh; Dietrich Pape; Lars K.H. Goebel; Gertrud Schmitt; Susanne Speicher-Mentges; Magali Cucchiari; Henning Madry	Paper No. 36 <b>Adgrg6 In Chondrocytes Modulates Articular Cartilage Homeostasis And Osteoarthritis Development Through Regulation of STAT3 And CAMP Signaling</b> Zhaoyang Liu; Jennifer H. Jonason; Ryan S. Gray	Paper No. 42 <b>Novel In Vitro Microfluidic Co-Culture Platform for Osteocyte Mechanotransduction Studies</b> Liangcheng H. Xu; Xin Song; Gwenneth Carroll; Rafi Bienenstock; Dustin Yang; Lidan You	Paper No. 48 <b>Comparison of Patient Demographics, Causes, and Patient-Related Risk Factors for Emergency Department Visits Following Primary Total Knee Arthroplasty</b> Rushabh Vakharia; Nipun Sodhi; Hiba Anis; Joseph Ehiorobo; Hytham Salem; Michael A. Mont; Martin W. Roche	
11:45 AM	Paper No. 31 <b>Prediction of Quadriceps Tendon Autograft Diameter with Preoperative Ultrasonography for Individualized Anterior Cruciate Ligament Reconstruction</b> Satoshi Takeuchi; Benjamin Rothrauff; Masashi Taguchi; Freddie H. Fu; Kentaro Onishi	Paper No. 37 <b>Role of SOXC-Tumor Necrosis Factor-<math>\alpha</math> Signaling Axis in Inflammation-Induced Joint Degeneration</b> Kyle Jones; Sean Niu; Umesh Gangishetti; Pallavi Bhattaram	Paper No. 43 <b>Osteocyte <math>Ca^{2+}</math> Responses to In Vivo Mechanical Loading in Mice Expressing Genetically Encoded Calcium Indicators with Different Sensitivities</b> James Boorman-Padgett; David Spray; Mia Thi; Jelena Basta-Pljakic; Robert Majeska; Mitchell Schaffler	Paper No. 49 <b>The Geriatric Trauma Outcome Score: Validation in the Elderly Orthopedic Population and Proposal of an Updated Scoring System</b> Emmanouil Grigoriou; Sonja Pavlesen; Basel Touban; Christopher Mutt; Mark Anders	Paper No. 52 <b>Cellular Senescence in Tendon Aging and Pathology</b> Yuki Saito; Takako S. Chikenji; Alyssa Vrieze; Tamara Tchkonja; James L. Kirkland; Peter C. Amadio; Anne Gingery
11:55 AM	Paper No. 32 <b>Influences of The High Tibial Osteotomy on The Patella Femoral Joint Congruity: Comparison Between Medial Open-wedge and Neutral Wedge Osteotomies</b> Shinji Matsubara; Kondo Eiji; Koji Iwasaki; Zenta Joutoku; Jun Onodera; Tomohiro Onodera; Kazunori Yasuda; Tomonori Yagi; Norimasa Iwasak	Paper No. 38 <b>Lysosomal Function is Deregulated in Osteoarthritis and its Inhibition Induced Apoptosis In Chondrocytes Through Bax Mediated Release of Cytochrome C</b> Mohammad Y. Ansari; Hope Ball; Saima Wase; Kimberly Novak; Taqriq M. Haqqi	Paper No. 44 <b>Osteocytic Connexin 43 Deficiency Increases Bone Catabolism but Makes Osteocytes More Sensitive to Anabolic Effects of Mechanical Loading</b> Michael Friedman; Yue Zhang; Henry Donahue	Paper No. 50 <b>Elder Abuse in the Orthopaedic Surgery Patient: Who is at Increased Risk?</b> Owen B. Gantz; Nicole D. Rynecki; James Potter; Marko Oydanic; Joseph A. Ippolito; Kathleen S. Beebe	Paper No. 53 <b>Enhancing Tendon-to-Bone Attachment Healing Via Pharmacological Ikk<math>\beta</math> Inhibition</b> Mikhail Golman; Dimitrios Skouteris; Xiaoning Li; Stavros Thomopoulos
12:05 PM	Paper No. 33 <b>Test-Retest Reliability of Tibiofemoral 3D Joint Space Width Distributions from Weight Bearing CT</b> Michael Ho; Neil Segal; John Bergin; Kevin Dibbern; Donald Anderson	Paper No. 39 <b>Synoviocyte Mechanosensitivity is Modulated by Glucose Preconditioning in an In Vitro Model of Diabetic Osteoarthritis and Synovial Joint Insulin Resistance</b> Neeraj Sakhrani; Lance A. Murphy; Andy J. Lee; Robert M. Stefani; Eric J. Semler; Roshan P. Shah; Christopher J. Visco; Xiaoning Yuan; Clark T. Hung	Paper No. 45 <b>Osteocyte-Specific Deletion of the Auxiliary <math>\alpha_2\delta_1</math> Voltage Sensitive Calcium Channel Subunit Impairs Femur Strength and Load-induced Bone Formation</b> Christian S. Wright; Xin Yi; Katelyn Semon; Artur Schneider; Molly Pederson; Mary C. Farah-Carson; Alexander G. Robling; William R. Thompson	Paper No. 51 <b>Cognitive Effects of a Season of Play in Highschool Football Players</b> Kyle E. Walker; Dan Deshong; Eli Bryk; Vincent Vigorita	Paper No. 54 <b>HMGB1 is Necessary for Normal Tendon Wound Healing</b> Jianying Zhang; Feng Li; Arthur McDowell; Grace Hobayan; MaCalus Hogan; James H-C. Wang

**12:15 PM – 1:15 PM**

Room: North 226



**ORS Orthopaedic Implants Section  
Scientific Meeting**

**This meeting is open to ORS Orthopaedic  
Implants Section members only**

Section Officers: Jeff Bischoff, PhD;

Deborah Hall, BS; Michael Hast, PhD; Giorgio Perino, MD;  
Heidi-Lynn Ploeg, PhD; Jonathan Jeffers, PhD; Sally LiArno, PhD;  
Kenneth Mann, PhD; William Mihalko, MD, PhD;  
Kartik Varadarajan, PhD; Julien Wegrzyn, MD, PhD;  
Markus Wimmer, PhD

With support from Exactech

This meeting will focus on what we have learned from applying the latest investigative methods to implant retrievals and how this information has changed the technical and regulatory landscape of our field. We will also discuss the latest knowledge on the interface between implants and the host tissue, as this is often the site of complications. The meeting will be interactive led by Pat Campbell, PhD, Orthopaedic Institute for Children/UCLA and Debbie Hall, BS, Rush University Medical Center, who will bring their extensive experience to the program.

**12:15 PM – 1:20 PM**

Room: North 227



**ORS Tendon Section Scientific Meeting**

**The meeting is open to ORS Tendon Section  
members only.**

Section Officers: Paul Ackermann, MD, PhD;  
Nelly Andarawis-Puri, PhD; Hani Awad, PhD;

Kathe Derwin, PhD; Nat Dymment, PhD; Leesa Galatz, MD;  
Catherine K. Kuo, PhD; Lou Soslowky, PhD; Steve Thomopoulos, PhD

The meeting will include a mentoring round table session with invited experts in the field. There will be approximately 3 rotations with 20 minutes per table.

**12:15 PM – 3:00 PM**

Room: North 224



**ORS Spine Section Scientific Meeting**

**This meeting is open to ORS Spine Section  
Members only.**

Section Officers: Nadeen Chahine, PhD;  
Aaron Fields, PhD; Sarah Gullbrand, PhD;

Lisbet Haglund, PhD; Nilsson Holguin, PhD; Christine Le Maitre, PhD;  
Joshua Li, MD, PhD; Jeff Lotz, PhD; David Nuckley, PhD;  
Grace O'Connell, PhD; Makarand Risbud, PhD; Dino Samartzis, DSc;  
Lachlan Smith, PhD

This meeting theme is Overcoming Obstacles to Clinical Translation of Novel Therapies for Low Back Pain Patients. We will hear unique perspectives from key stakeholders in industry and clinical medicine, as well as from the patient point-of-view and hold panel and round table discussions to build consensus around the best strategies to address those obstacles and improve patient care. The meeting promises to be a fun and interactive forum for all Section members to share ideas and debate the future of translational spine research.

**12:30 PM – 1:15 PM**

Room: North 229

**Research Interest Group: Imaging**

*Organizers: Yang Xia, PhD and Xiaojuan Li, PhD*

Imaging in the 21st century goes far beyond simple visualizations. Modern imaging uses a wide range of physical principles and technical approaches to probe different aspects of the biological systems at different resolutions. These tools include atomic/electronic/optical microscopes that can identify specific molecules and cells, optical/MRI/CT microscopes that can map tissue characteristics in animal models and ex vivo specimens, and clinical MRI/CT scanners that can detect diseases in humans.

This RIG will feature three speakers to briefly summarize the salient nature of the imaging technologies that can benefit orthopaedic research. Second, a large portion of the session time will be used as the group discussion, among the speakers and the audience, for ways to incorporate novel imaging tools and approaches into orthopaedic research.

**1:20 PM – 3:00 PM**

Room: North 227



**ORS Tendon Section Scientific Meeting**

**This meeting is open to all meeting  
participants.**

Section Officers: Paul Ackermann, MD, PhD;  
Nelly Andarawis-Puri, PhD; Hani Awad, PhD;

Kathe Derwin, PhD; Nat Dymment, PhD; Leesa Galatz, MD;  
Catherine K. Kuo, PhD; Lou Soslowky, PhD; Steve Thomopoulos, PhD

This meeting will highlight critical gaps that should be addressed by current research in rotator cuff injury and healing. Invited experts will give talks to present different perspectives on this topic, and then engage in a lively debate to defend their viewpoints. Poster pitches by invited students/trainees will highlight new tendon research at the ORS Annual Meeting. This meeting aims to inspire exciting new research directions to propel tendon clinical care and basic science research forward.

**1:30 PM – 3:00 PM**

Room: North 226



**ORS Orthopaedic Implants Section  
Scientific Meeting**

**This meeting is open to all meeting participants**

Section Officers: Jeff Bischoff, PhD;  
Deborah Hall, BS; Michael Hast, PhD;

Giorgio Perino, MD; Heidi-Lynn Ploeg, PhD; Jonathan Jeffers, PhD;  
Sally LiArno, PhD; Kenneth Mann, PhD; William Mihalko, MD, PhD;  
Kartik Varadarajan, PhD; Julien Wegrzyn, MD, PhD;  
Markus Wimmer, PhD

With support from Exactech

This meeting will focus on the future of joint replacement and discuss how the disparate fields of Robotics, Gait Analysis and Artificial Intelligence are converging to lead a clear path to improved orthopaedic surgery. The speakers are Sally LiArno, PhD, Stryker Orthopaedics; Kartik Mangudi Varadarajan, PhD, Massachusetts General Hospital; and Janie Wilson, PhD, McMaster University, to describe how the academic and industry worlds are capitalising on the convergence of these fields.

**1:30 PM–3:00 PM**

Room: West 301 A



**Implementing Compression Models of OA in Mice and Rats**

Organized by ORS Preclinical Models Section

*Organizers: Blaine Christiansen, PhD and Deva Chan, PhD*

OA on a compressed timeline. There is emerging interest in compression models of OA that can non-invasively induce joint degeneration in mice and rats using externally applied mechanical loads to injure the ACL or overload the articular cartilage. These models can be implemented using a variety of methods, and each method has its own advantages, limitations, and technical considerations. The purpose of this workshop is to discuss the development and implementation of compression models of OA, and present common hurdles encountered when using these methods. The three presenters each have considerable expertise with different compression models, giving them unique perspectives on the use of these models in their research. The goal of this workshop is to utilize this experience to provide insight to investigators who are using or are interested in using compression models of OA.

*Compression-Induced ACL Injury in Mice*

Blaine Christiansen, PhD, University of California Davis

*Compression-Induced ACL Injury in Rats*

Tristan Maerz, PhD, University of Michigan

*Load-Induced OA in Mice*

Marjolein van der Meulen, PhD, Cornell University

**1:30 PM–3:00 PM**

Room: West 301 BC



**Digital Patient Outcomes Using Sensors as Wearable Monitors: Opportunities, Methods and Applications**

Organized by International Combined Orthopaedic Research Societies (ICORS)

*Organizers: Bernd Grimm, PhD and Dominic Thewlis, PhD*

Wearable and soon even implantable sensors allow the permanent, unobtrusive and objective assessment of patients to a) digitally transform outcome measurement in clinical trials, b) generate novel, “digital biomarkers” for diagnostics or predictive and preventive screening, and c) to empower patients by feedback and coaching advise in a patient-centric and personalised way. This is particularly relevant in orthopaedics where movement and physical activity behaviour is directly affected by disease and treatment and can now be monitored with body-worn sensors.

*Wearable Sensors for Monitoring Patient Outcomes: Possibilities and Overview of Techniques*

Bernd Grimm, PhD, Sylvia Lawry Centre-The Human Motion Institute

*Clinical Applications and New Insights from Physical Activity and Sleep Monitoring in Orthopedic Patients*

Dominic Thewlis, PhD, University of Adelaide

*Wearable Sensors to Derive Meaningful Outcomes in Trauma Patients and Frail Elderly at Fall Risk: Review and Goals of the AO Smart Digital Solution Task Force*

Benedikt Braun, MD, PhD, Saarland University

*Beyond Wearables Sensors: The AO Fracture Monitor as an Implantable Device to Monitor Bone Healing*

Manuela Ernst, PhD, AO Research Institute

**1:00 PM–3:00 PM**

Room: West 301 D

**Good Laboratory Practices: Not Just for Industry?**

Organized by ORS Industry Engagement Committee

*Organizers: Lara Silverman, PhD and Judd Day, PhD*

The goal of this session is to understand the application of formal lab quality systems such as ISO 17025 or Good Laboratory Practices and explore how aspects of these systems can be applied to academic labs for studies that support regulatory filings and translational research. Speakers will present an overview of their implementation of lab quality system structures and discuss how they have applied aspects of these systems to their labs to improve productivity, training, data integrity and support translational research. The session seeks to bring together aspects of academia, industry and regulatory requirements to identify best practices towards optimizing scientific studies and achieving approval for human clinical studies.

*Introducing the Concept of “Quality” into Academic Labs; Lessons Learned*

Michael Jamieson, DRSc, Ottawa Hospital Research Institute

*Laboratory Accreditation to ISO/IEC 17025—One Lab’s Journey*

David Spenciner, ScM, MBA, DePuy Mitek

*GLP Study Requirements—a CRO and Industry Perspective*

Peggy Lalor, PhD, Histon, LLC

**1:30 PM–3:00 PM**

Room: North 221

**Skeletal Muscle Homeostasis: Understanding the Genetic and Molecular Regulation of Muscle Function and Its Impact on Bone Health**

*Organizers: Ronald Neppl, PhD and Julia Charles, PhD*

In healthy individuals, lean muscle accounts for 38–54% and 28–39% of total body mass, in men and women, respectively. These ranges are quite broad and are dependent upon multiple factors including age, physical activity level, overall health, genetic makeup, and nutritional input. Losses of muscle mass or functionality, whether a consequence of genetic or systemic disease, aging, trauma, or surgical intervention, is a major contributor to impaired mobility and a diminished quality of life. Understanding the genetic factors influencing muscle development and functionality are areas of intense basic biomedical research. This workshop will introduce recent advances in our understanding of muscle biology, including the genetic basis of muscular disease and the molecular regulation of muscle gene expression. Efforts to identify the underlying molecular programs responsible for the progression of muscle disease, as well as targeted molecular interventions, will be discussed.

*Molecular Regulation of Muscle Homeostasis and the Progression of Disease*

Ronald Neppl, PhD, Brigham and Women’s Hospital

*Genetics of Neuromuscular Diseases*

Vandana Gupta, PhD, Brigham and Women’s Hospital

*The Role of L-BAIBA in Muscle and Bone Crosstalk with Exercise*

Lynda Bonewald, PhD, Indiana University

**1:30 PM–3:00 PM**

Room: North 222

**JOR/ORS Workshop on Preprint Servers: Public Access and Peer-Review**

Preprint servers are places where manuscripts and data can be made public on the internet. These sites are not peer-reviewed, but often stimulate discussion of the posted studies. This workshop will analyze the pro and cons of using preprint servers, review the policies of publishers and journals, and invite a lively discussion on the role of this new public access to data.

*Introduction to Preprint Servers*

Linda J Sandell, PhD, Editor-in-Chief, *Journal of Orthopaedic Research*®

Professor Emerita, Washington University

*Preprint Servers for Clinical Studies*

Seth Leopold, MD, Editor-in-Chief, *Clinical Orthopaedics and Related Research*

Professor, University of Washington

*Preprint Servers for Laboratory Studies*

Joel Boerckel, PhD

Assistant Professor, University of Pennsylvania

*Discussants*

Tamara Alliston, PhD and Farshid Guilak, PhD



## 3:15 PM–4:15 PM Scientific Sessions

Time	Podium Session 11 Tibia Fixation Moderators: Jillian Beveridge, PhD and Douglas Van Citters, PhD	Podium Session 12 Looking Past the Bone – Biomarkers in Clinical Study Moderators: Zbigniew Gugala, MD, PhD and Jessica Lehoczyk, PhD	Podium Session 13 Bone – Structure and Function Moderators: Sara McBride-Gagyi, PhD and Joseph Wallace, PhD	Podium Session 14 Meniscus Moderators: Martin Englund, PhD and Chathuraka Jayasuriya, PhD	Podium Session 15 Tendon – Biomaterials and Therapeutics Moderators: Natalie Leong, MD and Chunfeng Zhao, MD
Room	West 301 A	West 301 BC	West 301 D	North 221	North 222
3:15 PM	Paper No. 55 <b>Will Methods of Reducing the Irregularity of the Tibial Osteotomy Lead to Improved Fixation of Cementless Tibial Components?</b> Luis Delgadillo-Chabolla; Hugh L. Jones; Sabir Ismaili; Philip C. Noble	Paper No. 61 <b>Individual Hypercoagulability and Inflammatory Response Following Surgical Fixation of Femur Fractures</b> Daniel You; Paul Cattle; Robert Korely; Adrienne Lee; Braedon McDonald; Leslie Skeith; Andrea Soo; Prism S. Schneider	Paper No. 67 <b>Differences in Material Properties of Trabecular Bone Tissue From Modeling and Remodeling-Based Bone Formation in Rats</b> Wei-Ju Tseng; Wenzheng Wang; Hongbo Zhao; Alexander Bennett; Lisa Mariani; Yihan Li; Nathaniel Dymant; Do-Gyoon Kim; Kevin Turner; X. Sherry Liu	Paper No. 73 <b>Gene Expression Pattern in Meniscus Tears at the Time of Arthroscopic Partial Meniscectomy Predicts Progression of Osteoarthritis</b> Muhammad F. Rai; Joseph D. Lamplot; William P. Tompkins; Michael V. Friedman; Eric J. Schmidt; Linda J. Sandell; Robert H. Brophy	Paper No. 79 <b>Tough Adhesive Biomaterials for Advanced Local Extended Drug Delivery to Tendon Tissue</b> Benjamin R. Freedman; Esther Koh; Nicolau Beckmann; Michael Obrecht; Nathalie Accart; Nicolas Brand; Farshad Ramazani; Andreas Fisch; Andreas Kuttler; Eckhard Weber; David J. Mooney
3:25 PM	Paper No. 56 <b>Impact of Alignment Variation and Activity on Tray-Bone Interface Micromotions in Cementless Total Knee Arthroplasty</b> Huizhou Yang; Riza Bayoglu; Chadd Clary; Paul J. Rullkoetter	Paper No. 62 <b>Higher Aggrecan 1-F21 Epitope Concentration In Synovial Fluid Early after Knee Injury is Associated with Worse Cartilage Quality 20 Years Later</b> Staffan Larsson; Paul Neuman; André Struglics	Paper No. 68 <b>PTH Treatment Increases Cortical Bone Mass More in Response to Compression than Tension in Mice</b> Amanda M. Rooney; F. Patrick Ross; Mathias P.G. Bostrom; Marjolein C.H. van der Meulen	Paper No. 74 <b>Biomaterials for Meniscus Cell Culture and Tissue Engineering: Phenotyping of Meniscal Cells</b> Benjamin Andrews; Shyni Varghese; Amy L. McNulty	Paper No. 80 <b>Evaluation of SS-31 as a Potential Therapeutic Target in the Treatment of Tendinopathy</b> Xueying Zhang; Hazel H. Szeto; Ying Zhang; Yusuke Nakagawa; Camila B. Carballo; Samuel Green; Xiang-Hua Deng; Scott A. Rodeo
3:35 PM	Paper No. 57 <b>Experimental Investigation into Cementless Tibia Stability</b> John Kyle P. Mueller; Eik Siggekkow; Charlie Parduhn; Brian Roach; Nick Drury; Marc Bandi	Paper No. 63 <b>Aging and Obesity Prime the Methyloome and Transcriptome of Adipose Stem Cells for Disease and Dysfunction</b> Shaoun Xie; Sulbha Choudhari; Chia-Lung Wu; Karen Abramson; David Corcoran; Simon Gregory; Jyothi Thimmapuram; Farshid Guilak; Dianne Little	Paper No. 69 <b>Assessment of Low-energy Acetabular Fractures on Clinical Computed Tomography Data with Three-Dimensional Trabecular Bone Structural Properties Using Machine Learning Techniques</b> Robel Kebede Gebre; Jukka Hirvasniemi; Iikka Lantto; Juhana Leppilahti; Simo Saarakkala; Timo Jämsä	Paper No. 75 <b>An Inducible AGE Model for Unraveling the Effects of Aging in Hierarchical Musculoskeletal Tissues</b> Austin Gregory Gouldin; Jennifer Puetzer	Paper No. 81 <b>Primary Cilium and Hedgehog Signaling Synergistically Mediate Tendon Enthesis Mechanical Responses</b> Fei Fang; Stavros Thomopoulos
3:45 PM	Paper No. 58 <b>Assessing the Performance of Metaphyseal Cones in Revision Total Knee Arthroplasty with Varying Bone Defects</b> Shuqiao Xie; Noel Conlisk; David Hamilton; Chloe Scott; Richard Burnett; Pankaj Pankaj	Paper No. 64 <b>Analyzing Transcriptome of Primary Cells from Bone: Noise from Bulk vs. Single Cell Expression</b> Donna Pacicca; Tammy Brown; Jeff Johnston; Margaret Gibson; Tomi Pastinen; Emily Farrow	Paper No. 70 – GUEST NATION <b>Energy Loss Behavior in Subchondral Bone Under Simulated Physiological Loads of Equine Athletes' Training</b> Shaktivesh shaktivesh; Fatemeh Malekipour; R. Chris Whitton; Peta L. Hitchens; Peter V.S. Lee	Paper No. 76 <b>Heparin-Conjugated Bio-Glue to Improve Healing of Lubricin-Coated Meniscus Tears by Stem Cell Recruitment</b> Rachel Brooke; David Xiang; Solaiman Tarafder; Chang H. Lee	Paper No. 82 <b>Pharmacological Stimulation Of PIEZO1 Suppresses Tendon Fibroblast to Myofibroblast Activation In Vitro</b> Anne E.C. Nichols; Whasil Lee; Alayna E. Loisel
3:55 PM	Paper No. 59 <b>A Tribological Approach Towards Understanding Micromotions in Bone-Implant Interfaces</b> Erik de Vries; Esther Sanchez Garza; David Matthews; Nico Verdonchot; Dennis Janssen; Emile van der Heide	Paper No. 65 <b>Radiographic Wear and Retrieval Analyses of Phospholipid Polymer-Grafted Highly Crosslinked Polyethylene Liners</b> Toru Moro; Yoshio Takatori; Sakae Tanaka; Kazuhiko Ishihara; Hiromi Oda; Takashige Umeyama; Eisei Fukutani; Hideya Ito; Masayuki Kyomoto; Hirofumi Oshima; Takeyuki Tanaka; Hiroshi Kawaguchi; Koza Nakamura	Paper No. 71 <b>Effects of Exercise and Sparc Knockout on Cranial Bone Structural and Biomechanical Properties</b> Melodie F. Metzger; Nathalie Pham; Alfonso R. Gonzalez; Seunghwan Lee; Miyako Suzuki; Trevor J. Nelson; Julianne D. Glaeser; Magali Millecamps; Laura S. Stone; Dmitriy Sheyn	Paper No. 77 <b>Inflammatory Challenge Alters Cytoskeletal Networks and Transiently Inhibits Meniscus Cell Migration</b> Elisabeth Lemmon; Liane Miller; Jay Patel; Robert Mauck	Paper No. 83 <b>Evaluation of Anti-Oxidative Effects of Apocynin in Diabetic Tendinopathy</b> Takashi Kurosawa; Yutaka Mifune; Atsuyuki Inui; Hanako Nishimoto; Kohei Yamaura; Shintaro Mukohara; Tomoyuki Yoshikawa; Ryosuke Kuroda
4:05 PM	Paper No. 60 <b>Impact Of Sagittal Resection Variability on Implant Fit During Partial Knee Arthroplasty</b> Andrew Jensen; Yifei Dai; Andrea Gardner	Paper No. 66 <b>Dexamethasone Regulates Circular RNA Expression in Early Osteogenesis and Chondrogenesis of Human Bone Marrow Mesenchymal Stromal Cells</b> Elena Della Bella; Ursula Menzel; Martin J. Stoddart	Paper No. 72 <b>Reactive Oxygen Species Lead to Age-Related Bone Loss by Accelerating Senescence of Osteoblasts in Mice</b> Xiangxu Chen; Verena Fischer; Anna Vikman; Melanie Haffner-Luntzer; Jan Tuckermann; Karin Scharffetter-Kochanek; Anita Ignatius; Astrid Liedert	Paper No. 78 <b>Effect of Structural Organization and Composition on Viscoelastic Shear Properties of Porcine Meniscus</b> Francesco Travascio; Christopher Norberg; Giovanni Filippone; Thomas Best; Michael Baraga; Alicia Jackson	Paper No. 84 <b>Nanofiber-Based Scaffold Support for Host Tendon Cell Migration and Matrix Synthesis</b> Hannah R. Childs; Romare M. Antrobus; Won Suk; Justin C. Casebeer; Ravi Balasubramanian; Helen H. Lu

**4:30 PM–5:30 PM Scientific Sessions**

Time	Podium Session 16 TKA Biomechanics Moderators: Guoan Li, PhD and Paul Rullkoetter, PhD	Spotlight Session 17 Osteoarthritis Phenotypes Moderators: Gayle Lester, PhD and Girish Pattappa, PhD	Podium Session 18 Orthopaedic Infections – Biomarkers & Diagnosis Moderators: Noreen Hickok, PhD and Dustin Williams, PhD	Podium Session 19 Shoulder – Computational and Technological Approaches Moderators: Rebecca Bell, PhD and Drew Lansdown, MD	Spotlight Session 20 Therapeutic Control of Skeletal Muscle Function Moderators: Sarah Greising, PhD and Rick Lieber, PhD
Room	West 301 A	West 301 BC	West 301 D	North 221	North 222
4:30 PM	Paper No. 85 <b>Bi-Unicondylar Arthroplasty: Improved Biomechanical Efficiency, Superior Gait Characteristics and Higher Patient Satisfaction Compared to Total Knee Arthroplasty</b> Amy Garner; Oliver Dandridge; Richard van Arkel; Andrew Amis; Justin Cobb	<b>SPOTLIGHT SPEAKER</b>  <b>Tonia Vincent, PhD</b> <b>Is Osteoarthritis One or Several Diseases?</b>	Paper No. 94 <b>Varying Growth Characteristics of Staphylococcus Aureus Isolates Causing Mild, Moderate, or Severe Illness in Children with Acute Hematogenous Osteomyelitis</b> Paula A. Hernandez; Laura M. Filkins; Naureen G. Tareen; Chanhee Jo; Lawson A. Copley	Paper No. 100 <b>Differentiating Healthy and Compromised Shoulder Exercise Performance with a Smartwatch and Machine Learning</b> David Burns; Daniel Fournier; Carl Whyne; Clark Dickerson; Stewart McLachlin	Paper No. 106 <b>β3AR Signaling-Induced FAP Beige Adipogenesis in Precondition (PC) of Muscle Ischemia-Reperfusion Injury (IRI)</b> He Zhang; Mengyao Liu; Hubert Kim; Brian T. Feeley; Xuhui Liu
4:40 PM	Paper No. 86 <b>The Influence of Bearing Thickness and Tibial Slope on the Anterior and Posterior Cruciate Ligaments Tension in Bi-cruciate Retaining Total Knee Arthroplasty</b> Yohei Okada; Atsushi Teramoto; Yasuraku Shibata; Shogo Nabeki; Kosuke Shiwa; Tomoaki Kamiya; Kota Watanabe; Mineko Fujimiy; Hiromichi Fujie; Toshihiko Yamashita		Paper No. 95 <b>Antistaphylococcal Antibodies from Circulating Plasmablasts can Diagnose and Differentiate Various S. Aureus Orthopaedic Infections</b> Gowrishankar Muthukrishnan; James Brodell; Charles Lee; Christopher Beck; Cheryl Ackert-Bicknell; John Daiss; Edward Schwarz	Paper No. 101 <b>Validation of Immersive Virtual Reality Revealing Improved and Efficient Surgical Skill Acquisition in Senior Orthopedic Residents: A Prospective Blinded Randomized Controlled Trial</b> Ryan Lohre; Aaron Bois; George S. Athwal; Danny P. Goel	Paper No. 107 <b>Local and Systemic Effects of Ischemic Therapy in a Rat Model</b> Austin J. Ramme; Brennan J. Rourke; James F. Markworth; Lucas Junginger; Rose Darcy; Carol Davis; Susan V. Brooks; Tristan Maerz; Asheesh Bedi
4:50 PM	Paper No. 87 <b>Intra-Operative Soft Tissue Targets in Total Knee Arthroplasty</b> Edgar A. Wakelin; Sami Shalhoub; Jeffrey M. Lawrence; John M. Keggi; Amber Randall; Corey E. Ponder; Jeffrey H. DeClaire; Jan Koenig; Christopher Plakos		Paper No. 96 <b>Elevated Levels of Serum ESR and CRP Prior to Second-Stage Re-Implantation Revision Surgery for Periprosthetic Joint Infection are Associated with Poor Outcomes</b> Wittawat Boonyanuwat; Liang Xiong; Wenhao Chen; Venkatsaiah Tirumala; Christian Klem; Young-Min Kwon	Paper No. 102 <b>Python-Tooth-Inspired Device to Enhance Tendon-to-Bone Repair</b> Iden Kurtaliaj; Ethan Hoppe; Liana Tedesco; Eric Yoon; Lester Smith; David Kovacevic; Victor Birman; Guy Genin; Stavros Thomopoulos	Paper No. 108 <b>Timing of Proteasome Inhibition for Contracture Prevention in Neonatal Brachial Plexus Injury</b> Qing Goh; Sia Nikolaou; Kritton Shay-Winkler; Roger Cornwall
5:00 PM	Paper No. 88 <b>The Association of Kinetic Gait Patterns with Kinematic Metrics in Total Knee Arthroplasty Patients</b> Janie L. Astephon Wilson; Dianne Ikeda	Paper No. 91 <b>Effect of a High-Fat Diet on Sex-Dependent Metabolic and Knee OA Phenotypes in Mice</b> Timothy M. Griffin; Dominic Cortassa; Erika Barboza Lopes; Albert Batushansky; Mike Kinter; Matlock Jeffries; Dawid Makosa; Melinda West	Paper No. 97 <b>Diagnostic Utility of a Novel Point-of-Care Test of Calprotectin for Periprosthetic Joint Infection in Total Knee Arthroplasty</b> Carlos A. Higuera Rueda; Jared A. Warren; Hiba K. Anis; Tejbir S. Pannu; Jesus M. Villa; Kathleen Bowers; Alison K. Klika; Jessica Colon-Franco; Xiaochun Zhang; Nicolas S. Piuze	Paper No. 103 <b>Predicting Clinical Outcomes after Total Shoulder Arthroplasty Using 3 Different Supervised Machine Learning Algorithms</b> Vikas Kumar; Christopher P. Roche; Steve Overman; Ryan Simovitch; Pierre Henri Flurin; Thomas Wright; Joseph Zuckerman; Howard Routman; Ankur Teredesai	<b>SPOTLIGHT SPEAKER</b>  <b>L. Andrew Koman, MD</b> <b>Musculoskeletal Uses of Botulinum Toxins: A 30-Year Translational Journey at Wake Forest School of Medicine</b>
5:10 PM	Paper No. 89 <b>The Effect of Joint Line Elevation on In Vivo Knee Kinematics in Bi-Cruciate Retaining Total Knee Arthroplasty</b> Christian Klem; Anand Padmanabha; Venkatsaiah Tirumala; Janna van den Kieboom; Ruben Oganessian; Paul Walker; John Drago; Kaya Adelzadeh; Andriana Velmahos; Saimrunali Dadigala; Travis Dang; Alina Syros; Young-Min Kwon	Paper No. 92 <b>Defining Patient Phenotype Clusters Based on Chondrocyte Metabolic Profiles</b> Spencer E. DeLucia; Aaron M. Stoker; Nicole T. Greco; Eli L. Pratte; Anna N. Sullentrup; James P. Stannard; James A. Keeney; James L. Cook	Paper No. 98 <b>Serum and Synovial Fluid Neutrophil-to-Lymphocyte Ratio (NLR): Novel Biomarkers for the Diagnosis and Prognosis of Native Septic Arthritis</b> Nathan Varady; Pierre-Emmanuel Schwab; Antonia F. Chen	Paper No. 104 <b>In Vivo Kinematics and Contact Path After Reverse Shoulder Arthroplasty</b> Gillian E. Kane; Clarissa LeVasseur; Alexandra Gabrielli; William Anderst; Albert Lin	
5:20 PM	Paper No. 90 – GUEST NATION <b>Failure to Recreate the Native Tibial Medial Centre of Rotation Following TKA Surgery Leads to Reduced Patient Outcomes</b> Joshua G. Twiggs; Brad Miles	Paper No. 93 <b>Metabolomic Profiles of Articular Cartilage Vary by Osteoarthritis Grade</b> Alyssa Kay Hahn; Hope D. Welhaven; Ethan Viles; Jenna Starke; Ronald K. June	Paper No. 99 <b>Advancing PJI Diagnosis: A Novel Test Using Cell-Free Dna Sequencing Identifies PJI Pathogens From a Routine Blood Draw</b> Adriana P. Echeverria; David C. Danko; Ian Cohn; Sara Shanaj; Lily Blair; Desiree Hollemon; Alberto Carli; Peter K. Sculco; Christine Mironenko; Matthew S. Hepinstall; Geoffrey Westrich; Thomas Sculco; Mathias Bostrom; Henry Michael; Andy Miller; Barry D. Brause; Asim A. Ahmed; Christopher E. Mason; Michael B. Cross; Laura Donlin	Paper No. 105 <b>Initial Fixation in Reverse Total Shoulder Arthroplasty: Validated Modeling Approach</b> Mehul A. Dharia; Yang W. Son; Jeffrey E. Bischoff	

**5:30 PM–7:00 PM**

Exhibit &amp; Poster Hall (North Hall A–C)

**Poster Session 1 Reception**

All ORS meeting attendees are invited to join us in the Exhibit & Poster Hall for beverages and appetizers.

**6:10 PM–6:50 PM**

Exhibit &amp; Poster Hall (North Hall A–C)

**Moderated Poster Presentations****Moderated Poster Session 4****Hip/Shoulder and Elbow**

Moderator: Brecca Gaffney, PhD

Moderated Poster Theater 1 (North Hall A–C)

**6:10 PM****Poster No. 475**

Impact On Femoral Strain And Implant Stress With Varying Anti-rotation Screw Length In A Minimally Invasive Dynamic Hip Screw

Dana J. Coombs; Mirco Rocci; This Aebi; David Muller;

Michael Bushelow

**6:14 PM****Poster No. 476**

3D Patient-Specific Biomechanical Planning Of Fracture Fixation

Scott M. Tucker; J. Spence Reid; Hwabok Wee; Sreekanth Arikatla;

Gregory S. Lewis

**6:18 PM****Poster No. 479**

Schizophrenia Increases Readmission Rates, Implant-related Complications, And Costs Of Care Following Primary Total Hip Arthroplasty: A Matched-control Analysis

Rushabh Vakharia; Joseph Ehiorobo; Nipun Sodhi; Hiba Anis;

Michael A. Mont; Martin W. Roche; Victor H. Hernandez

**6:22 PM****Poster No. 480**

A Rat Model Of Hip Hemi-Arthroplasty Using

3D-printed Titanium Implants

Adam D. Paish; Emily A. Truscott; Patti K. Kiser; Hesham Abdelbary;

Matthew G. Teeter; Douglas D. Naudie; David W. Holdsworth

**6:26 PM****Poster No. 481**

Outcome Of Acetabular Or Femoral Implant Revision

Versus Isolated Bearing Exchange For Osteolysis In

Well-fixed Cementless Total Hip Arthroplasty

Wenhao Chen; Liang Xiong; Christian Klem; Janna van den Kieboom;

Venkatsaikhil Tirumala; Ruben Oganessian; Paul Walker;

Young-Min Kwon

**6:30 PM****Poster No. 482**

Clinical Results In Total Hip Arthroplasty Using The First Monolithic

3d Printed Titanium Alloy Bone Ingrowth Acetabular Component

Hayley E. Ennis; Dylan Greif; Raymond Robinson

**6:34 PM****Poster No. 483**

Tissue Cutting By-product Surgical Smoke Contains Particles

Of Respirable Size With No Viable Biological Activity By

Bone Saw And Ultrasonic Cutting Of Bone Tissue

Vincent J. Casey; Cian Martin; Peter Curtin; Kevin Buckley;

Laoise M. McNamara

**6:38 PM****Poster No. 490**

Joint Function And Mechanics Are Similar For Female And

Male Rats In A Model Of Post-traumatic Elbow Contracture

Alex Reiter; Ryan Castile; Aaron Chamberlain; Spencer Lake

**6:42 PM****Poster No. 491**

Assessment Of The Three-dimensional Acromioclavicular

Distance In The Supine And Standing Positions

Yuki Yoshida; Noboru Matsumura; Satoshi Hiraga; Satoshi Oki;

Minoru Yamada; Yoshitake Yamada; Masahiro Jinzaki;

Morio Matsumoto; Masaya Nakamura; Takeo Nagura

**6:46 PM****Poster No. 493**

Do Glenoid Retroversion And Humeral Subluxation Affect

Outcomes Following Total Shoulder Arthroplasty?

C. Benjamin Ma; Weiyuan Xiao; Madeleine Salesky;

Edward C. Cheung; Alan L. Zhang; Brian T. Feeley; Drew A. Lansdown

**Moderated Poster Session 5****Foot and Ankle/Infection**

Moderator: Ramya Vemuri, PhD

Moderated Poster Theater 2 (North Hall A–C)

**6:10 PM****Poster No. 498**

Regional Genetic Responses Of Porcine Talar

Articular Cartilage To Impact Injury

Evan J. Bryant; Kailey L. Mansour; Andrew J. Sama;

Christopher J. Murdock; Chun-Yuh C. Huang; Jonathan Kaplan;

Amiethab Aiyer

**6:14 PM****Poster No. 499**

Wear Of Total Ankle Systems: Fixed Vs Mobile Bearing

Ilya Borukhov; Ramya Vemuri; Joseph Mummert; Sascha Bombosch;

Emily Sneddon; Jason Longaray; Ariel Palanca

**6:18 PM****Poster No. 500**

Bi-Radial Curvature Morphology Of The Healthy Tibiotalar Joint

Richard Obert; Robert Paxson; James Clancy; Mark Myerson;

Daniel Lee; Laura Brinker; Mathew R. Anderle

**6:22 PM****Poster No. 501**

Open Kinematic Chain Motion Of The Sesamoids In Dorsiflexion

Mackenzie French; Eric D. Thorhauer; Tadashi Kimura;

Bruce J. Sangeorzan; William R. Ledoux

**6:26 PM**

**Poster No. 502**

Post-traumatic Osteoarthritis-related Biomarker Responses To Leukoreduced Platelet Rich Plasma Treatment After Pilon Fractures  
Brett D. Crist; Aaron M. Stoker; Chris James; Gregory J. Della Rocca; James L. Cook

**6:30 PM**

**Poster No. 506**

Diagnostic And Prognostic Potential Of Anti-Staphylococcus Aureus Antibodies In Diabetic Foot Infections  
Stephanie P. Hao; Mark J. Ninomiya; Christopher A. Beck; Edward M. Schwarz; John L. Daiss; Irvin Oh

**6:34 PM**

**Poster No. 507**

Establishing A Murine Model Of Pyogenic Flexor Tenosynovitis  
Justin Cobb; Bowen Qiu; Constantinos Ketonis; Alayna Loiselle

**6:38 PM**

**Poster No. 508**

Total Hip And Knee Arthroplasty Can Save Lungs  
Alisina Shahi; Javad Parvizi; Samih Tarabichi; Lawrence Miller; Ali Oliashirazi

**6:42 PM**

**Poster No. 509**

Anesthetic- And NSAID-loaded UHMWPE Provide Post-arthroplasty Antibacterial Prophylaxis  
Dmitry Gil; Scott Grindy; Shannon Hugard; Nikolay Borodinov; Olga S. Ovchinnikova; Orhun Muratoglu; Heny Bedair; Ebru Oral

**6:46 PM**

**Poster No. 510**

Comparison Of Commercially-available Calcium Sulfate Bead Kits Loaded With Antibiotic Using In Vitro Large Joint Model  
Madison Brown; Omar Yunis; Michael Harris; Matthew Dipane; Andrew Wassef; Vishnu Priya Murali; Scott P. Noel; Joel D. Bumgardner; Edward McPherson; Jessica A. Jennings

**7:00 PM–9:00 PM**

The Duce

**ORS Research Section Reception**

You are invited to join us for a special Section reception on Saturday evening at one of the hottest spots in Phoenix - The Duce. Registration includes dinner and two drink tickets. Cash bar available.

Non-Section members\* registration required.

(\*Meniscus, ISFR, Orthopaedic Implants, Preclinical Models, Spine, Tendon)



**7:30 AM–9:00 AM**

Room: North 224

**Industry Connect an Ongoing Discourse with the FDA**

Organized by the ORS Industry Engagement Committee

*Organizers: Jeffrey Bischoff, PhD and Christopher Roche, MSBE, MBA*

This session is the fifth in a series, continuing an open discussion with the FDA which was started at the Industry Connect session in 2016 (Orlando) and has continued annually since then. The series is focused on presentations and discussion of timely regulatory topics relevant to orthopaedic product development. This year's session this year will focus on the international regulatory environment, including a review of current FDA pathways including De Novo and the status of the transition in Europe from the Medical Device Directive (MDD) to Medical Device Regulations (MDR). Presenters will incorporate perspectives from both the regulatory bodies as well as the medical device development community; and a discussion panel will focus on 'First in (where?)'. Participants will gain a better understanding of the most recent regulations and hot topics and have an opportunity to network with various ORS members from government, industry, and academia.

*The De Novo Program*

Sergio de del Castillo, RAC, De Novo Program Lead, Office of Regulatory Programs

Office of Product Evaluation and Quality, CDRH, FDA

*How the FDA's renewed focus on the De Novo pathway will encourage innovation*

Justin Eggleton, Vice President, Spine Regulatory Affairs, MCRA, LLC

*Innovation challenges for orthopedic device manufacturers under the new EU MDR—A notified body perspective*

Max Singh, MBA, PhD

Global Director - Orthopedics Focus Team, TÜV SÜD

*Global standards: Do they exist?*

Elizabeth Wray, Director, Regulatory Affairs, Zimmer Biomet

This session does not qualify for CME

**8:00 AM–9:00 AM**

Room: North 226

**Meet the NIH**

Organized by the ORS New Investigator Mentoring Committee

*Organizers: Ata Kiapour, PhD, MMSc and Kyle Allen, PhD*

Join us for the NIH-investigator Networking session that provide ORS meeting attendees with an opportunity to better understand NIH funding policy through one-on-one personal interaction with NIH staff. This session will allow the attendees to ask specific questions and participate in small group discussions with NIH grant review administrators and program officers. Participants can get their questions answered and learn what funding opportunities are available and which grant mechanisms are right for young investigators.

A representative from NSF will be available to answer questions regarding NSF grants.

**8:00 AM–9:00 AM Scientific Sessions**

Time	Podium Session 21 Knee–Ligament Reconstruction and Mechanics Moderators: Chadd Clary, PhD and Braden Fleming, PhD	Podium Session 22 Arthritis Treatment and Therapy Moderators: Xue Ma, MD, PhD and Rachel Miller, PhD	Podium Session 23 Intervertebral Disc Moderators: Zhen Li, PhD and Steven Presciutti, MD	Spotlight Session 24 Effective Study Designs for Clinical Research Moderators: Lynne C. Jones, PhD; Elizabeth L. Yanik, PhD	Podium Session 25 Skeletal Muscle–Injury and Repair Moderators: Andrea Domenighetti, PhD and Lisa Larkin, PhD
Room	West 301 A	West 301 BC	West 301 D	North 221	North 222
8:00 AM	Paper No. 109 <b>MPFL Reconstruction vs. Tibial Tuberosity Distalization for Treatment of Patellar Instability with Patella Alta: Dynamic Simulation</b> Travis J. Jones; Jason L. Koh; Kerwyn C. Jones; John J. Elias	Paper No. 115 <b>Controlled Delivery of Therapeutic Sirna Using a Highly Versatile Cell-Penetrating Peptide Loaded Collagen-Hyaluronic Acid Scaffold for Reduced Inflammation and Enhanced Cartilage Repair</b> Domhnall C. Kelly; Rosanne M. Raftery; James E. Dixon; Kevin M. Shakesheff; Caitriona M. O'Driscoll; Caroline M. Curtin; Fergal J. O'Brien	Paper No. 121 <b>Effects of the Bioresorbable Ultra-Purified Alginate Gel Combined with Bone Marrow Derived Mesenchymal Stem Cells or Bone Marrow Aspirate Concentrates on Intervertebral Disc Regeneration in Rabbits</b> Daisuke Ukeba	<b>SPOTLIGHT SPEAKER</b> 	Paper No. 130 <b>Browning Fibro-Adipogenic Progenitors Improves Muscle Regeneration After Volumetric Muscle Loss</b> Zili Wang; Mengyao Liu; Carlin Lee; Obiajulu Agha; Hubert Kim; Brian T. Feeley; Xuhui Liu
8:10 AM	Paper No. 110 <b>Bone Degeneration in Young Females Following Anterior Cruciate Ligament Injury</b> Daniella M. Patton; Collin T. Martin; Michael Casden; Karl J. Jepsen; James A. Ashton-Miller; Edward M. Wojtyś; Stephen H. Schlecht	Paper No. 116 <b>Astaxanthin Protects Against Osteoarthritis Via Nrf2: A Guardian of Cartilage Homeostasis</b> Kai Sun; Xingzhi Jing; Jiachao Guo; Xudong Yao; Jiamin Lin; Genchun Wang; Zhou Guo	Paper No. 122 <b>Measuring the Neutral Zone: Choosing a Method to Quantify Spinal Instability</b> Theodor Di Pauli von Treuheim; Olivia M. Torre; Grace E. Mosley; Philip Nasser; James C. Iatridis	<b>Kurt P. Spindler, MD</b> <b>The Role of Cohort Data in Clinical Outcomes Research</b>	Paper No. 131 <b>The Role of Muscle-Specific Fibroblast Growth Factor 9 (fgf9) in Innervation and Bone Shape</b> Jaclyn M. Soulas; Elahe Ganji; Ryan C. Locke; David M. Orntz; Megan L. Killian
8:20 AM	Paper No. 111 <b>Anterior Cruciate Ligament Injury Changes In Vivo Subchondral Bone Density Distribution Patterns of the Proximal Tibia</b> Soya Miura; Koji Iwasaki; Eiji Kondo; Shinji Matsubara; Masatake Matsuo; Keiko Goto; Tomohiro Onodera; Norimasa Iwasaki	Paper No. 117 <b>Ferostatin-1 as an Inhibitor of Blood-induced Chondrocyte Cell Death</b> Andy J. Lee; Lianna R. Gangi; Fereshteh Zandkarimi; Robert M. Stefani; Brent R. Stockwell; Clark T. Hung	Paper No. 123 <b>Bone Anti-Resorptive Raloxifene Improves the Structure of the Intervertebral Disc and Stimulates Transcription Factors</b> Neharika Bhadouria; Alycia Berman; Joseph Wallace; Nilsson Holguin		Paper No. 132 <b>Acute Local Vibration Results in a Decrease in Knee Flexor Maximum Voluntary Contraction</b> Timothy Lowe; Lisa Griffin; Xuanliang Neil Dong
8:30 AM	Paper No. 112 <b>Efficacy of MPFL Reconstruction in Treating Patellar Instability with Trochlear Dysplasia: A Computational Study</b> Sayed C. Rezvanifar; Brett L. Fleisher; John J. Elias	Paper No. 118 <b>Intra-Articular Injections of IL36Ra Attenuates Destabilizing Medial Meniscus (DMM) Surgery Induced Post-Traumatic Osteoarthritis (PTOA) Progression by Crafts Micro-CT Analyses</b> Xiaofei Li; Fang Fang; Tieshi Li; Xin Jin; Alessandra Esposito; Anna Spagnoli	Paper No. 124 <b>Neural Networks to Identify Aberrant Mechanosensing in Fibrous Environments</b> Edward D. Bonnevie; Beth G. Ashinsky; Bassil Dekky; Susan Volk; Harvey Smith; Robert L. Mauck		Paper No. 133 <b>Blocking CTGF/CCN2 Reduces Established Tissue Fibrosis and Sensorimotor Declines in a Rat Model of Overuse Injury</b> Mary F. Barbe; Mamta Amin; Michele Y. Harris; Lucas J. Hobson; Geneva E. Cruz; Jocelyne T. Dorotan; Brendan A. Hilliard; David M. Klyne; Steven N. Popoff
8:40 AM	Paper No. 113 <b>In Vivo Cartilage Contact During Downhill Running After Anterior Cruciate Ligament Reconstruction Combined with Lateral Extra-Articular Tenodesis</b> Kyohei Nishida; Tom Gale; Daisuke Chiba; Felipe Sunti; Bryson Lesniak; Freddie Fu; William Anderst; Volker Musahl	Paper No. 119 <b>Early Inhibition of Subchondral Bone Remodeling Slows Load-Induced Post-Traumatic OA Development</b> Sophia N. Ziemian; Timothy M. Wright; Miguel Otero; Marjolein C H van der Meulen	Paper No. 125 <b>Sonic Hedgehog Regulates PTHrP Expression in the Postnatal Mouse Intervertebral Disc</b> Chitra L. Dahia; Rajakumar Anbazhagan	Paper No. 128 <b>Clinical Effectiveness and Value-Based Care Analysis of Physical Therapy Compared with Watchful Waiting for the Treatment of Adhesive Capsulitis of the Shoulder: A Prospective Randomized Controlled Trial</b> Paul Fawzi Abraham; Mark R. Nazal; William K. Conaway; Noah J. Quinlan; Shivam Upadhyaya; Jada S. Gibbs; Scott D. Martin	Paper No. 134 <b>Dead Muscle Tissue Promotes Dystrophic Calcification by Lowering Circulating Tgf-<math>\beta</math>1 Level</b> LA Li; Shiqi Xiang; Guorui Cao; Bing Wang; Hang Lin; Alyssa D. Falcione; Peter Alexander; Rocky Tuan
8:50 AM	Paper No. 114 <b>Impact of Lateral Extra-Articular Tenodesis on Tibiofemoral Contact Mechanics</b> Niv Marom; Herve Quanezar; Hamidreza Jahandar; Tommy Fraychineaud; Zaid Zayyad; Thomas Wickiewicz; Andrew Pearle; Danyal Nawabi; Carl Imhauser	Paper No. 120 <b>NR1D1 Regulates Synovial Inflammation and Bone Destruction in Rheumatoid Arthritis</b> Hui Liu; Xuying Sun; Fengjing Guo; Jun Xiao	Paper No. 126 <b>In Vivo Deletion of HMGB1 Protects Against Inflammatory Induced Disc Degeneration</b> Kevin G. Burt; Adam Abraham; Nadeen Chahine	Paper No. 129 <b>Is Academic Department Teaching Status Associated with Adverse Outcomes After Lumbar Laminectomy and Discectomy for Degenerative Spine Diseases?</b> Dean C. Perfetti; Alan Job; Alexander M. Satin; Jeff S. Silber; David A. Essig	Paper No. 135 <b>Gli1 Labels a Subpopulation of FAP Cells that Respond to Muscle Injury</b> Lutian Yao; Elisia Tichy; Leilei Zhong; Luqiang Wang; Foteini Mourikioti; Ling Qin

## 9:15 AM – 10:15 AM

Room: West 301 A

### Achievement Awards & ORS Presidential Address

#### Presentation of Career Achievement Awards

*ORS Women's Leadership Forum Award*



Brigitte von Rechenberg, Prof. Dr.med.vet.,  
Dipl. ECVS  
*ORS Outstanding Achievement in Mentoring Award*



Suzanne Maher, PhD

*ORS Adele L. Boskey, PhD Award*



Robin Queen, PhD, FACSM, FIOR

*ORS/OREF Distinguished Investigator Award*



Joshua J. Jacobs, MD

#### Presentation of Scientific Achievement Awards

*ORS Marshall R. Urist, MD Award*



Karen Lyons, PhD

*ORS Arthur R. Steindler, MD Award*



Margaret McQueen, MD, FRCSEd(Orth)

*ORS Presidential Address*



James Iatridis, PhD, ORS President

## 10:15 AM – 11:15 AM

Exhibit & Poster Hall (North Hall A–C)

### Poster Session 1 Poster Viewing

(Authors required at ODD numbered posters)

## 10:25 AM – 11:05 AM

Exhibit & Poster Hall (North Hall A–C)

### Moderated Poster Presentations

#### Moderated Poster Session 6

##### Cartilage and Synovium 1

Moderator: Jay Patel, PhD

Innovation Theater (North Hall A–C)

### 10:25 AM

#### Poster No. 373

Cam-type Femoroacetabular Impingement Tissue Demonstrates Decreased Bioactivity And Extracellular Matrix Synthesis Compared To Normal Or Arthritic Cartilage

Haixiang Liang; Eric V. Neufeld; Benjamin C. Schaffler; Chelsea Matzko; Michael Mashura; Srino Bharam; Daniel A. Grande

### 10:29 AM

#### Poster No. 374

Sex Differences In Chondrocyte ROS Production Is Independent Of Integrin  $\alpha\beta 1$

Alicia Black; Sienna Cole; Ambra Pozzi; Andrea Clark

### 10:33 AM

#### Poster No. 375

Metabolic Responses Of Normal, Injured, And Osteoarthritic Chondrocytes In Primary Cell Culture

Nicole T. Greco; Aaron M. Stoker; Spencer E. DeLucia; Anna N. Sullentrop; Eli L. Pratte; James P. Stannard; James A. Keeney; James L. Cook

### 10:37 AM

#### Poster No. 377

Progression Of Osteoarthritis Accompanying With The Increased Chondrocyte Senescence: Role Of Mechanical Loading

Ning Wang; Rocky Tuan; Hang Lin

### 10:41 AM

#### Poster No. 383

Rapid Nontoxic Photochemical Collagen Crosslinking Improves Cartilage Wear

Diane R. Wagner; Amin Joukar; Hessam Noori-Dokht; Sonali Karnik; M. Jayed Hossain; Stephen B. Trippel

### 10:45 AM

#### Poster No. 384

Magneto-Patterned Mesenchymal Stem Cell Laden Hydrogels Recapitulate Cartilaginous Matrix Gradients

Hannah M. Zlotnick; Andy T. Clark; Sarah E. Gullbrand; James L. Carey; Xuemei M. Cheng; Robert L. Mauck

### 10:49 AM

#### Poster No. 385

Interleukin-1 $\alpha$  Decreases Coefficient Of Friction Of Synovium Ex Vivo

Lance A. Murphy; Lianna R. Gangi; Robert M. Stefani; Hagar M. Kenawy; Andy J. Lee; Gerard A. Ateshian; Roshan P. Shah; Clark T. Hung

**10:53 AM****Poster No. 388**

Proteoglycan-4 Inhibits Fibroblast To Myofibroblast Transition And Migration In Response To TGF-beta In A Fibroblast And Macrophage Co-culture Model

Marwa Qadri; Gregory Jay; Tannin Schmidt; Khaled A. Elsaid

**10:57 AM****Poster No. 389**

Towards In-Theatre Cartilage Tissue Engineering: Evaluation Of A Tri-layered Collagen-Based Scaffold Seeded With A Rapidly Isolated Chondrocyte/Stromal Cell Co-Culture In A Goat Model Of Osteochondral Defect Repair

Eamon J. Sheehy; Tanya Levingstone; Conor Moran; Grainne Cunniffe; Pedro J. Diaz-Payno; Robert T. Brady; Henrique Vazão Almeida; Simon Carroll; Pieter Brama; Daniel Kelly; Fergal O'Brien

**11:01 AM****Poster No. 390**

Mesenchymal Stromal Cell Derived Paracrine Factors Elicit Regeneration Of Osteoarthritic Cartilage Ex Vivo

Neety Sahu; Michela Bruschi; Pranay Agarwal; Nidhi Bhutani

## **Moderated Poster Session 7**

### **Clinical Studies**

Moderator: Alexander Lazarides, MD

Moderated Poster Theater 1 (North Hall A-C)

**10:25 AM****Poster No. 515**

Routine Use Of Synovial Alpha-defensin Does Not Change Clinical Decision-making Related To Periprosthetic Joint Infection

Derek F. Amanatullah; Robin Z. Cheng; James I. Huddleston; William J. Maloney; Andrea K. Finlay; Shanthi Kappagoda; Gina A. Suh; Stuart B. Goodman

**10:29 AM****Poster No. 516**

Comparing Metabolite Profiles Of Synovial Fluid And Serum After Knee Injury: A Mouse Study For Early Detection Of Osteoarthritis

Cameron W. Wallace; Alyssa K. Hahn; Priyanka P. Brahmachary; Ayten E. Erdogan; Ron June

**10:33 AM****Poster No. 517**

Examination Of Advanced Glycation End-product Accumulation Across Pain Phenotypes In Older Adults With Knee Osteoarthritis: Data From The Osteoarthritis Initiative

Victor A. Cheuy; Andrew J. Kittelson

**10:37 AM****Poster No. 518**

Orthopedic Surgeons Prescribe Fewer Opioids To Medicare Part D Patients In States With Medical Cannabis Laws

Cesar D. Lopez; Venkat Boddapati; Charles J. Jobin; Thomas R. Hickernell

**10:41 AM****Poster No. 519**

Interactive Software For Visualization Of 3D Fracture Fixation Biomechanical Principles

Gregory S. Lewis; Hwabok Wee; Jared Vicory; J. Spence Reid

**10:45 AM****Poster No. 520**

The Cost-ineffectiveness Of Manipulation Under Anesthesia For Treatment Of Adhesive Capsulitis

Yen Chen; Travis Doering; Nipun Sodhi; Rushabh Vakharia; Hiba Anis; Joseph Ehiorobo; Nicholas Sgaglione; Martin Roche; Michael Mont

**10:49 AM****Poster No. 521**

2-year Results With Robotic-assisted Total Knee Replacement: Comparison To A Non-robotic Assisted Group

Laura Scholl; Kenneth Gustke

**10:53 AM****Poster No. 522**

Implementation Of The Risk Assessment And Prediction Tool For Primary Total Joint Arthroplasty Decreased Hospital Length Of Stay And Discharge To Rehab

Devin Walsh; Eric Cohen; Jeremy Raducha; Matthew Quinn; Daniel Reid; Leigh Hubbard; John Froehlich

**10:57 AM****Poster No. 523**

Osteoarthritis-dependent Alterations In Pelvic And Hip Posture Do Not Require Cup Adaptions In THA

Eike Jakubowitz; Janine Haasper; Stefan Budde; Frank Seehaus; Andreas Spent; Christof Hurschler; Henning Windhagen; Thilo Flörkemeier

**11:01 AM****Poster No. 524**

Algorithm Based Automatic Templating And Patient Race Affect The Accuracy Of Preoperative Primary Total Knee Templates Compared To Manual Digital Templating

Eric L. Smith; Kenneth McAlpine; Thomas Seaver; Ruijia Niu; Enrique Garcia

## **Moderated Poster Session 8**

### **Biomaterials/Tendon and Ligament**

Moderator: Jose Canseco, MD, PhD

Moderated Poster Theater 2 (North Hall A-C)

**10:25 AM****Poster No. 365**

Evaluation Of Ex Vivo Herniation Risk Of A Novel Two-part Strategy For Annulus Fibrosus Repair

Tyler J. DiStefano; Jennifer O. Shmukler; Warren W. Hom; Steven B. Nicoll; James C. Iatridis

**10:29 AM****Poster No. 366**

Macrophage Responses To Stable And Non-stable CoCrMo Wear And Corrosion Debris Generated In-situ

Lauryn Samelko; Kathrin Ebinger; Simona Radice; Robin Pourzal; Markus A. Wimmer; Nadim J. Hallab

**10:33 AM****Poster No. 367**

Guided Osteochondral Differentiation Of Stem Cells On A Multilayered Scaffold

Elisabeth Amann; Amisel Amirall; Albina R. Franco; Isabel B. Leonor; Rui L. Reis; Martijn van Griensven; Elizabeth Rosado Balmayor



**10:37 AM**

**Poster No. 368**

3D Printed Synthetic and Decellularized Matrix Scaffolds for Treatment of Osteochondral Injury In Vitro and In Vivo  
Stacey M. Gruber; Sumit Murab; Karl Mueller; Paulomi Ghosh; Patrick Whitlock; Chia-Ying James Lin

**10:41 AM**

**Poster No. 369**

Controlling The Friction Coefficient Of Porous Structures Through 3d Printing Parameters  
Ilona Hoffmann; Keita Uetsuki; Hiroyuki Takahashi

**10:45 AM**

**Poster No. 370**

N-4 Chitosan: A Non-eluting, Broad Spectrum Antimicrobial Coating For Orthopedic Implants  
Randy Clevenger; CJ Kim; Kristin Blacklock; Gordon D. Donald

**10:49 AM**

**Poster No. 371**

Towards Development Of Engineered Discs With Gradients: Mechanical Properties Of Agarose-alginate-collagen Gels  
Keerthana Elango; Gabriel R. Lopez-Marcial; Grace D. O'Connell

**10:53 AM**

**Poster No. 372**

Do Taper Geometry And Head Size Affect Taper Fretting Corrosion In Total Hip Arthroplasty? A Retrieval Analysis Of Ceramic-on-polyethylene And Metal-on-polyethylene Explants  
Corinn Gehrke; Zein S. El-Zein; J. Sawyer Croley; Murphy A. Mallow; James J. Verner; Michael A. Flierl; Erin A. Baker

**10:57 AM**

**Poster No. 403**

Platelet-rich Fibrin Accelerates The Achilles Tendon Healing by Promoting The Proliferation Of Tenocytes Via Fgfr/akt Signaling  
Yoshiyuki Senga; Akinobu Nishimura; Akihiro Sudo

**11:01 AM**

**Poster No. 404**

Synovial Wrap For Supporting Primary Intra-articular Ligament Repair  
Lance A. Murphy; James Rogot; Neeraj Sakhrani; Robert Stefani; Andy Lee; Gerard Ateshian; Roshan Shah; Stavros Thomopoulos; Clark Hung

**10:45 AM – 12:15 PM**

Room: North 226

### **ORS Clinical Research Forum**

Organized by the ORS Clinical Research Forum Committee

This year's clinical research forum will focus on a set of topics aimed at improving how we interpret and perform clinical research. First we will have a talk on indices of important differences in clinical research followed by another talk on the concept of the fragility index to gauge the robustness of clinical research results. Next, the benefits and drawbacks of early stopping rules in clinical research will be presented followed by some tips and tools using a real world example of how to manage multi-centered studies. Next, an experienced clinical researcher will provide advice on becoming a successful clinical researcher and finally the panel will sit down and take questions from the audience. This years clinical research forum will provide you with a series of tools to improve your own clinical research projects and program.

#### *Introduction*

Joel J Gagnier ND, MSc, PhD, University of Michigan

#### *MCID/MID and Other Measures of Clinical Significance in Orthopaedics*

Raveendhara R. Bannuru MD, PhD, Tufts University

#### *Fragility Index and Related Concepts*

PJ Devereaux MD, PhD, McMaster University

#### *Early Stopping Rules*

PJ Devereaux MD, PhD, McMaster University

#### *Performing a Multi-centered Study in Orthopaedics*

James J. Irrgang PT, PhD, University of Pittsburgh

#### *How to be a Clinical Researcher/Clinician Scientist*

Volker Musahl MD, University of Pittsburgh

#### *Panel Discussion*

All Speakers

**11:15 AM–12:15 PM Scientific Sessions**

Time	Podium Session 26 NIRA—Spine and Cartilage Moderators: Russell Fernandes, PhD and Rita Kandel, MD	Podium Session 27 NIRA—Cartilage and Synovium Moderators: Doug Adams, PhD and Amarjit Viri, PhD	Podium Session 28 NIRA—Bone and Hip Moderators: Dennis Janssen, PhD and Clare Yellowley, PhD	Podium Session 29 NIRA—Lower Extremity Moderators: William Mihalko, MD, PhD and Robin Queen, PhD	Podium Session 30 NIRA—Biomaterials, Tendon, Ligament and Tumors Moderators: Catherine Ambrose, PhD and Hani Awad, PhD
Room	West 301 A	West 301 BC	West 301 D	North 221	North 222
11:15 AM	Paper No. 136 <b>Sensory Innervation in Porous Endplates by Netrin-1 from Osteoclasts Mediates Pge2-Induced Spinal Pain</b> Shuangfei Ni; Hongbin Lu; Jianzhong Hu; Xu Cao	Paper No. 143 <b>Adipose-Cartilage Crosstalk is a Critical Effector of Cartilage Pathology</b> Kelsey H. Collins; Irina Hutson; Daniel Ferguson; Yun-rak Choi; Luke E. Springer; Ruhang Tang; Eleanor N. Pollitt; Kristin L. Lenz; Christine T.N. Pham; Gretchen A. Meyer; Charles A. Harris; Farshid Guilak	Paper No. 151 <b>Acute Fisetin Treatment Attenuates Age-Associated Bone Density Loss in the Zmpste24<sup>-/-</sup> Progeria Mouse Model</b> William S. Hambright; Yohei Kawakami; Xiaodong Mu; Xueqin Gao; Aiping Lu; James Kirkland; Johnny Huard	Paper No. 160 <b>Retrieval Analysis of Total Ankle Arthroplasty Implants and Periprosthetic Tissue Through a Multicenter Collection</b> Erin A. Baker; Zachary M. Vaupel; Corinn K. Gehrke; Daniel M. Briggs; Kevin C. Baker; J. Christopher Coetzee; Mark S. Myerson; John G. Anderson; Stephen P. Biebelhausen; Paul T. Fortin	Paper No. 169 <b>A Bone Bandage for Treatment of Fracture Non-Unions</b> Deepak Bushan Raina; Alexandra Glencross; Nadia Chaher; Yang Liu; Lars Lidgren; Hanna Isaksson; Magnus Tägil
11:21 AM	Paper No. 137 <b>Evaluation of Lumbar Spinal Fusion Utilizing Recombinant Human Platelet Derived Growth Factor-<math>\beta</math> Chain Homodimer Combined with Bovine Collagen / <math>\beta</math>-tricalcium Phosphate in an Ovine Model</b> Benjamin C. Gadowski; Kevin Labus; Christian Puttlitz; Kirk McGilvray; Howard Seim; Brad Nelson; Jeremiah Easley	Paper No. 144 <b>Repressing MicroRNA-Dependent Retrotransposon Line-1 for Osteoarthritis Treatment</b> Yun Gao; Zhiyu Huang; Nan Hu; Pengcheng Liu; Jing Ding; Meng Feng; Kun Yang; Qiling Yuan; Xiangqiang Jiang; Cherie Charbonneau; Marco De Cecco; Richard Terek; John Froehlich; Joen M. Sedivy; Qian Chen	Paper No. 152 <b>Identification of a Novel Adipose Lineage Cell Population that Regulates Bone Marrow Environment</b> Leilei Zhong; Lutan Yao; Robert J. Tower; Yulong Wei; Luqiang Wang; Wei Yu; Yeji Zhang; Yanqing Gong; Fanxin Long; Patrick Seale; Chider Chen; Jaimo Ahn; Ling Qin	Paper No. 161 <b>Objective Mechanical Measures Predict Post-Traumatic OA Risk After Intra-Articular Fracture of the Tibial Plate</b> Kevin N. Dibbern; Michael C. Willey; J. Lawrence Marsh; Donald D. Anderson	Paper No. 170 <b>Development of siRNA-Activated Scaffold Delivery System to Ameliorate Inflammatory Responses During Regeneration of Osteoarthritic Cartilage</b> Tom Hodgkinson; Dohannal Kelly; James E. Dixon; Kevin M. Shakesheff; Fergal J. O'Brien
11:27 AM	Paper No. 138 <b>Phlpp1 Regulates Cellularity and Matrix Homeostasis in Intervertebral Disc Degeneration</b> Changli Zhang; Madeline Smith; George Zhou; Alon Lai; Robert Hoy; Victoria Mroz; Olivia Torre; Damien Laudier; Elizabeth Bradley; Jennifer Westendorf; James Iatridis; Svenja Illien-Junger	Paper No. 145 <b>Single-Cell RNA Sequencing Reveals a Novel Obesity-Associated Myeloid Cell Population in Visceral Fat and the Knee Joint</b> Natalia S. Harasymowicz; Alireza Savadipour; Chia-Lung Wu; John Bramley; William Buchser; Farshid Guilak	Paper No. 153 <b>Delineating the Effects of Pregnancy and Lactation on Rat Maternal Bone Responses to Future Estrogen Deficiency</b> Rebecca Chung; Yihan Li; Chantal M.J. de Bakker; Carlos Osuna; Justin Legging; Zachary Davis; Liyun Wang; X. Sherry Liu	Paper No. 162 <b>Biomechanical Evaluation of Extensor Tendon Transfers for Treatment of Foot Drop</b> Max Michalski; Trevor J. Nelson; Tonya An; Glenn Pfeffer; Melodie F. Metzger	Paper No. 171 <b>Micro-Geometry in Metal Scaffold Affect Angiogenesis and Osteogenesis</b> Chengyu Yang; Yixing He; Yang Liu; Chao Liu
11:33 AM	Paper No. 139 <b>A Combined Hydrogel and Mesenchymal Stem Cell Therapy Improves Disc Height and Condition in a Goat Model of Disc Degeneration</b> Chenghao Zhang; Sarah E. Gullbrand; Thomas P. Schaefer; Dawn M. Elliott; George R. Dodge; Robert L. Mauck; Neil R. Malhotra; Lachlan J. Smith	Paper No. 146 <b>Cellular and Molecular Mechanisms Regulating Synovial Joint Cavitation</b> Minwook Kim; Heejong Kim; Kimberly G. Helbig; Danielle R. Rux; Nancy Pleshko; Benjamin A. Garcia; Eiki Koyama; Maurizio Pacifici	Paper No. 154 <b>Elderly Patients with Distal Radius Fractures Exhibit Delayed Fracture Healing: An In Vivo Hr-pqct Micro-fea Study</b> Caitlyn J. Collins; Penny R. Atkins; Nicholas Ohs; Lukas Horling; Kerstin Stock; Patrick Christen; Michael Blauth; Ralph Müller	Paper No. 163 <b>Exploiting Biological Priors to Enhance Genome-Wide Association Study in a Dog Model of Anterior Cruciate Ligament Rupture</b> Lauren A. Baker; Rachel McNally; Mark Berres; Emily E. Binversie; Susannah J. Sample; Peter Muir	Paper No. 172 <b>Investigation of Chitosan-Based Bone Graft Substitutes for the Treatment of Femoral Critical-Size Bone Defects in a Rat Model</b> Bruno Zwingenberger; Corina Vater; Julia Bolte; Michael Gelinsky; Ronny Brünler; Dilbar Aibibu; Stefan Zwingenberger
11:39 AM	Paper No. 140 <b>Vegf-Neutralized Platelet-Rich Plasma and Adipose Stem Cells Enhance Articular Cartilage Regeneration in Goat Model</b> Shinsuke Kihara; Tomoya Iseki; Benjamin Rothrauff; Freddie Fu; Rocky Tuan; Peter Alexander	Paper No. 147 <b>Primary Cilia Drive Postnatal Articular Cartilage Morphogenesis Through Proteoglycan Production and Chondrocyte Organization in Mouse Limbs</b> Danielle Rux; Kimberly Helbig; Biao Han; Minwook Kim; Lin Han; Eiki Koyama; Maurizio Pacifici	Paper No. 155 <b>3D Bioprinting Spatio-Temporally Defined Patterns of Growth Factors to Tightly Control Tissue Regeneration</b> Fiona E. Freeman; Pierluca Pitacco; Jessica Nutty; David C. Browe; Jung-Youn Shin; Eben Alsberg; Daniel J. Kelly	Paper No. 164 <b>Development of Anti-CD163 Therapy for Staphylococcus Aureus Sepsis Following Surgical Site Infection</b> Yugo Morita; Masahiro Ishikawa; Noriaki Yokogawa; Kohei Nishitani; Karen L. de Mesy Bentley; Hiromi Ito; Chao Xie; John L. Daiss; Stephen L. Kates; Edward M. Schwarz	Paper No. 173 <b>Rcn3 Is Involved in Postnatal Tendon Maturation by Regulating Collagen Fibrillogenesis</b> Na Rae Park; Snehal Shetye; Douglas R. Keene; Sara Tufa; David M. Hudson; Marilyn Archer; Kyu Sang Joeng
11:45 AM	Paper No. 141 <b>Neural Eglf Like 1, a New Dual-Functioning Disease-Modifying Osteoarthritis Drug</b> Chenshuang Li; Pin Ha; Wenlu Jiang; Emily Berthiaume; Hsinchuan Pan; Cymbeline Culiat; Xinli Zhang; Kang Ting; Chia Soo; Zhong Zheng	Paper No. 148 <b>Periostin-siRNA Nanoparticles Mitigate Post-Traumatic Osteoarthritis in Mice Via Canonical Wnt And Nfkb Signaling Pathways</b> Xin Duan; Lei Cai; Christine TN Pham; Hua Pan; Robert H. Brophy; Samuel A. Wickline; Muhammad Farooq Rai	Paper No. 156 <b>Dynamics of Modeling and Remodeling-Based Bone Formation in Response to Intermittent Parathyroid Hormone (PTH) Treatment and Discontinuation</b> Wenzheng Wang; Wei-Ju Tseng; Hongbo Zhao; Tala Azar; Nathaniel Dymant; X. Sherry Liu	Paper No. 165 <b>Humanized Mice Exhibit Increased Susceptibility to Staphylococcus Aureus Osteomyelitis Induced Sepsis</b> Gowrishankar Muthukrishnan; Alexandra Wallimann; Maria Hildebrand; Aron Keshishian; Caroline Constant; Marc Antoine Burch; John Daiss; Stephan Zeiter; R. Geoff Richards; Edward Schwarz; T. Fintan Moriarty	Paper No. 174 <b>Aging and Degeneration Alter Chromatin Organization and Mechano-Responsivity in Human Tenocytes</b> Su-Jin Heo; Shreyasi Thakur; Boao Xia; Rowena Mcbeath; Melike Lakadamyali; Robert Mauck
11:51 AM	Paper No. 142 <b>Low Risk, High Impact: 3-D Printed Fracture Models for Resident Education</b> Danielle M. Cristino; Kayley A. Dear; Elaine C. Schmidt; Michael W. Hast; Samir Mehta	Paper No. 149 <b>Platelet Derived Growth Factor Receptor-beta (pdgfrb) Lineage Tracing Highlights Pericyte to Myofibroblast Transdifferentiation During Post-Traumatic Osteoarthritis</b> Takashi Sono; Ching-Yun Hsu; Stefano Negri; Sarah Miller; Yiyun Wang; Jiajia Xu; Carolyn A. Meyers; Bruno Peault; Aaron James	Paper No. 157 <b>Altered Capital Femoral Physis Morphology is Associated with Increased Risk of Cam-Type Femoroacetabular Impingement in Children and Adolescents</b> Shayan Hosseinzadeh; Alireza Emami; Gabriela Portilla; Eduardo N. Novais; Young-Jo Kim; Ata M. Kiapour	Paper No. 166 <b>Early Removal of the Infrapatellar Fat Pad Beneficially Alters the Pathogenesis of Primary Osteoarthritis in the Hartley Guinea Pig</b> Maryam F. Afzali; Lauren B. Radakovich; Zachary C. Pixler; Margaret A. Campbell; Joseph L. Sanford; Angela J. Marlot; Tammy H. Donahue; Kelly S. Santangelo	Paper No. 175 <b>Flow Cytometry and Single-Cell RNA Sequencing Identify Novel Myeloid Cell Populations in Bone-to-Tendon Interface Tissue After ACL Reconstruction Surgery in Mice</b> Takayuki Fujii; Susumu Wada; Camila Carballo; Yake Liu; Daoyun Chen; Xiang-Hua Deng; Kyung-Hyun Park-Min; Scott A. Rodeo; Lionel B. Ivashkiv
11:57 AM		Paper No. 150 <b>Robust Characterization of Non-Invasive PTOA Mouse Model</b> Fazal Ur Rehman Bhatti; Do-Gyoon Kim; Karen Hasty; Hongsik Cho	Paper No. 158 <b>A Finite Element Analysis to Investigate the Biomechanical Effect of Ischiofemoral Impingement, Femoroacetabular Impingement, and Abnormal Femoral Torsion on the Lumbar Spine</b> Anthony N. Khoury; Tejas Mhetre; Cheng-Jen Chuong; Hal D. Martin	Paper No. 167 <b>Identification Of Gli1 as a Progenitor Cell Marker for Meniscus Injury Repair</b> Yulong Wei; Hao Sun; Lutan Yao; Leilei Zhong; Wei Yu; Su Chin Heo; Lin Han; Fanxin Long; Robert L. Mauck; Jaimo Ahn; Ling Qin	Paper No. 176 <b>The "Boost Effect" from an Intramedullary Rod for the Treatment of Metastatic Bone Disease</b> Tae Won B. Kim; Sandra A. Miskiel; Kiet Huynh; Ahmad Amoush; John Gaughan; Gregory J. Kubicek
12:03 PM			Paper No. 159 <b>Malalignment of "Blade-type" Femoral Stems Leads to Dramatic Increases in Cortical Stresses and Interface Micromotion</b> Eunjo Hwang; Houston L. Braly; Sabir K. Ismaily; Philip C. Noble	Paper No. 168 <b>Exercise Enhances Skeletal Muscle Regeneration by Promoting Senescence in Fibro-Adipogenic Progenitors</b> Yuki Saito; Takashi Matsumura; Mineko Fujimiyi; Takako S. Chikenji	

### 11:15 AM – 12:30 PM

Room: North 229

#### Research Interest Group: Musculoskeletal Infection

##### Organizers:

*Jacobus J.C. (Chris) Arts, PhD, Maastricht UMC*  
*Edward Schwarz, University of Rochester Medical Center*  
*Josh Wenke, PhD, US Army Institute of Surgical Research*

Orthopaedic infections are a common and devastating condition to patients. Despite constant modifications in practice, infection rates for many conditions and surgeries remained relatively unchanged for decades. This RIG will be a forum where clinicians, engineers, and biologists disseminate and discuss the issues, approaches and discoveries. The topic will be broken into prevention, diagnosis, and treatment. The 2020 meeting will focus on prevention with future RIGs covering diagnostics and treatment. Clinicians will describe the problems, challenges and current practices. More importantly, their perspective on what is needed to reduce and effectively treat infections will be shared so the audience gains the insight required to target their innovations. Findings from recent consensus panels

### 12:15 PM – 1:15 PM

Room: North 227

#### Research Interest Group: Adaptive Design for Preclinical and Clinical Studies

##### Organizers:

*Brian Johnstone, PhD, Oregon Health & Science University*  
*Heather Pidcote, MD, PhD, Colorado State University*

Adaptive designs have been used by major pharmaceutical and device companies to improve the efficiency and ethical balance of randomized clinical trials. Increasingly, academic clinical trialists are also adopting these study design methods for the same purpose, and furthermore, these methods can be adapted for preclinical studies. This RIG will highlight how adaptive designs can be used in preclinical, clinical veterinary and translational human studies to improve efficiency, minimize cost, reduce patient exposure to risk, and maximize the potential to correctly answer the research question. The RIG will discuss the creation of a musculoskeletal translational research network to promote coordinated preclinical, clinical veterinary and translational human studies using adaptive design techniques.

### 12:15 PM – 1:30 PM

Room: North 224

#### Women's Leadership Forum: Celebrating Diversity

With support from



Please join the Women's Leadership Forum (WLF) for the Celebrating Diversity Luncheon. The lunch will include a discussion panel: Common Difficulties of Orthopaedics that No One Talks About. Many in our field experience imposter syndrome, repeated rejection, or burnout at some point. To destigmatize these experiences and provide shared opportunities for reflection with audience members, panelists will discuss how they have dealt with these issues over the course of their careers. Come celebrate with the WLF and network with fellow ORS meeting participants.

Additional registration fee required.

Panel Discussion: "Common Difficulties of Orthopedics That No One Talks About"

Tamara Alliston, PhD, University of California, San Francisco

Joel Boerckel, PhD, University of Pennsylvania

Marjolein van der Meulen, PhD, Cornell University

Travelle Franklin-Ford Ellis, MD, PhD, Tour for Diversity in Medicine

### 12:15 PM – 1:45 PM

Room: North 226

#### Research Interest Group: Skeletal Muscle

The role of senescent cells in muscle aging and disease as well as their implication in the cross talk between skeletal muscle and bone

##### Organizers:

*Rick Lieber, PhD, Shirley Ryan AbilityLab*  
*Sudheer Ravuri, PhD, Steadman Philippon Research Institute*

The goal of this RIG is to enhance the collaboration between clinics and laboratories and to discuss new and cutting-edge muscle research. The RIG will also describe the current knowledge or technical gaps and barriers to solving the muscle research problem. The RIG will focus on muscle aging and cross talk between muscle and bone. There will be a didactic portion, with ample time for an interactive discussion and questions at the end of the meeting. The RIG will begin with a 60-minute didactic portion taught by one of the leading pioneers of muscle cell therapy and muscle aging, Johnny Huard, PhD, Steadman Philippon Research Institute. For the final 30 minutes, there will be an interactive question and answer session between the audience and presenters. At the completion of the RIG, attendees will have a greater understanding and appreciation of mechanism of muscle aging and its cross talk with bone that can help us to develop innovative approaches for muscle regeneration and disease treatment.

**1:30 PM–3:00 PM Scientific Session**

Room	Time	1:30 PM	1:45 PM	2:00 PM	2:15 PM	2:30 PM	2:45 PM
North 222	<b>Podium Session 30A</b> Translational / Clinical Science Forum - Randomized Control Trials <b>Moderators:</b> Roy Aaron, MD and Joel Gagnier, ND, PhD	Paper No. 177 <b>Limb Occlusion Pressure Versus Standard Pneumatic Tourniquet Pressure in Open Carpal Tunnel Surgery - A Randomized Trial</b> Hannah Morehouse; Haley Goble; Bradley S. Lambert; Jaclyn Jones; Todd Siff; Patrick McCulloch; Shari Liberman	Paper No. 178 <b>Percutaneous Periarticular Multi-Drug Injection at One Day After Total Knee Arthroplasty as a Component of Multimodal Pain Management: A Randomized Control Trial</b> Takuya Iseki; Sachiyo Tsukada; Motohiro Wakui; Tomoya Iseki; Takatoshi Morooka; Toshiya Tachibana	Paper No. 179 <b>A Randomized Trial Comparing Knee Kinematics After ACL-Reconstruction vs. ACL-Reconstruction Plus Lateral Extra Articular Tenodesis During Downhill Running</b> Daisuke Chiba; Tom Gale; Bryson Lesniak; Freddie H. Fu; William Anderst; Volker Musahl	Paper No. 180 <b>A Randomized Controlled Trial of Short Versus Conventional Cementless Femoral Components in Primary Total Hip Arthroplasty</b> Pablo A. Slullitel; Johanna Dobransky; Cheryl Kreviazuk; Jung-Kyong Kim; George A. Grammatopoulos; Paul E. Beaulé	Paper No. 181 <b>Effects of Combining Scapular Strengthening Exercises with Motor Control Training on Spinal Accessory Nerve Dysfunction in Oral Cancer Survivors with Neck Dissection: A Randomized Clinical Trial</b> Yueh-Hsia Chen; Wei-An Liang; Chi-Rung Lin; Cheng-Ya Huang	Paper 181A <b>Accelerated Surgery In Patients With A Hip Fracture (hip Attack): An International, Randomized, Controlled Trial</b> PJ Devereaux; Flavia Borges; Ernesto Guerro; Jessica Vincent; Valerie Harvey; Kumar Balasubramanian; Mohit Bhandari

**1:30 PM–3:00 PM**

Room: West 301 A

**A Debate for the Need for New Orthopaedic Biomaterials**



Organized by ORS Orthopaedic Implants Section

Organizer: William Mihalko, MD, PhD

There have been several issues raised in the last two decades concerning our current and historically utilized biomaterials in orthopaedics.

There is a current need to bring these issues to light so that they can be investigated and solved to further advance the treatments and outcomes for patients. Although we have utilized current biomaterials in orthopaedic surgery for decades there have been several issues raised in the recent past that may be limiting the outcomes of patients. We aim to bring these issues to light in a debate type format to give the attendees a look into the future where issues like corrosion, biofilm formation, and hypersensitivity are no longer a concern in orthopaedics. To advance the education of attendees we will create a town hall discussion format after each side of a topic is presented to advance research in biomaterial science.

*Don't Mess with Success: Traditional Biomaterials are the Best Option in Orthopaedics*

Patricia Campbell, PhD, Orthopaedic Institute for Children / UCLA

*Out with The Old in with The New; Newer Materials Are Necessary to Improve Outcomes in Orthopaedic Surgery*

Steve Kurtz, PhD, Exponent, Inc.

*Metallic Oxide Layers are Protective Against Inflammatory Attack*

Nadim Hallab, PhD, Rush University

*Direct Cellular Corrosion Evidence in Current Orthopaedic Materials*

Jeremy Gilbert, PhD, Clemson University

*Improving Traditional Biomaterials Will Solve Our Problems*

Orhun Muratoglu, PhD, Harvard Medical School

*New Materials and Surfaces are Needed to Solve Our Infection Problems*

Kenneth Urish, MD, PhD, University of Pittsburgh

**1:30 PM–3:00 PM**

Room: West 301 BC

**From Osteoimmunology to Immunotherapy: A Progress Report**

Organizers: Georg Duda, PhD and Katharina Schmidt-Bleek, PhD

The research field osteoimmunology has revealed a striking and essential interdependency between bone and immune cells. The possibility of immune modulatory therapeutic approaches has gained interest. However, the sheer diversity and inherent plasticity of immune cells present during the bone healing process accounts for numerous unresolved aspects that are under current research observation. Inflammation is needed to initiate healing, but has to be strictly regulated to stay on the “good” side of the healing influences. In elderly, the ratio of M1:M2 macrophages is skewed and this dysregulation could be responsible for healing problems. CD8 effector T cells negatively influence bone healing, while regulatory T cells enhance healing. Their ratio could be a biomarker for predicting delayed healing. An in depth understanding of the interdependency of the immune and skeletal system can serve as a basis for the development of future immune modulatory treatment strategies.

*Harvest the Interdependency of T Cells and Bone - Towards Immune Modulation as a New Therapy Concept*

Katharina Schmidt-Bleek, PhD, Julius Wolff Institute, Charite University

*Let's Talk about Crosstalk: MSC-macrophage Communication Early in Bone Healing*

Stuart Goodman, MD, PhD, Stanford University

*The Effect of Inflammation on Bone Fracture Healing*

Ralph Marcucio, PhD, University of California San Francisco

**1:30 PM–3:00 PM**

Room: West 301 D

**Single Cell Omics for Musculoskeletal Research**



Organized by The Big Data Workgroup of the IFMRS\* (International Federation of Musculoskeletal Research Societies)

*Organizers: Jennifer Westendorf, PhD and*

*Muhammad Farooq Rai, PhD*

The ability to analyze individual cells within a tissue or cell population is transforming biology and medicine by allowing for the identification of new cell types and lineages that are present during normal and disease states. This workshop will feature speakers who are using cutting edge technologies to study the epigenome, transcriptome and/or proteome of musculoskeletal tissues at the single cell level. Speakers will review the strengths and limitations of current single cell technologies (scRNA-seq, Cy-ToF, and sci-ATAC-seq) as compared to bulk technologies and summarize how these technologies are advancing our understanding of skeletal development and disease.

*Using Single Cell RNA Sequencing to Determine Cellular Heterogeneity and Trajectories of Lineage Specification*

*Chia-Lung Wu, PhD, Washington University*

*Exploring the Regulatory Control of Cartilage Development to Understand Skeletal Disease*

*Terence Capellini, PhD, Harvard University*

*Single Cell Mass Cytometry (CytoF) Analyses to Map Cellular Heterogeneity in Healthy and Diseased Skeletal Tissues*

*Nidhi Bhutani, PhD, Stanford University*

\*ORS is a participatory member of the IFMRS

**1:30 PM–3:00 PM**

Room: North 221

**Recent Advances in Intervertebral Disc Repair**



Organized by International Combined Orthopaedic Research Societies (ICORS)

*Organizers: Fackson Mwale, PhD and John Antoniou, MD, PhD*

Intervertebral disc (IVD) degeneration is a common cause of back pain. IVD begins

early in adult life and may progress slowly for decades until becoming symptomatic and requiring medical intervention. The adult human IVD seems incapable of intrinsic repair and there are currently no proven treatments to prevent, stop or even retard disc degeneration. Fusion is currently the most common surgical treatment of symptomatic disc disease. However, radiographic follow-up studies have revealed that as many as 80% of patients may develop adjacent segment disc degeneration due to altered spine biomechanics. A biological means to treat disc degeneration is therefore desirable. The purpose of the workshop is to look at recent advances and future prospects of disc repair.

*Link-N as a Therapeutic Agent to Treat Early Intervertebral Degeneration*

*Fackson Mwale, PhD, Jewish General Hospital, McGill University*

*Intervertebral Disc Specific Chemo-Attractants for the Homing of Mesenchymal Stem Cells into Degenerative IVDS*

*Mauro Alini, PhD, AO Research Institute*

*Hunt for Transcriptional Control of Nucleus Pulposus Cells using iPS Cell Technology*

*Daisuke Sakai, MD, PhD, Tokai University*

*Cellular Reprogramming Strategies for Intervertebral Disc Repair*  
*Devina Purmessur, PhD, The Ohio State University*

**1:30 PM–3:00 PM**

Room: North 227

**Get That Job! How to Successfully Interview for Your Dream Position**

Organized by the ORS Industry Engagement Committee and New Investigator and Mentoring Committee

*Organizers: Lara Silverman, PhD and Kyle Allen, PhD*

The goal of this session is to discuss the interview process for academic and industry positions following graduation, and review strategies that successful candidates use during their job hunt. We will review tips and tricks for how to get an interview, prepare appropriately, and successfully navigate interview day. Unique aspects of academic versus industry interviews will be highlighted from experienced interviewers who can provide key insights into evaluating potential candidates.

*Interview/Job Hunt Skills for Industry Positions*

*David Vanderdoes, W L Gore*

*Interview/Job Hunt Skills for Post-doc Positions*

*Henry Donahue, PhD, Virginia Commonwealth University*

*Experiences from Interviewing for Industry and Post-doc Positions*  
*Rebecca Wachs, PhD, University of Nebraska*

This session does not qualify for CME.



## 3:00 PM–4:00 PM

Exhibit & Poster Hall (North Hall A–C)

Exhibit & Poster Session 1 Poster Viewing

## 3:15 PM–3:45 PM

Innovation Theater, Exhibit & Poster Hall (North Hall A–C)

Biomomentum Techniques Presentation

The Revolution of 3D Indentation Mapping in Orthopaedic Research

## 4:00 PM–5:00 PM Scientific Sessions

Time	Podium Session 31 Knee–Biomechanics and Reconstructive Outcomes <b>Moderators:</b> Bernd Grimm, Meng, PhD and Janie Wilson, PhD	Podium Session 32 Cartilage–Mechanics and Mechanobiology <b>Moderators:</b> Alan Grodzinsky, ScD and Ron June, PhD	Spotlight Session 33 Signaling Pathways in Bone Healing <b>Moderators:</b> Melanie Haffner-Luntzer, PhD and Katharina Schmidt-Bleek, PhD	Podium Session 34 Multidisciplinary Imaging and Novel Analysis <b>Moderators:</b> Matthew Koff, PhD and Yang Xia, PhD	Podium Session 35 Tendon and Ligament – Healing and Regeneration <b>Moderators:</b> Mark Buckley, PhD and Nathan Schiele, PhD
Room	West 301 A	West 301 BC	West 301 D	North 221	North 222
4:00 PM	Paper No. 182 <b>The Effect of Medial Unicompartmental Knee Arthroplasty on Kinematics, Contact Patterns and Lateral Compartment Dynamic Joint Space</b> Milad Zare; Du Gang; Griffin Monaghan; Brian Hamlin; Kenneth Urish; William Anderst	Paper No. 188 <b>Obesity Alters the Collagen Structure and Mechanical Properties of Cartilage in Mice</b> Amber T. Collins; Guoli Hu; Monique Goldsmith; Michael Reinsvold; Holly A. Leddy; Louis E. DeFrate; Courtney M. Karner	<b>SPOTLIGHT SPEAKER</b>  <b>Ivo Kalajzic, MD, PhD</b> <b>Murine Models and Genetic Approaches in Understanding Bone Healing</b>	Paper No. 197 <b>Fluorine-18 Fluorodeoxysorbitol is Both Sensitive and Specific for Diagnosing E. Coli Osteomyelitis in an Animal Model</b> Timothy Reed; Pooja Swami; Peter Gold; Haixiang Liang; Joseph Carrion; Kuldeep Bhargava; Kenneth Nichols; Christopher J. Palestro; Daniel A. Grande	Paper No. 203 <b>The Differential Roles of Decorin and Biglycan in the Early Proliferative and Remodeling Phases of Tendon Healing</b> Thomas P. Leahy; Ashley K. Fung; Stephanie N. Weiss; David E. Birk; Louis J. Soslowsky
4:10 PM	Paper No. 183 <b>A Biomechanical Analysis of a New Technique for MCL Reconstruction</b> Natalia D. McIver; Tony Sapradit; John Garcia; Robert Mercer; Robert Schenck; Gehron Treme; Dustin Richter; Christina Salas	Paper No. 189 <b>Relaxation Degree is Critical in Rate-Dependent Cartilage Failure with Proteoglycan Depletion</b> Guebum Han; Uraching Chowdhury; Melih Eriten; Corinne Henak		Paper No. 198 <b>Fiber-optic Raman Spectroscopy for Early-Stage Osteoarthritis Diagnostics</b> Kimberly Kroupa; Man I. Wu; Wei Wong; Mads S. Bergholt; Michael B. Albro	Paper No. 204 <b>Regulatory T-Cells are Required for Neonatal Tendon Regeneration</b> Varun Arvind; Alice Huang
4:20 PM	Paper No. 184 <b>Which Osteoarthritic Gait Features Recover Following Knee Realignment Surgery (High Tibial Osteotomy)?</b> Jake B. Bowd; Paul R. Biggs; Gemma M. Whatling; Chris Wilson; David Elson; Marina De Vecchis; Catherine A. Holt	Paper No. 190 <b>A Theraostic Nanolubricant</b> Taylor B. Lawson; Anisha T. Joenathan; Brian D. Snyder; Mark W. Grinstaff		Paper No. 199 <b>Non-Invasive Failure Diagnosis of Aseptic Loosening via Piezoresistive Bone Cement and Electrical Impedance Tomography</b> Hamid Ghaednia; Crystal E. Owens; Ricardo R. Roberts; Tyler N. Tallman; Anastasios John Hart; Kartik M. Varadarajan	Paper No. 205 <b>Provisional Extracellular Matrix Composition of Decellularized MRL/MpJ Tendons Harnesses Biological Cues to Modulate Morphology and Proliferation of Scar-Mediated C57BL/6 Tendon- Derived Cells In Vitro</b> Jason C. Marvin; Brenna Vaughn; Nelly Andarawis-Puri
4:30 PM	Paper No. 185 <b>Gait Analysis Demonstrates Abnormalities in Three Murine Models of Post-Traumatic Osteoarthritis</b> Brett Croen; Camila Carballo; Susumu Wada; Tony Chen; John Sevick; Reyna Bhandari; Scott Rodeo	Paper No. 191 <b>Establishing the Peracute Relationship Between Calcium Signaling and Mitochondrial Depolarization After Impact Injury to Articular Cartilage</b> Jingyang Zheng; Thomas Wyse Jackson; Lisa A. Fortier; Lawrence J. Bonassar; Michelle L. Delco; Itai Cohen	Paper No. 194 <b>Macrophage Lineage Hdac3 Deletion Enhances Bone Healing And Limits Osteoclast Fusion Via Pmpa1</b> David Molstad; Jennifer Westendorf; Elizabeth Bradley	Paper No. 200 – GUEST NATION <b>A High Throughput Pipeline for Rapid, Multi-Scale Imaging and Pathology Assessment of Human Joints</b> Anton D. Nathanson; Michael Carnell; Abhilash Srikantha; Lucy Ngo; Dirk Zeidler; Christian Wojek; Thomas W. Bauer; Melissa L. Knothe Tate	Paper No. 206 <b>Intrasynovial Versus Extrasynovial Tendon Repair: An In Vivo Gene Expression and Histologic Study at the Early Phase of Healing</b> Susumu Yoneda; Hua Shen; Shelly E. Sakiyama-Eibert; Stavros Thomopoulos; Richard H. Gelberman
4:40 PM	Paper No. 186 <b>Effects of Low-Intensity Pulsed Ultrasound on Gap Filling at Osteotomy Sites After Medial Open-Wedge High Tibial Osteotomy with Beta-Tricalcium Phosphate Spacer</b> Hidemasa Terao; Koji Iwasaki; Tomohiro Onodera; Zenta Jotoku; Eiji Kondo; Norimasa Iwasaki	Paper No. 192 <b>Dual Compartmentalized Functionality of TGF-beta in the Synovial Joint</b> Sedat Dogru; Zhonghao Dai; Michael B. Albro	Paper No. 195 <b>Notch and Wnt Signaling Crosstalk Regulates Skeletal Stem/Progenitor Cell Behavior During the Early Fracture Healing</b> Sooyeon Lee; Anne Marie Josephson; Lindsey H. Remark; Hannah P. Litwa; Madeleine Z. Wong; Philipp Leucht	Paper No. 201 <b>Deep Learning-Based Bone Segmentation of Computed Tomography Data Outperforms Other Automatic Methods</b> Daniella M. Patton; Emilie N. Henning; Ryan J. Reger; Robert W. Goulet; Sean K. Carroll; Benjamin Provencher; Nicolas Piche; Mike Marsh; Roberto J. Fajardo; Ellen E. Quillen; Karl J. Jepsen; Todd L. Bredbenner	Paper No. 207 <b>Sustained Activation of Canonical NF-KappaB in Myofibroblasts: A Potential Driver of Fibrotic Healing</b> Katherine Best; Hani Awad; Alayna Loiselle
4:50 PM	Paper No. 187 <b>Tibial Tuberosity Anteromedialization vs. MPFL Reconstruction for Treatment of Patellar Instability Related to Malalignment: Computational Simulation</b> Miho J. Tanaka; Andrew J. Cosgarea; Kerwyn C. Jones; John J. Elias	Paper No. 193 <b>Mechanical Activation of Piezo Ion Channels in Chondrocytes</b> Alireza Savadipour; Robert J. Nims; Neda Rashidi; Farshid Guilak	Paper No. 196 <b>Epigenetic Regulation of Bone Regeneration in Inflammation Disease</b> Jun Ying; Taotao Xu; Cuicui Wang; Regis O'Keefe; Yousef Abu-Amer; Jie Shen	Paper No. 202 <b>Is CT Necessary for Producing a Fully-Automatic 3D Scapular Shape Model? Combining Deep Learning and High-Resolution MRI to Visualize Scapular Bony Morphology</b> Victoria Wong; Francesco Caliva; Roland Krug; Valentina Pedoia; Drew A. Lansdown	Paper No. 208 <b>Hedgehog Signaling Regulates Tunnel Integration Following ACL Reconstruction</b> Timur B. Kamaliddinov; Keitaro Fujino; Xi Jiang; Andrew F. Kuntz; Miltiadis H. Zgonis; Nathaniel A. Dymant

## 5:15 PM–6:15 PM

Room: West 301 A

### Guest Speaker AAOS President, AAOS Kappa Delta & OREF Paper Presentations



AAOS President  
Kristy Weber, MD



*Kappa Delta Young Investigator Award*  
Alice Huang, PhD  
Cell and molecular mechanisms of tendon development, regeneration, and scar formation



*Kappa Delta Ann Doner Vaughn Award*  
Marc Swiontkowski, MD  
Finding Answers to the “Unsolved Fracture”: A 10-year journey—The Rationale, Design, and Execution of the Fixation Alternatives in the Treatment of Hip Fractures



*Kappa Delta Elizabeth Winston Lanier Award*  
Carl Deirmengian, MD  
The Discovery, Development, Characterization, and FDA Clearance of the Alpha-Defensin Test for Periprosthetic Joint Infection



*OREF Clinical Research Award*  
Braden C. Fleming, PhD  
Long-term Outcomes of ACL Reconstruction Surgery

## 6:30 PM–8:30 PM

Room: North 226

### Research Interest Group: Foot & Ankle

#### Organizers:

*L. Daniel Latt, MD, PhD, University of Arizona*  
*William Ledoux, PhD, VA Puget Sound*  
*Bart Lubberts, MD, PhD, Massachusetts General Hospital*  
*E. Meade Spratley, PhD, University of Virginia*

With support from Paragon 28

Foot and ankle surgery is one of the newest and fastest growing areas of orthopaedic surgery. Relatively little is known about the foot in comparison to anatomic regions that have long been the subject of orthopedic research. Foundational (basic science) research in foot and ankle surgery will need to expand rapidly to keep pace with the clinical practice and applied research.

The Foot and Ankle RIG will advance the science underpinning foot and ankle care by promoting communication and fostering collaborations among individuals interested in foot and ankle science.

## 6:30 PM–8:00 PM

Room: North 227

### Research Interest Group: Bridging Disciplines to Find Solutions for Osteoarthritis (OA)

#### Organizers:

*Tim M. Griffin, PhD, Oklahoma Medical Research Foundation*  
*Tom Andriacchi, PhD, Stanford University*  
*Richard Loeser, MD, University of North Carolina*  
*Rachel Miller, PhD, Rush University*

Interdisciplinary approaches are needed to address OA as a complex heterogeneous disease involving multiple organ systems and connective tissues that interact through elements of biology, mechanics and tissue structure. This complexity poses substantial challenges for developing safe and effective solutions to treat and prevent OA, which is now considered a serious disease (OARSI White Paper, 2016).

The goal of this program is to leverage the interdisciplinary strengths of the ORS and OARSI to stimulate and propose new strategic scientific approaches and patient-centric recommendations that exist at the interface between disciplines to address OA. The discussion theme this year will focus on OA pain mechanisms, phenotypes, and treatments under an interdisciplinary format that integrates elements of mechanics, biology and tissue structure. The presentations and discussion will focus on translation of basic science research to clinically relevant patient-focused outcomes.

**6:30 PM – 8:30 PM**

Room: North 229

**Research Interest Group: F.A.I.R.ness and Credibility in Computational Biomechanics**

*Organizers: Ahmet Erdemir, PhD, Cleveland Clinic  
Carl Imhauser, PhD, Hospital for Special Surgery*

Simulation is a highly effective tool in orthopaedic research and naturally it has been adapted increasingly in the biomechanics community. There is a large variety of resources (data, software, models and workflows) to leverage computational modeling in scientific studies. However, the need to ensure these resources are F.A.I.R. (findable, accessible, interoperable, reproducible) is pressing. Similarly, procedures to establish and communicate credibility of computational models and simulations are fragmented. The goal is to establish a platform where computational biomechanics enthusiasts can organize, communicate, share resources and experiences, and promote effective and appropriate use of simulation for scientific discovery and healthcare. A brief presentation will summarize the main concepts and current landscape followed by a panel discussion with panelists across the spectrum of academic generations, from students to established investigators.

**7:00 PM–9:00 PM**

Bitter & Twisted

**ORS 7th Annual Awards Celebration**

Join us as we honor and celebrate our distinguished 2020 award recipients! The evening will begin with a cocktail reception, followed by dinner and dessert.

Registration required.



**The International Combined Orthopaedic Research Societies (ICORS)**

is an alliance of societies dedicated to enhancing international collaborations to promote basic, translational and clinical musculoskeletal research worldwide.


**Constituent Members:**

Asean Orthopaedic Research Society  
Australia / New Zealand Orthopaedic Research Society  
British Orthopaedic Research Society  
Canadian Orthopaedic Research Society  
Chinese Orthopaedic Research Society  
European Orthopaedic Research Society  
Japanese Orthopaedic Association  
Korean Orthopaedic Research Society  
Orthopaedic Research Society  
Taiwanese Orthopaedic Research Society

**Scientific Associate Members:**

AO Foundation  
International Chinese  
Musculoskeletal Research Society

8:00 AM–9:00 AM Scientific Sessions

Time	Podium Session 36 Knee—Reconstruction and Gait Moderators: Cathy Carlson, DVM, PhD and Peter Lee, PhD	Spotlight Session 37 Human Induced Pluripotent Stem Cells for OA Treatment and Cartilage Regeneration Moderators: Nehal Abu-Lail, PhD and Brian Johnstone, PhD	Podium Session 38 Mechanical, Molecular and Genetic Determinants of Bone Growth and Quality Moderators: David Burr, PhD and Esther Wehrle, DVM, PhD	Podium Session 39 Late Breaking Moderators: Dianne Little, DVM, PhD and Ryan Willing, PhD	Podium Session 40 Spine—Diagnostics and Interventions Moderators: William Anderst, PhD and Erin Mannen, PhD
Room	West 301 A	West 301 BC	West 301 D	North 221	North 222
8:00 AM	Paper No. 209 <b>Depth Camera Measured Biomechanics of The Lower Extremity Reveal Movement Abnormalities in ACL Reconstructed Patients</b> Alex Ngan; Chantal Nguyen; Drew Lansdown; Patrick Curran; Benjamin Ma; Jeffrey Lotz; Brian Feeley	<b>SPOTLIGHT SPEAKER</b>   <b>John Bateman, PhD Modeling Cartilage Development and Disease Using Human Induced Pluripotent Stem Cells</b>	Paper No. 218 <b>The Role Of PGE2/EP2/4 Signaling Pathways in the Heterotopic Bone Formation of Muscular Dystrophic Mice</b> Xueqin Gao; Yan Cui; Greg Zhang; Johnny Huard	<b>See Next Page For Late Breaking Session</b>	Paper No. 224 <b>Rib-Hook Construct for Pediatric Hyperkyphosis and Kyphoscoliosis</b> Daniel Bonthius; Richard Gross; Yongren Wu; Mohammed Alshareef; Hai Yao
8:10 AM	Paper No. 210 <b>Alterations in Gait And Knee Joint Alignment Substantiate New PTOA Rodent Model of ACL Injury</b> McKenzie S. White; Steven M. Davi; Ross J. Brancati; Lindsey K. Lepley		Paper No. 219 <b>How Muscle Contractions Shape Embryonic Bones: A Phase-Contrast Enhanced Synchrotron X-Ray Tomography Study</b> Maria Pierantoni; Sophie Le Cann; Vivien Sotiriou; Andrew J. Bodey; Niamh Nowlan; Hanna Isaksson		Paper No. 225 <b>Spine Growth Modulation Compared to Observation and Bracing in Early Adolescent Idiopathic Scoliosis</b> Donita I. Bylski-Austrow
8:20 AM	Paper No. 211 <b>Kinematic Evaluation of Isolated and Combined Medial Patellofemoral and Patellofemoral Ligament Reconstruction to Address Lateral Patellar Instability</b> Alex W. Brady; Jeffrey Grantham; Zachary S. Aman; Samuel L. Rosenberg; Travis L. Turnbull; Hunter W. Storaci; Grant J. Dornan; Robert F. Laprade		Paper No. 220 <b>Enrichment for Genetic Predictors of Bone Quality Using Unbiased Analysis of Mouse Transcriptome and Human Genome-Wide Association Study</b> Serra Kaya; Neha S. Dole; Daniel S. Evans; Tamara Alliston		Paper No. 226 <b>In Vivo Evaluation of Disc Morphology: Healthy Controls &amp; Adolescent Idiopathic Scoliosis Before and After Corrective Spinal Fusion Surgery</b> Mary H. Foltz; Nitali Arora; Matthew MacEwen; Craig C. Kage; Kaitlyn M. Boelter; Taycia L. Brandon; Casey P. Johnson; Dan Miller; Tenner Guillaume; Walter Truong; David W. Polly; Arin M. Ellingson
8:30 AM	Paper No. 212 <b>Effects of Valgus Correction for Medial Osteoarthritis of the Knee On Knee Kinetics After Medial Open Wedge High Tibial Osteotomy: In Vivo Biomechanical Study Using Three- Dimensional Gait Analysis</b> Koji Iwasaki; Yasumitsu Ohkoshi; Tomohiro Onodera; Kou Suzuki; Takahiro Inoue; Kengo Ukishiro; Shigeyuki Sakurai; Keiji Omori; Kouta Miura; Kensaku Kawakami; Shoji Suzuki; Takumi Ino; Tatsunori Maeda; Eiji Kondo; Norimasa Iwasaki	Paper No. 215 <b>Single Cell Transcriptomic Analysis of Human Pluripotent Stem Cell Chondrogenesis</b> Chia-Lung Wu; Amanda Dicks; Nancy Steward; Ruhang Tang; Dakota B. Katz; Yun-Rak Choi; Farshid Guilak	Paper No. 221 <b>Transcriptional Response to Mechanical Load of Adults is Greater than Young Animals in a Tissue- Specific Manner</b> Carolyn Chlebek; F. Patrick Ross; Marjolien CH van der Meulen		Paper No. 227 <b>Finite Element Simulation of Scoliosis Correction with Vertebral Body Tethering and Growth</b> Christian R. D'Andrea; Girish Viraraghavan; Sriram Balasubramanian
8:40 AM	Paper No. 213 <b>Can Differential Analysis Of Knee Moments Improve Our Understanding Of Distinct Patterns Of Cartilage Loss?</b> Nicholas M. Brisson; Alison N. Agres; Adam G. Culvenor; Wolfgang Wirth; Felix Eckstein; Georg N. Duda	Paper No. 216 <b>Distinct Lineages Derived Chondrocytes from Human Peripheral Blood Induced Pluripotent Stem Cells for Hyaline Cartilage Regeneration</b> Ming-Song Lee; Brian Walczak; HongLi Jiao; Hui-Ching Huang; Wan-Ju Li	Paper No. 222 <b>The Anabolic Response to Loading In Mlo-y4 Cells is Suppressed by Neighboring Senescent Cells and Their Senescence-Associated Secretory Phenotype</b> Joseph Gardinier; Conor Daly-Seiler; Chunbin Zhang		Paper No. 228 <b>Exploring a Composite Model to Predict Curveseverity of Adolescent Idiopathic Scoliosis (ais)—A 6 Year Longitudinal Study</b> Wayne YW Lee; Jiajun Zhang; Kayee Cheuk; Yujia Wang; Ka-lo Cheng; Tsz-ping Lam; Alec LH Hung; Yong Qiu; Jack CY Cheng
8:50 AM	Paper No. 214 <b>Developing a Functional Imaging Method for Pharmacologically Characterizing Intra-Articular Sensory Neurons</b> Dongjun Ren; Richard J. Miller; Anne- Marie Malfait; Rachel Miller	Paper No. 217 <b>Osteochondral Tissue Chip Derived from Human iPSCs: Modeling OA Pathologies and Testing Drugs</b> Zixuan Lin; Zhong Li; Eileen N. Li; Tingjun Hao; Colin J. Del Duke; He Shen; Rocky Sung Chi Tuan; Hang Lin	Paper No. 223 <b>Alternative Methylphenidate Dosing Paradigms Differentially Alter Male Rat Femoral Microstructure and Biomechanics</b> William D. Nunn; Alexander A. Chirokikh; Sardar MZ Uddin; Michael Hadjiargyrou; Panayotis K. Thanos; David E. Komatsu		Paper No. 229 <b>Pelvic Compensation Accompanying Spinal Malalignment and Back Pain Related Factors in General Population</b> Shizumasa Murata; Hiroshi Hashizume; Syunji Tsutsui; Hiroyuki Oka; Masatoshi Teraguchi; Yuyu Ishimoto; Keiji Nagata; Motohiro Okada; Masanari Takami; Hiroshi Iwasaki; Akihito Minamide; Yukihiro Nakagawa; Yasutsugu Yukawa; Noriko Yoshimura; Munehito Yoshida; Hiroshi Yamada

8:00 AM–9:00 AM Scientific Sessions

Room: North 221

### Session 39

#### Late Breaking Podiums

**Moderators:** Dianne Little, DVM, PhD and Ryan Willing, PhD

**8:00 AM**

**Paper No. 2291**

Runx1 Overexpression in Osteoclast Precursors Leads to a Sexual Dimorphic Effect on Bone  
Giovanni Mella; Christopher W. Kinter; Martha Elena Diaz-Hernandez; Shana R. Watson; Jarred Kaiser; Joseph L. Roberts; Hicham Drissi

**8:06 AM**

**Paper No. 2292**

Single Dose of Anti-hmgb-1 Neutralizing Antibody Ameliorates Dysregulated Inflammation and Improves Fracture Healing in a Polytrauma Rat & Lt Rattus Norvegicus & Gt Model  
Preeti J. Muire; Joshua J. Avila; Lauren H. Mangum; Alicia L. Lofgren; Joseph C. Wenke

**8:12 AM**

**Paper No. 2293**

Biomaterial Fortification of Degenerate Cartilage Modulates Chondrocyte Mechanotransduction  
Kamiel S. Saleh; Jay M. Patel; Daphney R. Chery; Edward D. Bonnevie; Lin Han; Robert Mauck

**8:18 AM**

**Paper No. 2294**

Repairing the Capsule During Anterior Approach THR Improves Dislocation Resistance  
Brittany Marshall; Dan Huff; Chadd Clary; J Bohannon Mason

**8:24 AM**

**Paper No. 2295**

Automated Identification of Hip Implants from Postoperative X-Rays Using Machine Learning  
Aly A. Valliani; John T. Schwartz; Varun Arvind; Deepak Kaji; Brian H. Cho; Eric Geng; Michael Chang; Michael Gao; Eric K. Oermann; Jonathan Robinson; Jun S. Kim; Samuel K. Cho

**8:30 AM**

**Paper No. 2296**

Cationic Contrast Agents for Computed Tomography of Cartilage for Early OA Diagnosis  
Ambika G. Bajpayee; Chenzhen Zhang; Armin Vedadghavami; Julia F. Charles

**8:36 AM**

**Paper No. 2297**

Bilateral Femoral Cartilage T2 Asymmetry Detects Changes as Early as 3-Months Following ACL-Injury Surgery  
Marianne S. Black; Kate Young; Akshay Chaudhari; Feliks Kogan; Bragi Sveinsson; Emily J. McWalter; Garry E. Gold; Marc E. Levenston; Brian A. Hargreaves

**8:42 AM**

**Paper No. 2298**

Does PCL Reconstruction Result in Long-term Side-to-Side Differences in Lower Limb Biomechanics During Stair Navigation and Squatting?  
Alison N. Agres; Nicholas M. Brisson; Leonie A. KrahI; Tobias Jung; Georg N. Duda

**8:48 AM**

**Paper No. 2299**

Morphological Assessment of the Trochlear Groove with Respect to Ldfa, Gender, and Ethnicity: A Ct-analysis of 1,096 Femora  
Ilya Borukhov; Sally LiArno; Emily Sneddon; Tom McCarthy; Peter McEwen

**8:54 AM**

**Paper No. 2300**

Augmentation of Rotator Cuff Repair via Systemic Stem Cell Mobilization Therapy Combined with Local Chemokine Delivery  
Michael Newton; Mackenzie Fleischer; Samantha Hartner; Lisa Galasso; Mariam Alsaleh; Leonardo Cavinatto; Eksimar Singh; Lindsey Lammlin; Kevin Weisz; Tammy Luan; Tristan Maerz; Answorth Allen; Asheesh Bedi; Sara Rankin; Kevin Baker



## 9:15 AM – 10:15 AM

Room: West 301 A

### Plenary Session: Collaboration Award Presentations

2020 JOR Manuscript Awards

*The Journal of Orthopaedic® Research* Excellence in Basic Science Award

Initial cell plating density affects properties of human primary synovial mesenchymal stem cells  
Kaori Nakamura, Kunikazu Tsuji, Mitsuru Mizuno, Hideyuki Koga, Takeshi Muneta, Ichiro Sekiya

*The Journal of Orthopaedic Research®* Excellence in Clinical Science Award

Large variations in clinical antibiotic activity against *Staphylococcus aureus* biofilms of periprosthetic joint infection isolates  
Jonathan B. Mandell, Sara Orr, John Koch, Blake Nourie, Dongzhu Ma, Daniel D. Bonar, Neel Shah, Kenneth L. Urish

*The Journal of Orthopaedic Research®* Excellence in Translational Science Award

VEGF with AMD3100 endogenously mobilizes mesenchymal stem cells and improves fracture healing  
Richard Meeson, Anita Sanghani-Keri, Melanie Coathup, Gordon Blunn

*The Journal of Orthopaedic Research®* Early Career Award  
Jillian Beveridge, PhD

Cartilage Damage is Related to ACL Stiffness in a Porcine Model of ACL Repair  
Co-authors: Benedikt L. Proffen, Naga Padmini Karamchedu, Kaitlyn E. Chin, Jakob T. Sieker, Gary J. Badger, Ata M. Kiapour, Martha M. Murray, Braden C. Fleming

*JOR Spine* Early Career Award

Grace D. O'Connell, PhD  
Radial variation in biochemical composition of the bovine caudal intervertebral disc  
Co-authors: Semih E. Bezci, Benjamin Werbner, Minhao Zhou, Katerina G. Malollari, Gabriel Dorlhiac, Carlo Carraro, Aaron Streets

William H. Harris, MD Award  
Divya Rani Bijukumar, PhD

# stryker

Stryker / ORS Women's Research Fellowship



Stephanie G. Cone, PhD  
University of Wisconsin

Direct Measurement of Tendon Loading Following Pediatric and Adolescent ACL Reconstructions



Orthoregeneration  
Network

ON Foundation / ORS Kick-Starter Grant Recipients

Nina Tang, BS, The Ohio State University  
Developmental Transcription Factors for Reprogramming of Diseased Intervertebral Disc Cells

Jay Patel, PhD, University of Pennsylvania  
The Mechanobiology Behind Composite Scaffolds

ORS / ON Foundation Orthoregeneration Award Recipient



ON Foundation Keynote Speaker  
Gordana Vunjak-Novakovic, PhD  
*Engineering Human Tissues to Cure Disease and Live Longer*

## 10:15 AM – 11:15 AM

Exhibit & Poster Hall (North Hall A–C)

### Poster Session 2 Poster Viewing

(Authors required at EVEN numbered posters)

## 10:25 AM – 11:05 AM

Exhibit & Poster Hall (North Hall A–C)

### Moderated Poster Presentations

#### Moderated Poster Session 9

##### Knee 2

Moderator: Joshua Roth, PhD  
Innovation Theater, Exhibit & Poster Hall (North A–C)

##### 10:25 AM

##### Poster No. 453

Longitudinal Assessment Of Serum And Urine Biomarkers In Patients Following Osteochondral Allograft Transplantation In The Knee  
John R. Baumann; Aaron M. Stoker; Emily V. Leary; James P. Stannard; James L. Cook

##### 10:29 AM

##### Poster No. 455

Modulatory Role Of Fpr1 In Macrophage Activities And Experimental Osteoarthritis Of Mouse Knee Joints  
Xinlin Yang; Yilun Pei; Wanan Xiao; Rui He; Mahendra Chordia; Xisha Wang; Dongfeng Pan; Qianjun Cui

##### 10:33 AM

##### Poster No. 456

A 22-year Follow Up Study Of The Factor Related To The Onset Of Osteoarthritis Of The Knee And Sagittal Alignment Of spine Related To The Progression Of Osteoarthritis Of The Knee  
Keisuke Matsukura; Satomi Abe; Yusuke Sasaki; Mutsuya Shimizu; Tetsuya Kobayashi; Hiroshi Ito

##### 10:37 AM

##### Poster No. 459

Loss Of Knee Extension Range Of Motion Following An ACL Tear Impacts Knee Mechanics And Quadriceps Strength  
Brian Noehren; Kylie Davis; Lauren Erikson; Kathryn Lucas; Darren Johnson; Cale Jacobs

MONDAY

## MONDAY, FEBRUARY 10 (continued)

10:41 AM

Poster No. 460

Immune And Fibrotic Responses In Lymph Nodes And Joint Tissues After Tibial Implant Insertion In A Murine Model  
YunWei Xia; Upneet K. Sokhi; Tania Pannellini; YingZhen Niu; Kathleen Turajane; Branden Sosa; David J. Oliver; Mathias P. G. Bostrom; Xu Yang; Lionel B. Ivashkiv

10:45 AM

Poster No. 461

Association Of Canine Copy Number Variation With Anterior Cruciate Ligament Rupture  
Emily E. Binversie; Corinne D. Engelman; Zhengling Hao; John J. Moran; Alexander M. Piazza; Susannah J. Sample; Lauren A. Baker; Peter Muir

10:49 AM

Poster No. 464

Can Isolated Tibial Insert Exchange For The Idiopathic Stiff Total Knee Arthroplasty Provide Satisfactory Functional Outcome And Survivorship?  
Liang Xiong; Jonathan Yin; Wenhao Chen; Christian Klemt; Janna van den Kieboom; Venkatsaikhil Tirumala; Paul Walker; Ruben Oganessian; Young-Min Kwon

10:53 AM

Poster No. 470

Functional Genomics Identified Changes In The Biologic Activity And Composition Of Platelet-rich-plasma, And Correlation With Outcomes In Patients With Knee Osteoarthritis  
Bijan Dehghani; Habib Zahir; Xiaoning Yuan; Christine Kim; Reyna Bhandhari; Daniel Nemirov; Patrick Fava; Yurii Chinenov; Joseph Nguyen; Laura Donlin; Brian Halpern; Scott Rodeo; Miguel Otero

10:57 AM

Poster No. 471

Understanding Persistent Neuromuscular Deficits After Total Knee Arthroplasty  
Janie L. Astephen Wilson; Renata Kirkwood

11:01 AM

Poster No. 472

The Cumulative Effect Of Depression And Substance Abuse On Postoperative Complications After Primary Total Knee Arthroplasty  
Luke J. Garbarino; Peter A. Gold; Hiba K. Anis; Nipun Sodhi; Eric Neufeld; Jonathan Danoff; Sreevathsa Boraiah; Vijay J. Rasquinha; Michael A. Mont

### Moderated Poster Session 10

#### Bone and Hip

Moderator: Safeer Siddicky, PhD

Moderated Poster Theater 1 (North Hall A–C)

10:25 AM

Poster No. 430

High-cycle Fatigue Life Of Cortical Bone Is Radiation Dose-dependent  
Jason Ina; Ajit Vakharia; Ozan Akkus; Clare Rimnac

10:29 AM

Poster No. 431

Patient-specific Finite Element Computer Models Improve Fracture Risk Predictions In Cancer Patients With Femoral Bone Metastases Compared To Clinical Guidelines  
Florieke Eggermont; Gerco van der Wal; Paulien Westhoff; Arjonne Laar; Marianne de Jong; Tom Rozema; Herman Kroon; Onarisa Ayu; Loes Derikx; Sander Dijkstra; Nico Verdonchot; Yvette van der Linden; Esther Tanck

10:33 AM

Poster No. 432

Bone Quality Deterioration Induced By Type 1 And Type 2 Diabetes Mellitus: A Preliminary Study On Bone Mineralization And Mechanical Characterizations  
Bowen Wang; Matthew J.L. Tice; Robert R. Recker; Mishaela R. Rubin; Deepak Vashishth

10:37 AM

Poster No. 433

Trabecular-Cortical Interface Surface Area Metric (iSAM) Measured From Clinical HR-pQCT Scans Correlates Strongly With Experimentally-Determined Whole Bone Segment Stiffness  
Samuel T. Robinson; Bin Zhou; X. Edward Guo

10:41 AM

Poster No. 473

How Can Patients With Optimal Cup Orientation In The Coronal Plane But Functional Malalignment In The Sagittal Plane Be Identified Prior To Total Hip Arthroplasty—A Prospective Diagnostic Cohort Study  
Moritz M. Innmann; Christian Merle; Paul E. Beaulé; George Grammatopoulos

10:45 AM

Poster No. 474

Non-invasive, Non-radiographic Technique For Detecting Micro-motion In Total Joint Replacement Loosening  
Muhammad Moid Khalid Khan; Subodh Deshmukh; Kanthan Theivendran; Laura J. Leslie; Sarah Junaid

10:49 AM

Poster No. 477

Transchondral Strain In The Human Hip During Static And Dynamic Loading  
Jocelyn Todd; Jeffrey Weiss; Travis Maak; Alexandra Allan

10:53 AM

Poster No. 478

Simulation Of Hip Range Of Motion And Investigation Of Resection Slopes For Symptomatic Femoroacetabular Impingement  
Daniel Pfeiffer; Shane J. Nho; Floor M. Lambers

10:57 AM

Poster No. 484

Impact Of Femoral Stem Design On Implant Migration, Patient Activity, And Patient Function In Direct Anterior Approach Total Hip Arthroplasty  
Matthew G. Teeter; Maxwell Perelgut; Jennifer Polus; Brent A. Lanting

11:01 AM

Poster No. 485

How Do Cup Inclination And Anteversion In The Coronal Plane Relate To Ante-inclination In The Sagittal Plane After Total Hip Arthroplasty—A Prospective Diagnostic Cohort Study  
Moritz M. Innmann; Christian Merle; Paul E. Beaulé; Harinderjit S. Gill; George Grammatopoulos

## Moderated Poster Session 11

### Tendon and Ligament

Moderator: Susmitha Durgam, PhD

Moderated Poster Theater 2 (North Hall A–C)

#### 10:25 AM **Poster No. 396**

Proresolving Mediators LXB4 And RvE1 Regulate Inflammation In Stromal Cells From Patients With Shoulder Tendon Tears  
Stephanie G. Dakin; Romain A. Colas; Kim Wheway; Bridget Watkins; Louise Appleton; Jonathan Rees; Stephen Gwilym; Christopher Little; Jesmond Dalli; Andrew J. Carr

#### 10:29 AM **Poster No. 397**

Tendon Inflammatory Responses Are Altered With Age In An In Vitro Rotator Cuff Model Of Secondary Joint Damage  
Brienne Connizzo; Alan Grodzinsky

#### 10:33 AM **Poster No. 398**

Non-enzymatic Glycations In Type I Collagen Are Highly Site-specific In Aging Tendons  
David M. Hudson; Marilyn Archer; David Eyre

#### 10:37 AM **Poster No. 399**

Smad4 Conditional Deletion In Mouse Using Scleraxis-cre Causes Postnatal Limb Contracture  
Saundra Schlesinger; Seongkyung Seo; Brian A. Pryce; Alice H. Huang; Ronen Schweitzer

#### 10:41 AM **Poster No. 400**

A Canonical To Non-canonical Wnt Signalling Switch Regulates Tendon Stem / progenitor Cells Senescence And Rejuvenation  
Minhao Chen; Yingjuan Li; Peng Geng; Guangchun Dai; Panpan Lu; Yunfeng Rui

#### 10:45 AM **Poster No. 401**

Global Knockout Of Fgf9 Results In Enlarged Bone Ridges And Differential Gene Expression In Muscle But Not Bone  
Connor Leek; Ryan C. Locke; Iman Bhattacharya; David M. Ornitz; Megan L. Killian

#### 10:49 AM **Poster No. 402**

Exosome Educated Macrophages Improve Ligament Healing  
Connie S. Chamberlain; Linzie A. Wildenauer; Maxwell McCaughey; John A. Kink; Peiman Hematti; Ray Vanderby

#### 10:53 AM **Poster No. 405**

Evaluation Of Sex Differences In Rodent Anterior Cruciate Ligament Injury And Recovery  
Yake Liu; Scott Rodeo; Xiang-Hua Deng; Zhe Song; Xueying Zhang; Wada Susumu; Camila Carballo; Ellen Casey

#### 10:57 AM **Poster No. 406**

Deformation Behavior On The Native And Reconstructed Acls In Response To External Knee Loading Is Different  
Satoshi Yamakawa; Tomoyuki Suzuki; Volker Musahl; Richard E. Debski; Hiromichi Fujie

#### 11:01 AM **Poster No. 407**

Structural And Cellular Responses Of Supraspinatus Tendon Enthesis And Subchondral Bone To Pregnancy, Lactation, And Post-Weaning Recovery  
Yilu Zhou; Yihan Li; Zachary Davis; Wenzheng Wang; Ashley K. Fung; Snehal S. Shetye; Xi Jiang; Andrew F. Kuntz; Nathaniel Dymant; Louis J. Soslowsky; X. Sherry Liu

**11:15 AM–12:15 PM Scientific Sessions**

Time	Podium Session 41 Hip – Biomechanics and Outcomes Moderators: Deborah I. Hall, BS and Yaxia Zhang, MD, PhD	Podium Session 42 Biomaterials for Soft Tissues Moderators: Michel Assad, PhD and Michael McClure, PhD	Podium Session 43 Bone – Development and Aging Moderators: Treena Arinze, PhD and Colleen Wu, PhD	Podium Session 44 MRI of Osteoarthritis Moderators: Nancy Pleshko, PhD and David Reiter, PhD	Podium Session 45 Spinal Pain Moderators: Sarah Gullbrand, PhD and Grace O'Connell, PhD
Room	West 301 A	West 301 BC	West 301 D	North 221	North 222
11:15 AM	Paper No. 230 <b>How do Patient Reported Outcomes Correlate to Acetabular Coverage After Periacetabular Osteomy?</b> Mazen M. Ibrahim; Johanna Dobransky; Lilly Jean-Pierre; Stéphane Poitras; Paul E. Beaulé	Paper No. 236 <b>Bioadhesive Optimization and Cytocompatibility Assessment of a Novel Two-Part Strategy for Annular Repair</b> Tyler J. DiStefano; Jennifer O. Shmukler; Warren W. Hom; Theodor Di Pauli von Treuheim; David A. Goldberg; Steven B. Nicoll; Andrew C. Hecht; James C. Iatridis	Paper No. 242 <b>Slc1a5 Mediates Wnt Induced Osteoblast Differentiation by Providing Glutamine for De Novo Amino Acid Synthesis.</b> Deepika Sharma; Leyao Shen; Yilin Yu; Guo-Fang Zhang; Courtney M. Karner	<b>SPOTLIGHT SPEAKER</b>  <b>Constance Chu, MD</b> <b>Visualizing Pre-Osteoarthritis: Integrating MRI UTE-T2* with Mechanics and Biology to Combat Post-Traumatic Osteoarthritis</b>	Paper No. 251 <b>Progranulin Deficiency Exacerbates Spinal Cord Injury by Promoting Neuroinflammation and Macrophage Polarization</b> Jean De La Croix Ndong
11:25 AM	Paper No. 231 <b>Three-Dimensional Joint Congruity Evaluation of the Borderline Hip Dysplasia: Zonal Curvature Mismatch</b> Tohru Irie; Alejandro A. Espinoza Orias; Tomoyo Y. Irie; Shane J. Nho; Daisuke Takahashi; Norimasa Iwasaki; Nozomu Inoue	Paper No. 237 <b>Biomimetic Proteoglycans Molecularly Engineer and Modulate the Micromechanics of Cartilage Pericellular Matrix</b> Elizabeth R. Kahle; Biao Han; Prashant Chandrasekaran; Chao Wang; Evan R. Phillips; Katsiaryna Prudnikova; Michele S. Marcolongo; Lin Han	Paper No. 243 <b>Yap and Taz Coordinate Endochondral Bone Development</b> Joseph M. Collins; Nathaniel Dymont; Joel D. Boerckel		Paper No. 252 <b>Abolishing Pain &amp; Neuronal Hyperexcitability with Non-Opioid Anti-inflammatory Spinal Inhibition After Painful Radiculopathy</b> Sonia Kartha; Julia Quindlen-Hotek; Beth A. Winkelstein
11:35 AM	Paper No. 232 <b>Biomechanical Evaluation of Hip Microinstability Caused by Capsular and Labral Insufficiency Using a 6 Degrees of Freedom Robotic System: A Cadaveric Study</b> Alex W. Brady; Hajime Utsunomiya; Joseph J. Krob; Samuel I. Rosenberg; Bryson R. Kemler; Grant J. Dorman; Carly A. Lockard; Marc J. Philippon	Paper No. 238 <b>A New Cell-Free Biodegradable Synthetic Artificial Ligament for the Reconstruction of Anterior Cruciate Ligament (ACL) in a Rat Model</b> Yohei Kawakami; Kazuhiro Nonaka; Naomasa Fukase; Antonio D'Amore; James Cummins; Ryosuke Kuroda; William Wagner; Johnny Huard	Paper No. 244 <b>Does Lack of Muscle Lead to Abnormal Crystal Growth During Murine Long Bone Development?</b> Isabella Silva Barreto; Sophie Le Cann; Marianne Liebi; Vivien Sotiriou; Mikael J. Turunen; Tilman A. Grünewald; Niamh Nowlan; Hanna Isaksson		Paper No. 253 <b>Downregulation of Circulating Mir-155 Predicts Progression of Disc Degeneration and Also Correlates with Increased Leg Pain</b> Srikanth N. Divi; Dessislava Z. Markova; Alan S. Hilibrand; Alexander R. Vaccaro; D. Greg Anderson; Gregory D. Schroeder; Christopher K. Kepler
11:45 AM	Paper No. 233 <b>Effects of Periacetabular Osteotomy on In-Vivo Loading at the Edge of Dysplastic Acetabula During Gait</b> Ke Song; John C. Clohisey; Michael D. Harris	Paper No. 239 <b>Biomaterial Template To Enhance Tendon-to-bone Enthesis Regeneration</b> Raul Sun Han Chang; Johnny Ching-Wei Lee; Simon Rogers; Brendan Harley	Paper No. 245 <b>Single-Cell Rna Seq During Appendage Regeneration Reveals Distinct Osteoblast Progenitor Cells</b> W. Joyce Tang; Claire J. Watson; Christopher H. Allan; Ronald Y. Kwon	Paper No. 248 <b>Topographical Multi-Resolution Correlative Imaging Study of Osteoarthritic Cartilage</b> Farid Badar; Yang Xia	Paper No. 254 <b>Trimetallic Nitride Endohedral Fullerenes M3N@C80 A New Therapeutic Class for Low Back/Leg Pain</b> Li Xiao; Rong Huang; Nurul Sulimai; Francis H. Shen; Li Jin; Harry C. Dorn; Xudong Li
11:55 AM	Paper No. 234 <b>Arthroscopic Repair Compared to Physical Therapy for Symptomatic Acetabular Labral Tears in Patients Age 40 and Over: A Randomized Controlled Trial</b> Paul Fawzi Abraham; Nathan H. Varady; Jada S. Gibbs; Mark R. Nazal; William K. Conaway; Noah J. Quinlan; Stephen M. Gillinov; Shivam Upadhyaya; Kyle Alpaugh; Scott D. Martin	Paper No. 240 <b>Synthetic Cell Signaling Networks that Engage Biomaterials Via Engineered Communication Channels for Programmable Tissue Regeneration</b> Jonathan M. Brunger; Satoshi Toda; Wendell A. Lim	Paper No. 246 <b>The Role of Cells Senescence in the Development of Muscle and Bone Phenotype in Muscular Dystrophy</b> Xueqin Gao; Xiaodong Mu; Yan Cui; Johnny Huard	Paper No. 249 <b>Quantitative T1ρ And T2 Mapping are Sensitive in Detecting Early Ischemic Injury to the Femoral Head in an In Vivo Piglet Model at Clinical 3T MRI</b> Casey P. Johnson; Ferenc Toth; Alexandra R. Armstrong; Harry K. W. Kim; Jutta M. Ellermann	Paper No. 255 <b>Objective Assessment of Neck Disability and Pain for Head and Neck Cancer Patients</b> Kevin Bell; Michelle Riffitts; Sebastian Murati; Tina Harrison; Gwendolyn Sowa; Jonas Johnson; Marci Nilsen
12:05 PM	Paper No. 235 <b>Functional Variant In the GDF5 Locus Lead to Developmental Dysplasia of the Hip and Increased Risk of Hip OA</b> Ata M. Kiapour; Pushpanathan Muthurulan; Jiaxue Cao; Shayan Hosseinzadeh; David E. Maridas; Vicki Rosen; Terence D. Capellini	Paper No. 241 <b>Development of Bilayered Composite Collagen and Polymer Scaffolds for Osteochondral Tissue Regeneration Using a Combination of 3D Printing and Freeze Drying</b> Mark Lemoine; John M. O'Byrne; Daniel J. Kelly; Fergal J. O'Brien	Paper No. 247 <b>Site-1 Protease Ablation in the Osterix-lineage Results in Bone Marrow Dysplasia with Neutrophilia Coupled to Osteopenia</b> Debabrata Patra; Joongho Kim; Qiang Zhang; Eric Tycksen; Linda J. Sandell	Paper No. 250 <b>Voxel-Based Relaxometry of Knee Articular Cartilage T1rho And T2 Relaxation in Collegiate Basketball Players: a Multicenter Study</b> Kenneth T. Gao; Valentina Padoia; Katherine A. Young; Matthew F. Koff; Garry E. Gold; Hollis G. Potter; Sharmila Majumdar	Paper No. 256 <b>Relationship Between Lumbar Instability and Low Back Pain: A Prospective Study with 189 Volunteers</b> Manabu Suzuki; Yasuhisa Tanaka; Ko Hashimoto; Toshimi Aizawa; Eiji Itoi

### 12:15 PM – 1:30 PM

Innovation Theater, Exhibit & Poster Hall (North Hall A–C)

#### ORS Business Innovation Competition

*Organizers: Farshid Guilak, PhD and Suzanne Tabbaa, PhD*

With support from AO Foundation /AO Development Incubator

Join us to hear final pitches and view top posters competing in this year's Business Innovation Competition. This program provides an opportunity to validate the market potential of participants' research, technology and the steps for taking an innovative idea from bench to market. Teams had an opportunity to work with expert mentors (investors, serial entrepreneurs, and industry experts) who provided feedback and input on their commercialization strategies and pitch delivery.

### 12:15 PM – 1:55 PM

Room: North 227



#### ORS Meniscus Section Scientific Meeting

##### ORS Meniscus Section members only.

Section Officers: Martin Englund, MD, PhD;  
Chathuraka Jayasuriya, PhD; Matthew Koff, PhD;  
Chang Lee, PhD; Marc Levenston, PhD;

Suzanne Maher, PhD; Amy McNulty, PhD; Jennifer Puetzer, PhD;  
M. Farooq Rai, PhD; Andreas Seitz, PhD

With support from Shu-Tung and Alice Li Foundation Inc.

The ORS Meniscus Section leadership has developed exciting lineup of speakers, networking opportunities, and brainstorming sessions, which we hope you will enjoy. Suzanne Maher, PhD, Hospital for Special Surgery will kick-start the meeting with a brief business review over lunch. Martin Englund, MD, PhD, Lund University will moderate presentations and a panel discussion by industry members about New/Emerging Meniscus-Related Technologies and Translational Challenge. After an ice breaker organized by Andreas Seitz, PhD, Ulm University and our Section Networking Committee, Amy McNulty, PhD, Duke University Medical Center will moderate a session about Models and Approaches used in the Preclinical Testing of Meniscal Solutions from the perspective of a biologist (Chat Jayasuriya, PhD, Brown University), an engineer (Jillian Beveridge, PhD, Cleveland Clinic) and a surgeon (Donna Pacicca, MD, Children's Mercy Hospital). The speakers will pose key questions for brainstorming through breakout sessions.

### 12:15 PM – 1:45 PM

Room: North 224



#### ORS Preclinical Models Section Scientific Meeting

##### ORS Preclinical Models Section members only.

Section Officers: D. Joshua Cohen, MD;  
Aimee Colbath, DVM, MS, DACVS;

Jeremiah Easley, DVM; Laurie Goodrich, DVM, PhD;  
Kurt Hankenson, DVM, PhD; Michael Lehmickie, MS; Uma Sankar, PhD;  
Stephan Zeiter, DVM, PhD, DipECLAM

With support from MTF Biologics

ORS Preclinical Models Section members will have the opportunity to break out into four smaller groups by topic area. Invited experts from the field will lead group discussion with questions submitted from the Section membership. Topic areas include bone healing/fracture, implants, osteoarthritis and regenerative medicine/biologics.

### 12:30 PM – 1:00 PM

Room: North 222

#### ORS Annual Business Meeting

ORS members are invited to join us to hear a recap of 2019 and a look forward to 2020.

### 1:30 PM – 3:00 PM

Room: West 301 A



#### A Multidisciplinary Platform for the Development of Personalised Medical Implant Technologies

Organized by Guest Nation—Australia

*Organizers: David Ackland, PhD and Peter Lee, PhD*

Recent advances in computer-aided engineering and additive manufacturing are transforming treatment of bone and joint conditions through development of personalised implants and surgeries. Small and medium enterprises often lack resources for research and development of medical implants, with few established pathways to assist them with understanding the regulatory environment critical to their success.

The purpose of this workshop will be to:

1. Evaluate bottlenecks in current development and commercialisation pathways for personalised implant technologies
2. Determine knowledge and technology required for rigorous development and evaluation of pre-clinical and clinical test methods, personalised medical implants and decision support tools
3. Establish a framework or methodology to support the use, and increase the rate of success, of personalised implant technologies

#### A Multidisciplinary Platform for the Development of Personalised Medical Implant Technologies

Peter Lee, PhD, University of Melbourne

#### Measurement and Modeling Strategies for Innovative Implant Solutions

Mark Taylor, PhD, Flinders University

#### Implant Integration and Prevention of Implant Infection Through Modelling, Manufacture and Development of Novel Biomaterials and Tissue Engineered Constructs

Hala Zreiqat, PhD, The University of Sydney

#### Innovative Approaches for Intra and Post-Operative Management of Implant Recipients and Evaluation of Clinical Outcomes of Novel Implant Surgeries

Bogdan Solomon, PhD, Adelaide Medical School



**1:30 PM–3:00 PM**

Room: West 301 BC

**Advances of Nanomedicine in Treating Musculoskeletal Diseases**

*Organizers: Bingyun Li, PhD and Jessica A. Jennings, PhD*

Nanomedicine offers the potential for new and better treatments for various applications and may revolutionize the way we detect and treat musculoskeletal diseases. Nanomedicine may be applied in tissue engineering, wound healing, infectious diseases, antibiotic resistance, tumor, etc. This workshop will present the recent advances and breakthroughs of nanomedicine in treating musculoskeletal diseases.

*Nanobioengineering in Musculoskeletal Research*

Yi-Xian Qin, PhD, Stony Brook University

*Nanomaterials and Regenerative Engineering*

Yusuf Khan, PhD, University of Connecticut Health Center

*Surface Nanotopography as a Regulator of Cell Response*

Barbara D. Boyan, PhD, Virginia Commonwealth University

*Nanomedicine for Musculoskeletal Infection Treatment*

Bingyun Li, PhD, University of West Virginia

**1:30 PM–3:00 PM**

Room: West 301 D

**Osteoarthritis: Novel Molecular Determinants Revolutionize Our Understanding of the Disease Pathology**

Organized by German Society for Orthopaedics and Trauma (DGOU) and ORS

*Organizers: Susanne Graessel, PhD and Henning Madry, MD, PhD*

Clinical symptoms of OA appear in more than 10% of the world population and affect almost everyone over the age of 65. As a consequence of the increasing longevity and obesity within the western countries, the economic and social burden caused by OA is growing rapidly and substantially influencing the life quality of the affected individuals with enormous costs to the health care system for diagnosis, treatment, sick leave, rehabilitation, and early retirement. For the patients the major problem is disability, resulting from joint tissue destruction and pain. Here, we want to elucidate novel concepts and hypotheses regarding disease progression, which are relevant for understanding underlying molecular mechanisms as a prerequisite for future therapeutic approaches.

*Impact of the Peripheral Nervous System and Its Neuropeptides on OA Pathology*

Susanne Graessel, PhD, University of Regensburg

*OA Induced Changes in Cartilage and Subchondral Bone Topographical Pattern*

Henning Madry, MD, Saarland University

*The Role of Cytokines and Proteases in OA*

Frank Zaucke, PhD, Dr. Rolf M. Schwiete Research Unit for Osteoarthritis

**1:30 PM–3:00 PM**

Room: North 221

**Mechanochemical Signaling in Bone: A Workshop in Honor of Dr. Christopher R. Jacobs**

*Organizers: Lidan You, PhD and Ronald Kwon, PhD*

The purpose of this workshop is 1. to explore means by which mechanical and chemical signals are integrated in bone under both physiological and pathological conditions. The presentations will encompass diverse research areas including gap junctional communication, progenitor-vascular interactions, and mechanochemical signaling in the primary cilium. The panel of speakers comprises ORS members and non-members with diverse expertise. The speakers will provide background to bring participants to a basic level of understanding, as well as present new data. This workshop will establish foundations and facilitate discussion among clinicians, scientists, and engineers on bone mechanotransduction. 2. To honor the memory and scientific legacy of Dr. Chris Jacobs, whose pioneering work had an enormous impact on the orthopaedic research community. While talks will focus on new data, speakers will highlight their past work with Dr. Jacobs, as a means to honor his memory and scientific legacy.

*Gap Junctions and Bone Mechanobiology*

Henry Donahue, PhD, Virginia Commonwealth University

*Progenitor-Vascular Interactions Under Mechanical Loading*

Alesha Castillo, PhD, New York University

*Mechano-Chemical Signaling in the Primary Cilium*

Tim Stearns, PhD, Stanford University

**1:30 PM–3:00 PM**

Room: North 222

**Understanding and Addressing our Own Implicit Biases**

Organized by the ORS Women's Leadership Forum and ORS New Investigator and Mentoring Committee

*Organizers: Jennifer Woodell-May, PhD and Spencer Szczesny, PhD*

Regardless of your gender, race, or ethnicity, we all perceive the world through a lens colored by our individual experiences. We all harbor implicit biases/prejudices that distort our perspectives. In many cases, these biases are innocuous heuristics that are necessary to navigate the numerous choices we make on a daily basis. However, often these biases influence larger decisions and behaviors that negatively impact others and support existing social disparities. The major goals of this workshop are to learn how to recognize bias in oneself (and others) and how to effectively/constructively manage it. Importantly, we want to provide a safe space for people to express instances of bias that they may have experienced or unwittingly acted on towards others. Through education and open discussions, we can highlight strategies for empathy, awareness, and inclusion to reduce prejudices and create a more open and inviting work environment.

*Understanding and Addressing Implicit Bias*

Ronald Lindsey, MD, UTMB Health

*Counteracting Unconscious Bias*

Travelle Franklin-Ford Ellis, MD, PhD, Zimmer Biomet

### 1:30 PM–3:00 PM

Innovation Theater, Exhibit & Poster Hall (North Hall A–C)

#### **Investor Perspectives on Innovation and Academic Technologies**

Organized by the ORS Industry Engagement Committee

*Organizers: Suzanne M. Tabbaa, PhD and Farshid Guilak, PhD*

The Business Innovation Competition (BIC) was founded as a program to provide academics, clinicians, and students the opportunity and educational resources to develop an understanding for commercialization and develop a community to foster innovation. This session will complement the 2020 BIC program and provide ORS members the opportunity to learn more about fundraising and investment for technologies they are looking to transition into the commercial space. This session will include presentations and discussions from various investor perspectives to provide ORS members an understanding of the fundraising process for a technology and provide key insights from various experts.

*Fundraising Mechanisms for Academic Start-ups: The Basics*

Tiffany Wilson, MBA, Global Center for Medical Innovation

*Understanding the Funding Ecosystem: Insights and Strategies to Raising Early Capital*

Allison Long Pettine, Crescent Ridge Partners

*The Other Markets*

Ben Glenn, JD, A Matter of Innovation

*Pathways of Successful Start-ups*

Nicholas Pachuda, DPM, Johnson & Johnson

*Perspective and Direction of Investment and Innovation in Orthopaedics*

Roland Herzog, PhD, AO Foundation, Switzerland

\*This session does not qualify for CME.

### 2:00 PM–3:15 PM

Room: North 224



#### **ORS Meniscus & Preclinical Models Sections Combined Session**

With support from MTF Biologics and Shu-Tung Alice Li Foundation, Inc



This meeting is open to all meeting participants.

The ORS Preclinical Models Section and Meniscus Sections will host a combined session concluding their scientific meetings to discuss state-of-the art techniques and challenges to

meniscus research in animal models. Four speakers (two from each Section) will present their prospective on large and small animal models for meniscus research followed by an open panel discussion of possible solutions to challenges we face in advancing preclinical meniscus research. The goal of the session is to spur discussion about how meniscal researchers can benefit from preclinical models and what is hampering this advancement, as well as how preclinical researchers can advance their investigations by understanding what meniscal biological and mechanical measures are available.

### **NOW ACCEPTING APPLICATIONS!**

The Stryker/ORS Women's Research Fellowship promotes women in science by providing an opportunity for a female ORS member who is a recent PhD in science or engineering to conduct research in the field of orthopaedic technology. The Fellowship provides **one year of support** in the amount of up to

**\$50,000** or eligible applicants who are within three years of obtaining PhD degrees and are full-time post-doctoral fellows conducting orthopaedic research with an experienced research advisor.

**stryker**

Visit [ors.org/stryker-ors-fellowship](https://ors.org/stryker-ors-fellowship) for more information

MONDAY

### 3:15 PM–4:15 PM Scientific Sessions

Time	Podium Session 46 Hip—Surgical Technique and Outcomes <b>Moderators:</b> Shuyang Han, PhD and Hannah Lundberg, PhD	Podium Session 47 Cartilage—Development and Chondrogenesis <b>Moderators:</b> Karin Payne, PhD and Martin Stoddart, PhD	Podium Session 48 Cellular Mechanisms of Bone Repair and Regeneration <b>Moderators:</b> Meghan McGee-Lawrence, PhD and Ling Qin, PhD	Podium Session 49 Orthopaedic Infections—Treatments and Outcomes <b>Moderators:</b> Bingyun Li, PhD and Britt Wildemann, PhD	Podium Session 50 Spine—Structure, Function, and Imaging <b>Moderators:</b> Ameet Aiyangar, PhD and Jamie Williams, PhD
Room	West 301 A	West 301 BC	West 301 D	North 221	North 222
3:15 PM	Paper No. 257 <b>Implant Positioning in Total Hip Arthroplasty within a Target Zone: A Comparison Between Traditional vs. Computer Assisted Navigated Surgery</b> Terry Clyburn; Richard Okafor; Bradley Lambert; David Dong; Michael Trakhtenbroit; Stephen Incavo; David Lionberger	Paper No. 263 <b>Girk3 Suppresses Kappa Opioid Responses in Chondrocytes</b> Ian M. Loring; Earnest L. Taylor; Elizabeth W. Bradley; Jennifer J. Westendorf	Paper No. 269 <b>Pas Cells are Activated During Implant Osseointegration in a Mouse Tibial Implant Model</b> Alexander Vesprey; Eun Sung Suh; Xu Yang; Miracle Rogers; Brandon Sosa; Yingzhen Niu; Lionel Ivashkiv; Mathias Bostrom; Ugur M. Ayurk	Paper No. 275 <b>Staphylococcus Aureusmazf Inhibit Cell Growth, Biofilm Formation And Pathogenicity is Ica-dependent</b> Dongzhu Ma	Paper No. 281 <b>Influence of Spinal Motion on Lumbar Intervertebral Disc Space Width Distribution Influence of Spinal Motion on Lumbar Intervertebral Disc Space Width Distribution</b> Kazyuki Segami; Alejandro A. Espinoza Orias; Howard S. An; Nozomu Inoue
3:25 PM	Paper No. 258 <b>Preoperative Opioid Use Negatively Impacts Patient-Reported Outcomes After Revision Total Hip Arthroplasty</b> Karim Sabeh; Eitan Ingall; Matthew Fury; Venkatsaiakhil Tirumala; Christian Klem; Young-Min Kwon	Paper No. 264 <b>Effects of Mir-138 And Mir-181a/b-1 On Chondrocyte Differentiation</b> Hongjun Zheng; Jin Liu; Zhaohui Wang; Ryan Nunley; Audrey McAlinden	Paper No. 270 <b>Lgr6, an Adult Stem Cell Marker, is Expressed in Periosteal Cells &amp; is Correlated with Osteogenic Potential</b> Laura Doherty; Sanja Novack; Jessica Lehoczy; Ivo Kalajic; Kurt D. Hankenson; Archana Sanjay	Paper No. 276 <b>Intracellular Methicillin-Resistant Staphylococcus Aureus (mrSa) and Inflammatory Reaction Persist After Treatment with Vancomycin in a Novel Murine Model of Mrsa Septic Arthritis</b> Francis Y. Lee; Kareme D. Alder; Kwon-Hyuk Kwon; Sean Cahill; Inkyu Lee; Saelim Lee; Jungho Back; Zichen Hao; Lu Li; Montana T. Morris	Paper No. 282 <b>In-Vivo Three Dimensional Changes of The Spinal Canal Before and After Corrective Surgeries of Adolescent Idiopathic Scoliosis</b> Chaofan Han
3:35 PM	Paper No. 259 <b>Can the Sagittal Pelvic Tilt be Estimated from Ap Pelvic Radiographs in Patients Awaiting Total Hip Arthroplasty? A Prospective, Diagnostic Cohort Study</b> Moritz M. Innmann; Christian Merle; Paul E. Beaulé; George Grammatopoulos	Paper No. 265 <b>Regulation of Chondrogenesis by Long Non-Coding Rnas Loc105370526 and Zfhx4-as1</b> Zhaohui Wang; Hongjun Zheng; Jin Liu; Nguyen Huynh; Farshid Guilak; Audrey McAlinden	Paper No. 271 <b>Comparison of Skeletal and Soft Tissue Human Pericytes Identifies CXCR4 Expressing Pericytes as Osteoblast / Non-Adipocyte Precursors</b> Jiajia Xu; Dongqing Li; Ching-Yun Hsu; Leslie Chang; Ye Tian; Leilitia Zhang; Yiyun Wang; Bianca Vezzani; Carolyn Meyers; Mario Gomez Salazar; Yongxing Gao; Kristen Broderick; Carol Morris; Sridhar Nimmagadda; Bruno Peault; Aaron James	Paper No. 277 <b>Assessment of Antibiotic Therapies to Eradicate S. Aureus Occupying the Osteocytic-Canalicular Network of Cortical Bone in a Murine Model</b> Mark J. Ninomiya; Karen L. de Mesy Bentley; Ryan P. Trombetta; James Brodell; Chao Xie; Steven Gill; Edward M. Schwarz	Paper No. 283 <b>Vertebral Endplate Remodeling Reduces Small Molecule Transport into the Degenerating Intervertebral Disc</b> Beth G. Ashinsky; Sai A. Mandalapu; Edward D. Bonnevie; Stephen Pickup; Chao Wang; Lin Han; Robert L. Mauck; Harvey E. Smith; Sarah E. Gullbrand
3:45 PM	Paper No. 260 <b>Effect of Lipped Liner Design on the Wear and Deformation in Hip Joint Replacement for Variations in Cup Rotational and Translational Positioning</b> Mazen Al-Hajjar; Sophie Williams; Jonathan Thompson; Graham Isaac; John Fisher	Paper No. 266 <b>TGFBR2/Noggin Axis is Essential for Joint Development and Homeostasis</b> Tieshi Li; Fang Fang; Alessandra Esposito; Xiaofei Li; Anna Spagnoli	Paper No. 272 <b>Loss of Wnt16 Reduces Canonical Wnt Signaling and Enhances Growth During Appendage Regeneration</b> Andrea R. Cronrath; Visali Sethuraman; Yi-Hsiang Hsu; Ronald Y. Kwon; Claire J. Watson	Paper No. 278 <b>Comparison of the Therapeutic Effect of Bone-Modifying Agents for Acute Osteomyelitis in Mice</b> Hideyuki Kobayashi; Masahiko Takahata; Shigeto Hiratsuka; Tomohiro Shimizu; Dai Sato; Ryo Fujita; Norimasa Iwasaki	Paper No. 284 <b>T2* Mapping of Human Cartilage Endplate: Spatial Differences and Association with Adjacent Disc Degeneration</b> Linshanshan Wang; Misung Han; Jason Wong; Sara L. Sampson; Patricia Zheng; Roland Krug; Aaron J. Fields
3:55 PM	Paper No. 261 <b>Effect of Hypoalbuminemia on Outcomes After Revision Total Hip Arthroplasty</b> Dominick V. Congiusta; Nicole D. Rynecki; Rushi Patel; Michael M. Vosbikian; Irfan H. Ahmed	Paper No. 267 <b>Enhancing the Reparative Outcome of Autologous Chondrocyte Implantation by Selectively Removing Senescent Cells With Peptide Foxo4-dri</b> Yuchen He; Yuzhao Huang; Rocky Tuan; Hang Lin	Paper No. 273 <b>Single Cell RNA-Sequencing Reveals Diverse Progenitor Populations of The Regenerating Murine Digit Tip</b> Feini Qu; Ilan C. Palte; John C. Bramley; William J. Buchser; Farshid Guilak	Paper No. 279 <b>Single-Stage Revision of the Infected Total Joint Arthroplasty is Associated with Improved Patient-Reported Outcomes</b> Venkatsaiakhil Tirumala; Christian Klem; Ameen Barghi; Wittawat Boonyanuwat; Wenhao Chen; Liang Xiong; Young-Min Kwon	Paper No. 285 <b>Metastatic Lesions Within Vertebral Trabecular Bone Highly Affect Fracture Properties: A Finite Element Modeling Study</b> Sebastian Saldarriaga; Simon Cataño Jimenez; Asghar Rezaei; Hugo Giambini
4:05 PM	Paper No. 262 <b>The Relationship Between In Vivo Range Of Motion and Simulated Range of Motion in Total Hip Arthroplasty</b> Ryo Mitsutake; Hiromasa Tanino; Yasuhiro Nishida; Hiroshi Ito	Paper No. 268 <b>Cytoskeletal-Nuclear Engagement is Dynamic with Chondrogenic Differentiation</b> Ryan Daniels; Robert Mauck	Paper No. 274 <b>Cellular Heterogeneity And Lineage Restriction During Mouse Digit Tip Regeneration At Single Cell Resolution</b> Gemma Johnson; Erick Masias; Jessica Lehoczy	Paper No. 280 <b>Bacteriophage-Derived Lysin Combination with Vancomycin Demonstrates Superior Antimicrobial Potential in Murine DAIR Model of PJI</b> Brandon R. Sosa; Yingzhen Niu; Kevin Staats; Vincentius Suhardi; Alberto Carli; Vincent Fischetti; Mathias Bostrom; Xu Yang	Paper No. 286 <b>Strains Measured Using Tomosynthesis-Based Digital Volumes Correlation are Detectable Under Load and Reflect Age-Related Changes In Human Vertebral Bone</b> Daniel Oravec; Roger Zauel; Michael J. Flynn; Yener N. Yeni

## 4:30 PM–5:30 PM Scientific Sessions

Time	Podium Session 51 Hip—Biomechanics, Biomaterials and Effects on Outcomes <b>Moderators:</b> Michael Harris, PhD and Sally Liarno, PhD	Podium Session 52 Tendon and Ligament—Mechanical and Biological Influences of Structure and Function <b>Moderators:</b> Dirk Hubmacher, PhD and Jeffrey Weiss, PhD	Podium Session 53 Bone Tumors <b>Moderators:</b> Susan Bukata, MD and Timothy Damron, MD	Spotlight Session 54 Technology Driven Patient Care and Outcomes <b>Moderators:</b> Mario Lamontagne, PhD and Susumu Wada, MD, PhD	Spotlight Session 55 Meniscus—Injury and Healing <b>Moderators:</b> Amy McNulty, PhD and Andreas Seitz, PhD
Room	West 301 A	West 301 BC	West 301 D	North 221	North 222
4:30 PM	Paper No. 287 <b>How Much is Enough? Contributions of Capsular Releases to Femoral Exposure in THA Via A Direct Anterior Approach</b> Zackary Byrd; Shuyang Han; Sabir Ismaili; Luis E. Delgadillo-Chabolla; Adam Freehand; Philip C. Noble	Paper No. 293 <b>PIEZO1 is a Tendon Mechanosensor of Shear Stress That Determines Tissue Strength and Stiffness</b> Fabian S. Passini; Aiman S. Saab; Patrick Jaeger; Matthias J. Arlt; Kim D. Ferrari; Dominik Haenni; Sebastiano Caprara; Bruno Weber; Jess G. Snedeker	Paper No. 299 <b>Development of Novel Therapeutic Strategy for Osteosarcoma Transplanting Controlled-Release Pirarubicin Conjugated Endothelial Progenitor Cells</b> Yohei Kawakami; Teruya Kawamoto; Hitomi Hara; Shuichi Fujiwara; Kazumichi Kitayama; Shunsuke Yahiro; Ryosuke Kuroda; Toshihiro Akisue	<b>SPOTLIGHT SPEAKER</b>  <b>Antonia Chen, MD, MBA</b> <b>Role of Digital Technologies in the Future of Orthopaedics Surgery</b>	Paper No. 308 <b>Stable Cartilage Progenitor Cell Line Stimulates Healing of Meniscus Injury in the Rat Knee</b> Salomi Desai; John Twomey-Kozak; Jake Newberry; Neill Li; Brett D. Owens; Chathuraka T. Jayasuriya
4:40 PM	Paper No. 288 <b>Tribocorrosion of CoCrMo-alloys in Various Model Synovial Fluids: The Role of Hyaluronic Acid</b> Simona Radice; Alfons Fischer; Markus Wimmer	Paper No. 294 <b>Multiaxial and Multiscale Strain Assessment Across the Mouse Achilles Tendon During Passive Dorsiflexion</b> Keshia Mora; Samuel Mlawer; Alayna Loisel; Mark Buckley	Paper No. 300 <b>Nell1 Deletion Reduces Osteosarcoma Disease Progression and Improves Overall Survival Via Pleiotropic Cellular Effects</b> Qizhi Qin; Seungyong Lee; Leslie Chang; Carolyn Meyers; Edward McCarthy; Carol Morris; Aaron W. James		Paper No. 309 <b>Effects of Ultra-Purified Alginate Gel Implantation on Large Meniscal Defects in Mini Pig Models</b> Takuma Kaibara; Eiji Kondo; Koji Iwasaki; Tomohiro Onodera; Yoshitaka Oda; Shinya Tanaka; Norimasa Iwasaki
4:50 PM	Paper No. 289 <b>The Impact of Variation in Reaming Depth and Stem Offset on Joint Mechanics Following THA</b> Casey A. Myers; Paul J. Rullkoetter	Paper No. 295 <b>Anterior Cruciate Ligament Bundle Function Differs Between Sexes Throughout Skeletal Growth in a Porcine Model</b> Danielle Howe; Stephanie G. Cone; Jorge A. Piedrahita; Lynn A. Fordham; Jeffrey T. Spang; Matthew B. Fisher	Paper No. 301 <b>A Cross-Species Personalized Medicine Pipeline Identifies The CRM1 Export Pathway as a Potentially Novel Treatment for Osteosarcoma</b> Alexander L. Lazarides; Jason Somarelli; Erdem Altunel; Sneha Rao; Sarah Hoskinson; Serene Cheng; So Young Kim; Kathryn Ware; Cindy Eward; S. David Hsu; William Eward		Paper No. 310 <b>Dynamic Changes in the Porcine Meniscus and Articular Cartilage After Meniscal Injury</b> Sonia Bansal; Liane M. Miller; Jay M. Patel; Kamel S. Saleh; Brendan D. Stoeckl; Dawn M. Elliott; Michael W. Hast; Miltiadis H. Zgonis; Robert L. Mauck
5:00 PM	Paper No. 290 <b>The Effect of Lower Limb Length and Hip Offset Differences, and Surgical Approaches on Gait Mechanics in Total Hip Arthroplasty</b> Mario Lamontagne; Erik Kowalski; Danilo S. Catelli; George Grammatopoulos; Paul E. Beaulé	Paper No. 296 <b>Acute Reduction In Collagen V Expression Increases Viscoelasticity in Mature Tendons</b> Ryan Leiphart; Stephanie Weiss; David Birk; Louis Soslowsky	Paper No. 302 <b>Inflammatory Interactions Between Aggressive Breast Cancer and Bone Cells Promote Bone Destruction Through Perk1/2 Signaling and Inflammatory Conversion of Quiescent Osteoblasts</b> Alana Munger; Minh Nam Nguyen; Jungho Back; Lu Li; Lauren Gillinov; Inkyu Lee; Saelim Lee; Francis Y. Lee	Paper No. 305 <b>Improving Postoperative Clinical Decision Making: Altering Rehabilitation After Total Knee Arthroplasty Using Statistics as the Framework</b> Ryan M. Chapman; Wayne E. Moschetti; Paul M. Werth; Douglas W. Van Citters	<b>SPOTLIGHT SPEAKER</b>  <b>Robert Brophy, MD</b> <b>The Response of the Knee Joint to Meniscal Injury: Mundane Mechanics or Byzantine Biology?</b>
5:10 PM	Paper No. 291 <b>Multivariate Usage of Magnetic Resonance (MR) Biomarkers to Predict Histologically Confirmed Necrosis in Failed Total Hip Arthroplasty (THA)</b> Mohammad Sherafati; Thomas W. Bauer; Hollis G. Potter; Matthew F. Koff; Kevin M. Koch	Paper No. 297 <b>Toughening Mechanisms in Healthy and Pathologic Tendon Entheses</b> Mikhail Golman; Adam A. Abraham; Iden Kurtaliaj; Brittany P. Marshall; Yizhong Hu; X. Edward Guo; Guy Genin; Victor Birman; Stavros Thomopoulos	Paper No. 303 <b>Trabectedin Suppresses Osteosarcoma Lung Metastasis</b> Masahiro Inoue; Keisuke Horiuchi; Michiro Susa; Kazuhiro Chiba	Paper No. 306 <b>Real-Time Patient Joint Mechanics Monitoring Using Deep Learning and Wearable Sensors</b> Mohsen Sharifi Renani; Abigail Eustace; Casey Myers; Chadd Clary; Paul Rullkoetter	
5:20 PM	Paper No. 292 – GUEST NATION <b>Patients with A Reduced Level of Function Demonstrate Altered Hip Joint Loading Profiles During Gait Following Total Hip Arthroplasty</b> Jasvir S. Bahl; John B. Arnold; Mark Taylor; Lucian B. Solomon; Dominic Thewlis	Paper No. 298 <b>Collagen and Prg4 Fluorescent Reporter Mice Establish Unique Subsets of Tendon Fibroblasts</b> Nathaniel Dymant; Xi Jiang; Catherine Bautista; Anjana Srikumar; Andrew Hendrix; Courtney Thompson; Alexander Kuang; Andrew Kim	Paper No. 304 <b>A Novel Approach to Identifying Genes Driving Metastasis in Ewing's Sarcoma</b> Charlotte E. Palmer; Matthew J. Allen	Paper No. 307 – GUEST NATION <b>Validation of a Computational Simulation Outcome Prediction Tool in Bilateral Total Knee Arthroplasty Patients</b> Brad P. Miles; Joshua Twiggs	



**5:30 PM–7:00 PM**

Exhibit & Poster Hall (North Hall A–C)

**Poster Session 2 Reception**

All ORS meeting attendees are invited to join us in the Exhibit & Poster Hall for beverages and appetizers.

**5:45 PM–6:15 PM**

Innovation Theater, Exhibit & Poster Hall (North Hall A–C)

**Kubtec Techniques Presentation**

Customer Experiences with the Digimus (DXA) cabinet system for Global and ROI BMD and Body Composition measurements

Join speakers Meghan McGee-Lawrence, PhD, Augusta; Blaine Christiansen, PhD, UC Davis; and Ryan Ross, PhD, RUMC as they discuss 1) comparing the ability of a high-resolution system and older systems to measure change in BMD and Body Composition in traditional models, such as Loading; 2) a longitudinal study of the effect of fracture on BMD; and 3) unique animal models with high and low BMD.

**6:10 PM–6:50 PM**

Exhibit & Poster Hall (North Hall A–C)

**Moderated Poster Presentations**

**Moderated Poster Session 12**

**Cartilage and Synovium 2**

Moderator: Sudheer Ravuri, PhD

Moderated Poster Theater 1 (North Hall A–C)

**6:10 PM**

**Poster No. 376**

High-throughput Drug Screening For Osteoarthritis  
Thomas J. Kean; James E. Dennis

**6:14 PM**

**Poster No. 378**

Untargeted Metabolomic Analysis Of Ampkalpha1 Ko Mouse Knees Reveals Elevated Pathways In Female Mutants  
Soumilee Chaudhuri; Isaak Thornton; Liang-Yu Chen; Ru Liu-Bryan; Ron June

**6:18 PM**

**Poster No. 379**

Matrix Mediated Cartilage Regeneration In A Rabbit Articular Defect Model  
Zhihua Lu; Sheng Zhou; Justin Vaida; Gongming Gao; Amanda Stewart; Joshua Parenti; Ming Pei

**6:22 PM**

**Poster No. 380**

Adipose-derived Stem Cells Enhance Chondrogenesis And Cartilaginous Matrix Synthesis Of Articular Chondrocytes Is Mediated By Extracellular Vesicles  
Shun Cheng Wu; Jhen-Wei Chen; Che-Wei Wu; Chung-Hwan Chen; Je-Ken Chang; Mei-Ling Ho

**6:26 PM**

**Poster No. 381**

Mechanically-Activated Microcapsules Deliver Chondroprotective Agents And Prevent Degeneration In An Inflammatory Microenvironment  
Ana P. Peredo; Yun Kee Jo; Daeyeon Lee; George R. Dodge; Robert L. Mauck

**6:30 PM**

**Poster No. 382**

Carbon Dot-guided Delivery Of Therapeutic (sox9, Tgf- $\beta$ 946) Raav Vectors To Enhance The Chondrogenic Differentiation Potential Of Human Bone Marrow-derived Mesenchymal Stem Cells  
Jagadeesh K. Venkatesan; Gertrud Schmitt; Françoise Pons; Luc Lebeau; Magali Cucchiari

**6:34 PM**

**Poster No. 386**

Characterization Of Collagen Content In Chondrocyte Environment Of Healthy And Osteoarthritic Human Tibial Cartilage  
Awuniji Linus; Mohammadhossein Ebrahimi; Petri Tanska; Mikko A. Finnilä; Arto P. Koistinen; Antti Joukainen; Heikki Kröger; Saarakkala Simo; Mikael J. Turunen; Rami K. Korhonen

**6:38 PM**

**Poster No. 387**

Microscale Compositional Mapping Predicts Local Strains Across Interface Of Cartilage Repair From An Eight Month Equine Model  
Rebecca M. Irwin; Alexander J. Boys; Tianyu Gao; Itai Cohen; Lara A. Estroff; Lawrence J. Bonassar

**6:42 PM**

**Poster No. 391**

In Vitro Evaluation Of The Effects Of Ultra-purified Alginate On The Performance Of Osteochondral Allografts Harvested From Pig Knees  
RIKIYA BABA; Daisuke Fukui; Stephanie Y. Adachi; Erikka Linn; Lyhour Lay; Alyssa Alvarez; Tomohiro Onodera; Robert L. Sah; Norimasa Iwasaki; Koichi Masuda

**6:46 PM**

**Poster No. 392**

Cytoskeleton Disruption Reverses Epigenetic Changes Of Dedifferentiated Chondrocytes  
Adrienne K. Scott; Benjamin Seelbinder; Corey P. Neu

**Moderated Poster Session 13**

**Shoulder and Elbow/Tumors**

Moderator: Brianne Connizzo, PhD

Moderated Poster Theater 2 (North Hall A-C)

**6:10 PM**

**Poster No. 486**

Alterations In Stress Distribution Pattern Of Glenoid Cavity Associated With Rotator Cuff Tear Size  
Yuki Matsui; Atsushi Urita; Yukinori Tsukuda; Norimasa Iwasaki

**6:14 PM**

**Poster No. 487**

Combed Fenestration Ovine Model Of Chronic Rotator Cuff Degeneration Mimics What Is Seen Clinically In Humans  
James W. Johnson; Jeremiah Easley; Dan Regan; Brad Nelson; Eileen Hackett; Holly Stewart; Devin von Stade; Lauren Berens; Cecily Broomfield; Tony Romeo; Ted Schlegel; Kirk McGilvray

**6:18 PM**

**Poster No. 488**

Do Outcomes Of Arthroscopic Subscapularis Tendon Repairs Depend On Rotator Cuff Fatty Infiltration?  
Drew Lansdown; Emily Monroe; Sergio Flores; Alan Zhang; Brian Feeley; C. Benjamin Ma



**6:22 PM**

**Poster No. 489**

Comprehensive Characterization Of Murine Supraspinatus And Infraspinatus Degeneration Following Tendon And Nerve Chronic Injury

Genbin Wu; Daniel McClintick; Vivian Hu; Jonathan Gatto; Bruno Peault; Ayelet Dar; Frank Petrigliano

**6:26 PM**

**Poster No. 492**

Four-dimensional Computed Tomography Evaluation Of Shoulder Joint Contact Area In Baseball Players

Daisuke Momma; Alejandro A. Espinoza Orias; Tohru Irie; Tomoyo Y. Irie; Norimasa Iwasaki; Nozomu Inoue

**6:30 PM**

**Poster No. 494**

The Effect Of Neck Shaft Angle On Muscle And Joint Contact Forces Following Reverse Shoulder Arthroplasty

Emily Bachner; Lawrence V. Gulotta; David Dines; Samuel Taylor; Andreas Kontaxis

**6:34 PM**

**Poster No. 511**

Local And Abscopal Effects Of Fractionated Hindlimb Irradiation On Bone Marrow Cell Populations

Ashley R. Sweeney-Ambros; Timothy A. Damron; Megan E. Oest

**6:38 PM**

**Poster No. 512**

The Local Administration Of Gelatin Hydrogel Microspheres Incorporating Cisplatin Enhanced Anti-tumor Effects With Less Side Effects In Vivo Bone Metastasis Model

Yutaro Kanda; Kenichiro Kakutani; Takashi Yurube; Zhongying Zhang; Yuji Kakiuchi; Yoshiki Takeoka; Ryu Tsujimoto; Kunihiro Miyazaki; Toru Takada; Yasuhiko Tabata; Ryosuke Kuroda

**6:42 PM**

**Poster No. 513**

Transcription Factor Twist1 Affects On Expression Of Abc Transporters And Chemoresistance To Doxorubicin In Human Osteosarcoma Cells

Hiroya Kondo; Joe Hasei; Mahito Nakanishi; Shota Takihira; Miho Kure; Ryoji Joko; Koji Demiya; Suguru Yokoo; Eiji Nakata; Aki Yoshida; Toshiyuki Kunisada; Toshifumi Ozaki

**6:46 PM**

**Poster No. 514**

Mithramycin A Radiosensitizes Ews:Flt1+ Cells By Inhibiting DNA Double-strand Break Repair Leading To Apoptotic Cell Death

Mei Yun Lin; Megan E. Oest; Timothy A. Damron; Jason A. Horton

**7:15 PM–9:00 PM**

Room: North 226

**Research Interest Group: Hip Dysplasia and Other Structural Hip Disorders**

*Organizers: Alessandra Carriero, PhD, The City College of New York  
Victor Huayamave, PhD, Embry-Riddle Aeronautical University*

*Megan Killian, PhD, University of Delaware*

*Chad Price, MD, International Hip Dysplasia Institute (IHDI)*

This inaugural RIG will bring together basic scientists, translational researchers and clinicians interested in studying hip dysplasia and other structural hip disorders with opportunities to discuss scientific and clinical approaches to improve outcomes in patients. The first part of the RIG will feature invited speakers with open discussion to follow. The RIG will work together to define pathways to move research and clinical practice forward. Guidelines and future research directions will be discussed. Plans for sharing knowledge and resources will be considered.

**7:30 PM–9:00 PM**

Canyon Café

**Mayo Clinic Alumni Reception (Ancillary Event)**

MONDAY

**8:00 AM–9:00 AM Scientific Sessions**

Time	Podium Session 56 Hip – Biomaterials and Reconstruction <b>Moderators:</b> Michael Samaan, PhD and Sophie Williams, PhD	Spotlight Session 57 Stem Cells and Chondrocytes for Regenerative Medicine <b>Moderators:</b> Michelle Delco, DVM, PhD and Matthew Hilton, PhD	Podium Session 58 Bone – Cell Signaling and Treatments <b>Moderators:</b> Melissa Kacena, PhD and Hongshuai Li, MD, PhD	Podium Session 59 Tendon – Biology and Growth <b>Moderators:</b> Anne Gingery, PhD and Megan Killian, PhD	Podium Session 60 Biomaterials for Bone Regeneration <b>Moderators:</b> Claire Acevedo, PhD and Nick Willett, PhD
Room	West 301 A	West 301 BC	West 301 D	North 221	North 222
8:00 AM	Paper No. 311 <b>Objective Mechanical Measures Predict Post-traumatic OA Risk After Intra-Articular Fracture of the Acetabulum</b> Kevin N. Dibbern; Matthew Engelken; Holly D. Thomas-Aitken; Tai Holland; Michael C. Willey; J. Lawrence Marsh; Donald D. Anderson	<b>SPOTLIGHT SPEAKER</b>  <b>Frank P. Barry, PhD</b> <b>Cellular Treatments for OA: Evidence, Mechanism and Value</b>	Paper No. 320 <b>Shp2 Deficiency in the Prrx1+ Osteochondroprogenitors Blocks Osteogenic Differentiation and Causes Cartilage Tumorigenesis</b> Jiahui Huang; Chunlin Zuo; Lijun Wang; Douglas Moore; Mark Dooner; Wentian Yang	Paper No. 326 <b>Yap is Required for Load-Induced Gene Expression Changes in the Tendon</b> Mor Grinstein; Ludovic Gaut; Luke O'Connor; Heather Dingwall; Delphine Duprez; Jenna Galloway	Paper No. 332 <b>Resorption of Hydroxyapatite Ceramic Spacers Following Expansive Open-Door Laminoplasty: A Quantitative Long-Term Study</b> Yu Moriguchi
8:10 AM	Paper No. 312 <b>Mechanical Testing of Synthetic Bone-Graft for Core Decompression Treatment of Femoral Head Avascular Necrosis</b> Samuel Hockett; Micah Self; John T. Sherrill; Simon C. Mears; C. Lowry Barnes; Erin M. Mannen		Paper No. 321 <b>Eif2ak4/gcn2 Maintains Bone Homeostasis Through Regulation of Skeletal Stem Cell Proliferation</b> Guoli Hu; Yilin Yu; Fanxin Long; Courtney Karner	Paper No. 327 <b>Depletion of Tendon Cells Results in Increased Biomechanical Properties of Healing Flexor Tendon</b> Katherine Best; Alayna Loiselle	Paper No. 333 <b>E-jet Printing of Nanocomposite Scaffold for Enhanced Bone Tissue Engineering</b> Chris Steffi; Chee Hoe Kong; Yanli Cai; Bryan TH Koh; Wilson Wang
8:20 AM	Paper No. 313 <b>270 Degree Labral Reconstructions Lead to Increased Contact Pressure and Decreased Suction Seal Compared to Primary Labral Repair: A Cadaveric Study</b> Sunikom Suppauskorn; Edward Beck; Jourdan Caccienne; Jorge Chahla; Elizabeth Shewman; Laura Krivicich; Jonathan Rasio; Shane Nho		Paper No. 322 <b>Hyper-Innervation Driven by Ngf-trka Signaling is Required for Heterotopic Bone</b> Seungyong Lee; Charles Hwang; Chase A. Pagani; David M. Stepien; Michael Sorkin; Qizhi Qin; Carrie Kubiak; Carolyn A. Meyers; Noelle D. Visser; Kaetlin Vasquez; Sarah Miller; Stefano Negri; Mohamed Garada; Husain A. Rasheed; Zhu Li; Amanda Huber; Liliana Minichiello; Paul S. Cederna; Stephen W.P. Kemp; Thomas L. Clemens; Aaron W. James; Benjamin Levi	Paper No. 328 <b>Mesenchymal Stem Cells-Derived Exosomes in Achilles Tendon Repair and its Quality Evaluation by Glycan Epitopes</b> Yuta Hayashi; Shigeru Miyaki; Yohei Sanada; Hiroaki Tateno; Naosuke Kamei; Masakazu Ishikawa; Tomoyuki Nakasa; Nobuo Adachi	Paper No. 334 <b>The Bio-integration and Bone Fixation Performance of Continuous Mineral Fiber-Reinforced Implants</b> Gregory Charles Berlet; Ronit Merchav-Feuermann; Abraham Nyska; Nicolette Dudley Jackson
8:30 AM	Paper No. 314 <b>Vitamin E Alters The Effects Of CoCrMo Degradation Products on DNA Replication Fork Initiation and Progression</b> Vikas Manjunath; Maureen McCoy; Aisha Bhatti; Abhijith Segu; Paul Chastain; Joshua J. Jacobs; Ebru Oral; Mathew T. Mathew; Divya Bijukumar	Paper No. 317 <b>Physiologic Preconditioning of Mesenchymal Stem Cells (MSC) has a Beneficial Effect on Cytokine Inhibited MSC Chondrogenesis and In Vivo Cartilage Repair</b> Girish Pattappa; Ruth Schewior; Jonas Krueckel; Matthias Koch; Johannes Weber; Siegmund Lang; Andreas Boehrer; Johannes Zellner; Brian Johnstone; Denitsa Docheva; Peter Angele	Paper No. 323 <b>Sodium Salicylate Treatment as Modulator of Immune Populations to Create A Healthy Inflammatory Environment During Femur Fracture in Aging</b> Emma Muinos Lopez; Anne Marie Josephson; Philipp Leucht	Paper No. 329 <b>F4/80 Tendon Resident Macrophages and Potential Cross-Talk with Tendon Fibroblasts During Growth</b> Catherine A. Bautista; Xi Jiang; Kyu Sang Joeng; Nathaniel A. Dymont	Paper No. 335 <b>Fe<sub>3</sub>O<sub>4</sub> Embedded Tio, Nano Rods With Electromagnetic Field Polarize Macrophages to M2 Phenotype and Promote Osteogenesis and Angiogenesis</b> Ranyue Ren; Jiachao Guo; Wei Xiong
8:40 AM	Paper No. 315 <b>Seven-Year Follow-Up of Vitamin E-Diffused Highly Cross-Linked Polyethylene in Total Hip Arthroplasty</b> Yohei Naito; Masahiro Hasegawa; Shine Tone; Hiroki Wakabayashi; Akihiro Sudo	Paper No. 318 <b>RTL3 Coordinates with SOX9 to Regulate COL2A1 Expression in Human Articular Chondrocytes</b> Hope C. Ball; Mohammad Y. Ansari; Kimberly Novak; Tariq M. Haqqi	Paper No. 324 <b>Macrophage Primary Cilia Lengthening Inhibits Osteoclastogenesis</b> Michael M. Sutton; Christopher R. Jacobs	Paper No. 330 <b>Phenotype Stability and Expansion Potential of Embryonic Tendon Progenitor Cells In Vitro</b> Phong K. Nguyen; Feiyang Deng; Sereen Assi; Paolo Paco; Spencer Fink; Caroline Stockwell; Catherine K. Kuo	Paper No. 336 <b>Fusion Efficacy and Biomechanical Evaluation of 3d-Printed Hyperelastic Bone® Composite Scaffolds Versus Rhbmp-2 In a Rat Spinal Arthrodesis Model</b> Jonathan T. Paul; Allison C. Greene; Joseph G. Lyons; Mark A. Plantz; Tejas S. Nandurkar; Adam Jakus; Soyeon Jeong; Silvia Minardi; Chawon Yun; Ramille Shah; Robert M. Havey; Kenneth R. Blank; Muturi G. Muriuki; Avinash G. Patwardhan; Stuart R. Stock; Wellington K. Hsu; Erin L. Hsu
8:50 AM	Paper No. 316 <b>Wear Of UHMWPE Using ADL Scratched Femoral Heads in a Hip Simulation</b> Elizabeth Hippensteel; Madison Miller; Jason Langhorn	Paper No. 319 <b>DLX5 is a Therapeutic Target for Attenuating Hypertrophy and Apoptosis in Mesenchymal Progenitor Cells</b> John N. Twomey-Kozak; Salomi Desai; Wenguang Liu; Neill Li; Nick Lemme; Qian Chen; Brett Owens; Chathuraka Jayasuriya	Paper No. 325 <b>ALLOB, A Ready-to-use and Injectable Cryopreserved Allogenic Cell Therapy Product Derived from BM-MSC, Displays Potent Osteoinductive and Osteogenic Properties, Leading to Enhanced Bone Fracture Healing</b> Sylvain Normand; Jérôme Jenicot; Coline Muller; Pierre-Yves Laruelle; Anna Tury; Benoît Moreaux; Sandra Pietri	Paper No. 331 <b>Coordinated Regulation of Collagen Organization by Scleraxis and Mohawk at Postnatal Stages of Tendon Growth</b> Deepanwita Pal; Sara Tufa; Douglas Keene; Chisa Shukunami; Ronen Schweitzer	Paper No. 337 <b>Bone Ingrowth of RTT Porous Structure</b> Weidong Tong; Bryan Smith; Dwight Henninger; Robert Kane; Timothy Muench

**9:00 AM – 10:00 AM**

Exhibit &amp; Poster Hall (North Hall A–C)

**Exhibit & Poster Session 2 Poster Viewing**

(Authors required at ODD posters)

**9:10 AM – 9:50 AM**

Exhibit &amp; Poster Hall (North Hall A–C)

**Moderated Poster Presentations****Moderated Poster Session 14****Hand and Wrist/Imaging/Skeletal Muscle**

Moderator: Mayumi Sonekatsu, MD, PhD

Innovation Theater, Exhibit &amp; Poster Hall

**9:10 AM****Poster No. 408**

ADAMTSL2 Regulates Canonical Wnt Signaling During C2C12

Myoblast Differentiation

Nandaraj Taye; Dirk Hubmacher

**9:14 AM****Poster No. 409**

Use Of Optogenetics For Light-mediated Muscle Contraction And

Tendon Loading

Elahe Ganji; Jaclyn M. Soulas; C. Savio Chan; Matthew B. Hudson;

Christopher W. Ward; Megan L. Killian

**9:18 AM****Poster No. 410**

Oral Magnesium Supplementation And Low-magnitude,

High-frequency Vibration Treatment Attenuate Sarcopenic

Muscular Changes

Can Cui; Zhengyuan Bao; Yuning Chim; Ling Qin;

Simon Kwoon-ho Chow; Wing-hoi Cheung

**9:22 AM****Poster No. 411**

Epigenetic Regulations Implicate Muscle Healing Processes

Yong Li; Haiying Pan; Xiaojing Dai; Keith Kenter

**9:26 AM****Poster No. 495**

Increased Dorsal Subluxation Of The MC1 Is Associated With Rapid

Osteophyte Formation In Trapeziometacarpal OA

Joseph Crisco; Amy Morton; Douglas Moore; Amy Ladd;

Arnold-Peter Weiss

**9:30 AM****Poster No. 496**

Elevated Circulating Proinflammatory Cytokines Drive Transcriptional

Activity In Dupuytren's Disease

Mark L. Wang; Pedro K. Beredjiklian; Michael R. Rivlin;

Nicholas A. Ruggiero; Andrzej Fertala; George J. Feldman;

Ryan E. Tomlinson

**9:34 AM****Poster No. 497**

Early Expression Of Mmp-9 And Mmp-2 Predicts Rate Of Recovery

After A Crush Injury In A Rat Sciatic Nerve Model

David Micah Brogan; Christopher J. Dy; Jason Wever; Tony Lee;

Samuel Achilefu

**9:38 AM****Poster No. 503**

Multi-acquisition Variable-resonance Image Combination (MAVRIC)

Based T2 Mapping Of Peri-Prosthetic Tissues In Subjects With Total

Hip Arthroplasty

Julia Sternberg; Madeleine Gao; Sampada Bhawe; Bin Lin;

Hollis G. Potter; Kevin M. Koch; Matthew F. Koff

**9:42 AM****Poster No. 504**

3D SHG Imaging And 2D TPEF Assessment Of Collagen Orientation

And Crosslinking In Superficial Articular Cartilage During Early

Experimental Osteoarthritis

Zhiyi Liu; Carrie Hui Mingalone; Yang Zhang; Li Zeng;

Irene Georgakoudi

**9:46 AM****Poster No. 505**

Detecting Total Hip Replacement Implant Design On Preoperative

Radiographs Via Deep Learning

Alireza Borjali; Antonia Chen; Orhun Muratoglu; Mohammad Amin

Moric; Kartik Mangudi Varadarajan

**Moderated Poster Session 15****Bone 2**

Moderator: Brittany Wilson, PhD

Moderated Poster Theater 1 (North Hall A–C)

**9:10 AM****Poster No. 413**

Osteocytic TGF Contributes To Post-traumatic Osteoarthritis Through

Control Of Subchondral Bone Plate Thickness

Karsyn N. Bailey; Cristal S. Yee; Jeffrey Nguyen; Courtney M. Mazur;

Alexis Dang; Tamara Alliston

**9:14 AM****Poster No. 416**

Collagen IX Regulates The Endochondral Ossification Of The Murine

Femoral Head

Anja Niehoff; Juliane Heilig; Helen F. Dietmar; Bent Brachvogel;

Mats Paulsson; Frank Zaucke

**9:18 AM****Poster No. 417**

Single Cell Transcriptome Analysis Of Aging Effect On Bone Marrow

Mesenchymal Progenitors

Lutian Yao; Leilei Zhong; Robert J. Tower; Yulong Wei; Zhen Miao;

Jihwan Park; Rojeshi Shrestha; Luqiang Wang; Wei Yu; Yeji Zhang;

Katalin Susztak; Mingyao Li; Jaimo Ahn; Ling Qin

**9:22 AM****Poster No. 418**

Skeletal Stem And Progenitor Cells Isolated From The Effluent Of

Reamer-irrigator-aspirator Procedures

Mark Lee; Alex Wessel; Bryan Le; Wei Yao; Fernando A. Fierro

**9:26 AM****Poster No. 419**

Simultaneous Evaluation Of Bone And Cartilage Status In

Asymptomatic Fai Subjects And Healthy Controls Using Pet-mri

Gerd Melkus; Kawan Rakhra; Reggie Taylor; Katie Dinelle;

Stephen Dinning; Paul E. Beaulé



**9:30 AM Poster No. 420**

Interbody Fusion In A Large Animal Model With Escherichia Coli-derived Rbnp-2

William R. Walsh; Matthew H. Pelletier; Tian Wang; James Crowley; Daniel Wills; Christopher Tan; Ralph J. Mobbs; Carine Hsiao

**9:34 AM Poster No. 421**

Tmem100.creERT2 Transgene Marks Mesenchymal-lineage Cells And Endothelial Cells In A Mouse Model

Eun Sung Suh; Alexander Vesprey; Didem Goz Ayturk; Ugur Ayturk

**9:38 AM Poster No. 422**

Transcriptomic Analysis Of Peri-implant Tissue Reveals Impaired Osseointegration In Aged Mice That Is Associated With Suppression Of Angiogenic And Notch Pathways And Immune Activation

Kathleen Turajane; Gang Ji; Yurii Chinenov; David Oliver; Branden Sosa; Ugur M. Ayturk; Matthew B. Greenblatt; Lionel B. Ivashkiv; Mathias Bostrom; Xu Yang

**9:42 AM Poster No. 428**

Controlled Delivery Of Bioactive Molecules For Healing Of Critical-sized Femoral Defects In A Rat Model Of Bone Healing

Deepak Bushan Raina; Lucas Maximilian Matuszewski; Corina Vater; Julia Bolte; Hanna Isaksson; Lars Lidgren; Magnus Tägil; Stefan Zwingenberger

**9:46 AM Poster No. 435**

Intermittent Parathyroid Hormone Alters Peri-implant Cancellous Bone Transcriptional Profile During Osseointegration In A Murine Model

Kathleen Turajane; Gang Ji; Yurii Chinenov; David Oliver; Branden Sosa; Ugur M. Ayturk; Matthew B. Greenblatt; Lionel B. Ivashkiv; Mathias Bostrom; Xu Yang

**Moderated Poster Session 16**

**Intervertebral Disc and Meniscus**

Moderator: Yun Peng, PhD

Moderated Poster Theater 2 (North Hall A—C)

**9:10 AM Poster No. 393**

Bio-inspired Double-cross-linkable Tissue Adhesive For Healing Of Avascular Meniscus Tears

Alexander S. Litrel; Juliet L. Allen; Robert Stanciu; Eugenia Lee; Solaiman Tarafder; Chang H. Lee

**9:14 AM Poster No. 394**

Radial Meniscal Tears Was Best Repaired By A Modified “Cross” Tie Grip Suture Based On Biomechanical Comparison Of Four Repair Techniques

Yuta Nakanishi; Daisuke Araki; Kouki Nagamune; Tetsuya Yamamoto; Kanto Nagai; Noriyuki Kanzaki; Yuichi Hoshino; Takehiko Matsushita; Ryosuke Kuroda

**9:18 AM Poster No. 395**

Biophysical Cues Regulate Nanoscale Chromatin Organization In Mesenchymal Stem Cells

Su-Jin Heo; Shreyasi Thakur; Claudia Loebel; Peter Relich; Boao Xia; Jason Burdick; Melike Lakadamyali; Robert Mauck

**9:22 AM Poster No. 446**

Deletion Of Rage Signaling Protects The Intervertebral Discs From Morphological And Mechanical Deficits In A Type 2 Diabetic Mouse Model

Remy E. Walk; Tracy Xu; Donald Aboytes; Simon Y. Tang

**9:26 AM Poster No. 447**

TNF $\alpha$  Stimulation Reduces Glycosaminoglycan Content And Material Properties Of The Nucleus Pulposus

Timothy Jacobsen; Nadeen O. Chahine

**9:30 AM Poster No. 448**

A Computational Approach To Cellular Micromechanical Environment In Tissue Engineering Scaffolds

Mitchell Page; Christian Puttlitz

**9:34 AM Poster No. 449**

Multiplex Crispra-driven Collagen & Aggrecan Deposition Drives A Chondrogenic Phenotype Without Exogenous Growth Factors

Nilofar Farhang; Jacob Weston; Bryton Davis; Alison Thompson; Robert Bowles

**9:38 AM Poster No. 450**

Enrichment Of Nucleus Pulposus Progenitor Is Coupled With MEK Kinase Activity

Wai Kit Tam; Daisuke Sakai; Di Liu; Juliana Lee; Kenneth Cheung; Rocky Tuan; Victor Leung

**9:42 AM Poster No. 451**

Computational Analysis Identifies Transcriptional Factor Regulatory Network With Runx1, A Major Driver Of Intervertebral Disc Degeneration

Steven M. Presciutti; Martha E. Diaz-Hernandez; Hicham Drissi; Nazir M. Khan

**9:46 AM Poster No. 452**

Microencapsulation Of Annulus Fibrosus Cells In Oxidized Alginate Microbeads For Intervertebral Disc Cell Delivery

Christopher J. Panebianco; Tiffany Y. Lim; Michael D. Weir; James C. Iatridis

**10:00 AM – 11:00 AM**

Room: West 301 A

**ORS Debate: Endogenous Stem Cells are Superior to Ex Vivo Engineered Stem Cells for Musculoskeletal Tissue Repair**

Moderator: Rita Kandel, MD, Sinai Health System

For the Motion:

Robert Mauck, PhD, McKay Orthopaedic Research Laboratory, University of Pennsylvania

Against the Motion:

Johnny Huard, PhD, Steadman Philippon Research Institute

# 11:15 AM–12:15 PM Scientific Session

Time	Podium Session 61 Knee—Biomarkers and Osteoarthritis <b>Moderators:</b> Bruce Beynon, PhD and Carl Imhauser, PhD	Spotlight Session 62 Disc Degeneration <b>Moderators:</b> Chitra Dahia, PhD and Arthur Michalek, PhD	Podium Session 63 Biological Treatments and Therapeutics for Bone <b>Moderators:</b> Jessica Jennings, PhD and Eamon Sheehy, PhD	Podium Session 64 From Biology to Mechanics in Hand and Wrist <b>Moderators:</b> Jennifer Nichols, PhD and Magnus Tagil, MD, PhD	Podium Session 65 Rotator Cuff—Regeneration and Repair <b>Moderators:</b> Hugo Giambini, PhD and Heath Henninger, PhD
Room	West 301 A	West 301 BC	West 301 D	North 221	North 222
11:15 AM	Paper No. 338 <b>Utilizing Synovial Fluid, Serum and Urine Biomarkers to Predict Radiographic Osteoarthritis Severity</b> Ishita Patel; Aaron M. Stoker; James A. Keeney; Emily V. Leary; James L. Cook	<b>SPOTLIGHT SPEAKER</b>  <b>Nadeen Chahine, PhD</b> <b>Profiling Serum Cytokines in Patients with Disc Disease: Immune Dysregulation and Disease Biomarkers</b>	Paper No. 347 <b>Evaluation of a Patient Specific, 3d Printed Bone Graft Cage in an Ovine Tibial Critical Defect Model</b> Christopher J. Medberry; Chantelle Jukic; Scott Larsen; Glen Pierson; Thomas P. Schaer	Paper No. 353 <b>Senescent Cells Escape from Immune Clearance in Fibrotic Subsynovial Connective Tissue in Carpal Tunnel Syndrome</b> Takako S. Chikenji; Yuki Saito; Alyssa Vrieze; Sandra Passe; Tamara Tchkonja; James L. Kirkland; Peter C. Amadio; Anne Gingery	Paper No. 359 <b>Regeneration of a Full-Thickness Defect in Rotator Cuff Tendon with Umbilical Cord-Derived Mesenchymal Stem Cells in a Rat Model</b> Ji-Hye Yea; Jungseob Park; InJa Kim; Gayoung Sym; Chris Jo
11:25 AM	Paper No. 339 <b>Modeling Post-Traumatic Osteoarthritis Through Non-Invasive ACL Rupture in Rats</b> Shannon B. Brown; Tolulope O. Ajayi; Jessica Hornyak; Ryan Jungels; Yash Y. Shah; Elena G. Yarmola; Kyle D. Allen; Blanka Sharma		Paper No. 348 <b>CD107a<sup>low</sup> Osteoprogenitor Cells Induce Bone Formation Across Orthopaedic Models</b> Jiajia Xu; Stefano Negri; Yongxing Gao; Yiyun Wang; Ching-Yun Hsu; Carolyn Meyers; Takashi Sono; Ye Tian; Leslie Chang; Sarah Miller; Kristen Broderick; Bruno Peault; Aaron James	Paper No. 354 <b>Promote Schwann Cell Migration in Collagen Conduit with 3d Porous Chemotactic Scaffold of Matrilin-2 and Chitosan for Hand Nerve Repair</b> Brandon Vorrius; Neill Li; Julie Katarincic; Qian Chen	Paper No. 360 <b>Antioxidant's Cytoprotective Effects on Hypoxia-induced Apoptosis of Rotator Cuff Fibroblasts</b> Ji-Yong Gwak; Ra Jeong Kim; Hyung Bin Park
11:35 AM	Paper No. 340 <b>Serum and Urine Biomarkers for Predicting Success or Failure After Osteochondral Allograft Transplantation Surgery</b> John R. Baumann; Aaron M. Stoker; Emily V. Leary; James P. Stannard; James L. Cook		Paper No. 349 <b>Osteogenesis of Mesenchymal Stem/Stromal Cell Spheroids Using Bmp2 Nanoparticles and Engineered Hydrogels</b> Jacklyn Whitehead; Alefia Kothambawala; Katherine H. Griffin; Charlotte Vorwald; Serena Cinque; J. Kent Leach	Paper No. 355 <b>Real-Time MRI-Based Carpal Motion Assessment Using Statistical Displacement and Shape Models</b> Brent H. Foster; Calvin B. Shaw; Robert D. Boutin; Robert M. Szabo; Christopher O. Bayne; Anand A. Joshi; Abhijit J. Chaudhari	Paper No. 361 <b>The Enhancement Effect of Acetylcholine and Pyridostigmine on the Bone Tendon Interface Healing in a Mouse Rotator Cuff Model</b> Zhanwen Wang; Yang Chen; Han Xiao; Shengcan Li; Tao Zhang; Jianzhong Hu; Hui Xie; Hongbin Lu
11:45 AM	Paper No. 341 <b>Senescence Accelerated Mice as a New Animal Model for Ageing Related Osteoarthritis Development</b> Yohei Sanada; Shigeru Miyaki; Yasunari Ikuta; Masahiro Shinohara; Keita Nagira; Hiroyuki Ishitobi; Kiminori Matsubara; Masakazu Ishikawa; Tomoyuki Nakasa; Nobuo Adachi	Paper No. 344 <b>Epigenome Editing Of Sensory Neuron Ion Channels Reduced Degenerative Induced Mechanical Nociception</b> Joshua D. Stover; Brandon Lawrence; Jared Zitnay; Jeffrey Weiss; Robby D. Bowles	Paper No. 350 <b>Ex Vivo Regional Gene Therapy with Human Adipose-Derived Stem Cells for Bone Repair</b> Venus Vakhshori; Sofia Bougioukli; Osamu Sugiyama; Hyunwoo P. Kang; Andrew Homere; Amy Tang; Sang-Hyun Park; Jay Lieberman	Paper No. 356 <b>Full Range of Motion in Total Wrist Arthroplasty Requires 2 Cm Shift in Center of Rotation</b> Bardiya Akhbari; Amy M. Morton; Kalpit N. Shah; Douglas C. Moore; Arnold-Peter C. Weiss; Scott W. Wolfe; Joseph J. Crisco	Paper No. 362 <b>Do Superficial Biopsies Underestimate True Rotator Cuff Muscle Fat Content?</b> Andrew V. Gomez; Benjamin Ma; Brian Feeley; Drew A. Lansdown
11:55 AM	Paper No. 342 <b>Delivering Anti-Inflammatory Stem Cells Into a Porcine Model of Post-Traumatic Osteoarthritis</b> Thomas J. Kremen; Tina Stefanovic; Wafa Tawackoli; Khosrowdad Salehi; Pablo Avalos; Derek Reichel; Manuel J. Perez; Juliane D. Glaeser; Dmitriy Sheyn	Paper No. 345 <b>Evaluation of Senolytics Effect in Human Discs Ex-Vivo</b> Hosni Cherif; Daniel Bisson; Kai Sheng; Lisbet Haglund	Paper No. 351 <b>Chemical Homing for Localized Delivery of Extracellular Matrix Cues to Bone Fractures to Accelerate Repair</b> Jeffery J. Nielsen; Stewart A. Low; Lina C. Trigg; Christopher L. Chen; Ephraim U. Mbachu; Kayleen I. Nordyke; Madeleine I. Tremblay; Philip S. Low	Paper No. 357 <b>Carpal Motion in Chronic Geissler IV Scapholunate Interosseous Ligament Wrists</b> Frederick W. Werner; Jessica Figueroa; Paul M. Travers; Walter H. Short	Paper No. 363 <b><sup>68</sup>Ga-FAPI PET/CT: A Pilot Study of FAP Evaluation in a Murine Rotator Cuff Repair Model</b> Xueying Zhang; Samuel Green; Yake Liu; Daoyun Chen; Camila B. Carballo; John Babich; Ed Fung; Anastasia Nikolopoulou; Xiang-Hua Deng; Scott A. Rodeo
12:05 PM	Paper No. 343 <b>Osteoarthritic Biochemical Changes in Tibiofemoral Cartilage are Detectable 6 Months After Anterior Cruciate Ligament Reconstruction</b> Jack R. Williams; Kelsey Neal; Ashutosh Khandha; Hollis G. Potter; Lynn Snyder-Mackler; Thomas S. Buchanan	Paper No. 346 <b>Degeneration Alters Structure-Function Relationships Across Length Scales in the Human Intervertebral Disc</b> Beth G. Ashinsky; Sarah E. Gullbrand; Chao Wang; Lin Han; Robert L. Mauck; Harvey E. Smith	Paper No. 352 <b>Enzyme-Controlled, Nutritive Hydrogel for Mesenchymal Stem Cell Survival and Paracrine Functions</b> Guotian Luo; Cyprien Denoed; Joseph Paquet; Julie Boisselier; Adeline Gand; Adrien Moya; Ahmad Diallo; Stéphane Marinesco; Anne Meiller; Pierre Bequart; Hilel Moussi; Véronique Larreta-Garde; Jean-Thomas Vilquin; Emmanuel Pauthe; Esther Potier; Hervé Petite	Paper No. 358 <b>A Cognitive Discrimination of Power and Precision Grasps for an Intuitive Control in Hand Prosthetics</b> Eike Jakubowitz; Ahmad Sahah; Max-Heinrich Laves; Christof Hurschler; Henning Windhagen; Alina Obermeier	Paper No. 364 <b>Comparison of Biological Scaffolds for Augmentation of Partial Rotator Cuff Tears in a Preclinical Model</b> Matthew J. Smith; Chantelle C. Bozynski; Keiichi Kuroki; Cristi R. Cook; Aaron M. Stoker; James L. Cook



## TUESDAY, FEBRUARY 11 (continued)

### 12:15 PM – 1:45 PM

Exhibit & Poster Hall (North Hall A–C)

#### Exhibit & Poster Session 2 Poster Viewing

### 12:30 PM – 1:30 PM

Room: North 221

#### Leveraging a Sabbatical to Invigorate Your Research Program

Organized by the ORS New Investigator and Mentoring Committee

*Organizer: Alayna Loiselle, PhD*

This session will explore several topics related to successfully planning for and completing a sabbatical. The sabbatical is an important opportunity for mid-career and senior investigators to devote protected time to gain additional training, develop collaborations or pursue new research directions. This experience can lay a strong foundation for the next stages of an investigator's career. In this session we will discuss topics including identifying sabbatical collaborators/hosts, how to negotiate for and justify a sabbatical, including perspectives from a department chair. We will also discuss how to manage your lab, possibly remotely, during the sabbatical, how to maintain collaborations post-sabbatical and how to maximize the professional value of the sabbatical, as well as potential personal and family considerations of the sabbatical.

*Strategies for a Success Before, During and After a Sabbatical*  
Chris Hernandez, PhD, Cornell University

*International Sabbatical Opportunities and Challenges*  
Ronald June, PhD, Montana State University

*Sabbatical Planning and Negotiation from the Department Chair Perspective*  
Marjolein van der Meulen, PhD, Cornell University

### 12:30 PM – 1:30 PM

Room: North 222

#### Developing and Sustaining Mentoring Relationships Throughout Your Career

Organized by the ORS New Investigator and Mentoring Committee

*Organizer: Joshua Roth, PhD, University of Wisconsin-Madison*

Throughout our orthopedic research careers, developing and sustaining mentoring relationships is a key component to building a successful and fulfilling career. A mentoring relationship is a two-way street so as we advance through our careers, we must be effective at both giving and receiving mentorship. An effective mentoring relationship is one that is mutually beneficial for both the mentor and mentee, rather than taxing for the mentor and discouraging for the mentee. The purpose of this session is to learn tips, tricks, and tools that can be used throughout our careers to develop and sustain effective mentoring relationships regardless of our career path. We will learn personal tips and tricks along with more formal tools (e.g. individual development plans) from successful academic faculty, clinical-scientist, and industry representatives that they have used to develop and sustained effective mentoring relationships as both a mentor and a mentee.

#### Early-Career Faculty Perspective on Mentoring

Corinne Henak, PhD, University of Wisconsin-Madison

Mariana Kersh, PhD, University of Illinois Urbana-Champaign

#### Mid-Career Faculty Perspective on Mentoring

Timothy Griffin, PhD, Oklahoma Medical Research Foundation

#### Industry Perspective on Mentoring

Jeffrey Bischoff, PhD, Zimmer Biomet

#### Clinician-Scientist Perspective on Mentoring

William Mihalko, MD, PhD, University of Tennessee-Campbell Clinic

### 1:45 PM – 2:45 PM

Room: West 301 A

#### ORS Closing Session



#### ORS Presidential Inauguration & Address

Susan Chubinskaya, PhD, Incoming President

ORS Business Innovation Competition—Recognition of Winners

Presentation of the ORS New Investigator Recognition Awards (NIRA)

#### ORS Section Awards

ORS International Section of Fracture Repair (ISFR) Awards

ORS Meniscus Section Awards

ORS Orthopaedic Implants Section Awards

ORS Preclinical Models Section Awards

ORS Spine Section Awards

ORS Tendon Section Awards

# GRANT RECIPIENTS

Congratulations 2020 Grant Recipients!

## ORS/OREF Travel Grants in Orthopaedic Research Translation

Rachel Silverstein, MD, MBS, Westchester Medical Center

Ichiro Okano, MD, Hospital for Special Surgery

Matthew Vopat, MD, University of Kansas Medical Center

William Hambright, PhD, Steadman Philippon Research Institute

Alexander Lazarides, PhD, Duke University Medical Center

Srikanth Divi, MD Rothman Institute /

Thomas Jefferson University Hospital

Holly Stewart, VMD, Colorado State University

## ON Foundation Education Grants

Rebecca Chung, PhD, University of Pennsylvania

Laura Doherty, UConn Health

Sara Ahmed Hassouna Elsayed, BVMSc, MVMSc,  
University of Cambridge

John Martin, PhD, Duke University

Anne Nichols, PhD, University of Rochester Medical Center,  
Center for Musculoskeletal Research

Feini Qu, VMD, PhD, Washington University in St. Louis

Sabah Rezvani, Virginia Tech

Andreas Seitz, PhD, Institute of Orthopaedic Research and  
Biomechanics

Yi Sun, University, Hong Kong

Anna Woloszyk, PhD, University of Texas Health Science Center  
San Antonio

## ON/ORS Kick-Starter Grant

Nina Tang, BS, The Ohio State University

Jay Patel, PhD, University of Pennsylvania

## FUTURE ORS ANNUAL MEETINGS



### ORS 2021 Annual Meeting

Saturday, February 13 – Tuesday, February 16, 2021  
Long Beach, California



### ORS 2022 Annual Meeting

Saturday, February 5 – Tuesday, February 8, 2022  
Tampa, Florida



# GUEST NATION POSTER PRESENTATIONS

## GUEST NATION

The following papers are presented in Podium Sessions from the Guest Nation—Australia.

Please check the Annual Meeting mobile app for room locations.

## PODIUMS

### Saturday, February 8

#### Session 13

##### Bone—Structure and Function

3:45 PM—3:55 PM

Paper No. 70

Energy Loss Behavior in Subchondral Bone Under Simulated Physiological Loads of Equine Athletes' Training  
Shaktivesh Shaktivesh; Fatemeh Malekipour; R Chris Whitton; Peta L Hitchens; Peter VS Lee

#### Session 16

##### TKA Biomechanics

5:20 PM—5:30 PM

Paper No. 90

Failure to Recreate the Native Tibial Medial Centre of Rotation Following TKA Surgery Leads to Reduced Patient Outcomes  
Joshua G. Twiggs; Brad Miles

### Sunday, February 9

#### Session 34

##### Multidisciplinary Imaging and Novel Analysis

4:30 PM—4:40 PM

Paper No. 200

A High Throughput Pipeline for Rapid, Multi-Scale Imaging and Pathology Assessment of Human Joints  
Anton D. Nathanson; Michael Carnell; Abhilash Srikantha; Lucy Ngo; Dirk Zeidler; Christian Wojek; Thomas W. Bauer; Melissa L. Knothe Tate

### Monday, February 10

#### Session 51

##### Hip—Biomechanics, Biomaterials and Effects on Outcomes

5:20 PM—5:30 PM

Paper No. 292

Patients with A Reduced Level of Function Demonstrate Altered Hip Joint Loading Profiles During Gait Following Total Hip Arthroplasty  
Jasvir S. Bahl; John B. Arnold; Mark Taylor; Lucian B. Solomon; Dominic Thewlis

#### Session 54

##### Technology Driven Patient Care and Outcomes

5:20 PM—5:30 PM

Paper No. 307

Validation of a Computational Simulation Outcome Prediction Tool in Bilateral Total Knee Arthroplasty Patients  
Brad P. Miles; Joshua Twiggs

## MODERATED POSTERS

The following papers are presented in MODERATED POSTER Sessions from the Guest Nation—Australia.

### Saturday, February 8

#### Session 3

##### Bone 1

10:57 AM—11:01 AM

Poster No. 429

Moderated Poster Theater 2 (North Hall A—C)

Implant Stiffness And Peri-prosthetic Bone Changes In The Rat Model: Structural And Mechanical Outcomes  
Mengzhen Yan; Rema Oliver; Christos Christou; Matthew Pelletier; Mark Hoffman; William Walsh

### Tuesday, February 11

#### Session 15

##### Bone 2

9:30 AM—9:34 AM

Poster No. 420

Moderated Poster Theater 1 (North Hall A—C)

Interbody Fusion In A Large Animal Model With Escherichia Coli-derived Rbmbp-2  
William R. Walsh; Matthew H. Pelletier; Tian Wang; James Crowley; Daniel Wills; Christopher Tan; Ralph J. Mobbs; Carine Hsiao

## POSTERS

The following posters are being presented from the Guest Nation—Australia.

### POSTER SESSION 1 (PS1)

#### February 8—February 9

##### Skeletal Muscle

###### Poster No. 765

Individuals Affected By Patellofemoral Joint Osteoarthritis Have Smaller Hip Abductor Muscle Volumes  
David C. Ackland; Matthew Denton; Anthony Schache; Marcus Pandy; Kay Crossley

##### Bone

###### Poster No. 876

Trabecular Bone Growth In An Adolescent Cystic Fibrosis Rat Model: A Pilot Study  
Maged Awadalla; Egon Perilli; Saulo Martelli; Mark Gardner; Kaye S. Morgan; Marcus Kitchen; Patricia Cmielewski; Bryant Roberts; David Parsons; Martin Donnelley

###### Poster No. 885

Increased Density In Proximal Sesamoid Bones Of Racehorses Is Associated With The Onset Of Cyclical Loading And Bone Pathology  
Babatunde Ayobami Ayodele; Peta L. Hitchens; Eleanor J. Mackie; R. Chris Whitton

##### Knee

###### Poster No. 1028

Longitudinal Changes In Lower Limb Joint Loading Up To Two Years Following Tibial Plateau Fracture  
Stuart Millar; Kieran Bennett; Francois Fraysse; John B. Arnold; Lucian B. Solomon; Dominic Thewlis

###### Poster No. 1038

The Effect Of Different Anterolateral Procedures In Combination With An ACL Reconstruction On The Envelope Of Knee Motion  
Danè Dabirrahmani; Thomas Neri; Joseph Cadman; Samuel Grasso; Aaron Beach; David Parker; Richard Appleyard

###### Poster No. 1061

OA Vs. Non-OA Tibiae: Influence Of Joint Alignment On Cartilage, Cortical Subchondral Bone Plate And Trabecular Bone  
Sophie K. Rapagna; Bryant C. Roberts; Lucian Solomon; Karen J. Reynolds; Dominic Thewlis; Egon Perilli

###### Poster No. 1103

Anatomical Tibial Slope And Its Recreation Following Total Knee Arthroplasty Is Linked To Pain When Flexing The Knee  
Joshua G. Twiggs; Brad Miles

##### Hip

###### Poster No. 1126

Accuracy Of Ebra-cup Measurements After Reconstruction Of Severe Acetabular Defects At Revision THR  
John M. Abrahams; Stuart A. Callary; Bogdan Solomon; Sung W. Jang; Joe Hewitt; Donald W. Howie

###### Poster No. 1133

The Influence Of Polyimide MP-1TM Wear Particles On A Rodent Closed Fracture Healing Model  
Rema A. Oliver; Christos Christou; Tian Wang; Alisa Buchman; Simha Sibony; William R. Walsh

###### Poster No. 1164

Optimal Positioning Of The Hip Joint Center In Total Hip Arthroplasty: Effects On Hip Abductor Muscle And Joint Contact  
Jasvir S. Bahl; John B. Arnold; Mark Taylor; Lucian B. Solomon; Dominic Thewlis

###### Poster No. 1185

Incidence Of Femoral Periprosthetic Fracture Around Cemented Primary Total Hip Replacement  
Stuart A. Callary; Darcy Noll; Kerry Costi; Tania Carbone; Peter Smitham; Donald Howie; Lucian Bogdan Solomon



# GUEST NATION POSTER PRESENTATIONS (CONTINUED)

## POSTER SESSION 2 (PS2)

February 10–February 11

### Biomaterials

#### Poster No. 1417

Bone Healing Using Two Novel Broad Spectrum Antimicrobial Coatings With Allograft

Xingdi C. Wang; Vedran Lovric; Renxun Chen; Naresh Kumar; Mark Willcox; Rema A. Oliver; William R. Walsh

#### Poster No. 1427

Orthoss<sup>®</sup> Substituted Hydroxyapatite Bone Graft Substitute In A Rabbit Posterolateral Spinal Fusion

Rema A. Oliver; James Crowley; Dan Wills; Tian Wang; Michael Dan; John Ward; Daniel Pasqualino; William R. Walsh

#### Poster No. 1444

The Mechanical Properties And Density Of Dihydropyrrrolone (dhp) Impregnated Bone Cement: A Pilot In Vitro Study

Chun K. Loh; Mitchell Murray; Vedran Lovric; Andrew Leicester; Andrew Leicester; Matthew H. Pelletier; William R. Walsh

### Skeletal Muscle

#### Poster No. 1668

Tensile Properties Of Physiotherapy Tapes

Joe Herbert; Tian Wang; Matthew Pelletier; John Ward; Kerri Blyth; William R. Walsh

### Bone

#### Poster No. 1685

Evidence That The Role Of Osteocytes In The Development Of Osteolytic Lesions Is Gender Specific

Renee Ormsby; Lucian Solomon; Roumen Stamenkov; David Findlay; Gerald J. Atkins

#### Poster No. 1763

Compressive Fatigue Behavior Of Equine Subchondral Bone  
Behzad Babaei; Shaktivesh Shaktivesh; Fatemeh Malekipour; Chris R. Whitton; Peter Vee-Sin Lee

#### Poster No. 1764

How Much Does Subchondral Bone Microdamage Unload Its Underlying Bone?

Fatemeh Malekipour; Chris R. Whitton; Peter Vee Sin Lee

#### Poster No. 1767

Molecular And Systems Approaches To Probe Tissue Compartments' Molecular Transport And Sieving Properties

Lucy Ngo; Anton D. Nathanson; Melissa L. Knothe Tate

### Spine

#### Poster No. 1847

Achieving Successful Posterolateral Fusion Using A Collagen Calcium Phosphate Silicate Bio-ceramic

Rema Oliver; James Crowley; Daniel Wills; Tian Wang; Michael Dan; John Ward; Daniel Pasqualino; William R. Walsh

### Knee

#### Poster No. 1920

Biomechanical Differences Between Healthy, Osteoarthritic And Post-Operative Medial Stabilized Knees

Danè Dabirrahmani; Hamed Shahidian; Joseph Cadman; Lauren Kark; James Sullivan; Richard Appleyard

#### Poster No. 1953

Stair Negotiation Biomechanics Of Medial Stabilizing Knees- Biomechanical And Patient Reported Outcomes

Danè Dabirrahmani; Joseph Cadman; James Sullivan; Richard Appleyard

### Shoulder and Elbow

#### Poster No. 2098

The Influence Of Rotator Cuff Tears On Shoulder Joint Contact Behavior After Reverse Total Shoulder Arthroplasty

David C. Ackland; Dale Robinson; Peter Lee; Martin Richardson; Kwong Ming Tse

### Infection

#### Poster No. 2211

Importance Of A Foreign Material Surface In A Murine Tibial Drill Hole Model Of Infection

Aaron Schindeler; Aiken Dao; Justin D. Bobyn; David G. Little





# EXHIBITOR INFORMATION

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United States

Phone: 216–399–6743

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United States

Phone: 404–894–5227

**gcmiatl.com**

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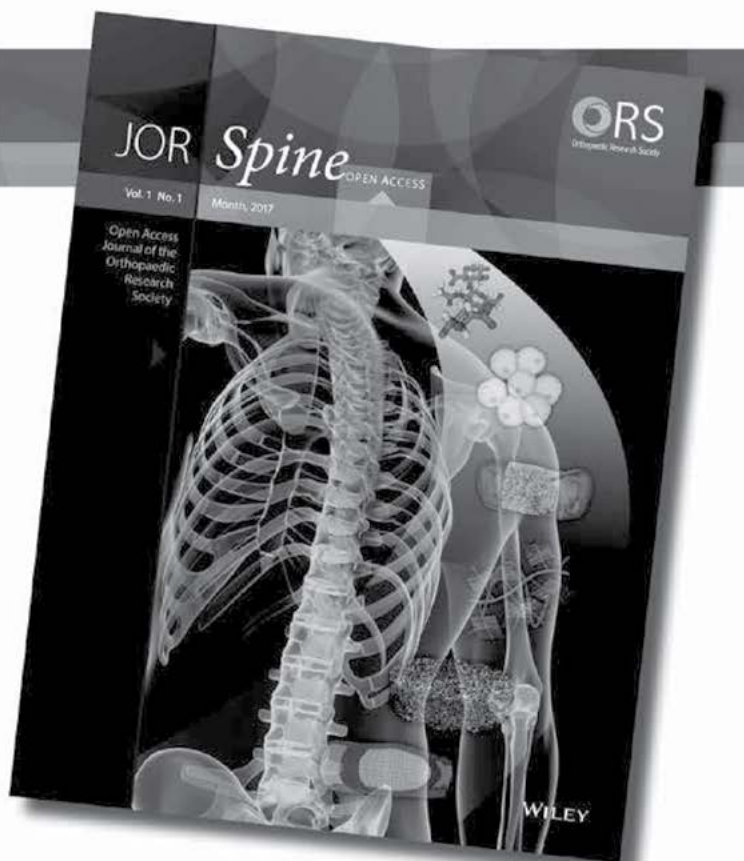
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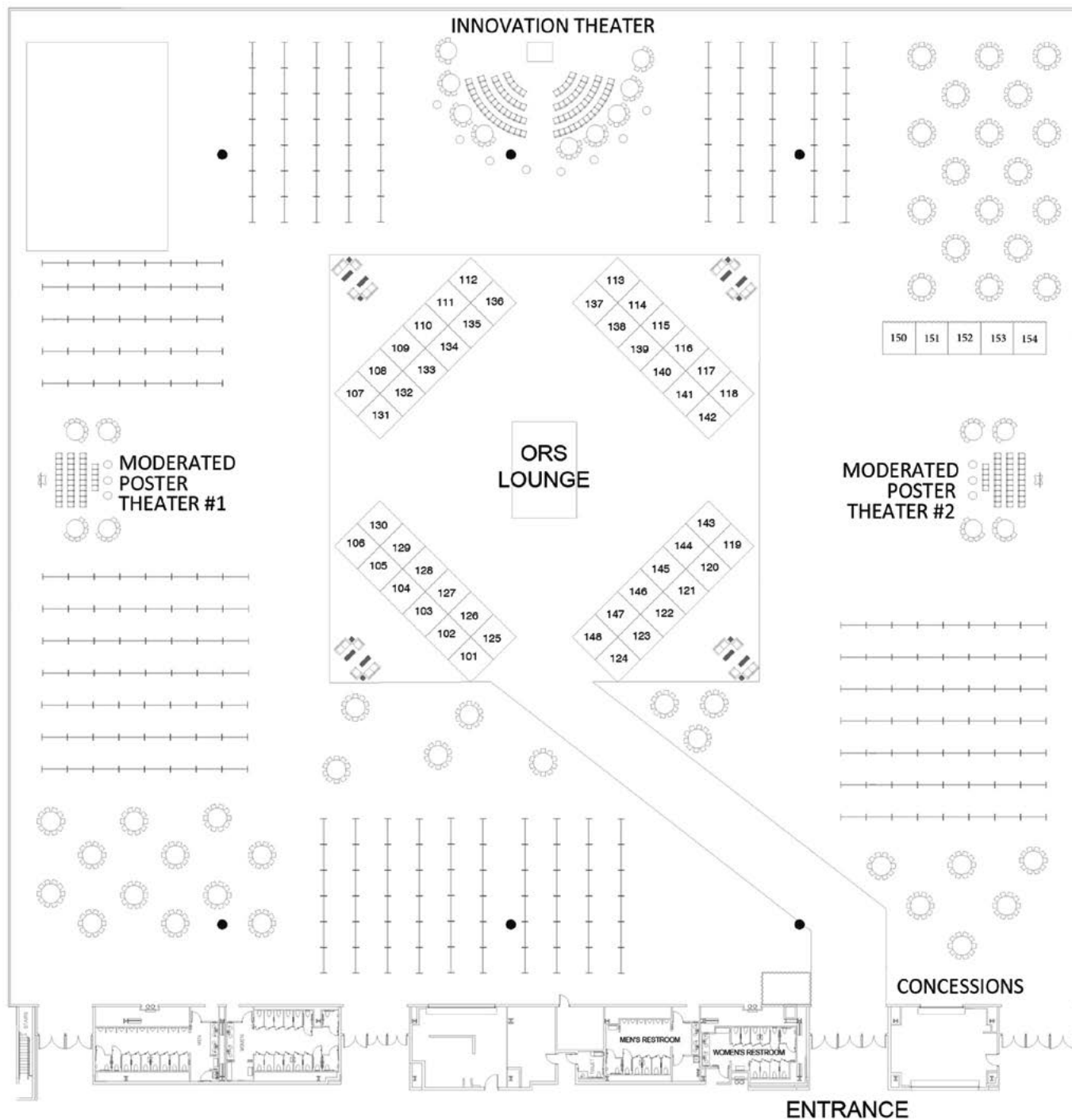
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# Exhibit & Poster Hall Floor Plan (North Hall A–C)



## NOTES

## NOTES





## NOTES

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