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Join the ORS . . . . . . . . . . . . . . . . Inside Back Cover
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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GENERAL MEETING INFORMATION

PLEASE NOTE
Your Annual Meeting badge must be worn and displayed at all times during the ORS Annual Meeting.

CONTINUING MEDICAL EDUCATION
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.

DISCLAIMER
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.

FILMING / RECORDING POLICY
The photography or recording of any kind (cell phone, camera, video recorder, etc.) of a scientific presentation, educational program, workshop, posters, or meetings of the ORS is strictly forbidden without prior approval in writing by the ORS or the author/speaker. This policy will be strictly enforced.
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

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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 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 Lehmicke, 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.
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<td>8:10 AM</td>
<td>Paper No. 2 Biomechanical Analyses of</td>
<td>Paper No. 8 New Antibacterial Coating for</td>
<td>Paper No. 17 Do Pre-operative and Post-</td>
<td>Paper No. 23 Joint Congruency and Distance</td>
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<td>Massive Tumor-Induced Bone Loss in the</td>
<td>Titanium Prosthesis Does Not Compromise</td>
<td>Operative Glenoid</td>
<td>Analysis of the Subtalar Joint During</td>
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<td>Peri-Acetabular Region Montana T. Morris;</td>
<td>Bone Integration</td>
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<td>Alex Mouchey, Koreme D. Alder; Alana M.</td>
<td>Svenja EC; Stein; Larissa Vruke; Daniela</td>
<td>Influence Outcomes</td>
<td>Rich J. Lissner; Nicola Krabbehl; Alejx</td>
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<td>Munger; Kenneth Milligan; Courtney Roomba;</td>
<td>Wamecke; Anita Ignatius; Lutz Oeserelen</td>
<td>After Reverse</td>
<td>Barg; Beat Hinterrnfen; Charles L. Saltzman;</td>
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<td>Andrew E. Anderson; Amy L. Lenz</td>
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<td>8:40 AM</td>
<td>Paper No. 3 Development Of Uni- and Bi-axial</td>
<td>Paper No. 9 Hydroxyapatite: A Recruiting</td>
<td>Paper No. 18 Impact</td>
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<td>Strain in the Implanted Femur during Gait</td>
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<td>Paper No. 5 Serum Metal Ions and Adverse</td>
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<td>Paper No. 19 Proteome</td>
<td>Paper No. 24 In Vivo Kinematics of the</td>
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<td>Local Tissue Reaction in Metal-on-</td>
<td>Carriers Enable Targeted and Sustained</td>
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<td>Polyethylene Total Hip Arthroplasty</td>
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<td>Tendon and Bursa in</td>
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<td>9:00 AM</td>
<td>Paper No. 6 Three-Dimensional Quantitative</td>
<td>Paper No. 11 Epha2 Ligand-functionalized</td>
<td>Paper No. 20 Inducible Endogenous Stem Cells</td>
<td>Paper No. 26 Objective Mechanical Measures</td>
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<td>Acetabular Rim Morphology Evaluation in</td>
<td>Microparticles for Targeted Delivery of</td>
<td>Within Human Rotor</td>
<td>Predict Post-traumatic OA Risk After Intra-</td>
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<td>Patients with Borderline Dysplastic Hip</td>
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<td>Cuff Muscle to</td>
<td>articular Fracture of the Calcaneus</td>
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<td>Tohru Irie; Alejandro A. Espinosa Olias;</td>
<td>Zhenggang Wang; Shuang Liang; Amin Chen</td>
<td>Promote Muscle</td>
<td>Kevin N. Dibbern; Karan Rao; Molly Davy;</td>
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<td>Regeneration After</td>
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**SATURDAY, FEBRUARY 8 (continued)**

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

Exhibit & Poster Session 1 Poster Viewing
Authors at EVEN numbered posters

Moderated Poster Presentations

Moderated Poster Session 1
Knee 1
Moderator: Arielle Fischer, PhD
Innovation Theater (North Hall A–C)

10:25 AM – 11:05 AM
10:25 AM Poster No. 454
Changes In Patellofemoral Joint Morphology During Skeletal Growth And Maturation Are Not Sex-Dependent
Shayan Hosseinizadeh; Martha M. Murray; Ata M. Kiapour

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

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

Poster No. 462
In Vitro Effects Of Macrophages On Common Orthopaedic Implant Alloys
Griffin M. Heise; Caitlin Black; Brian Morrow; Richard Smith; William Mihalko

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

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

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

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

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

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. Salzmann; Oliver C. Sax; Colleen Rentenberger; Jennifer Shue; John A. Carrino; Andrew A. Sama; Frank P. Cammisa; Federico P. Girardi; Alexander P. Hughes

**10:29 AM**  
**Poster No. 437**  
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; 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  
Devarah 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; Devarah 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 Matsu; Yuen Rufei; 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  
Sooyon 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
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 Piuzzi; 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

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<thead>
<tr>
<th>Time</th>
<th>Podium Session 6</th>
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<th>Spotlight Session 10</th>
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<td>11:15 AM</td>
<td>Paper No. 28</td>
<td>Paper No. 34</td>
<td>Paper No. 40</td>
<td>Paper No. 46</td>
<td>SPOTLIGHT SPEAKER</td>
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<td>11:25 AM</td>
<td>Paper No. 29</td>
<td>Paper No. 35</td>
<td>Paper No. 41</td>
<td>Paper No. 47</td>
<td>Hani A. Awad, PhD</td>
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<td>11:35 AM</td>
<td>Paper No. 30</td>
<td>Paper No. 36</td>
<td>Paper No. 42</td>
<td>Paper No. 48</td>
<td>Emerging Paradigms</td>
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<td>Valgus High Tibial Osteotomy Reduces Osteoarthritis in the Anteromedial Tibial Plateau in an Ovine Model of Partial Anterior Meniscusectomy</td>
<td>Adgrg6 In Chondrocytes Modulates Articular Cartilage Homeostasis And Osteoarthritis Development Through Regulation of STAT3 And CAMP Signaling</td>
<td>Novel In Vitro Microfluidic Co-Culture Platform for Osteocyte Mechanotransduction Studies</td>
<td>Comparison of Patient Demographics, Causes, and Patient-Related Risk Factors for Emergency Department Visits Following Primary Total Knee Arthroplasty</td>
<td>Tendon Supplementation: Science to Practice</td>
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<td>Paper No. 43</td>
<td>Paper No. 43</td>
<td>Paper No. 49</td>
<td>Paper No. 50</td>
<td>Cell Senescence in Tendon Aging and Pathology</td>
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<td>Paper No. 44</td>
<td>Paper No. 44</td>
<td>Paper No. 55</td>
<td>Paper No. 53</td>
<td>Enhancing Tendon-to-Bone Attachment Healing Via Pharmacological Ikkβ Inhibition</td>
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<td>Paper No. 45</td>
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<td>Paper No. 56</td>
<td>Psychological Function and Clinical Impact of Obstetric Patients’ Injuries who Use Opioids</td>
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<td>12:05 PM</td>
<td>Paper No. 33</td>
<td>Paper No. 39</td>
<td>Paper No. 51</td>
<td>Paper No. 57</td>
<td>Clinical Interpretations of Post-Arthroplasty Outcome Surveys in Patients with Total Knee Arthroplasty</td>
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**Spotlight Speaker**

Hani A. Awad, PhD
Emerging Paradigms in Tendon Healing

**Podium Session 6**

**Knee – Anatomy, Biomechanics and Reconstruction**

Moderators: John Elias, PhD and Edward Woytys, 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 Heverian, PhD and Matthew Silva, PhD

**Podium Session 9**

**Epidemiology**

Moderators: Minami K. Yamamura; Patrick Carry; Kaley Holmes; Alicia Phillips; Brandon Ogilvie; Nancy Hudson Miller; Karin A. Payne

**Spotlight Session 10**

**Cellular and Molecular Mechanisms in Tendon Pathology**

Moderators: Matthew Fisher, PhD and Martha M. Murray, MD

**FEBRUARY 8 – 11, 2020 | PHOENIX, ARIZONA**
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.

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 Dyment, PhD; Leesa Galatz, MD; Catherine K. Kuo, PhD; Lou Soslowsky, 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.

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.

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.
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

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, Histion, 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 Nepppl, 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 Nepppl, 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

<table>
<thead>
<tr>
<th>Time</th>
<th>Podium Session 11 Title</th>
<th>Modulators</th>
<th>Room</th>
<th>Podium Session 12 Title</th>
<th>Modulators</th>
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<th>Podium Session 13 Title</th>
<th>Modulators</th>
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<th>Podium Session 14 Title</th>
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<th>Podium Session 15 Title</th>
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<tbody>
<tr>
<td>3:15 PM</td>
<td>Will Methods of Reducing the Irregularity of the Tibial Osteotomy Lead to Improved Fixation of Cementless Tibial Components?</td>
<td>Luis Delgado-Valdaballa; Hugh L. Jones; Sabir Ismaily; Philip C. Noble</td>
<td>West 301 A</td>
<td>Looking Past the Bone—Biomarkers in Clinical Study</td>
<td>Zbigniew Gugala, MD, PhD and Jessica Lehoczky, PhD</td>
<td>West 301 B</td>
<td>Bone—Structure and Function</td>
<td>Sara McBride-Gayou and Joseph Wallace, PhD</td>
<td>West 301 D</td>
<td>Meniscus</td>
<td>Martin England, PhD and Chaituraka Jayasurya, PhD</td>
<td>North 221</td>
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<td>3:35 PM</td>
<td>Impact of Alignment Variation and Activity on Tray-Bone Interface Micromotions in Cementless Total Knee Arthroplasty</td>
<td>Huizhou Yang; Rita Bayoglu; Chadd Clay; Paul J. R ballerott</td>
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<td>3:55 PM</td>
<td>Experimental Investigation into Cementless Tibia Stability</td>
<td>John Kyle F. Mueller; Erik Siggelkow; Charlie Parduhn; Brian Roach; Nick Drum; Marc Bandi</td>
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4:30 PM – 5:30 PM Scientific Sessions

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<tr>
<th>Time</th>
<th>Podium Session 16 (TKA Biomechanics) Moderators: Queon Li, PhD and Paul Ruhkkoetter, PhD</th>
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<tbody>
<tr>
<td>4:30 PM</td>
<td>Paper No. 85 Bi-uni-condylar Arthroplasty: Improved Biomechanical Efficiency, Superior Gait Characteristics and Higher Patient Satisfaction Compared to Total Knee Arthroplasty Amy Garner; Oliver Dandridge; Richard van Arkel; Andrew Amis; Justin Cobb</td>
</tr>
<tr>
<td>4:40 PM</td>
<td>Paper No. 86 The Influence of Bearing Thickness and Tibial Slope on the Anterior and Posterior Cruciate Ligament in Bi-cruciate Retaining Total Knee Arthroplasty Yohi Okada; Atsushi Teramoto; Yatarou Shibata; Shogo Nabeisi; Kosuke Shoikawa; Tomoki Kamiya; Kota Watanabe; Mineko Fujimiya; Himmichi Fujie; Toshihiko Yamashita</td>
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<tr>
<td>4:50 PM</td>
<td>Paper No. 87 Intra-operative Soft Tissue Targets in Total Knee Arthroplasty Edgar A. Wakelin; Sami Shalfoub; Jeffrey M. Lawrance; John M. Keggi; Amber Randall; Corey E. Ponder; Jeffrey H. DeClaire; Jan Koenig; Christopher Piakos</td>
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**SPOTLIGHT SPEAKER**
Tonia Vincent, PhD

Is Osteoarthritis One or Several Diseases?

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<tr>
<th>Time</th>
<th>Podium Session 17 (Osteoarthritis Pathophysiology) Moderators: Goyle Lester, PhD and Grish Patelappa, PhD</th>
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<tr>
<td>4:40 PM</td>
<td>Paper No. 94 Varying Growth Characteristics of Staphylococci Aureus Isolates Causing Mild, Moderate, or Severe Illness in Children with Acute Hematogenous Osteomyelitis Paula A. Hernandez; Laura M. Elinson; Naureen G. Taneen; Chanhee Jo; Lawson A. Copley</td>
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<td>4:50 PM</td>
<td>Paper No. 95 Antistaphylococcal Antibodies from Circulating Plasminogenclasts can Diagnose and Differentiate Various Staphylococcal Infections Gowrisankar Muthusrikrishnan; James Brodell; Charles Lee; Christopher Beck; Cheryl Aker-Bicknell; John Dais; Edward Schwarz</td>
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**SPOTLIGHT SPEAKER**

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<tr>
<th>Time</th>
<th>Podium Session 18 (Orthopaedic Infections—Biomechanics) Moderators: Nonnen Hickin, PhD and Dustin Williams, PhD</th>
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<tr>
<td>4:40 PM</td>
<td>Paper No. 96 Elevated Levels of Serum Esr And Crp Prior to Second-Stage Re-implantation Surgery For Periprosthetic Joint Infection Are Associated with Poor Outcomes Wittawat Boonyanuwat; Liang Xiong; Weihao Chen; Venkataakihal Tirumala; Christian Kient; Young-Min Kwon</td>
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<td>4:50 PM</td>
<td>Paper No. 97 Diagnostic Utility of a Novel Protein Point-of-Care Test of Calprotectin for Periprosthetic Joint Infection in Total Knee Arthroplasty Carlos A. Higuera Rueda; Jared A. Warren; Hiba K. Anis; Tejgur S. Panu; Jessica M. Mill; Kathleen Bowers; Alison K. Klika; Jessica Colón-Francisco; Xiaochun Zhang; Nicolas S. Puzi</td>
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**SPOTLIGHT SPEAKER**

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<tr>
<th>Time</th>
<th>Podium Session 19 (Shoulder—Computational and Technological Approaches) Moderators: Rebecca Bell, PhD and Drew Linsdown, MD</th>
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<tr>
<td>4:40 PM</td>
<td>Paper No. 100 Differentiating Healthy and Compromised Shoulder Exercise Performance with a Smartwatch and Machine Learning David Burns; Daniel Fourrier; Carin Whyne; Clark Dickerson; Stewart McAllinich</td>
</tr>
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<td>4:50 PM</td>
<td>Paper No. 101 Validation of Immersive Virtual Reality Revealing Improved Efficient Surgical Skill Acquisition in Senior Orthopedic Residents: A Prospective Blinded Randomized Controlled Trial Ryan Lohre; Aaron Bois; George S. Alwalkh; Danny P. Geel</td>
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**SPOTLIGHT SPEAKER**

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<th>Time</th>
<th>Podium Session 20 (Therapeutic Control of Skeletal Muscle Function) Moderators: Sarah Greising, PhD and Rick Lieber, PhD</th>
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<tr>
<td>4:40 PM</td>
<td>Paper No. 102 Designing and Differentiating Various Orthopaedic Infections – Biomarkers: A 30-Year Translational Journey at Wake Forest School of Medicine Mehul A. Dharia; Yang W. Son; Andrew M. Mosh; Brian D. Brause; Asim A. Ahmed; Christopher E. Mason; Michael B. Cross; Laura Donlin</td>
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**SPOTLIGHT SPEAKER**

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<tr>
<th>Time</th>
<th>Spotlight Session 20 (Orthopaedic Infections—Biomechanics) Moderators: Nonnen Hickin, PhD and Dustin Williams, PhD</th>
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<tr>
<td>4:50 PM</td>
<td>Paper No. 103 Predicting Clinical Outcomes after Total Shoulder Arthroplasty Using 3 Different Supervised Machine Learning Algorithms Vikas Kumar; Christopher P. Roche; Steve Overman; Ryan Simovitch; Pierre Henri Florn; Thomas Wright; Joseph Zuckerman; Howard Routman; Ankur Teredesai</td>
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**SPOTLIGHT SPEAKER**

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<th>Time</th>
<th>Spotlight Session 21 (Therapeutic Control of Skeletal Muscle Function) Moderators: Sarah Greising, PhD and Rick Lieber, PhD</th>
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<tr>
<td>4:40 PM</td>
<td>Paper No. 104 In Vivo Kinematics and Contact Path After Reverse Shoulder Arthroplasty Gillian E. Kane; Clarissa LeVasseur; Alexandra Gabrielle; William Anderst; Albert Lin</td>
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**SPOTLIGHT SPEAKER**

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<tr>
<th>Time</th>
<th>Spotlight Session 22 (Orthopaedic Infections—Biomechanics) Moderators: Nonnen Hickin, PhD and Dustin Williams, PhD</th>
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<tr>
<td>4:50 PM</td>
<td>Paper No. 105 Initial Fixation in Reverse Total Shoulder Arthroplasty: Validated Modeling Approach Mehul A. Dharia; Yang W. Son; Jeffrey E. Bischof</td>
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</table>
5:30 PM – 7:00 PM  
**Exhibit & 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 & 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 Klemt; Janna van den Kieboom; Venkatsaikalih Tirumala; Ruben Oganesyan; 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 Acromiohumeral 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; Wei Yuan 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 Mumert; Sascha Bombsbosch; 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 Wassaf; 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)
SUNDAY, FEBRUARY 9

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.
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<th>Spotlight Session 24</th>
<th>Podium Session 25</th>
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<td>8:00 AM</td>
<td>Paper No. 109</td>
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<td>Paper No. 111</td>
<td>Paper No. 115</td>
<td>Paper No. 121</td>
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<tr>
<td>MPFL Recon. vs. Tibial Tuberosity Instability with Patella Alta: Dynamic Simulation</td>
<td>Controlled Delivery of Therapeutic Sirna Using a Highly Versatile Cell-Penetrating Peptide Loaded Collagen-Hyaluronic Acid Scaffold</td>
<td>Bone Degeneration in Young Females Following Anterior Cruciate Ligament Injury</td>
<td>Astaxanthin Protects Against Osteoarthritis Via Nrf2; A Guardian of Cartilage Homeostasis</td>
<td>Effects of the Bioresorbable Ultra-Purified Alginete Gel Combined with Bone Marrow Derived Mesenchymal Stem Cells or Bone Marrow Aspirate Concentrates on Intervertebral Disc Regeneration in Rabbits</td>
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<td>Arthritis Treatment and Therapy</td>
<td>Antioxidant Protects Against Osteoarthritis Via Nrf2</td>
<td>Ferrostatin-1 as an Inhibitor of Blood-induced Chondocyte Cell Death</td>
<td>Intra-Articular Injections of IL6Rα Attenuates Destabilizing Medial Meniscus (DDM) Surgery</td>
<td>Measuring the Neutral Zone: Choosing a Method to Quantify Spinal Instability</td>
<td>Dead Muscle Tissue Promotes Dystrophic Calcification by Lowering Circulating Tgf-B1 Level</td>
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<td>8:30 AM</td>
<td>Paper No. 113</td>
<td>Paper No. 114</td>
<td>Paper No. 118</td>
<td>Paper No. 128</td>
<td>Paper No. 131</td>
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<td>In Vivo Cartilage Contact During Downthill Running After Anterior Cruciate Ligament Reconstruction Combined with Latera Extra-Articular Tenodesis</td>
<td>Impact of Lateral Extra-Articular Tenodesis on Tibiofemoral Contact Mechanics</td>
<td>Intra-Articular Injections of IL6Rα Attenuates Destabilizing Medial Meniscus (DDM) Surgery</td>
<td>Neural Networks to Identify Ablant Mechanosensing in Fibrous Environments</td>
<td>Clinical Effectiveness and Value-Based Care Analysis of Clinical Outcomes Research</td>
<td>The Role of Muscle-Specific Fibroblast Growth Factor 9 (fgf9) in Innervation and Bone Shape</td>
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<td>8:40 AM</td>
<td>Paper No. 119</td>
<td>Paper No. 120</td>
<td>Paper No. 119</td>
<td>Paper No. 129</td>
<td>Paper No. 135</td>
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<tr>
<td>Bone Remodeling in Subchondral Bone Inhibiting Slow Mode-Induced Post-Traumatic OA Development</td>
<td>NR101 Regulates Synovial Inflammation and Bone Destruction in Rheumatoid Arthritis</td>
<td>In Vivo Deletion of HmgB1 Protects Against Inflammation Induced Disc Degeneration</td>
<td>Is Academic Department Teaching Status Associated with Adverse Outcomes After Lumbar Laminalpectomy and Discoscopy for Degenerative Spine Diseases?</td>
<td>Gen1 Labels a Subpopulation of Fap Cells that Respond to Muscle Injury</td>
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<td>Arthritis Treatment and Therapy</td>
<td>Bone Anti-Resorptive Raloxifene Improves the Structure of the Intervertebral Disc and Stimulates Transcription Factors</td>
<td>Sonic Hedgehog Regulates PTH/PTHrP Expression in the Postnatal Mouse Intervertebral Disc</td>
<td>Do Men and Women Benefit Equally from Total Knee Arthroplasty Using a Mono Aspect Ratio Design?</td>
<td>Browning Fibro-Adipogenic Progenitors Improves Muscle Regeneration After Volumetric Muscle Loss</td>
<td>Average Local Vibration Results in a Decrease in Knee Flexor Maximum Voluntary Contraction</td>
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**SUNDAY, FEBRUARY 9 (continued)**

8:00 AM – 9:00 AM Scientific Sessions

**SPOTLIGHT SPEAKER**

Kurt P. Spindler, MD  
_The Role of Cohort Data in Clinical Outcomes Research_
SUNDAY, FEBRUARY 9

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 α1β1
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. Sullentrup; 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-1a 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-Payo; 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. Brahmacary; 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 Sgagliione; 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
Devon 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 Spenst; Christof Hurschler; Henning Windhagen; Thilo Föhrkeimer

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; Simon Radic; 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 Giersven; 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 Croy; Murphy A. Mallow; James J. Verner; Michael A. Flier; 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
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 Pittsburg
How to be a Clinical Researcher / Clinician Scientist
Volker Musahl MD, University of Pittsburg
Panel Discussion
All Speakers
ORS 2020 ANNUAL MEETING
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.
1:30 PM – 3:00 PM Scientific Session

**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.

*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

**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 Inflammaging 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.
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.
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 enthusiast 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.
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<th>Time</th>
<th>Podium Session 35</th>
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<td>8:00 AM</td>
<td>Paper No. 209</td>
<td><strong>SPOTLIGHT SPEAKER</strong></td>
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<td>Depth Camera Measured Biomechanics of The Lower Extremity</td>
<td><strong>John Bateman, PhD</strong></td>
<td>The Role Of PGE2/EP2/4 Signaling Pathways in the Heterotopic Bone Formation of Muscular Dystrophic Mice</td>
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<td>Rib-Hook Construct for Pediatric Hyperkyphosis and Kyphoscoliosis</td>
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<td>Xueqin Gao, Yan Cui, Greg Zhang, Johnny Huard</td>
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<td>Daniel Bonthius, Richard Gross, Yongren Wu, Mohammed A shaleef, Hai Tao</td>
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<td>Effects of Valgus Correction for Medial Osteoarthrits of the Knee On Knee Kinetics After Medial Open Wedge High Tibial Osteotomy: In Vivo Biomechanical Study Using Three-Dimensional Gait Analysis</td>
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<td>Can Differential Analysis Of Knee Moments Improve Our Understanding Of Distinct Patterns Of Cartilage Loss?</td>
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<td>Single Cell Transcriptomic Analysis of Human Pluripotent Stem Cell Chondrogenesis</td>
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<td>Distinct Lineages Derived Chondrocytes from Human Peripheral Blood Induced Pluripotent Stem Cells for Hyaline Cartilage Regeneration</td>
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<td>Osteochondral Tissue Chip Derived from Human iPSCs: Modeling OA Pathologies and Testing Drugs</td>
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<td>Alternative Methylenodepoxide Dosing Paradigms Differentially After Male Rat Femoral Microstructure and Biomechanics</td>
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<td>How Muscle Contractions Shape Embryonic Bones: A Phase-Contrast Enhanced Synchrotron X-Ray Tomography Study</td>
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<td>Maria Pierantoni, Sophie Le Cann, Vivien Sotiriou, Andrew J. Boden, Niamh Nowlan, Hanna Iakasson</td>
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<td>Enrichment for Genetic Predictors of Bone Quality Using Unbiased Analysis of Mouse Transcriptome and Human Genome-Wide Association Study</td>
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<td>Transcriptional Response to Mechanical Load of Adults is Greater than Young Animals in a Tissue-Specific Manner</td>
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<td>The Anabolic Response to Loading in Mio-4 Cells is Suppressed by Neighboring Senescent Cells and Their Senescence-Associated Secretory Phenotype</td>
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<td>Pelvic Compensation Accompanying Spinal Malalignment and Back Pain Related Factors in General Population</td>
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**MONDAY, FEBRUARY 10**

8:00 AM – 9:00 AM Scientific Sessions

**Podium Session 35**
- **Knee – Reconstruction and Gait**
  - Moderators: Cathy Carlson, DVM, PhD and Peter Lee, PhD

**Podium Session 37**
- **Human Induced Pluripotent Stem Cells for OA Treatment and Cartilage Regeneration**
  - Moderators: Netai 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 Weihe, 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

**Spotlight Speaker**
John Bateman, PhD
Modeling Cartilage Development and Disease Using Human Induced Pluripotent Stem Cells

See Next Page For Late Breaking Session
MONDAY, FEBRUARY 10 (continued)

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. Krahl; Tobias Jung; Georg N. Duda

8:48 AM Paper No. 2299
Morphological Assessment of the Trochlear Groove with Respect to Ldفا, 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 / ORS Women’s Research Fellowship
Stephanie G. Cone, PhD
University of Wisconsin
Direct Measurement of Tendon Loading Following Pediatric and Adolescent ACL Reconstructions

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; Emilie 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; Quanjun 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 Ofspine 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
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; Upeen 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; Venkatsaiakhil Tirumala; Paul Walker; Ruben Oganesyan; 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; Yuri Chinenov; Joseph Nguyen; Laura Donlin; Brian Halpern; Scott Rodes; 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; Sreevatsa 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)

10:29 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
Floreike Eggermont; Gerco van der Wal; Paulien Westhoff; Arjonne Laar; Marianne de Jong; Tom Rozema; Herman Kroon; Onarisa Ayu; Loes Derik; Sander Dijkstra; Nico Verdonscot; 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 Vashishtth

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 LX84 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
Brianne 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 Fgt9 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 Dyment; Louis J. Soslowsky; X. Sherry Liu
11:15 AM – 12:15 PM Scientific Sessions

**MODERN, FEBRUARY 10 (continued)**

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<td>Paper No. 242</td>
<td>Soft Tisues We Induced Osteoblast Differentiation by Providing Glutamine for De Novo Amino Acid Synthesis.</td>
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<td>Paper No. 243</td>
<td>Yap and Taz Coordinate Endochondral Bone Development Joseph M. Collins</td>
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<td>Paper No. 244</td>
<td>Does Lack of Muscle Lead to Abnormal Crystal Growth During Murine Long Bone Development? Isabella Silva Barreto, Sophie Li Cann, Marielle Lieb, Vivien Sotrino, Michael J. Turunen, Tim Han A. Gräns, Nihan Nowlan, Hanna Isaksson</td>
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<td>11:55 AM</td>
<td>Paper No. 250</td>
<td>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 Caspy J. Johnson, Ferenc Toth, Alexandre R. Armstrong, Harry K. W. Kim, Jutta M. Ellermann, Christopher K. Kepler</td>
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<td>Paper No. 251</td>
<td>Does Lack of Muscle Lead to Abnormal Crystal Growth During Murine Long Bone Development? Isabella Silva Barreto, Sophie Li Cann, Marielle Lieb, Vivien Sotrino, Michael J. Turunen, Tim Han A. Gräns, Nihan Nowlan, Hanna Isaksson</td>
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**SPOTLIGHT SPEAKER**

Constance Chu, MD
Visualizing Pre-Osteoarthritic: Integrating MRI UTE-T2* with Mechanics and Biology to Combat Post-Traumatic Osteoarthritis

**Moderators:**
- S. Gilchrist, PhD
- H. Kitano, MD
- A. Reiter, PhD

**Players:**
- A. Maniscalco, MD
- B. Winkelstein, MD
- H. Lo, MD

**Topics:**
- Osteoarthritis
- MRI
- Mechanics
- Biology
- Post-Traumatic Osteoarthritis
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 Lehmicke, 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.
1:30 PM – 3:00 PM
Room: West 301 D
**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.

**Nanobiotechnology 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, in some cases, 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.*

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**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.

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**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.

Visit ors.org/stryker-ors-fellowship for more information
MONDAY, FEBRUARY 10 (continued)

3:15 PM – 4:15 PM Scientific Sessions

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<td>Implant Positioning in Total Hip Arthroplasty within a Target Zone: A Comparison Between Traditional vs. Computer Assisted Navigated Surgery</td>
<td>GIRK3 Suppresses Kappa Opioid Responses in Chondrocytes</td>
<td>Pas Cells are Activated During Implant Osseointegration in a Mouse Tibial Implant Model</td>
<td>Staphylococcus Aureus: Inhibiting Cell Growth, Biofilm Formation And Pathogenicity is tca-dependent</td>
<td>Influence of Spinal Motion on Lumbar Intervertebral Disc Space Width Distribution Influence of Spinal Motion on Lumbar Intervertebral Disc Space Width Distribution</td>
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<td>Preoperative Opioid Use Negatively Impacts Patient-Reported Outcomes After Revision Total Hip Arthroplasty</td>
<td>Regulation of Chondrogenesis by Long Non-Coding Rnas</td>
<td>Lgr6, an Adult Stem Cell Marker, is Expressed in Periosteal Cells &amp; is Correlated with Osteogenic Potential</td>
<td>Intracellular Methicillin-Resistant Staphylococcus Aureus (mrsa) and Inflammatory Reaction Persist After Treatment with Vancomycin in a Novel Murine Model of Mrsa Septic Arthritis</td>
<td>In-Vivo Three Dimensional Changes of The Spinal Canal Before and After Corrective Surgeries of Adolescent Idiopathic Scoliosis Chaoan Fan</td>
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<td>Karim Sabeh, Eitan Ingali, Matthew Furry, Venkatakaihal Tulimala, Christian Kient, Young-Min Kwon</td>
<td>Hs34 comforts the Myeloid Lineage Restriction During Mouse Intervertebral Disk Healing by Long Non-Coding Rnas</td>
<td>Laura Doberty; Sanja Novack, Jessica Letchcoy, Ivo Kalapic, Kurt D. Hanksen, Archana Sanjay</td>
<td>Francis Y. Lee; Kamene D. Alder, Kwon-Hyuk Kwon, Sean Cahill, Inkyu Lee, Saemil Lee, Jungho Back, Zichen Hao, Lu Li, Montana T. Morris</td>
<td>Stephen Pickup, Chao Wang, Lin Han; Robert L. Mauck, Harvey E. Smith, Sarah E. Guilbrand</td>
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<td>Can the Sagittal Pelvic Tilt be Estimated from Ap Pelvic Radiographs in Patients Waiting Total Hip Arthroplasty? A Prospective, Diagnostic Cohort Study</td>
<td>TGFBR2 / Noggin Axis is Identified by Single Cell RNA-Sequencing and Outcomes of The Regenerating Appendage Regeneration</td>
<td>Assessment of Antibiotic Therapies to Eradicate S. Aureus Occupying the Osteocytic-Canalicular Network of Cortical Bone in a Murine Model</td>
<td>VertebraleBecule Remodeling Reduces Small Molecule Transport into the Degrernating Intervertebral Disc</td>
<td>Zichen Hao; Lu Li; Montana T. Morris</td>
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<td>Moritz M. Inmann, Christian Merle; Paul E. Beaulieu, George Grammatopoulos</td>
<td>Comparison of the Therapeutic Effect of Bone-Modifying Agents for Acute Osteomyelitis in Mice</td>
<td>Assessment of Antibiotic Therapies to Eradicate S. Aureus Occupying the Osteocytic-Canalicular Network of Cortical Bone in a Murine Model</td>
<td>Mark J. Ninomiya, Sharon M. Sosa, Yingzhen Niu, Stephen Pickup, Chao Wang, Lin Han; Robert L. Mauck, Harvey E. Smith, Sarah E. Guilbrand</td>
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<td>The Relationship Between In Vivo Range Of Motion and Simulated Range of Motion in Total Hip Arthroplasty</td>
<td>Single Cell RNA-sequencing Reveals Diverse Progenitor Populations of The Regenerating Marine Digit Tip</td>
<td>Cellular Heterogeneity And Lineage Restriction During Mouse Digit Tip Regeneration At Single Cell Resolution</td>
<td>Bacteriophage-Derived Lysin Combining with Vancomycin Demonstrates Superior Antimicrobial Potential in Murein DAIR Model of PII</td>
<td>Strains Measured Using Tomosynthesis-Based Digital Volumes Correlation are Detectable Under Load and Reflect Age-Related Changes In Human Vertebral Bone Daniel Gravé, Roger Zavale, Michael J. Flynn, Yener N. Yeni</td>
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<td>Ryo Mitsukata, Hiromasa Tanino, Yasuhara Nishida, Hiroshi Ito</td>
<td>Cathodylatisco-Uncal Heterogeneity Engagement in Dynamic with Chondrocytically Differentiation Ryan Daniels, Robert Mauck</td>
<td>Gemma Johnson; Erick Masias; Jessica Letchcoy</td>
<td>Edward M. Schwarz, Chao Xie; Steven Gill, Inkyu Lee, Saemil Lee, Jungho Back, Zichen Hao, Lu Li, Montana T. Morris</td>
<td>Michael J. Flynn, Yener N. Yeni</td>
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<td>Paper No. 296</td>
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<td>How Much is Enough? Contributions of Capsular Releases to Femoral Exposure in THA Via A Direct Anterior Approach</td>
<td>PIE201 is a Tendon Mechanosensor of Shear Stress That Determines Tissue Strength and Stiffness</td>
<td>Development of Novel Therapeutic Strategy for Osteosarcoma Transplanting Controlled-Release Piranubicin Conjugated Endothelial Progenitor Cells</td>
<td>Stable Cartilage Progenitor Cell Line Stimulates Healing of Meniscus Injury in the Rat Knee</td>
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<td>Zackary Byrd; Shuyang Han; Sabir Ismaily; Luis E. Delgadillo-Chabolla; Adam Freehand; Philip C. Noble</td>
<td>Fabian S. Passini; Aimian S. Saab; Patrick Jaeger; Matthias J. Art; Kim D. Ferrar; Dominik Haenni; Sebastiano Caprara; Bruno Weber; Jess G. Sneudeker</td>
<td>Yohei Kawakami; Teruya Kawamoto; Hitomi Hara; Shuichi Fujihara; Kazumichi Kitayama; Shunsuke Yahiro; Ryosuke Kuroda; Yoshio Akiu</td>
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<td>Tribocorrosion of CoCrMo- alloys in Various Model Synovial Fluids: The Role of Hyaluronic Acid</td>
<td>Multiaxial and Multiscale Strain Assessment Across the Mouse Achilles Tendon During Passive Dorsiflexion</td>
<td>A Cross-Species Personalized Medicine Pipeline Identities The CRMI Export Pathway as a Potentially Novel Treatment for Osteosarcoma</td>
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<td>Simona Radice; Alfons Fischer; Markus Wimmer</td>
<td>Keshia Mora; Samuel Mlwere; Alayma Losell; Mark Buckley</td>
<td>Alexander L. Lazarides; Jason Somarilli; Erend Attune; Shenra Rao; Sarah Hoskinson; Serene Cheng; So Young Kim; Kathryn Ware; Cindy Eady; S. David Hsu; William Eward</td>
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<td>The Impact of Variation in Reaming Depth and Stem Offset on Joint Mechanics Following THA</td>
<td>Anterior Cruciate Ligament Bundle Function Differences Between Sexes Throughout Skeletal Growth in a Porcine Model</td>
<td>Inflammatory Interactions Between Aggressive Breast Cancer and Bone Cells</td>
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<td>Casey A. Myers; Paul J. Rullkoetter</td>
<td>Danielle Howe; Stephanie G. Cone; Jorge A. Piedrabita; Lynn A. Fordham; Jeffrey T. Spang; Matthew B. Fisher</td>
<td>Promote Bone Destruction Through Perk1 /2 Signaling and Inflammatory Conversion of Quiescent Osteoblasts</td>
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<td></td>
<td>The Effect of Lower Limb Length and Hip Offset Differences, and Surgical Approaches on Gait Mechanics in Total Hip Arthroplasty</td>
<td>Acute Reduction In Collagen V Expression Increases Viscosity and Elasticity in Mature Tendons</td>
<td>Trebectedin Suppresses Osteosarcoma Lung Metastasis</td>
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<td>Mario Lamontagne; Erik Kowalski; Danilo S. Catelli; George Grammatopoulos; Paul E. Beaulé</td>
<td>Ryan Leiphart; Stephanie Weiss; David Birk; Louis Soslowsky</td>
<td>Masahiro Inoue; Keisuke Horiuchi; Yuko Mungor; Mih N. Nam Nguyen; Jungho Back; Lu Li; Luier Gillingov; Inkyu Lee; Santim Lee; Francis T. Lee</td>
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<td>Multivariate Usage of Magnetic Resonance (MR) Biomarkers to Predict Histologically Confirmed Necrosis in Failed Total Hip Arthroplasty (THA)</td>
<td>Toughtening Mechanisms in Healthy and Pathologic Tendon Tendinopathies</td>
<td>A Novel Approach to Identifying Genes Driving Metastasis in Ewing’s Sarcoma</td>
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<td>Mohammad Sherdast; Thomas W. Bauer; Hollis G. Potter; Matthew F. Koff; Kevin M. Koch</td>
<td>Mikhail Golman; Adam A. Abraham; Iden Kurtaliaj; Brittany F. Marshall; Yichong Hu; Edward Guo; Guy Genin; Victor Birman; Stavros Thomopoulus</td>
<td>Charlotte E. Palmer; Matthew J. Allen</td>
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<td>5:20 PM</td>
<td>Paper No. 292 – GUEST NATION</td>
<td>Collagen and PrP4 Fluorescent Reporter Mice Establish Unique Subsets of Tendon Fibroblasts</td>
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<td>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 Thewiss</td>
<td>Nathaniel Dymant; Xi Jiang; Catherine Bautista; Anjana Srikumar; Andrew Hendrix; Courtney Thompson; Alexander Kuang; Andrew Kim</td>
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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; Isaac 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-β) 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 Cucchiarini

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; Erika 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

6:50 PM – 6:55 PM
Exhibit & Poster Hall (North Hall A–C)

Monumental Poster Presentations

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
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

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

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

Local And Abscopal Effects Of Fractionated Hindlimb Irradiation On Bone Marrow Cell Populations
Ashley R. Sweeney-Ambros; Timothy A. Damron; Megan E. Oest

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 Kikutani; Takashi Yurube; Zhongying Zhang; Yuji Kakiuchi; Yoshiki Takeoka; Ryu Tsujimoto; Kunihiko Miyazaki; Toru Takada; Yasuhiro Tabata; Ryosuke Kuroda

Transcription Factor Twist1 Affects On Expression Of Abc Transporters And Chemoresistance To Doxorubicin In Human Osteosarcoma Cells
Hiroya Kondo; Joe Hasei; Mahito Nakanishi; Shota Takihara; Miho Kure; Ryoji Joko; Koji Demiya; Suguru Yokoo; Eiji Nakata; Aki Yoshida; Toshiyuki Kunisada; Toshifumi Ozaki

Mithramycin A Radiosensitizes Ews:Fli1+ 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

Research Interest Group: Hip Dysplasia and Other Structural Hip Disorders
Organizers: Alessandra Carriero, PhD, The City College of New York Victor Huayamae, 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.

Mayo Clinic Alumni Reception (Ancillary Event)
## TUESDAY, FEBRUARY 11

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

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<td>Stem Cells and Chondrocytes for Regenerative Medicine</td>
<td>Bone – Cell Signaling and Treatments</td>
<td>Tendon – Biology and Growth</td>
<td>Biomaterials for Bone Regeneration</td>
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<td>Moderators: Michael Samaan, PhD and Sophie Williams, PhD</td>
<td>Moderators: Michelle Delto, DVM, PhD and Matthew Hillion, PhD</td>
<td>Moderators: Melissa Kacena, PhD and Hongshuai Li, MD, PhD</td>
<td>Moderators: Anne Ginsberg, PhD and Megan Kiliyan, PhD</td>
<td>Moderators: Claire Acevedo, PhD and Nick Willett, PhD</td>
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<td>Objective Mechanical Measures Predict Post-traumatic OA Risk After Intra-Articular Fracture of the Acetabulum</td>
<td>SpineDeficiency in the Prrx1+ Osteochondroprogenitors Blocks Osteogenic Differentiation and Causes Cartilage Tumorigenesis</td>
<td>YAP is Required for Load-Induced Gene Expression Changes in the Tendon</td>
<td>Resorption of Hydroxyapatite Ceramic Spacers Following Expansive Open-Door Laminoplasty: A Quantitative Long-Term Study</td>
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<td>8:00 AM</td>
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<td>270 Degree Labral Reconstructions Lead to Increased Contact Pressure and Decreased Suction Seal Compared to Primary Labral Repair: A Cadaveric Study</td>
<td>E2fz4/Acr2/2 Maintains Bone Homeostasis Through Regulation of Skeletal Stem Cell Proliferation</td>
<td>Depletion of Tendon Cells Results in Increased Biomechanical Properties of Healing Flexor Tendon</td>
<td>E-Jet Printing of Nanocomposite Scaffolds for Enhanced Bone Tissue Engineering</td>
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<td>8:30 AM</td>
<td>Paper No. 314</td>
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<td>Vitamin E Alters The Effects Of CoCrMo Degradation Products on DNA Replication-Fork Initiation and Progression</td>
<td>Hyper-Innervation Driven by Myt-1/Ka Signaling is Required for Heterotopic Bone Formation</td>
<td>Mesenchymal Stem Cells-Derived Exosomes in Achilles Tendon Repair and Its Quality Evaluation by Glycan Epitopes</td>
<td>The Bio-integration and Bone Fixation Performance of Continuous Mineral Fiber-Reinforced Implants</td>
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<td>8:40 AM</td>
<td>Paper No. 315</td>
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<td>Seven-Year Follow-Up of Vitamin E-Diffused Highly Cross-Linked Polyethylene in Total Hip Arthroplasty</td>
<td>Sodium Sulfate Treatments as Modulator of Immune Populations to Create A Healthy Inflammatory Environment During Femur Fracture in Aging</td>
<td>F4/80 Tendon Resident Macrophages and Potential Phenotypes of Embryonic Tendon Repair and Growth</td>
<td>Fe-ε, Embedded Ti, Nano Rods With Electromagnetic Field Polarize Macrophages to M2 Phenotype and Promote Osteogenesis and Angiogenesis</td>
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<td>Yohin Naito, Masahiro Haragawa, Shinie Tone, Hiroki Wakabayashi, Akiko Sudo</td>
<td>Emma Muinos Lopez, Anne Marie Josephson, Philipp Leucht</td>
<td>Catherine A. Bautista, Xi Xiang, Kyo Sang Joong, Nathaniel A. Syment</td>
<td>Ranque Ren, Jiachao Guo, Wei Xiong</td>
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<td>Wear of UHMWPE Using ADL Scratched Femoral Heads in a Hip Simulation</td>
<td>Macrophage Primary Cilia Lengthening Inhibits Osteoclastogenesis</td>
<td>Scaffolds Versus Rhbmp-2 In a Rat Spinal Arthrodesis Model</td>
<td>Fusion Efficacy and Biomechanical Evaluation of 3D-Printed Hyperelastic Bone® Composite Scaffolds Versus Rhbmp-2</td>
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<td>9:00 AM</td>
<td>Paper No. 317</td>
<td>Paper No. 325</td>
<td>Paper No. 331</td>
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<td>Physiologic Preconditioning of Mesenchymal Stem Cells (MSC) has a Beneficial Effect on Cytokine Inhibited MSC Chondrogenesis and In Vivo Cartilage Repair</td>
<td>AllBio, 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</td>
<td>Coated Regulation of Collagen Organization by Scleraxis and Mohawk at Postnatal Stages of Tendon Growth</td>
<td>Bone Ingrowth of RTT Porous Structure</td>
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<td>RTL3 Coordinates with SOX9 to Regulate Col2A1 Expression in Human Articular Chondrocytes Hope C. Ball, Mohammad Y. Ansari, Osteogenesis and Angiogenesis to M2 Phenotype and Promote Osteogenesis and Angiogenesis to M2 Phenotype and Promote Osteogenesis and Angiogenesis</td>
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<td>Elizabeth Higposteed, Madison Miller, Jason Langhorn</td>
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<td>Yuta Hayashi, Shigeru Miyaki, Yohi Saneda, Hiroaki Tateno, Naoko Saki, Masakazu Ishikawa, Tomoyuki Nakasa, Nobuo Adachi</td>
<td>Gregory Charles Bertel, Ronit Merchav-Feuermann, Abraham Nyska, Nicolette Dudley Jackson</td>
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9:00 AM – 10:00 AM
Exhibit & Poster Hall (North Hall A – C)
Exhibit & Poster Session 2 Poster Viewing
(Authors required at ODD posters)

9:10 AM – 9:50 AM
Exhibit & 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 & 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. 415
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 Bhave; 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 Mingalou; 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; Antonio Chen; Orhun Muratoglu; Mohammad Amin Morid; 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 Bang; 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 Zauke

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; Yejia 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. Beaule
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<th>Time</th>
<th>Poster No.</th>
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<tr>
<td>9:30 AM</td>
<td>Poster No. 420</td>
<td>Interbody Fusion In A Large Animal Model With Escherichia Coli-derived Rhbmp-2</td>
<td>William R. Walsh; Matthew H. Pelletier; Tian Wang; James Crowley; Daniel Wills; Christopher Tan; Ralph J. Mobbs; Carine Hsiao</td>
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<td>9:34 AM</td>
<td>Poster No. 421</td>
<td>Tmem100.creert2 Transgene Marks Mesenchymal-lineage Cells And Endothelial Cells In A Mouse Model</td>
<td>Eun Sung Suh; Alexander Vesprey; Didem Goz Ayturk; Ugur Ayturk</td>
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<td>9:38 AM</td>
<td>Poster No. 422</td>
<td>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</td>
<td>Kathleen Turajane; Gang Ji; Yuri Chinenov; David Oliver; Branden Sosa; Ugur M. Ayturk; Matthew B. Greenblatt; Lionel B. Ivashkiv; Mathias Bostrom; Xu Yang</td>
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<td>9:42 AM</td>
<td>Poster No. 428</td>
<td>Controlled Delivery Of Bioactive Molecules For Healing Of Critical-sized Femoral Defects In A Rat Model Of Bone Healing</td>
<td>Deepak Bushan Raina; Lucas Maximilian Matuszewski; Corina Vater; Julia Bolte; Hanna Isaksan; Lars Lidgren; Magnus Tågil; Stefan Zwingenberger</td>
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<td>9:46 AM</td>
<td>Poster No. 435</td>
<td>Intermittent Parathyroid Hormone Alters Peri-implant Cancellous Bone Transcriptional Profile During Osseointegration In A Murine Model</td>
<td>Kathleen Turajane; Gang Ji; Yuri Chinenov; David Oliver; Branden Sosa; Ugur M. Ayturk; Matthew B. Greenblatt; Lionel B. Ivashkiv; Mathias Bostrom; Xu Yang</td>
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**Moderated Poster Session 16**

Intervertebral Disc and Meniscus
Moderator: Yun Peng, PhD
Moderated Poster Theater 2 (North Hall A–C)

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<th>Time</th>
<th>Poster No.</th>
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<tr>
<td>9:10 AM</td>
<td>Poster No. 393</td>
<td>Bio-inspired Double-cross-linkable Tissue Adhesive For Healing Of Avascular Meniscus Tears</td>
<td>Alexander S. Litrel; Juliet L. Allen; Robert Stanciu; Eugenia Lee; Solaiman Tarafder; Chang H. Lee</td>
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<td>9:14 AM</td>
<td>Poster No. 394</td>
<td>Radial Meniscal Tears Was Best Repaired By A Modified “Cross” Tie Grip Suture Based On Biomechanical Comparison Of Four Repair Techniques</td>
<td>Yuta Nakanishi; Daisuke Araki; Kouki Nagamune; Tetsuya Yamamoto; Kanto Nagai; Noriyuki Kanzaki; Yuichi Hoshino; Takehiko Matsuhashita; Ryosuke Kuroda</td>
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<td>9:18 AM</td>
<td>Poster No. 395</td>
<td>Biophysical Cues Regulate Nanoscale Chromatin Organization In Mesenchymal Stem Cells</td>
<td>Su-Jin Hee; Shreyasi Thakur; Claudia Loebel; Peter Relich; Boao Xia; Jason Burdick; Melike Lakadamayali; Robert Mauck</td>
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<td>9:22 AM</td>
<td>Poster No. 446</td>
<td>Deletion Of Rage Signaling Protects The Intervertebral Discs From Morphological And Mechanical Deficits In A Type 2 Diabetic Mouse Model</td>
<td>Remy E. Walk; Tracy Xu; Donald Aboytes; Simon Y. Tang</td>
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<td>9:26 AM</td>
<td>Poster No. 447</td>
<td>TNFα Stimulation Reduces Glycosaminoglycan Content And Material Properties Of The Nucleus Pulposus</td>
<td>Timothy Jacobsen; Nadeen O. Chahine</td>
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<td>9:30 AM</td>
<td>Poster No. 448</td>
<td>A Computational Approach To Cellular Micromechanical Environment In Tissue Engineering Scaffolds</td>
<td>Mitchell Page; Christian Puttlitz</td>
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<td>9:34 AM</td>
<td>Poster No. 449</td>
<td>Multiplex Crispra-driven Collagen &amp; Aggrecan Deposition Drives A Chondrogenic Phenotype Without Exogenous Growth Factors</td>
<td>Niloofar Farhang; Jacob Weston; Bryton Davis; Alison Thompson; Robert Bowles</td>
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<td>9:38 AM</td>
<td>Poster No. 450</td>
<td>Enrichment Of Nucleus Pulposus Progenitor Is Coupled With MEK Kinase Activity</td>
<td>Wai Kit Tam; Daisuke Sakai; Di Liu; Juliana Lee; Kenneth Cheung; Rocky Tuan; Victor Leung</td>
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<td>9:42 AM</td>
<td>Poster No. 451</td>
<td>Computational Analysis Identifies Transcriptional Factor Regulatory Network With Runx1, A Major Driver Of Intervertebral Disc Degeneration</td>
<td>Steven M. Presciutti; Martha E. Diaz-Hernandez; Hicham Drissi; Nazir M. Khan</td>
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<td>9:46 AM</td>
<td>Poster No. 452</td>
<td>Microencapsulation Of Annulus Fibrosus Cells In Oxidized Alginate Microbeads For Intervertebral Disc Cell Delivery</td>
<td>Christopher J. Panebianco; Tiffany Y. Lim; Michael D. Weir; James C. Iatridis</td>
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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
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<th>Time</th>
<th>Podium Session 61: Knee–Biomarkers and Osteoarthritis</th>
<th>Spotlight Session 62: Disc Degeneration</th>
<th>Podium Session 63: Biological Treatments and Therapeutics for Bone</th>
<th>Podium Session 64: From Biology to Mechanics in Hand and Wrist</th>
<th>Podium Session 65: Rotator Cuff—Regeneration and Repair</th>
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**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.

**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
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
Interbody Fusion In A Large Animal Model With Escherichia Coli-derived Rgbmp-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 Donnelly

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 Whitten

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
POSTER SESSION 2 (PS2)

February 10 – February 11

Biomaterials
Poster No. 1417
Bone Healing Using Two Novel Broad Spectrum Antimicrobial Coatings With Allograft
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