ORS
Orthopaedic Research Society

2018 ANNUAL MEETING PROGRAM BOOK

March 9, 2018 Pre-ORS • March 10–13, 2018 • Hyatt Regency New Orleans • New Orleans, LA

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WELCOME TO THE ORS 2018 ANNUAL MEETING

Welcome to New Orleans!

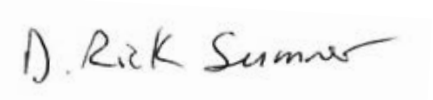
On behalf of the Orthopaedic Research Society, we would like to welcome you to the ORS 2018 Annual Meeting. For 64 years, the ORS Annual Meeting has been a gathering place for those with a passion for musculoskeletal research. Engineers, biologists, orthopaedic surgeons, residents, fellows, students, clinicians, veterinarians, research administrators and many more from across the globe come together and help us to advance our mission to advance musculoskeletal research worldwide.

We encourage you to take advantage of the many opportunities the ORS Annual Meeting provides: to hear the latest research advances and discoveries made by our colleagues, learn about the latest technology advances in the field, participate in career development programs, and have fun with fellow colleagues. We also hope that you go out and enjoy the city of New Orleans where great food and music abound.

Thank you to the many dedicated volunteer leaders who have contributed to the success of the ORS Annual Meeting by serving as a reviewer, moderator, committee member, annual meeting volunteer, and more—over 300 volunteers have helped to make this meeting a success! We would also like to extend our thanks to the ORS staff, who work to ensure that your experience at the ORS Annual Meeting will lead you to make the decision to have the ORS serve as your "home" society.

We wish you a great ORS 2018 Annual Meeting experience and that you make the decision to return in 2019 when we will be in the beautiful and vibrant city of Austin, Texas.

Best regards,



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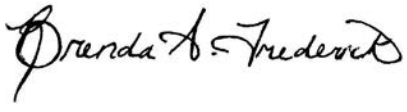

Brenda A. Frederick, IOM
Executive Director
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SCHEDULE

EXHIBIT AND POSTER HALL

Elite Hall, Hyatt Regency New Orleans—Innovation Theater, Charging Stations, Seating, and Refreshment Breaks

Saturday, March 10	8:00 AM–5:45 PM
Sunday, March 11	8:00 AM–5:30 PM
Monday, March 12	8:00 AM–5:30 PM
Tuesday, March 13	7:00 AM–3:00 PM (no exhibits on Tuesday)

SPEAKER READY ROOM

Room 12, Hyatt Regency New Orleans

Friday, March 9	2:00 PM–6:00 PM
Saturday, March 10	7:00 AM–6:00 PM
Sunday, March 11	6:30 AM–6:30 PM
Monday, March 12	7:00 AM–6:30 PM
Tuesday, March 13	7:00 AM–3:00 PM

REGISTRATION

Empire Foyer, Hyatt Regency New Orleans

Friday, March 9	7:00 AM–6:00 PM
Saturday, March 10	7:00 AM–6:00 PM
Sunday, March 11	7:00 AM–6:00 PM
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Tuesday, March 13	7:00 AM–3:00 PM

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TISSUE-BASED TOPICS

Biomaterials: Daniel Kelly, PhD

Bone: Alison Gartland, PhD, Amarjit Virdi, PhD

Cartilage and Synovium: Karen Lyons, PhD, Henning Madry, MD

Diagnostic Imaging: Chair: Yang Xia, PhD

Infection: Bingyun Li, PhD

Meniscus: Amy McNulty, PhD

Muscle: Christopher Mendias, PhD

Osteoarthritis/Other Forms of Arthroplasty: Magali Cucchiarini, PhD, Karen King, P-hD

Regenerative Medicine: Catherine K. Kuo, PhD, Jeremy J. Mao, PhD

Tendon and Ligament: Hani Awad, PhD, Scott Rodeo, MD

Trauma and Fractures: Michael Gardner, MD, Matthew Silva, PhD

Tumors: Michelle Ghert, MD

ANATOMIC TOPICS

Foot and Ankle: Jarrett Cain, DPM, MSc, FACFAS

Hand and Wrist: Roger Cornwall, MD

Hip: Andrew Anderson, PhD

Hip and Knee Arthroplasty: Moussa Hamadouche, MD, PhD, Mario Lamontagne, PhD

Knee: Lisa Larkin, PhD

Shoulder and Elbow: Brian Feeley, MD

Spine: Stephen Ferguson, PhD, Rita Kandel, MD, Edward Vresilovic, MD, PhD

Support the ORS/OREF Resident Reseach and Post-Doctoral Fellowship Grant Fund

Your gift provides orthopaedic resident and post-doctoral ORS members with the opportunity to pursue important research that may one day translate into innovative new treatments and therapies that help patients regain their mobility and enjoy improved quality of life.

Your generous gift:

- Enables post-doctoral ORS members to devote their time and resources to research
- Assists ORS resident members who are exploring careers in research
- Supports ORS and OREF missions to advance orthopaedic research

PhD members receive Order of Merit recognition for a gift of $500 or more. MD and other members will receive Order of Merit recognition for gifts of $1,000 or more.

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ORS COLLABORATIVE EXCHANGE GRANTS
DONATE YOUR DRINK

Donate Your Drink tickets to support the ORS Collaborative Exchange Grants! Our goal is to get 1,000 drink tickets donated to support this great cause. If we can accomplish this, we will raise $9,000 in support of the ORS Collaborative Exchange Grants Fund.

The ORS Collaborative Exchange Grants provide funds to investigators and trainees at any stage of their careers to foster collaboration in orthopaedic-related research areas and to facilitate the exchange of new research methodologies and techniques. Funds can be applied towards travel, accommodation, and living costs for an investigator or trainee to visit another research institution.

Look for the designated **Donate Your Drink** kiosks throughout the meeting. **All donated tickets will be included in a raffle drawing for FREE REGISTRATION for the ORS 2019 Annual Meeting in Austin, TX.**

Collaborating in the Science of Patient Care

AAOS
American Academy of Orthopaedic Surgeons

Attend the AAOS 2018 Annual Meeting and its Specialty Day
Friday, March 9 and Saturday, March 10, Morial Convention Center

Programs included with the $100 Annual Meeting fee:

Friday, 7:00 AM – 6:00 PM
- Symposia
- Paper Presentations
- Posters
- Poster Tours
- Scientific Exhibits
- Orthopaedic Video Theater

Friday, 9:00 AM – 4:00 PM
- Exhibits
  - Ask an Expert
  - Technology Theater

Saturday, 7:00 AM – 3:00 PM
- Posters
- Scientific Exhibits
- Orthopaedic Video Theater

Additional Programs
ORS attendees may purchase tickets for Instructional Courses and Specialty Day sessions.

Friday, 8:00 – 10:00 AM - ORS co-branded ICL 403
The Synovial Joint: Structure, Function, Injury and Repair, Osteoarthritis
Joseph A. Buckwalter, MD – Moderator

Friday, 1:30 – 3:30 PM - ORS co-branded ICL 441
New Paradigms in the Etiology, Pathogenesis and Treatment of Osteonecrosis
Stuart B. Goodman, MD – Moderator

How to Register:
ORS attendees must have their ORS badge to register. A $100 fee is required to access the AAOS Annual Meeting on Friday and Saturday. Additional fees apply for Instructional Courses and Specialty Day sessions. Please stop by AAOS registration at the Morial Convention Center, Academy Hall B, on Friday beginning at 7:00 AM to register.

For details about the AAOS 2018 Annual Meeting go to www.aaos.org/annual.

ORS 2018 GUEST NATION
CANADA

The ORS is delighted to announce that Canada has been selected as the 2018 Guest Nation. The Guest Nation Program honors our colleagues in Canada, recognizes their contributions to the field of musculoskeletal research, and celebrates our collaborations with the Canadian Orthopaedic Research Society (CORS) and the Canadian Orthopaedic Association (COA).

Stop by and visit CORS and COA representatives located in Poster and Exhibit Hall.

The International Combined Orthopaedic Research Societies (ICORS) is an alliance of societies dedicated to enhancing international collaborations to promote basic, translational and clinical musculoskeletal research worldwide.

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FUTURE ICORS MEETING

ICORS 2019
June 19–22, 2019
Montreal, Quebec

Hosted by the Canadian Orthopaedic Association and the Canadian Orthopaedic Research Society

http://www.2019icors.org

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STEP 1: Download the Event App using App URL: **https://crowd.cc/s/1ffal** (works with iOS and Android mobile devices)

STEP 2: Once AttendeeHub is downloaded, tap the icon and input "ORS 2018" within the Search Bar and tap "Download"

FUTURE ORS ANNUAL MEETINGS

ORS 2019 Annual Meeting

Saturday, February 2–Tuesday, February 5, 2019

Austin, Texas

ORS 2020 Annual Meeting

Saturday, February 8–Tuesday, February 11, 2020

Phoenix, Arizona

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Jeffrey Toth, PhD
Francesco Travascio, PhD
Stephen Trippel, MD
Karen L. Troy, PhD
Tsung-Yuan Tsai, PhD
Riichiro Tsukamoto, MD
Wakenda Tyler, MD, MPH
Keita Uetsuki, PhD
Douglas Van Citters, PhD
Marjolein CH van der Meulen, PhD
Andre Van Wijnen, PhD
Kartik M. Varadarajan, PhD
Sophie Verrier, PhD
Amarjit Virdi, PhD
Nam Vo, PhD
Edward Vresilovic, MD, PhD
Qun (Leo) Wan, PhD
Bing Wang, MD, PhD
Hali Wang, PhD
James Wang, PhD
Jaw-Lin Wang, PhD
Tao Wang, PhD
Vincent Wang, PhD
Jennifer Wayne, PhD
Julien Wegrzyn, MD, PhD
Lei Wei, PhD
Jeffrey Weiss, PhD
Joseph Wenke, PhD
Frederick W. Werner, MME
Britt Wildemann, PhD
Jamie Williams, PhD
John L. Williams, PhD
Sophie Williams, PhD
Bettina Willie, PhD
Ryan Willing, PhD
Markus Wimmer, PhD
Beth Winkelstein, PhD
Edward Wojtys, MD
Yang Xia, PhD
Ei Yamamoto, PhD
Raghunatha Yammani, PhD
Weitian Yang, MD, PhD
Wei Yao, MD
Hai Yao, PhD
Clare Yellowley, PhD
Yener N. Yeni, PhD
Kelvin Yeung, PhD
Gokce Yildirim, MS
Hiroki Yokota, PhD
Toshitaka Yoshii, MD, PhD
Aliaa Youssef, PhD
Hongchuan Yu, PhD
Kiminori Yukata, PhD
Chawon Yun, PhD
Stephan Zeiter, DVM, PhD
Ronald Zernicke, PhD, DSc
Dimitrios Zeugolis, PhD
Nianli Zhang, PhD
Yaxia Zhang, MD, PhD
Chunfeng Zhao, MD
Michael Zuscik, PhD

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PARTICIPATE and find your HOME in the leading global musculoskeletal research community.

Our members include biologists, clinicians, engineers, veterinarians, and orthopaedic surgeons—everyone in the field of musculoskeletal research.

- Advance your career
- Build relationships
- Enhance professional skills
- Grow collaborations
- Increase your knowledge

STOP BY the ORS Member Center in the Exhibit/Poster hall
OR JOIN ONLINE at
www.ors.org (click on "Join ORS").

Be sure to visit the ORS website to see who joined our research community this year!

ORS 2018 ANNUAL MEETING HIGHLIGHTS

FRIDAY, MARCH 9 PRE-ORS

7:00 AM–6:00 PM
ORS/OREF Grant Writing Course

9:00 AM–5:30 PM
ORS Meniscus Section Scientific Meeting (full day meeting)

2:00 PM–4:15 PM
ORS Preclinical Models Section Scientific Meeting

3:00 PM–6:00 PM
ORS Tendon Section Scientific Meeting

3:00 PM–6:00 PM
ORS Spine Section Scientific Meeting

3:30 PM–4:15 PM
ORS Preclinical Models Section & ORS ISFR Collaborative Workshop

3:30 PM - 6:00 PM
ORS ISFR Section Scientific Meeting

4:00 PM–6:00 PM
Poster Session 1 Poster Pick-Up & Set-Up

6:00 PM–7:30 PM
ORS Business Plan Competition

6:00 PM–8:00 PM
Research Interest Group: Stem Cells and Osteogenesis

6:15 PM–8:15 PM
ORS Section Receptions:
– ORS ISFR
– ORS Orthopaedic Implants Section
– ORS Preclinical Models Section
– ORS Spine Section
– ORS Tendon Section

7:30 PM–9:00 PM
ORS Business Plan Competition and Networking Reception

SATURDAY, MARCH 10

7:00 AM–8:00 AM
Poster Session 1 Poster Pick-Up & Set-Up

7:00 AM–8:00 AM
First Timer's Session: How to Make the Most of Annual Meeting

8:00 AM–9:30 AM
Launching and Navigating a Successful Career as a Clinician-Scientist

8:00 AM–9:30 AM
Scientific Workshops
– In Vivo and In Vitro Techniques to Study Skeletal Muscle Growth and Regeneration
– Outcome Measures in Orthopaedic Research of the Joints and Spine
– The Scientific Legacy of Adele Boskey: From Biomineralization Mechanisms to Bone Quality
– Functional Analysis the Key to the Next Revolution in the Treatment and Prevention of Hip and Knee Arthritis

8:00 AM–5:00 PM
ORS/OREF Basic Science Course

9:45 AM–10:45 AM
Scientific Sessions

9:45 AM–10:45 AM
Pathways Towards Independence—How to Land a Job and Start a Career

10:45 AM–11:45 AM
Exhibits & Posters

11:00 AM–11:30 AM
Technique Workshop: Techniques for Measuring Mechanical Properties of Tissue
Organized by: TA Instruments—ElectroForce Systems Group

11:30 AM–1:00 PM
Research Interest Group: Cartilage Repair

11:45 AM–12:45 PM
Hands-On Workshop: Working With C-Motion's Dynamic Stereo X-ray Software Suite
Organized by: C-Motion

11:45 AM–1:00 PM
Lunch (not provided)

1:00 PM–2:05 PM
Scientific Sessions

2:15 PM–3:20 PM
Scientific Sessions

3:30 PM–4:45 PM
ORS Opening Session: Welcome & Presidential Address

4:45 PM–5:45 PM
Exhibits & Posters

5:00 PM–5:30 PM
Technique Workshop: Bone Scaffold Characterizations and In Vivo Performance by Micro and Nano-CT
Organized by: Bruker BioSpin

5:45 PM–7:30 PM
Welcome Reception

6:30 PM– 8:30 PM
Research Interest Group: Osteoarthritis

7:30 PM–9:30 PM
ORS Women's Leadership Forum Reception

7:30 PM–9:00 PM
Mayo Clinic Alumni Reception

ORS 2018 ANNUAL MEETING HIGHLIGHTS (CONTINUED)

SUNDAY, MARCH 11

7:00 AM–8:00 AM
Research Interest Group: Foot & Ankle

7:00 AM–8:00 AM
Meet the Professor

7:00 AM–8:15 AM
Scientific Workshop
– The Evolution of Total Joint Arthroplasty: A Historical Review of Hip, Knee, and Shoulder Prosthesis Design Advances

8:00 AM–9:30 AM
Social Media—Engagement and Outreach Tools for New Investigators

8:00 AM–9:30 AM
Scientific Workshops
– Regenerative Rehabilitation: The Role of Mechanotherapies Used to Optimize Regenerative Medicine Outcomes
– Osseointegrated Prosthetic Limbs: Recent Developments and Future Directions
– Normal and Neoplastic Osteogenesis Signaling: Targeted Therapeutic Opportunities

8:00 AM–12:00 PM
Clinical Research Forum

8:15 AM–10:45 AM
ORS Orthopaedic Implants Section Scientific Meeting

9:45 AM–10:45 AM
Scientific Sessions

10:45 AM–11:45 AM
Exhibits & Posters (Authors at EVEN Posters)

11:45 AM–12:45 AM
Industry Connect: An Ongoing Discourse with the FDA

11:45 AM–12:45 PM
Meet the NIH

11:45 AM–1:00 PM
Lunch (not provided)

1:00 PM–2:00 PM
ORS 2018 Keynote Speaker, Dr. John P.A. Ioannidis

2:15 PM–3:15 PM
ORS Excellence in Orthopaedics Awards Session: Kappa Delta, OREF Award Presentations

3:30 PM–4:30 PM
Scientific Sessions

4:30 PM–5:30 PM
Exhibits & Posters (Authors required at ODD Posters)

4:45 PM–5:15 PM
Technique Workshop: How Mechanical Testing Can Enhance Your Research Studies
Organized by: Biomomentum Inc.

5:30 PM–6:00 PM
Poster Session I Dismantle

5:30 PM–6:30 PM
Scientific Sessions

6:30 PM–7:30 PM
Early Career After Party: Celebrate Diversity

6:45 PM–8:45 PM
Research Interest Group: Growth Factors

7:00 PM–10:00 PM
ORS 5th Annual Gala: Celebrate Excellence

MONDAY, MARCH 12

6:45 AM–7:45 AM
Research Interest Group: ORS Musculoskeletal Biology Workshops at Sun Valley—MRI for Early Osteoarthritis Detection: Basic and Clinical Approaches

7:00 AM–8:00 AM
Poster Session 2 Poster Pick-Up & Set-up

7:00 AM–8:00 AM
Meet the Professor

8:00 AM–9:30 AM
Scientific Workshops
– Limb Regeneration: What Can We Learn from Animal Models for Human Translation?
– In Vivo Bone and Joint Loading—How and Why Should We Measure It?
– New Biological and Biomechanical Approaches to Orthopaedic Management of Pediatric Neuromuscular Disorders
– Evaluation of Implant Failure: The Role of MRI and Retrieval Analysis

8:00 AM–9:30 AM
JOR Publications Workshop: How to Get Your Research Articles Submitted, Accepted, and Cited

8:00 AM–9:30 AM
Negotiating for Success

9:45 AM–10:45 AM
Scientific Sessions

10:45 AM–11:45 AM
Exhibits & Posters (Authors Required at EVEN Posters)

ORS 2018 ANNUAL MEETING HIGHLIGHTS (CONTINUED)

11:00 AM–11:30 AM
Technique Workshop: Histomorphometry in Musculoskeletal Systems
Organized by: BIOQUANT Image Analysis Corporation

11:45 AM–12:45 PM
Embracing Diversity: Challenge & Opportunities

11:45 AM–1:00 PM
Lunch (not provided)

1:00 PM–2:00 PM
Scientific Sessions

2:15 PM–3:15 PM
Scientific Sessions

3:15 PM–4:15 PM
Exhibits & Posters (Authors Required at ODD Posters)

4:30 PM–5:30 PM
ORS Debate: Osteoarthritis (OA) Is a Disease of Bone

5:45 PM–6:45 PM
Scientific Sessions

TUESDAY, MARCH 13

7:00 AM–7:45 AM
ORS Business Meeting

8:00 AM–9:30 AM
What Does Your CV/Resume Say About You?

8:00 AM–9:10 AM
Scientific Session

8:00 AM–9:30 AM
Scientific Workshops
– In Vivo MicroCT Imaging: Longitudinal Assessment of Skeletal Microstructure, Strength, and (Re)modeling Dynamics
– Cell Autonomous and Non-Cell Autonomous Mechanisms of Aging
– Advances in Understanding Early Post-Traumatic Osteoarthritis

9:45 AM–10:45 AM
Scientific Sessions

10:45 AM–11:45 AM
Poster Viewing

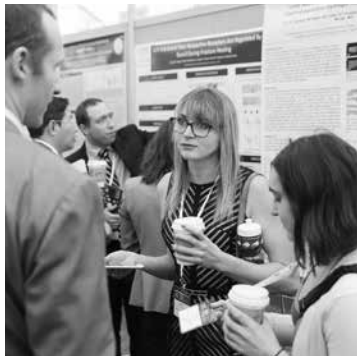
11:45 AM–12:45 PM
Lunch (not provided)

12:45 PM–1:45 PM
Scientific Sessions

1:45 PM–2:45 PM
Poster Viewing

3:00 PM– 4:00 PM
ORS Closing Session: Achievement Awards & 2018 Inauguration Ceremony

4:00 PM–4:30 PM
Poster Session 2 Dismantle



2018 POSTER SESSIONS—ELITE HALL

SATURDAY—TUESDAY

ORS WILL HAVE TWO POSTER SESSIONS: ***Poster Session 1—***Posters will be displayed Saturday and Sunday, authors will present posters on Sunday. ***Poster Session 2—***Posters will be displayed Monday and Tuesday, authors will present posters on Monday.

POSTER SESSION 1

SATURDAY, MARCH 10 8:00 AM–5:45 PM
10:45 AM–11:45 **AM Poster Viewing**
(Break in Hall - with refreshments)
11:45 AM–1:00 PM **Lunch** (Lunch is not provided)
4:45 PM–5:45 PM **Poster Viewing** (Break in Hall—with refreshments)

SUNDAY, MARCH 11 8:00 AM–5:30 PM
10:45 AM–11:45 AM* **Poster Viewing**
(Break in Hall – with refreshments)
11:45 AM–1:00 PM **Lunch** (Lunch is not provided)
4:30 PM–5:30 PM* **Poster Viewing**
(Break in Halll—with refreshments)

*Authors at posters to answer questions
EVEN-NUMBER poster presenters 10:45 AM–11:45 AM
ODD-NUMBER poster presenters 4:30 PM–5:30 PM

POSTER SESSION 2

MONDAY, MARCH 12 8:00 AM–5:30 PM
10:45 AM–11:45 AM** **Poster Viewing**
(Break in Halll—with refreshments)
11:45 AM–1:00 PM **Lunch** (Lunch is not provided)
3:15 PM–4:15 PM** **Poster Viewing**
(Break in Halll—with refreshments)

**Authors at posters to answer questions
EVEN-NUMBER poster presenters 10:45 AM–11:45 AM
ODD-NUMBER poster presenters 3:15 PM–4:15 PM

TUESDAY, MARCH 13 7:00 AM–3:00 PM
10:45 AM–11:45 AM **Poster Viewing**
(Break in Hall—with refreshments)
11:45 AM–12:45 PM **Lunch** (Lunch is not provided)
1:45 PM–2:45 PM **Poster Viewing** (Break in Hall—with refreshments)

POSTER CATEGORIES	POSTER SESSION 1 #'S	POSTER SESSION 2 #'S
Biomaterial	326–383	1213–1272
Board of Specialty Society (BOS) Best Posters	BOS1–BOS6	BOS1–BOS6
Bone	643–726	1530–1616
Business Plan Competition (BPC)	BPC1–BPC6	BPC1–BPC6
Cartilage and Synovium	384–469	1273–1359
Foot and Ankle	1089–1104	1972–1986
German Society for Orthopaedics and Trauma (DGOU)	DGOU	DGOU
Guest Nation - Canada	CANADA1–CANADA4	CANADA1–CANADA4
Hand and Wrist	1076–1088	1960–1971
Hip	886–913	1771–1794
Hip and Knee Arthroplasty	914–1029	1795–1914
Imaging	1168–1189	2051–2072
Infection and Inflammation	1105–1133	1987–2014
International Combined Orthopaedic Research Society (ICORS) Best Posters	ICORS1–ICORS11	ICORS1–ICORS11
Knee	828–885	1716–1770
Late Breaking Poster Session	2106–2193	2194–2281
Meniscus	470–487	1360–1377
Muscle	612–642	1500–1529
NIRA Finalists	103–145	103–145
Osteoarthritis and forms of Arthropathy	488–528	1378–1416
Poster Teasers	See pages 29 and 31	See pages 29 and 31
Regenerative Medicine	575–611	1465–1498
Shoulder and Elbow	1030–1075	1915–1959
Spine	727–827	1617–1715
Tendon/Ligament	529–574	1417–1464
Trauma and Fracture Repair	1134–1167	2015–2050
Tumors	1190–1212	2073–2095
Women's Health Advisory Board (WHAB) Best Poster	WHAB1–WHAB2	WHAB1–WHAB2

FRIDAY MEETING DETAIL | **PRE-ORS**

7:00 AM–6:00 PM

ORS/OREF Grant Writing Course
With Support from MTF Biologics

This popular introductory course is one of the opportunities offered by ORS and OREF for new investigators to learn the art of grant writing. This course is ideal for investigators who are in the process of writing their first grant proposal. Experts will offer strategies for writing a compelling Aims page, developing a strong approach to test an exciting hypothesis, using preliminary data and supporting documents to present a cohesive final grant proposal. A mock study section provides a first-hand look at what is involved in NIH peer review. Lunch and a post-course networking reception are included in the registration fee.

Registration required.

ORS Section Meetings and Receptions*

The purpose of the Section is to promote the common interest of ORS members in specified areas of research related to orthopaedics and the musculoskeletal system.
Advanced registration is required for all Section Scientific Meetings and receptions.

Learn more about the ORS Sections by visiting www.ors.org/about-ors-sections.

9:00 AM—5:30 PM

ORS MENISCUS SECTION Orthopaedic Research Society

ORS Meniscus Section Scientific Meeting (full day meeting)
Knowledge Gaps in the Field of Meniscus Research

Organizers: Adetola Adesida, PhD, University of Alberta; Kyle Allen, PhD, University of Florida; Lutz Dürselen, PhD, Ulm University; Martin Englund, MD, PhD, Lund University; Trent Guess, PhD, University of Missouri; Tammy Haut Donahue, PhD, Colorado State University; Chathuraka Jayasuriya, PhD, Rhode Island Hospital; Matthew Koff, PhD, Hospital for Special Surgery; Marc Levenston, PhD, Section Chair, Stanford University; Suzanne Maher, PhD, Hospital for Special Surgery; Amy McNulty, PhD, Duke University Medical Center; M. Farooq Rai, PhD, Washington University at St. Louis; Andreas M. Seitz, PhD, Ulm University

The objective of the ORS Meniscus Section Scientific Meeting is to identify critical knowledge gaps in the field of meniscus research. The meeting will include invited talks in the following areas: What is Normal Meniscus?; How to Detect Change?; and Meniscus 2038, a debate focused on possible developments over the next 20 years from engineering and clinical perspectives. These three scientific sessions will also include short talks and comments by Section members. There will be a poster teaser session and a special session on identifying and discussing future ORS Meniscus Section initiatives. The meeting will end with a networking reception and the day will be filled with ample opportunity for those interested in meniscus research to participate and interact with colleagues.

2:00 PM–4:15 PM

ORS PRECLINICALMODELS Orthopaedic Research Society

ORS Preclinical Models Section Scientific Meeting

Organizers: Matthew Allen, Vet MB, PhD, University of Cambridge; Michele Corrigan, Trinity College Dublin; Laurie Goodrich, DVM, PhD, Colorado State University; Kurt Hankenson, DVM, PhD, Section Chair, University of Michigan; Dianne Little, DVM, PhD, Purdue University, C. Wayne McIlwraith, DVM, PhD, Colorado State University; Stephan Zeiter, DVM, PhD, DipECLAM, AO Research Institute

The ORS Preclinical Models Section Scientific Meeting will include a panel discussion with guidance on preparing Animal Care and Use Protocols in different species—rodents, rabbits and large animals. Panelists will present example protocols for the species they use in their research to allow comparison across species for components such as search for alternatives, anesthesia and analgesia, post-procedural monitoring, and periprocedural care. Models of osteoarthritis will be used as an example, but the concepts discussed will be applicable across many disease and tissue types. The Section will also host a poster teaser session from selected abstracts, and end with a brief News and Views session, providing an opportunity for Section members to share ideas, or information with the preclinical community.

3:00 PM–6:00 PM

ORS Tendon Section Scientific Meeting

Organizers: Paul Ackermann, MD, PhD, Karolinska Hospital; Peter Amadio, MD, Section Chair, Mayo Clinic; Nelly Andarawis-Puri, PhD, Cornell University; Kathe Derwin, PhD, Cleveland Clinic; Evan Flatow, MD, Mt. Sinai School of Medicine; Catherine K. Kuo, PhD, University of Rochester; Ronen Schweitzer, PhD, Shriners Hospital; Lou Soslowsky, PhD, University of Pennsylvania; Steve Thomopoulos, PhD, Columbia University

The 2nd annual ORS Tendon Section Scientific Meeting will focus on current strategies to treat diagnose and treat tendinopathy, current understanding of the etiology and pathology of tendinopathy, and critical gaps in each that should be addressed. Keynote talks by clinical and basic science experts in tendinopathy will provide overviews on these topics. Attendees will participate in discussions to identify promising future directions to propel tendinopathy clinical care and basic science research field forward. This meeting aims to inspire multidisciplinary collaborations and exciting new research directions to advance therapeutic approaches to treating tendinopathy.

3:00 PM–6:00 PM

ORS Spine Section Scientific Meeting

Organizers: Nadeen Chahine, PhD, Columbia University; Sibylle Grad, PhD, AO Research Institute Davos; Lisbet Haglund, PhD, McGill University; Judith Hoyland, PhD, Section Chair, University of Manchester; Christine Le Maitre, PhD, Sheffield Hallam University; Jeff Lotz, PhD, University of California San Francisco; Devina Purmessur, PhD, The Ohio State University; Makarand Risbud, PhD, Thomas Jefferson University; Daisuke Sakai, MD, PhD, Tokai University School of Medicine; Lachlan Smith, PhD, University of Pennsylvania

The Section will host a symposium on origins of spine-related pain aims to review our current understanding of factors causing or contributing to painful spine symptoms. Furthermore, with the availability of advanced profiling technologies and study designs, new pathways of pain are being identified that may lead to novel diagnostic and therapeutic targets. A more in-depth understanding of pain origins will help basic and clinician scientists to design clinically relevant studies and medical doctors to treat pain symptoms of patients in a more precise and personalized manner. Emphasis is put on the role of biomechanical imbalance as pain generator.

3:30 PM–4:15 PM

ORS Preclinical Models Section and ORS ISFR Collaborative Workshop Fracture Non-Union Models

Organizers: ORS Preclinical Models Section and ORS ISFR

The ORS Preclinical Models Section and ORS ISFR will join forces for a collaborative workshop focused on advancing animal models of fracture non-union.

3:30 PM–6:00 PM

ORS International Section of Fracture Repair (ORS ISFR) Scientific Meeting

With Support from | Bioventus (Champion)
Orthofix (Advocate)

Organizers: Peter Augat, MD, Institute of Biomechanics Murnau; Chelsea Bahney, PhD, Orthopaedic Trauma Institute; Mathias P.G. Bostrom, MD, Hospital for Special Surgery; Chantal Chenu, PhD, Royal Veterinary College; Jörg Goldhahn, PhD, ETH Zurich; Allen Goodship, MD; David Hak, MD, Section Chair, Denver Health; Amy Hoang-Kim, PhD, Women's College Hospital; Ralph Marcucio, PhD, UCSF

The 2nd annual ORS International Section of Fracture Repair Scientific Meeting (ORS ISFR) will host a multi-part research symposium dedicated to the advancement and interchange of science of fracture repair and its application to improvement of patient care. The meeting will include a Fracture Non-Union Models Workshop held in collaboration with the ORS Preclinical Models Section; ORS ISFR Keynote Speakers presenting basic research related to the endogenous role of stem cells during fracture healing (Ivo Kalajzic, MD, PhD, University of Connecticut Health Center) and translational approaches to bone regeneration using bio-inspired materials (Bill Murphy, PhD, University of Wisconsin); a series of short videos from "Leading to Believing in a 150 seconds or less" featuring Impact Research (HIP ATTACK, Mohit Bhandari, MD, PhD, McMaster University), other videos showcasing research moving into the community; and a Junior Investigator 3-Minute Thesis Competition, where presenters are challenged to demonstrate the significance and impact of their research in 1 slide and 3 minutes!

6:00 PM–7:30 PM—Live competition

7:30 PM–9:00 PM—Networking Reception
ORS Business Plan Competition & Reception With Support from AO Development Incubator

Teams will pitch their innovative bench to market ideas to our expert panel of judges that will include members from industry and those that have been successful in bringing their idea to market. Following the live competition there will be a reception where participants, leadership, and judges will network.

Finalists that will participate in the Live Competition, Friday, March 9, 2018

Adaptable Ortho Innovations
Adaptable Ortho Innovations (AOI) creates innovative products that provide a custom fit to every patient, every time.
Laurel Kuxhaus, A. Martin Clark

Detechture Devices
Detechture Devices is an orthopaedic device company that develops instrumented implants to monitor fracture healing.
Monica C. Lin, Chelsea Bahney

Far Cortex Anchor (FCA)
The problem addressed by FCA is that with the current popular anchor paradigm, many large RTC tears cannot be repaired, or if repaired, have recurrent tear.
Jeremi Leasure, Daniel Martin

Flex Technology
Flex Technology is a research and development company owned by William Krause, PhD, which has developed, patented and licensed to a major orthopaedic.
William Krause, Larry Bowman

ProteaPex Theraputics LLC
ProteaPex Therapeutics, LLC (PxTx) has developed an innovative disease modifying therapeutic technology to treat post-traumatic osteoarthritis (PTOA).
Marina D'Angelo, Jeffrey Boily

Semi-Finalists participating in the ORS Business Plan Poster Competition

Bonsano Medical Inc.
Bonsano Medical is a company founded and funded by orthopaedic surgeon and ORS member Daniel L. Martin, MD, for commercialization of a proximal humerus fracture (PHF) device/technique that was developed over ten years with 50 personal clinical cases.
Daniel L. Martin, Jeremi Leasure

Osteofortis
Osteofortis is a technology that leverages progesterone signaling to boost bone mass accrual and prevent Osteofortis development.
Alexander Kot, Sophia Liang

Micro Macro Testing
The BESTEST™ increases the likelihood of correctly quantifying the actual risk of osteoporosis-related fracture, providing a low cost complement to the tools currently in use and assuring a better management of the patient.
Francesca Cosmi, Alessandra Nicolosi

Patient Specific Orthopaedics
A company specialized in patient-specific orthopaedics. Its aim is to plan surgery and to fabricate surgical guides to aid in computer-guided orthopaedic surgery.
Mahmoud A. Hafez, Abdul-Rahman Elshafei

Precision OS Technology
Precision OS will objectify orthopaedic surgical education, improve surgeon expertise with the end goal of improving patient outcomes. Precision OS allows the surgeon to enhance their skill through tactile, anatomic and metric feedback towards "deliberate expert practice."
Colin O'Connor, Roberto Olveira

SteriDev
SteriDev is a medical device company dedicated to the safe and efficient delivery of current healthcare innovations.
Robert Zondervan, Andrew Raser

Registration Required.

6:00 PM–8:00 PM
Research Interest Group: Stem Cells and Osteogenesis With Support from JWC Medical, Inc.

Organizers: Quanjun Cui, MD, University of Virginia; Abhijit S. Dighe, PhD, University of Virginia; Stuart Goodman, MD, PhD, Stanford University Medical Center; Lynne C. Jones, PhD, John Hopkins University; Philippe Hernigou, MD, Chu Henri Mondor

The goal of this RIG is to bring scientists and clinicians who are interested in stem cell therapy and osteogenesis together to discuss:
a) Reality Versus Hype of Stem Cells Utility: Clinical Trials;
b) Regulatory Issues: Stem Cell-Based Products;
c) Controversies on Use of Allogeneic Stem Cells;
d) Stem Cell Therapy in Patients with History of Cancer; and
e) Guidelines and Future Research Directions.

SATURDAY MEETING DETAIL

7:00 AM–8:00 AM
First Timer's Session:
How to Make the Most of Annual Meeting

NEW! This interactive session moderated by a panel of experienced ORS members will help Annual Meeting registrants make the most of their meeting experience. All attendees are invited to participate.

8:00 AM–9:30 AM
Launching and Navigating a Successful Career as a Clinician-Scientist

Organized by: ORS New Investigator Mentoring Committee
Organizers: Roger Cornwall, MD, Cincinnati Children's Hospital and Benjamin Alman, MD, Duke University

Clinician-scientists are uniquely poised to identify important unsolved clinical problems, work through the scientific approaches to address those problems while maintaining clinical relevance, and then translate scientific breakthroughs into therapies with game-changing public health potential. Granting agencies encourage applications from them. Hospital and university departments love to showcase them. So why wouldn't everyone want to become a clinician-scientist? Why do we need so many efforts to increase the number of clinician-scientists in the world of orthopaedic research? Why is it so hard? This session will discuss the challenges, benefits, opportunities, and logistics of planning, launching, and sustaining a career as a clinician-scientist. Many people have an interest in science but do not know where to start if they didn't choose the MD-PhD route early in medical school. Many clinicians have ideas or questions and do not know that they can be explored scientifically, or how to go about it. In this session, experienced clinician-scientists will address these problems in brief talks and answer questions of budding clinician-scientists in open discussions. The purpose is to give those curious about, or struggling in, a clinician-scientist career an overview of the strategies, hurdles, and keys to a successful career, while celebrating the unique joy that such a career can bring.

Why a Clinician-Scientist Career?
Roger Cornwall, MD, Cincinnati Children's Hospital

Nuts and Bolts
Jonathan Schoenecker, MD, PhD, Vanderbilt University

Building Sustained Success
Francis Y. Lee, MD, PhD, Yale University

The Next Generation
Brian Snyder, MD, PhD, Boston Children's Hospital

The Big Picture
Leesa Galatz, MD, Mount Sinai Hospital

8:00 AM–9:30 AM
Scientific Workshops

✦WORSHOP✦
In Vivo and In Vitro Techniques to Study Skeletal Muscle Growth and Regeneration

Organizers: Christopher Mendias, PhD, Hospital for Special Surgery and Gretchen Meyer, PhD, Washington University

The purpose of this workshop is to introduce scientists to common techniques used to study skeletal muscle growth and regeneration. The workshop will cover mouse models of muscle hypertrophy and injury, molecular genetics tools used to study different populations of cells in muscle tissue, and in vitro techniques to study muscle stem cells. There will be a didactic portion, with ample time for an interactive discussion and questions at the end of the workshop.

In Vivo Models of Myogenesis
Esther Dupont-Versteegden, PhD, University of Kentucky

Myogenesis in a Dish: Advantages and Limitations to Myogenic Cell Culture
Gretchen Meyer, PhD, Washington University

✦WORKSHOP✦
Outcome Measures in Orthopaedic Research of the Joints and Spine

Organized by: ORS Industry Engagement Committee (IEC) and ORS Spine Section
Organizers: Sally LiArno, PhD, Stryker Orthopaedics and Saeed Khayatzadeh, PhD, Edward Hines Jr. VA Hospital

Patient-Reported-Outcome-Measures (PROMs) or Patient-Reported-Outcomes (PRO) assess the quality of care delivered to patients from the patient perspective. PRO questionnaires can be used to assess many factors including symptoms, functioning, health status, general health perceptions, quality of life, and activity level. This workshop focuses on how PROMs calculate the health gains after orthopaedic surgical treatment using pre- and post-operative surveys.

The Last Night of the PROMs? Should We Still Be Evaluating Surgical Outcomes With Patient-Level Metrics
David Hamilton, PhD, BSc (hons), BSc (hons), MCSP, University of Edinburgh

Are Sensors the Holy Grail of PROs? What Digital Technology Will Mean for Quality Measures
Stefano Bini, MD, University of California San Francisco

In Search of Biomarkers Predictive of PROs in Spinal Degeneration and Back Pain
Nadeen Chanine, PhD, Columbia University

✦WORKSHOP✦
The Scientific Legacy of Adele Boskey: From Biomineralization Mechanisms to Bone Quality

Organized by: ORS Women's Leadership Forum
Organizers: Nancy Pleshko, PhD, Temple University and Susan Bukata, MD University of California Los Angeles

Dr. Adele Boskey made major contributions to the fields of bone biology and mineralization using novel in vitro systems, and she expanded on these studies throughout her career. Her research sought to understand the composition of mineral and matrix in osteoporosis, osteogenesis imperfecta, and other diseases of bone fragility, and the effect of therapeutics on bone, at multiple structural levels in preclinical models and clinical tissues. This workshop will address the molecular basis of biomineralization, followed by discussion of how factors important in skeletal mineralization affect bone biomechanics, diseases associated with poor quality mineral and matrix, and current therapeutics to improve mineral quality. Together, this workshop will facilitate an exchange of knowledge and stimulate discussion among renowned keynote speakers, scientists and clinicians at all career levels with an interest in bone mineralization and quality, while honoring the memory and contributions of one of our most important leaders in the field of orthopaedic research.

The Evolving Role of Matrix Vesicles in the Regulation of Musculoskeletal Tissues
Barbara D. Boyan, PhD, Virginia Commonwealth University

Skeletal Mineralization and Bone Mechanical Properties
Marjolein C.H. van der Meulen, PhD, Cornell University

Insights Into a Rare Bone Disease: Osteogenesis Imperfecta, from Bench to Bedside and Back Again
Cathleen L. Raggio, MD, Hospital for Special Surgery

✦WORKSHOP✦
Functional Analysis the Key to the Next Revolution in the Treatment and Prevention of Hip and Knee Arthritis

Organized by: Canadian Orthopaedic Research Society (CORS)
Organizers: Fackson Mwale, PhD, McGill University and Albert Yee, MD, MSc, FRCSC, Sunnybrook and Women's College

Joint replacement remains one of the most successful interventions in orthopaedic surgery; however, there are still patients who do not achieve their maximum function due to instability and/or persistent pain. This symposium will review current evidence linking patient reported outcomes and functional analysis as well as current evidence on how surgical approach and prosthetic influence impacts patient function. Finally, advanced modeling combining finite element analysis and patient specific data in the understanding the pathomechanism of joint degeneration will be presented.

How to Interpret Biomechanical/Functional Analysis of the Lower Extremity
Mario Lamontagne, PhD, University of Ottawa

Gait Analysis After Total Hip Replacement: What Is the Influence of Surgical Approach and Implant Design?
Paul E. Beaulé, MD, University of Ottawa

Gait Analysis After Total Knee Replacement: Implant Design or Kinematic Reconstruction—Which is More Important?
Janie Wilson, PhD, Dalhousie University

Advanced Modeling/Imaging Using Patient Specific Data the Next Frontier in Arthritis Prevention
David R. Wilson, PhD, University of British Columbia

8:00 AM–5:00 PM
ORS/OREF Basic Science Course
With Support from Orthofix

Organized by: ORS Basic Science Education Committee

The ORS/OREF Basic Science Course will provide attendees with the tools to explain the functions and limitations of the science behind the decisions, treatments, and procedures that are performed in practice every day. The course content has been derived from the Orthopaedic Basic Science: Foundations of Clinical Practice textbook. Course attendees will receive a copy of the textbook as part of the registration fee. The knowledge of the concepts learned in this course is evaluated through the Orthopaedic In-Training Examination and the American Board of Orthopaedic Surgery Part 1 and Recertification Examinations. Understanding the science behind clinical decisions is important as we strive to improve patient care.

The course will benefit anyone currently in the field or entering the field of orthopaedics including orthopaedic residents and fellow, practicing orthopaedic surgeons and musculoskeletal researchers.

Registration Required.

9:45 AM–10:45 AM

Pathways Towards Independence—How to Land a Job and Start a Career

Organized by: ORS New Investigator Mentoring Committee and ORS Industry Engagement Committee
Organizers: Hicham Drissi, PhD, Emory University and Michael Lehmicke, MS, Depuy Synthes

This networking session focuses on individuals starting a career in orthopaedics, but who may be unsure about the differences between a career in academics or industry, and how to go about a job search in industry versus academia. Invited mentors from academia (department heads/vice chairs and directors of Research with extensive experience hiring junior faculty) as well as leaders from industry (program directors and team leaders) will interface with job seekers.

The format focuses on small group discussions with one or two mentors at a table (one mentor from academia and one leader from industry) with eight job seekers. At each table, job seekers will have 3 minutes to introduce themselves, their education, their research, and what they are looking for. Following that, the leaders/mentors introduce themselves and discuss the nature of positions that may be appropriate for each seeker. Leaders/mentors will offer advice on how to go about a job search and how to establish a strong network that will provide long-lasting support. Leaders/mentors will change tables once. We will finish the event with a free social time.

Registration Required.

CME is not available for this session.

11:00 AM–11:30 AM

Technique Workshop: Techniques for Measuring Mechanical Properties of Tissue

Organized by: **TA Instruments—ElectroForce Systems Group**
Speaker: Luis Morales

The presentation will focus on techniques for mechanical characterization of: orthopaedic tissues, vascular tissues, artificial biomaterials, plus an overview of in vivo loading of bone.

Objectives:
- Orthopaedic tissues material characterization
- Vascular tissues material characterization
- Artificial biomaterials material characterization

CME is not available for this workshop.

11:30 AM–1:00 PM

Research Interest Group: Cartilage Repair

Organizers: Daniel A. Grande, PhD, Feinstein Institute for Medical Research and Jos Malda, PhD, UMC Utrecht

The Cartilage Repair RIG brings together investigators primarily interested in the repair of articular cartilage. There is currently no technique that restores the complex cytoarchitecture and biochemical composition of native cartilage once damaged. Topics explored include novel approaches to using tissue engineering, stem cells, growth factors, and biomaterials. The Cartilage Repair RIG promotes new collaborations to disseminate new information, which can lead to improved clinical outcomes.

11:45 AM–12:45 PM

Hands-On Workshop: Working with C-Motion's Dynamic Stereo X-ray Software Suite

Organized by: **C-Motion**
Speakers: Scott Selbie, PhD and Pete Loan

Advances in diagnostic imaging have greatly improved our ability to detect structural changes in musculoskeletal tissues. There is now evidence that subtle joint translations of only a few millimeters are critical to estimating key clinical measures such as tissue stress, joint impingement, or implant kinematics during loaded functional movements. Dynamic Stereo X-ray (DSX) is the only currently available technology that can achieve sub-millimeter accuracy for a wide variety of functional movements. This workshop shows attendees how to use C-Motion's new DSX Software Suite to calibrate their equipment, correct X-ray images, and track multiple bones in the images.

Objectives:
- Calculating the 3D pose of the X-ray sources and image planes from images of the calibration object, including uniformity-corrections, distortion-corrections, and X-ray image resizing.
- Using bone models extracted from CT, define anatomically meaningful reference frames, add landmarks, and define regions of interest. Track bones in X-ray trials using single frame or 4D optimization.
- Export bone tracking to Visual3D for joint animations and kinematic analysis, including the calculation of joint congruency and ligament lengths. Validate markerless bone tracking with bead tracking.

CME is not available for this workshop.

3:30 PM–4:45 PM

ORS Opening Session: Welcome & Presidential Address

- **Introduction of the ORS Board of Directors**
- **Introduction of ICORS Members**
- **Welcome 2018 Guest Nation: Canada**

ORS/OREF Distinguished Investigator Award
Christopher Evans, PhD

ORS Women's Leadership Forum Award
Jennifer Westerndorf, PhD

ORS Outstanding Achievement in Mentoring Award
Alan Grodzinsky

2018 JOR Manuscript Awards*

The *Journal of Orthopaedic Research*® Excellence in Basic Science Award
Pro-Inflammatory M1 Macrophages Promote Osteogenesis by Mesenchymal Stem Cells via the COX-2-Prostaglandin E2 Pathway
Laura Y. Lu, Florence Loi, Karthik Nathan, Tzu-hua Lin, Jukka Pajarinen, Emmanuel Gibon, Akira Nabeshima, Luis Cordova, Eemeli Jämsen, Zhenyu Yao, Stuart B. Goodman

The *Journal of Orthopaedic Research*® Excellence in Clinical Science Award
Gait Mechanics and Second ACL Rupture: Implications for Delaying Return-to-Sport
Jacob J. Capin, Ashutosh Khandha, Ryan Zarzycki, Kurt Manal, Thomas S. Buchanan, Lynn Snyder-Mackler

The *Journal of Orthopaedic Research*® Excellence in Translational Science Award
Fully Porous 3D Printed Titanium Femoral Stem to Reduce Stress-Shielding Following Total Hip Arthroplasty
Sajad Arabnejad, Burnett Johnston, Michael Tanzer, Damiano Pasini

The *Journal of Orthopaedic Research*® Early Career Award
Muhammad Farooq Rai, PhD
Advantages of RNA-seq Compared to RNA Microarrays for Transcriptome Profiling of Anterior Cruciate Ligament Tears
Co-authors: Eric D. Tycksen, Linda J. Sandell, Robert H. Brophy

**Editors recused themselves from voting due to a conflict of interest.*

ORS Business Plan Competition—Recognition of Winners

3rd Place • 2nd Place • 1st Place

ORS 2018 Arthur Steindler, MD Award

Ernst B. Hunziker, MD, PhD

SATURDAY MEETING DETAIL

Inaugural Class of ORS Fellows

Gunnar Andersson, MD, PhD
Joan E. Bechtold, PhD
Mathias P.G. Bostrom, MD
Joseph A. Buckwalter, MD
David B. Burr, PhD
Dennis R. Carter, PhD
Bruce Caterson, PhD
Richard D. Coutts, MD
Richard Cruess, MD
Dwight T. Davy, PhD
Michael G. Ehrlich, MD
Christopher H. Evans, PhD
Gary E. Friedlaender, MD
Mary Goldring, PhD
Alan J. Grodzinsky, PhD
Farshid Guilak, PhD
Joshua J. Jacobs, MD
Brian Johnstone, PhD
Theodore Miclau, MD
Van C. Mow, PhD
Regis O'Keefe, MD, PhD
J. Edward Puzas, PhD
Clare M. Rimnac, PhD
Linda J. Sandell, PhD
Stephen Trippel, MD
Savio L-Y. Woo, PhD
Timothy M. Wright, PhD

stryker

Presentation of Stryker/ORS Women in Science Fellowship

ORS 2018 Presidential Address
Rick Sumner, PhD

5:00 PM–5:30 PM

Technique Workshop: Bone Scaffold Characterizations and In Vivo Performance by Micro and Nano-CT

Organized by: **Bruker BioSpin**
Speakers:
Prof. Håvard Jostein Haugen, Head of the Department of Biomaterials Institute for Clinical Dentistry, University of Oslo, Norway
Prof. Liebert Parreiras Nogueira, Department of Biomaterials Institute for Clinical Dentistry, University of Oslo, Norway

Three-dimensional (3D) structures find applications in the biomedical field mainly as scaffolds for tissue engineering and regenerative medicine, as for most tissues (e. g., bone tissue, blood vessel, muscle tissue) a porous support guiding growing tissue is crucial. Their characterization appears to be fundamental, as the architectural parameters, porosity in particular, but also pore size, interconnectivity, strut size, shape, and anisotropy, strongly affect the mechanical and biological performance of the 3D structures, and thus their functionality.

Micro-computed tomography is a powerful technique which allows the nondestructive characterization of such materials in a fast, automated, and high accuracy way. We will present the most recent developments in scaffold and bone characterization by Micro and Nano-CT, developed at the Department of Biomaterials, Institute for Clinical Dentistry, University of Oslo, Norway.

Objectives:
- Advanced characterization of bone graft substitute
- Enhancement microCT evaluation of bone-titanium implants interphases
- Microstructure characterization at nanoscale

CME is not available for this workshop.

5:45 PM–7:30 PM

ORS Welcome Reception

All ORS Meeting Attendees are invited to this kick-off celebration! Join fellow attendees for beverages and appetizers. This event provides an excellent opportunity to see familiar faces and meet new friends.

6:30 PM–8:30 PM

Research Interest Group: Osteoarthritis

Organizer: Stephen Trippel, MD, Indiana University School of Medicine

Osteoarthritis is the primary cause of disability among American adults. Its etiology has not been elucidated and it has no cure. As a musculoskeletal condition, it falls within the purview of the ORS. Currently, the ORS lacks a forum for interested biologists, engineers and clinicians to focus on this disease. The Osteoarthritis Research Interest Group is intended to provide this forum. Future organization and topics will be determined by the participants.

The topic of the first meeting of the Osteoarthritis RIG will be "Osteoarthritis: A Disease of the Joint as an Organ." Four presentations will each be followed by equal time for discussion.

The Role of Bone
David Felson, MD, MPH, Boston University

The Role of Synovium
Carla Scanzello, MD, PhD, University of Pennsylvania

The Role of Mechanics
Thomas Andriacchi, PhD, Stanford University

The Role of Cartilage
Richard Loeser, MD, University of North Carolina

7:30 PM–9:30 PM

ORS Women's Leadership Forum Reception With Support from Virginia Tech

Join the members of the Women's Leadership Forum (WLF) at this event to celebrate many accomplishments of women in the field. This is an excellent opportunity to network and celebrate successes!

Registration required: $65/person

SATURDAY, MARCH 10, 2018 SESSIONS 9:45 AM – 10:45 AM

TIME	SESSION 1 Hip and Knee Arthroplasty: Clinical Outcomes Research	SESSION 2 Cartilage and Synovium: Gene Regulation and Biology	SESSION 3 Bone Therapeutics	SESSION 4 Osteoarthritis: Clinical and Therapeutic	SPOTLIGHT SESSION 5 Infection and Inflammation
ROOM	**Celestin D-E**	**Empire A**	**Empire CD**	**Empire B**	**Celestin F-H**
Moderators	Kharma Foucher, MD, PhD and Mario Lamontagne, PhD	Matthew Fisher, PhD and Maurizio Pacifici, PhD	X. Edward Guo, PhD and Ryan Tomlinson, PhD	Sally Liarno, PhD and Amy McNulty, PhD	Noreen Hickok, PhD and Bingyun Li, PhD
9:45 AM	Paper No. 0001 **Does Gender Really Influence the Risk of Complications Following Total Joint Arthroplasty?** Spencer B. Dowdle, Nicholas A. Bedard, David E. Demik, Yubo Gao, Steve S. Liu, John J. Callaghan	Paper No. 0007 **A Novel Mouse Model to Elucidate the Role of Gdf5 in Postnatal Joints** Steven Pregizer, Vicki Rosen	Paper No. 0013 **Low-Density Lipoprotein Receptor-Related Protein 1 (lrp1) Is Important for Fracture Repair** Gurpreet Baht	Paper No. 0019 **How Precisely Does Ultrasonographic Evaluation Reflect the Histological Status of the Articular Cartilage of the Knee Joint?** Hiromu Ito, Kosuke Maeguchi, Yugo Morita, Moritoshi Furu, Takayuki Fujii, Masayuki Azukizawa, Akinori Okahata, Kohei Nishitani, Shinichi Kuriyama, Shinichiro Nakamura, Shuichi Matsuda	**SPOTLIGHT SPEAKER**  Geoff Richards, PhD, FBSE, FIOR **Fracture Related Infection**
9:55 AM	Paper No. 0002 **Effects of the Femoral Head Diameter on the Range of Motion in Total Hip Arthroplasty** Ryo Mitsutake, Hiromasa Tanino, Tatsuya Sato, Yasuhiro Nishida, Hiroshi Ito	Paper No. 0008 **The Long Non-Coding RNA RNF144A-AS1 Acts Through the Interferon Pathway and Enhances the Chondrogenic Differentiation of Mesenchymal Stem Cells** Nguyen P.T. Huynh, Catherine C. Gloss, Jeremiah Lorentz, Jonathan Brunger, Audrey McAlinden, Bo Zhang, Farshid Guilak	Paper No. 0014 **Knockdown Indian Hedgehog (Ihh) Does Not Delay Fibular Fracture Healing in Genetic Deleted Ihh Mice and Pharmaceutical Inhibited Ihh Mice** Shengchun Li, Xiaochun Wei, Hongbin Li, Kai Li, Shaowei Wang, Min Zhang, Jin Deng, Xiaodu Wang, Yanxiang Zhang, Lei Wei	Paper No. 0020 **Repeated Intra-Articular Injection of Zoledronic Acid Modulates Chondrocyte Proliferation and Death in Murine Post-Traumatic Osteoarthritis** Michael A. David, Melanie K. Smith, Brian T. Graham, Alexis Merritt, Sejal Shah, Brianna Hulbert, Rachael Pilachowski, Christopher Price	
10:05 AM	Paper No. 0003 **When Does Prosthetic Joint Infection Strike? A Retrieval Analysis Perspective** Michael A. Kokko, Matthew P. Abdel, Daniel J. Berry, Douglas W. Van Citters	Paper No. 0009 **The Role of p16INK4a Expression in Cartilage Aging and Osteoarthritis Development** Brian O. Diekman, Garrett A. Sessions, John A. Collins, Cathy S. Carlson, Richard F. Loeser, Norman E. Sharpless	Paper No. 0015 **Bone-Targeted Therapuetics Alter the Intervertebral Disc in Mice** Nilsson Holguin, Alycia G. Berman, Joseph Wallace, Matthew Allen, Alexander Robling	Paper No. 0021 **Injectable Hydrogels for Intra-Articular Delivery Demonstrate Mechanical Integrity and On-Demand Drug Release** Derek Holyoak, Tibra Wheeler, Natalia Rebollo, Marjolein C.H. van der Meulen, Ankur Singh	
10:15 AM	Paper No. 0004 **Similar Transverse Plane Biomechanics Between Fixed- and Mobile-Bearing Total Knee Arthroplasty During Gait, Stair Climbing and Pivoting** Shangcheng Wang, Zhihong Liu, Jianmin Feng, Lianfu Deng, Nigel Zheng	Paper No. 0010 **The Role of LPC and LPA in Osteoarthritis-Related Ossification and Pain** Emily Rumpf, Sonali Govande, Kennedy McKendall, Deepa Kurpad, Theresa Freeman, Ryan Tomlinson	Paper No. 0016 **Live Imaging in Zebrafish Reveals Mechanisms of Cellular Translocation During Appendage Regeneration** Lynnsey Moss, Barrie Sugarman, Claire Watson, Christopher Allan, Ronald Kwon	Paper No. 0022 **Alcohol Consumption Accelerates Osteoarthritis Progression** Sardar M.Z. Uddin, Dennis Fricke, Panayotis Thanos, David E. Komatsu	Paper No. 0025 **An Antibiotic-Eluting Scaffold With Responsive Dual-Release Kinetics for the Treatment of Osteomyelitis** Eamon J. Sheehy, Amro Widaa, Peter O'Donnell, Emily Ryan, Alan Ryan, Gang Chen, Robert Brady, Steven Kerrigan, Fergal J. O'Brien
10:25 AM	Paper No. 0005 **Changes in Objectively Measured Habitual Physical Activity and Sedentary Behaviour Following Total Knee Arthroplasty** Dick van der Jagt, Emmanuel Frimpong, Lipalo Mokete, Mohammed Tikly, Joanne McVeigh, Rebecca Meiring	Paper No. 0011 **NOD2 Signaling Regulates Extra Cellular Matrix Degeneration and Contributes to the Development of Osteoarthritis by Stabilizing TRAF6** YuTing Wang, Liming Zhao, Yonghui Dong, Qing Yang, Anmin Chen	Paper No. 0017 **Loss of the Ankylosing Spondylitis Gene (ERAP1) Decreases Bone Strength and Perturbs Fracture Healing** Robert L. Zondervan, David P. Rastall, Ivan Rakic, Nicholas Servadio, Mitch Vorce, Hayley Walkowski, Andrea Amalfitano, Kurt D. Hankenson	Paper No. 0023 **Unloader Knee Brace Increases Medial Compartment Joint Space During Gait in Knee Osteoarthritis Patients** Kanto Nagai, Shumeng Yang, Freddie Fu, William Anderst	Paper No. 0026 **IS53p4 Bioactive Glass Highly Cost Effective in Clinical Treatment of Chronic Osteomyelitis** Tag van Vugt, J.A.P. Geurts, J.J. Arts
10:35 AM	Paper No. 0006 **Is Obesity the Same Risk Factor for Total Hip and Total Knee Replacement?** David E. DeMik, Nicholas A. Bedard, S. Blake Dowdle, Timothy S. Brown, Yubo Gao, John J. Callaghan	Paper No. 0012 **cAMP Regulates the Fibrotic Processes in Osteoarthritic Synovial Fibroblasts: Role of Proteoglycan-4 (PRG4)** Marwa Qadri, Ling Zhang, Rennolds Ostrom, Gregory Jay, Khaled A. Elsaid	Paper No. 0018 **hPTH(1-34) Promotes Bone Fracture Healing in Multiple Diabetic Murine Models** Francis Y. Lee, Kareme D. Alder, Andrew H.A. White, Yeon-ho Chung, Shasta Henderson, Jungho Back, Minh Nam Nguyen, Hyuk-Kwon Kwon	Paper No. 0024 **Open-Wedge High Tibial Osteotomy Changes In Vivo Stress Distribution Patterns of the Patellofemoral Joint Using Computed Tomography Osteoabsorptiometry** Toshiaki Kameda, Eiji Kondo, Koji Yabuuchi, Tomohiro Onodera, Jun Onodera, Kazunori Yasuda, Norimasa Iwasaki	Paper No. 0027 **Animal Shoulder Hemiarthroplasty Model and Use of Topical Vancomycin to Eradicate P. Acnes After Shoulder Surgery: An In-Vivo Animal Study** Usama Qayyum, Djuro Petkovic, Javier Sanchez, Linda Effiong, Stavros Thomopolous, Thomas R. Gardner, Charles Jobin

SATURDAY, MARCH 10, 2018 SESSIONS 1:00 PM – 2:05 PM

TIME	SESSION 6 Hip and Knee Arthroplasty: Surgical Navigation Robotics and Simulation	SESSION 7 Cartilage: Diagnostics and Treatment	SPOTLIGHT SESSION 8 Bone Remodeling	SESSION 9 Shoulder and Elbow	SESSION 10 Tumors
ROOM	**Celestin D-E**	**Empire A**	**Empire CD**	**Empire B**	**Celestin F-H**
Moderators	Dennis Janssen, PhD and Robert A. Siston, PhD	Christopher Little, BVMS, PhD and Henning Madry, MD	Alison Gartland, PhD and Amarjit Virdi, PhD	Brian Feeley, MD and Xinning Li, MD	Timothy Damron, MD and Michelle Ghert, MD
1:00 PM	Paper No. 0028 **In Vivo Kinematics During Gait in Patients With Robot-Assisted Unilateral Total Hip Arthroplasty** Yun Peng, Paul Arauz, John MacAuliffe, Young-Min Kwon	Paper No. 0034 **Inducible Conditional Protein A Knockdown in Articular Cartilage Delay Osteoarthritic Progression in Mice Model** Yi-Hsiung Lin, Yu Chou, Laing Yin Chou, Sai-Sek Li, Chung-Hwan Chen, Mei-Ling Ho, Chau-Zen Wang	**SPOTLIGHT SPEAKER** 	Paper No. 0043 **Total Shoulder Arthroplasty Rehabilitation: Maximum Elevation and Time Spent Above 90° of Elevation Are Critical Metrics to Monitor** Ryan M. Chapman, Michael T. Torchia, John-Erik Bell, Douglas W. Van Citters	Paper No. 0049 **A Novel Formulation of Niclosamide Treats Metastatic Osteosarcoma In Vivo** David L. Kerr, Artak Tovmasyan, Husam Mikati, Willa Chen, Randall Tim Kreulen, Prasad Walke, Jason Somarelli, Suzanne Bartholf DeWitt, Terese Camp, Shiaowen David Hsu, Brian Brigman, Gabi Hanna, Greg Palmer, David Needham, William Eward
1:10 PM	Paper No. 0029 **Navigated Total Hip Arthroplasty: Early Complications, Utilization, and Patient Demographics** J. Joseph Gholson, Kyle Duchman, Jesse Otero, Andrew Pugely, Yubo Gao, John J. Callaghan	Paper No. 0035 **Purification of hiPSC-Derived Chondrocyte-Like Cells Using a CRISPR-Cas9-Generated Collagen II Reporter Enhances Chondrogenesis and Cartilaginous Matrix Production** Shaunak Adkar, Vincent P. Willard, Chia-Iung Wu, Amanda Dicks, Adarsh Ettyreddy, Nancy Steward, Nidhi Bhutani, Charles A. Gersbach, Farshid Guilak	Tamara Alliston, PhD **Osteocyte Control of Bone Quality Through Perilacunar Remodeling**	Paper No. 0044 **Development and In Vitro Validation of a Minimally Invasive Total Shoulder Arthroplasty Technique Using Novel Patient Specific Guides and Instruments** Joshua W. Giles, Cyrus Broden, Christine Tempelaire, Ferdinando Rodriguez y Baena	Paper No. 0050 **Osteoblast Inhibition Promotes Osteolytic Lesions in Renal Cell Bone Metastasis** Robert L. Satcher, Sue Hwa Lin, Tianghong Pan
1:20 PM	Paper No. 0030 **The Learning Curve Associated With Robotic Total Knee Arthroplasty** Nipun Sodhi, Anton Khlopas, Morad Chughtai, Jared Newman, Assem A. Sultan, Nicolas S. Piuzzi, George Yakubek, Robert C. Marchand, Arthur Malkani, Michael A. Mont	Paper No. 0036 **Anti-Inflammatory Activity of Nanofullerol** Xinlin Yang, Fuai Cui, Xuejun Du, Guowei Shang, Quanjun Cui		Paper No. 0045 **Comparison of Shoulder Rotation Torques and Velocity in the Overhead Baseball Pitch and the Windmill Softball Fastpitch** Donna M. Scarborough, Shannon E. Linderman, Robert C .McCunney, Eric M. Berkson, Luke S. Oh	Paper No. 0051 **Crispr-cas9-Mediated Silencing of Cd44 in Human Highly Metastatic Osteosarcoma Cells** Tang Liu, Francis Hornicek, Zhenfeng Duan
1:30 PM	**POSTER TEASERS—SEE FOLLOWING PAGE.**				
1:35 PM	Paper No. 0031 **Do Anatomical Variations in the Shape of the Femur Affect Stress Shielding After Placement of a Calcar-Guided Short Stem?** Pim Pellikaan, Amelie Sas, Sjoerd Kolk, Thierry Scheerlinck, G. Harry van Lenthe	Paper No. 0037 **Cationic Contrast-Enhanced Computed Tomography Biomarkers Distinguish Reparative and Degenerative Articular Cartilage in an Equine Model** Brad B. Nelson, Janne T.A. Mäkelä, Taylor B. Lawson, Amit N. Patwa, Brian D. Snyder, Mark W. Grinstaff, Laurie R. Goodrich, Chris Kawcak	Paper No. 0040 **Purinergic Upregulation of Osteocyte RANKL Expression in Response to Local Microinjury In Vitro** Sean M. McCutcheon, Robert J. Majeska, David C. Spray, Maribel Vazquez, Mitchell B. Schaffler	Paper No. 0046 **The Anatomy of the Superior Capsule Revisited: Reconstructive Considerations** Brandon T. Brown, Christopher C. Schmidt, Georgios N. Panagopoulos, Michael P. Smolinski, Sean Delserro, Lance R. Williams, Patrick J. Mcmahon, Mark Carl Miller, Patrick Smolinski	Paper No. 0052 **The Theranostic Potential of Vesicular Stomatitis Virus for Metastatic Inhibition and Circulating Tumor Cell Imaging in Osteosarcoma Syngeneic Mouse Model** Muhammad P. Johan, Tadahiko Kubo, Tomohiko Sakuda, Taisuke Furuta, Mitsuo Ochi, Nobuo Adachi
1:45 PM	Paper No. 0032 **Sensitivity of Calculated Ligament Tensions to Differences in Intraoperative Knee Kinematics: An FE Computational Study** Kyle Snethen, Melinda K. Harman, Jörg Lützner, Hai Yao, Clare Fitzpatrick	Paper No. 0038 **High Molecular Weight Hyperbranched Polyglycerol in Articular Cartilage Lubrication** Janne Toivo August Mäkelä, Taylor Lawson, Catalina Bordeianu, Brad B .Nelson, Anilkumar Parambath, Srinivas Abbina, Jayachandran N. Kizhakkedathu, Mark W. Grinstaff, Brian D. Snyder	Paper No. 0041 **SHP2 Regulates Intramembranous Ossification by Modifying the TGFbeta/SMAD Signaling Pathway** Iijun Wang, Douglas C . Moore, Jiahui Huang, Qian Wu, SLiqin Xie, Michael G. Ehrlich, Wentian Yang	Paper No. 0047 **Biceps Detachment Alters Joint Function and Tendon Mechanical Properties in a Chronic Massive Rotator Cuff Tear Rat Model** Mengcun Chen, Snehal S. Shetye, Julianne Huegel, Daniel J. Gittings, Courtney A. Nuss, Stephanie N. Weiss, Andrew F. Kuntz, Louis J. Soslowsky	Paper No. 0053 **Crispr-Mediated Nell-1 Gene Deletion Demonstrates Essential Roles in Osteosarcoma Cell Proliferation, Migration and Osteogenic Differentiation** Leslie Chang, Zhibo Sun, Carolyn Meyers, Greg LaChaud, Chia Soo, Kang Ting, Aaron James
1:55 PM	Paper No. 0033 **Representing the Effect of Variation in Soft Tissue Constraints in Experimental Simulation of Total Knee Replacements** Helena Johnston, Abdellatif Abdelgaied, Louise Jennings, John Fisher	Paper No. 0039 **The Potential Role of Extracellular Vesicles Released From Chondrocytes and Stem Cells in Cartilage Repair and Osteoarthritis** Xiaoming Liu, Claire Shortt, Xiayun Huang, Mary K. Cowman, Thorsten Kirsch	Paper No. 0042 **Development of Bone-Targeted Polymer Conjugates of Wnt/β-Catenin Agonists to Stimulate Fracture Healing** Maureen R. Newman, Steven G. Russell, Collin J. Larkin, Tzong-Jen Sheu, J. Edward Puzas, Danielle S.W. Benoit	Paper No. 0048 **Difference in Postoperative Vascular Patterns Between Small-to-Medium and Large-to-Massive Rotator Cuff Tears Using the Contrast Enhanced Ultrasound** Atsushi Urita, Tadanao Funakoshi, Tatsunori Horie, Mutsumi Nishida, Norimasa Iwasaki	Paper No. 0054 **Personalized Therapy of Breast Cancer Metastasis to Bone From Big Data Analysis to New Therapeutic Target** Francis Y. Lee, Minh Nam Nguyen, Jungho Back, Hyuk-Kwon Kwon, Yeon-ho Chung, Ibe Izuchukwu, Andrew H.A. White, Kareme D. Alder, Adam Sahlstrom, Tyler Warner, Naga Sudha Nukala

SESSION 6 POSTER TEASERS

Room: Celestin D-E

Moderators
Dennis Janssen, PhD and Robert A. Siston, PhD
1:30 PM

Paper No. 0889
WITHDRAWN

Paper No. 0914
Early Outcomes of Revision Surgery for Head-Neck Taper Corrosion of Metal-on-Polyethylene THA With Pseudotumors
Yun Peng, John MacAuliffe, Paul Arauz, Young-Min Kwon

Paper No. 0915
Pre-Operative Opioid Use Independently Predicts Increased Risk of Early Revision of TKA
Nicholas Bedard, David DeMik, S. Blake Dowdle, Jessel Owens, Steve Liu, John Callaghan

Paper No. 1009
Mobile-Bearing Insert Does Not Rotate During Squatting Activity
Kenji Hoshi, Goro Watanabe, Ryuji Tanaka, Jiro Fujii, Yasuo Kurose, Kazuyoshi Gamada

Paper No. 1891
Evaluation of Anterior Tibial Post Impingement in Posterior-Stabilized Total Knee Prosthesis During Stair Climbing
Toshifumi Watanabe, Akino Aoki, Kenji Hoshi, Kazuyoshi Gamada, Takeshi Muneta, Masafumi Horie, Hiroki Katagiri, Koji Otabe, Toshiyuki Ohara, Kenta Katagiri, Ichiro Sekiya, Hideyuki Koga

SESSION 7 POSTER TEASERS

Room: Empire A

Moderators
Christopher Little, BVMS, PhD and Henning Madry, MD
1:30 PM

Paper No. 0384
Ccn2 Increases Interlukine-17 Production via Reduced Mir-655 Expression
Hsuan-Chih Liu, Chih-Hsin Tang

Paper No. 0399
Characterization of Cartilage Properties of Dystrophin/ Utrophin Double Knockout Mice
Charles A. Huard, Xueqin Gao, Sarah Amra, Ying Tang, Haizi Cheng, Johnny Huard

Paper No. 0434
Sox9 Is an Unorthodox Reader of the 5hmC Deposition That Orchestrates Cartilage Development
Piera Smeriglio, Fiorella C. Grandi, Antoine Zalc, Sarah Taylor, Nidhi Bhutani

Paper No. 0455
Comparison of Canine Mesenchymal Stem Cells Derived From Synovium, Infrapatellar Fat Pad, Subcutaneous Adipose Tissue and Bone Marrow
Akari Sasaki, Mitsuru Mizuno, Koji Otabe, Hisako Katano, Kunikazu Tsuji, Hideyuki Koga, Manabu Mochizuki, Ichiro Sekiya

Paper No. 0466
From French Paradox to Osteoarthritis Treatment: Hierarchical Chondro-Protective Actions of Resveratrol
Yilu Zhou, Tiange Zhang, Mengxi Lv, Tong Li, Earl M. Bampo, Megan E. Hoerrner, Mary P. Watson, X. Lucas Lu

SPOTLIGHT SESSION 8 POSTER TEASERS

Room: Empire CD

Moderators
Alison Gartland, PhD and Amarjit Virdi, PhD
1:30 PM

Paper No. 0673
Influence of Material Property Variation in Mineralized Collagen Fibrils and Extra-Fibrillar Matrix on Cortical Bone Fracture Behavior
Yaohui Wang, Ani Ural

Paper No. 0692
Mechanical Loading Recovers Bone but Not Muscle Lost During Loading
Andrew Krause, Jennifer Steiner, Charles Lang, Henry Donahue

Paper No. 1163
Intraoperative Delivery of Jagged-1 Drives Craniofacial Bone Regeneration in Rodents
Daniel W. Youngstrom, Rafael Senos, Robert L. Zondervan, Kurt D. Hankenson

Paper No. 1541
Plasminogen Is Critical for Bone Fracture Repair by Promoting the Functions of Mesenchymal Progenitors
Luqiang Wang, Zhengqiang He, Alan Mitteer, Yanqing Gong, Ling Qin

Paper No. 1564
Effect of Tissue-Level Ductility on Ultimate Strength of the Human Vertebral Body
Saghi Sadoughi, Ariana Moini, Shan Zhu, Tony Keaveny

SESSION 9 POSTER TEASERS

Room: Empire B

Moderators
Brian Feeley, MD and Xinning Li, MD
1:30 PM

Paper No. 0565
Post-Operative Tendon Loading With Treadmill Running Delays Tendon to Bone Healing: Evaluation of the Indian-hedgehog Pathway in a Murine Rotator Cuff Repair Model
Susumu Wada, Amir Lebaschi, Yusuke Nakagawa, Camila Carballo, Zoe Album, Tyler Uppstrom, Arielle Hall, Liang Ying, Xiang-Hua Deng, Scott Rodeo

Paper No. 1041
In Vivo Kinematic Analysis of the Glenohumeral Joint in Shoulders With Rotator Cuff Tears
Naoya Kozono, Takamitsu Okada, Naohide Takeuchi, Satoshi Hamai, Hidehiko Higaki, Satoru Ikebe, Hirotaka Gondo, Takeshi Shimoto, Yoshitaka Nakanishi, Takahiro Senju, Yasuharu Nakashima

Paper No. 1052
Quantifying the Effect of Age at the Time of Surgery on MCID and SCB After Total Shoulder Arthroplasty
Christopher P. Roche, Pierre Henri Flurin, Thomas Wright, Joseph Zuckerman, Ryan Simovitch

Paper No. 1053
Stress and Strain in the Supraspinatus Tendon During a Simulated Functional Reach
John M .Looft, Mohab Eid, Jack Fischbach, Rebekah L. Lawerance, Arin M. Ellingson, Paula M. Ludewig

Paper No. 1436
Wnt/β-Catenin Signaling Play a Role in Rotator Cuff Repair and Are Affected by Mechanical Loading
Yusuke Nakagawa, Amir Lebaschi, Susumu Wada, Camila Carballo, Zoe Album, Liang Ying, Xiang-Hua Deng, Scott Rodeo

SESSION 10 POSTER TEASERS

Room: Celestin F-H

Moderators
Timothy Damron, MD and Michelle Ghert, MD
1:30 PM

Paper No. 1195
Molecular Radiosensitizing Effect of P53-Armed Telomeraze-Specific Oncolytic Adenovirus in Soft Tissue Sarcoma
Tadashi Komatsubara, Hiroshi Tazawa, Kouji Demiya, Yusuke Mochizuki, Kazuhisa Sugiu, Toshinori Omori, Yasuaki Yamakawa, Syuhei Osaki, Tomohiro Fujiwara, Eiji Nakata, Toshiyuki Kunisada, Yasuo Urata, Toshiyoshi Fujiwara, Toshifumi Ozaki

Paper No. 1196
Mithramycin A Inhibits Proliferation and Radiosensitizes EWS:Fli1+ Ewing Sarcoma
Mei Yun Lin, Megan Elizabeth Oest, Timothy A. Damron, Jason A .Horton

Paper No. 1197
Cholesterol Inhibition Reduces Hh Signaling Mediated Chondrosarcoma
Qingxia Wei, Eyal Ramu, Mushriq al Jazrawe, Raymond Poon, Jay Wunder, Benjamin Alman

Paper No. 1198
Optimization of Vegfa Genome Editing by Crispr/cas9 in Osteosarcoma Cells for Therapeutic Application
Fangfei Li, Chao Liang, Luyao Wang, Baosheng Guo, Guofen Chen, Aiping Lu, Ge Zhang

Paper No. 1200
Circulating Microrna-1260b as Novel Biomarkers for Myxofibrosarcoma Promote Invasion to Modulate Tumor Microenvironment
Takuya Morita, Tomohiro Fujiwara, Aki Yoshida, Masahiro Kiyono, Suguru Yokoo, Joe Hasei, Toshiyuki Kunisada, Toshihumi Ozaki

SATURDAY, MARCH 10, 2018 SESSIONS 2:15 PM – 3:20 PM

TIME	SESSION 11 Scaffolds for the Repair of Musculoskeletal Tissues	SESSION 12 Regenerative Medicine 1	SESSION 13 Spine Therapeutics and Repair	SESSION 14 Injury Healing	SESSION 15 New Dimensions in the Hand and Wrist
ROOM	Celestin D-E	Empire A	Empire CD	Empire B	Celestin F-H
Moderators	Joel Boerckel, PhD and James Wang, PhD	Stephanie Bryant, PhD and Fergal O'Brien, PhD	Rita Kandel, MD and James Kang, MD	Braden C. Fleming, PhD and Spencer Szczesny, PhD	Roger Cornwall, MD and Karen Troy, PhD
2:15 PM	Paper No. 0055 **Multi-functional Tissue Graft for Musculoskeletal Applications** Héctor Capella-Monsonís, Dimitrios Zeugolis	Paper No. 0061 **IL-6 Mediated Attenuation of Cell Aging Markers in Bone Marrow-Derived Mesenchymal Stem Cells** Yuzhao Huang, Yangzi Jiang, Rocky Tuan	Paper No. 0067 **Urolithins A Alleviates Intervertebral Disc Degeneration In Vitro and In Vivo** Huiyong Liu, Chao Song, Hanfeng Guan, Feng Li	Paper No. 0073 **Adipose-Derived Stem Cell Sheets and CTGF for Enhanced Flexor Tendon Healing** Hua Shen, Susumu Yoneda, Stephen W. Linderman, Rohith Jayaram, Shelly Sakiyama-Elbert, Younan Xia, Richard H. Gelberman, Stavros Thomopoulos	Paper No. 0079 **Assessment of Normal Proximal and Distal Radioulnar Joint Kinematics During Active Forearm Rotation Using 4-Dimensional Computed Tomography** Hiroki Kita, Satoshi Oki, Naoto Inaba, Naoki Kuremoto, Naoto Fukasawa, Rieko Shimizu, Masahiro Jinzaki, Morio Matsumoto, Masaya Nakamura, Takeo Nagura, Noboru Matsumura
2:25 PM	Paper No. 0056 **Relation Between Macrophage Differentiation, Angiogenesis and Topology-Directed Osteoinduction of Calcium Phosphate Ceramics** Rongquan Duan, Yang Zhang, Luuk van Dijk, Davide Barbieri, Florence de Groot, Joost de Bruijn, JeJeroen J.J.P. van den Beucken, Huipin Yuan	Paper No. 0062 **Molecular Mechanisms of Platelet-Rich Plasma Elucidating Clinical-Grade PRP's Intrinsic Variation** Ling He, Jeffrey A. Ahn, Gregory Chotkowski, Qimei Gong, Jinxuan Zheng, Scott Rodeo, Jin Wen, Hanying Bai, Jasmine J. Pei, Yoon Kun, Junqi Ling, Jeremy J. Mao	Paper No. 0068 **Neonatal Mice Intervertebral Discs Restore Function Following Herniation Injury** Olivia M. Torre, Rohit Das, Ramy E. Berenblum, Alice H. Huang, James C. Iatridis	Paper No. 0074 **Uncovering Tenomodulin Role in Early Tendon Healing** Dasheng Lin, Denitsa Docheva	Paper No. 0080 **Four-Dimensional Real-Time MRI for Assessment of Dynamic Wrist Instability** Calvin B. Shaw, Brent H. Foster, Robert D. Boutin, Cyrus P. Bateni, Christopher O. Bayne, Robert M. Szabo, Krishna S. Nayak, Abhijit Chaudhari
2:35 PM	Paper No. 0057 **Incorporation of Novel Cell-Penetrating Peptide-Based Gene Delivery Vectors Into Bone-Mimicking Collagen Hydroxyapatite Scaffold Significantly Enhances Repair of Critical-sized Bone Defects** Rosanne M. Raftery, David P. Walsh, Gang Chen, Gizem Osman, Kevin Shakesheff, James Dixon, Fergal J. O'Brien	Paper No. 0063 **Donor-Specific Effects of Platelet-Rich Plasma for the Treatment of Osteoarthritis** Christian O'Donnell, Eleonora Migliore, Fiorella C. Grandi, Nithya Lingampalli, Harini Raghu, Nicholas J. Giori, Pier F. Indelli, William H. Robinson, Nidhi Bhutani, Constance R. Chu	Paper No. 0069 **Fullerol Alleviates Lumbar Radiculopathy via Antagonizing TNF-α Induced Ion Channel Activation, Calcium Signaling and Neuropeptide Release** Li Xiao, Charles Malcolm Roberson, Mengmeng Ding, Andrew Fernandez, Li Jin, Xudong Li	Paper No. 0075 **Human Exosome Educated Macrophages Stimulate Early Tendon Healing** Connie S. Chamberlain, Anna E.B. Clements, John A. Kink, Ugeun Choi, Peiman Hematti, Ray Vanderby	Paper No. 0081 **Articular CMC Contact Area Decreases With Osteoarthritis Progression and Is Influenced by Gender and Task** Amy M. Morton, Joseph J. Crisco, Douglas C. Moore, Amy L. Ladd, Arnold-Peter C. Weiss
2:45 PM	**POSTER TEASERS—SEE FOLLOWING PAGE.**				
2:50 PM	Paper No. 0058 **In Vitro and In Vivo Evaluation of a Glycosaminoglycan Mimetic for Cartilage Repair** Gloria Portocarrero Huang, Roseline Menezes, George Collins, Louis Rizio, Treena Livingston Arinzeh	Paper No. 0064 **CCL21/CCR7 Axis Regulating Juvenile Cartilage Repair Can Enhance Cartilage Healing in Adults** Zenta Joutoku, Tomohiro Onodera, Daisuke Momma, Masatake Matsuoka, Rikiya Baba, Kazutoshi Hontani, Shinji Matsubara, Ryosuke Hishimura, Norimasa Iwasaki	Paper No. 0070 **Atsttrin Protects Against Intervertebral Joint D estruction in a Murine Model of Ankylosing Spondylitis** Aubryanna Hettinghouse, Michal Lata, Maggie Ford, Chuanju Liu	Paper No. 0076 **Cellular Senescence in Carpal Tunnel Syndrome** Anne Gingery, Yoshikuni Mimata, Chunfeng Zhao, Sanjeev Kakar, Tamar Tchkonia, James L. Kirkland, Peter C. Amadio	Paper No. 0082 **Novel Exploration of the MOPSTM Ability to Store Phalangeal Allograft Tissue** Charles A. Baumann, John R. Baumann, Aaron M. Stoker, Christpher M. Loftis, Jay T. Bridgeman, James L. Cook
3:00 PM	Paper No. 0059 **An Injectable Calcium Sulphate/ Hydroxyapatite Biomaterial Delivering rhBMP-2 and ZA for Bone Regeneration in the Femoral Canal of Osteoporotic Rats** Aurimas Sirka, Deepak Bushan Raina, Hanna Isaksson, Elizabeth Tanner, Alfredas Smailys, Sarūnas Tarasevičius, Magnus Tägil, Lars Lidgren	Paper No. 0065 **Cartilage Tissue Engineering Combining Microspheroid Building Blocks and Microneedle Arrays** Shawn P. Grogan, Erik W. Dorthé, Nicholas Glembotski, Florian Gaul, Darryl D. D'Lima	Paper No. 0071 **Cell Delivery in Collagen Gels Enhances Annulus Fibrosus Repair of the Sheep Spine In Vivo** Stephen R. Sloan Jr., Ibrahim Hussain, Rodrigo Navarro-Ramirez, Christoph Wipplinger, Micaella Zubkov, Gernot Lang, Roger Härtl, Lawrence Bonassar	Paper No. 0077 **S100a4 Promotes Scar-mediated Tendon Healing via Cell Non-Autonomous Extracellular Signaling** Jessica Ackerman, Imani Miles, Alayna Loiselle	Paper No. 0083 **Local Delivery of Supplemental Agrin at the Time of Injury Prevents Motor Endplate Degradation** Winnie A. Palispis, Henry Hoang, Jennifer Uong, Justin P. Chan, Tetsuro Onishi, Ranjan Gupta
3:10 PM	Paper No. 0060 **Development of a Thermo-Sensitive Antibacterial Hyaluronic Based Hydrogel for Orthopaedic Implant Coating Use** Chih-Hung Chang, Yu-Chun Chen, Ni-En Jiang, Chun-Hsing Liao Liao, Ming-Lun Hsu, Chui-Jia Farn	Paper No. 0066 **A Synthetic Transcription System Based on NF-kB Signaling for Cartilage Tissue Engineering Using Self-Regulating Delivery of Therapeutic Biologic Drugs** Lara G. Pferdehirt, Alison K. Ross, Jonathan M. Brunger, Farshid Guilak	Paper No. 0072 **Acellular Ultra-Purified Alginate Gels for Intervertebral Disc Regeneration in a Preclinical Animal Model** Takeru Tsujimoto, Hideki Sudo, Masahiro Todoh, Katsuhisa Yamada, Koji Iwasaki, Takashi Ohnishi, Norimasa Iwasaki	Paper No. 0078 **Genetic Lineage Tracing of Targeted Cell Populations During Enthesis Healing** Helen L. Moser, Anton Ph Doe, Kristen M. Sochol, Ivo Kalajzic, Haruhiko Akiyama, Matthias A. Zumstein, Leesa M. Galatz, Alice H. Huang	Paper No. 0084 **CT-Generated Implant Models for Biplane Videoradiographic Analysis of Total Wrist Arthroplasty** Bardiya Akhbari, Amy M. Morton, Douglas C. Moore, Arnold-Peter C. Weiss, Joseph J. Crisco

SESSION 11 POSTER TEASERS

Room: Celestin D-E

Moderators
Joel Boerckel, PhD and
James Wang, PhD
2:45 PM

Paper No. 0365
Surface Topography of Calcium Phosphate Ceramics Influences Heterotopic Osteogenesis and Supports Bone Regeneration in a Critical-Sized Os Ilium Bone Defect
Lukas A. van Dijk, Vincent van Miegem, Davide Barbieri, Rob C. Bakker, Alessia Longoni, Nard G. Janssen, Debby Gawlitta, Antoine J.W.P Rosenberg, Huipin Yuan, Joost D. de Bruijn, Florence G. Barrère-de Groot

Paper No. 0366
WITHDRAWN

Paper No. 1251
In-Vitro and In-Vivo Carrier Properties of a Macroporous Composite Biomaterial for Sustained Delivery of Bone Morphogenic Protein-2 and Zoledronic Acid
Deepak B. Raina, David Larsson, Filip Mrkonjic, Hanna Isaksson, Ashok Kumar, Lars Lidgren, Magnus Tägil

Paper No. 1252
In Vivo Dynamic Visualization of Bone Tissue Regeneration in Bmp2-induced Ectopic Ossification
Kunihiko Hashimoto

Paper No. 1253
Effects of Intra-Articular Ultrapurified Low Endotoxin Alginate Administration on Meniscal Defects in Rabbits: A Histological and Biomechanical Study
WooYoung Kim, Eiji Kondo, Tomohiro Onodera, Takayuki Nonoyama, Rikiya Baba, Kazutoshi Hontani, Zenta Joutoku, Shinji Matsubara, Kentaro Homan, Ryosuke Hishimura, Norimasa Iwasaki

SESSION 12 POSTER TEASERS

Room: Empire A

Moderators
Stephanie Bryant, PhD and
Fergal O'Brien, PhD
2:45 PM

Paper No. 0596
Identifying the Most Effective Types of Integration-Free Human iPS Cell-Derived Neural Stem/Progenitor Cells in the Treatment of Spinal Cord Injury
Tsuyoshi Iida, Narihito Nagoshi, Jun Kohyama, Osahiko Tsuji, Morio Matsumoto, Hideyuki Okano, Masaya Nakamura

Paper No. 0603
Expression of MicroRNA-892b in Human Mesenchymal Stem Cells Promotes Cartilage Regeneration in Arthymic Nude Rat Osteochondral Defect Model
Hye Young Kim, Jong Min Lee, Eugene Lee, Ju Young Kim, Gun-Il Im

Paper No. 0604
Scaffold-Mediated Delivery of miR-133a Inhibitor to Host Cells Rapidly Improves In Vivo Bone Repair Involving an Enhanced Host Response From M2 Macrophages
Irene Mencía Castaño, Caroline M. Curtin, Rosanne M. Raftery, Gang Chen, Brenton Cavanagh, Brian Quinn, Garry Duffy, Fergal O'Brien

Paper No. 1479
Rapid Condensation and Robust Chondrogenesis of Human Mesenchymal Stem Cells Within Their Own Extracellular Matrix: The Application for Cartilage Regeneration
Yuanheng Yang, He Shen, Caitlin Lucas, Hang Lin, Rocky Tuan

Paper No. 1490
Effectiveness of Anti-fibrotic Drugs in Reducing Sensorimotor Declines Induced by Overuse Injury
Mary F. Barbe, Mamta Amin, Michele Y. Harris, Sean P. Delaney, Geneva E. Cruz, Assari S, Steve N. Popoff

SESSION 13 POSTER TEASERS

Room: Empire CD

Moderators
Rita Kandel, MD and
James Kang, MD
2:45 PM

Paper No. 0728
Homing of Mesenchymal Stem Cells Enhances Tie2+ Progenitor Cells and Induces a Proliferative Response in Intervertebral Disc Organ Culture
Sebastian Wangler, Marianna Peroglio, Ursula Menzel, Lorin M. Benneker, Daisuke Sakai, Mauro Alini, Sibylle Grad

Paper No. 0773
Regulating hADSC ECM Phenotype via CRISPR Epigenome Editing for IVD Tissue Engineering
David Ede, Niloofar Farhang, Jake Weston, Bryton Davis, Leann Lam, Brandon Lawrence, Robert Bowles

Paper No. 1631
Upregulation of Glycosaminoglycan Synthesis in Nucleus Pulposus Cells by Neurotropin via Stimulation of Chondroitin Sulfate N-acetylgalactosaminyltransferase 1
Tomoko Nakai, Daisuke Sakai, Mitsuru Naiki, Masahiko Watanabe

Paper No. 1654
Development and Validation of DNA Origami Biosensors to Study Osmotic Mechanotransduction in the Spine
Benjamin A. Walter, Alexander E. Marras, William S. Marras, Carlos E. Castro

Paper No. 1685
Growth Differentiation Factor-6 Attenuated Pro-Inflammatory Molecular Changes in the Rabbit Annular Puncture Model and the Degenerated Disc-Induced Pain Generation in the Rat Xenograft Radiculopathy Model
Shingo Miyazaki, Kenji Kato, Kevin Cheng, Junichi Yamada, Mary E Lenz, Ashish D. Diwan, Koichi Masuda

SESSION 14 POSTER TEASERS

Room: Empire B

Moderators
Braden C. Fleming, PhD and
Spencer Szczesny, PhD
2:45 PM

Paper No. 0530
TGF-beta Signaling Is Sufficient to Prevent Loss of Tendon Cell Fate in a Cell-Autonomous Manner
Guak-Kim Tan, John V. Brigande, Brian A. Pryce, Ronen Schweitzer

Paper No. 0547
Gender-Dependent Alterations in the Mechanical Response of Collagen V Haploinsufficient Murine Tendons
Jaclyn A. Carlson, Snehal S. Shetye, Ashley B. Rodriguez, Jessica M. Johnston, Mei Sun, Sheila M. Adams, David E. Birk, Louis J. Soslowsky

Paper No. 0552
Tendon Fibril Structures Have Complex Wrapping, Branching, and Cell Interactions as Observed in Three-Dimensional Serial Block-Face SEM
Babak N. Safa, Jessica R. Natriello, Dawn M. Elliott

Paper No. 0561
CTGF Induces Tenogenic Differentiation and Proliferation of Adipose Derived Stromal Cells
Xiaoning Li, Suphannee Pongkitwitoon, Hongbin Lu, Richard Gelberman, Stavros Thomopoulos

Paper No. 0562
Integrin Alpha 11 Beta 1 Involvement in Abnormal Collagen Remodeling by Aged Tendon Stem/Progenitor Cells
Cvetan Popov, Denitsa Docheva

SESSION 15 POSTER TEASERS

Room: Celestin F-H

Moderators
Roger Cornwall, MD and
Karen Troy, PhD
2:45 PM

Paper No. 1076
Loads in the Distal Radius and Ulna During Simulated Active Dart Throw Motion of the Wrist
Martine E. McGregor, Diana A. Isa, Clare E. Padmore, Mark F. Welsh, G. Daniel G. Langhor, Graham J.W. King, James A. Johnson

Paper No. 1078
Impairment of Median Nerve Longitudinal Mobility in the Carpal Tunnel in Patients With Carpal Tunnel Syndrome
Yifei Yao, Zhili Shao, Emily Grandy, Carli Norman, Peter J. Evans, William H. Seitz, Zong-Ming Li

Paper No. 1079
Apoptotic Body or Exosomes Alleviates the Immunological Rejection in a Vascularized Composite Allotransplantation Rat Model: A Preliminary Study
Shaoqing Feng, Ding Pan, Chider Chen, Ling Qin, Scott Levin

Paper No. 1080
Nerve Sealants Alone Do Not Increase the Peak Load or Prevent Gapping in Digital Nerve Repair
David Pope, Mark Carl Miller, Patrick J. Schimoler, Alexander Kharlamov, Peter Tang

Paper No. 1081
Ultrasonography Findings in Severe Carpal Tunnel Syndrome
Gideon Nkrumah, John Fowler

ORS
Orthopaedic Research Society

SUNDAY MEETING DETAIL

7:00 AM–8:00 AM
Research Interest Group: Foot & Ankle

Organizers: Samuel Adams, MD, Duke University and L. Daniel Latt, MD, PhD, University of Arizona

The RIG will advance the science underpinning foot and ankle care by promoting communication and fostering collaborations among individuals interested in foot and ankle science. Its goal is to serve as a network to facilitate the interaction between basic scientists, translational researchers, and clinicians interested in collaborating on studies of foot and ankle science. The objectives are to: 1) hold meetings twice a year where clinicians and scientists can interact to discuss research priorities. 2) promote communication and foster collaboration through face to face meetings as well as online resources such as a member list and an online forum, 3) advocate for foot and ankle research.

7:00 AM–8:15 AM
Scientific Workshop
The Evolution of Total Joint Arthroplasty: A Historical Review of Hip, Knee, and Shoulder Prosthesis Design Advances

ORS ORTHOPAEDIC IMPLANTS Orthopaedic Research Society

Organized by: ORS Industry Engagement Committee (IEC) & ORS Orthopaedic Implants Section
Organizers: Christopher P. Roche, MSE, MBA, Exactech, Inc. and Dennis Janssen, PhD, Radboud University Medical Center

Total joint arthroplasty is one of the most cost-effective and clinically successful medical procedures ever devised, with highly predictable outcomes for many different indications. This workshop provides a historical overview of prosthesis designs in the hip, knee, and shoulder, describing how devices for each application have evolved to:

1) limprove long-term survivorship,

2) Enhance patient satisfaction,

3) Reduce the occurrence and severity of complications,

4) Address expanding usage, new indications and surgical techniques, and

5) Utilize novel materials and manufacturing technologies. An improved understanding of each prosthesis design lineage, better informs clinicians, designers, and medical researchers of modern design requirements in order to create new innovations that optimize function and offer the potential for improved outcomes.

Historical Overview of Shoulder Arthroplasty Prosthesis Design
Evan Flatow, MD, Mt. Sinai School of Medicine

Historical Overview of Hip Arthroplasty Prosthesis Design
John Callaghan, MD, University of Iowa

Historical Overview of Knee Arthroplasty Prosthesis Design
Michael Mont, MD, Cleveland Clinic

8:00 AM–9:30 AM
Social Media—Engagement and Outreach Tools for New Investigators

Organized by: New Investigator Mentoring Committee
Organizers: Kyle Allen, PhD, University of Florida and Karl Lewis, PhD, Indiana University

Social media is a ubiquitous part of lives. Increasingly, it has become a powerful means for professional branding and networking. This session will feature insights from avid social media users regarding how to make the most of various platforms for professional advancement.

This session will be more of a forum/panel style session, discussing the following topics:

1) How to use social media to promote your research program

2) How to use social media to advocate for science research/ inform the general public

3) How to use social media to strengthen your professional network

Participants will be asked to sit in groups based on interest area. The speakers will run through a series of workshop goals (science advocacy, outreach, and networking) and examples of what they have been able to incorporate into their labs/ programs. Then, we will challenge the groups to develop a strategy to "build a community" around these ideas. The motivation here is to create new networks at the ORS meeting that are active throughout the meeting.

Educating the Public
Robert Bowles, PhD, University of Utah

Extending Your Professional Network
Megan Killian, PhD, University of Delaware

Promoting and Distributing Your Own Work
Joel Boerckel, PhD, University of Pennsylvania

8:00 AM–9:30 AM
Scientific Workshops

✦WORKSHOP✦
Regenerative Rehabilitation: The Role of Mechanotherapies Used to Optimize Regenerative Medicine Outcomes

Organizer: Christopher Evans, PhD, Mayo Clinic

Participants in this workshop will gain an in-depth understanding of how regenerative medicine research focuses on the repair or replacement of tissues lost to injury, disease, or age, primarily via the enhancement of endogenous stem cell function or the transplantation of exogenous stem cells; whereas rehabilitation science emphasizes the use of mechanical and other physical stimuli to promote functional recovery. Learn how rehabilitation and regenerative medicine research are being integrated in order to create synergy for maximizing orthopaedic treatment outcomes. Identifying the underlying mechanisms of this synergy allows for improved rehabilitation protocols based on empirical data, and the use of appropriate timing and the right approaches of rehabilitation interventions will help to optimize and improve outcomes for the growing regenerative medicine patient population. Understanding and implementing findings from these two approaches will inform orthopaedic practice as these innovative technologies make their way to the clinic.

*Regenerative Rehabilitation: Background and Introductio*n
Christopher Evans, PhD, Mayo Clinic

Stimulation of Bone Healing Through Mechanical Loading
Vaida Glatt, PhD, University of Texas Health Science Center at San Antonio

Chondrogenesis in Response to Mechanical Load for Cartilage Repair
Martin Stoddart, PhD, FRSB, AO Research Institution

✦WORKSHOP✦
Osseointegrated Prosthetic Limbs: Recent Developments and Future Directions

Organizers: Mark Ehrensberger, PhD, University of Buffalo and Sujee Jeyapalina, PhD, University of Utah

Osseointegrated (OI) prosthetic limbs represent a promising alternative to conventional socket prostheses. The OI prostheses are directly anchored within the bone of the residual limb and utilize a percutaneous connection to the external artificial limb. Currently, there are three types of OI prostheses under clinical trial in the USA. Success of these trials will enable a wider use of this technology within the US health care system. In this workshop, experienced clinician scientists will introduce the general concepts of OI prostheses, summarize recent clinical experiences and highlight future research directions. This overview will give both orthopedic researchers and clinicians a "bench to bedside" account of these unique devices, which can perhaps revolutionize amputee care worldwide.

Experience With the OPRA System
Rickard Brånemark, MD, PhD, University of California San Francisco

Transfemoral Osseointegrated Prosthesis—Utah Implant Design Principles, Translational Research, and Clinical Outcomes
James P. Beck, MD, University of Utah

The Department of Defense Osseointegration Program
Jonathan Forsberg, MD, PhD, USU-Walter Reed

✦WORKSHOP✦
Normal and Neoplastic Osteogenesis Signaling: Targeted Therapeutic Opportunities

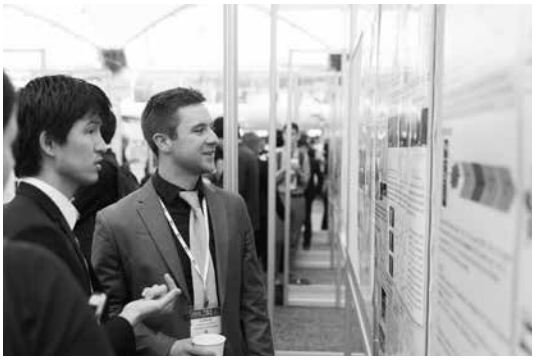
Organized by: Musculoskeletal Tumor Society (MSTS) and ORS
Organizers: Francis Y. Lee, MD, PhD, Yale University and Michelle Ghert, MD, McMaster University

In the era of Personalized Medicine and Post-Genome Sequencing, genetic profiling and molecular signaling data are readily available for human pathology samples. And yet, such big data are not readily utilized to treat altered bone properties and tumorigenesis. This workshop will highlight molecular signaling that distinguishes normal and neoplastic osteogenesis and stemness in order to discover new therapeutic opportunities to enhance bone health and cancer outcomes.

Normal Osteogenic Differentiation and Stemness
Hicham Drissi, PhD, Emory University

Aberrant Signaling in Neoplastic Osteoprogenitors and Therapeutic Targets
Bang Hoang, MD, Albert Einstein School of Medicine

Aberrant Stemness of Neoplastic Osteoprogenitors and Therpaeutic Targets
C. Parker Gibbs, MD, PhD, University of Florida



8:00 AM - 12:00 PM

ORS Clinical Research Forum: Generating Reliable Clinical Information—Barriers and Biases in Cohort Studies and Randomized Controlled Trials

Organized by: ORS Clinical Research Committee

The Clinical Research Forum will focus on the utility of cohort studies and challenges of randomized trials. Speakers will highlight key elements of cohort studies, provide a reference standard in designing observational studies and clarify the difference between cohort studies and registry data. The Forum will continue with an in-depth discussion of the many sources of bias in randomized trials. Finally, a lively debate will weigh the timeliness and importance vs. the drawbacks and challenges of Open Access Data in clinical research. Overall, the Forum will provide an informative, up-to-date and interactive discussion on clinical research in Orthopaedic Surgery.

Session I:
Cohort Studies: When Observational Studies Trump Randomized Trials

Moderator: Joel Gagnier, ND, MSc, PhD, University of Michigan

What Is a Cohort Study and What Types of Questions Can It Answer?
David Wasserstein, MD, MSC, MPH, FRCSC, Sunnybrook Health Sciences Centre

What is the Gold Standard in the Design of a Cohort Study?
Marc Swiontkowski, MD, University of Minnesota Medical School

Why Are Observational Studies Sometimes More Valid Than RCTs?
Greg Maletis, MD, Kaiser Permanente Baldwin Park Medical Center

What is the Difference Between a Cohort Study and a Registry?
Carolyn Hettrich, MD, MPH, University of Kentucky

Panel Discussion

SESSION II:
Common Sources of Bias in Randomized Controlled Studies

Moderator: Roy K. Aaron, MD, Department of Orthopaedics, Warren Alpert Medical School of Brown University

Opportunities for Bias Within the Structure of Randomized Controlled Trials
Jennifer Racine, Department of Orthopaedics, Warren Alpert Medical School of Brown University

Selection Bias and Outcomes Measure Bias in Randomized Studies
Joel J. Gagnier ND, MSc, PhD, Department of Orthopaedics, University of Michigan

Bias within Data Analysis in Randomized Controlled Trials
Roy K. Aaron, MD, Department of Orthopaedics, Warren Alpert Medical School of Brown University

Panel Discussion

DEBATE:
Will the Scientific Community Embrace Open Data in Clinical Research?

Moderator: Michael Yaszemski, MD, PhD, Mayo Medical Center

Case for the Motion
Michelle Ghert, MD, FRCSC, McMaster University

Case Against the Motion
Kurt P. Spindler, MD, Cleveland Clinic Foundation

Panel Discussion

8:15 AM–10:45 AM

ORS
ORTHOPAEDIC IMPLANTS
Orthopaedic Research Society

ORS Orthopaedic Implants Section Scientific Meeting

Organizers: Dennis Janssen, PhD, Radboud University Medical Center; Kenneth Mann, PhD, SUNY Upstate Medical University; Heidi-Lynn Ploeg, PhD, University of Wisconsin Madison; Chris Roche, MSE, MBA, Exactech, Inc.; Harry van Lenthe, PhD, KU Leuven; Nico Verdonschot, PhD, Section Chair, Radboud University Medical Center; Peter Walker, PhD, New York University-Hospital for Joint Diseases; Janie Wilson, PhD, Dalhousie University; Markus Wimmer, PhD, Rush University Medical Center

The ORS Orthopaedic Implants Section Scientific Meeting will feature invited two lectures by Stuart Goodman, MD, PhD, Stanford University Medical Center, Dept. of Orthopaedic Surgery on The Future of Biologic Coatings for Orthopaedic Implants and Catherine Van Der Straeten, MD on Hip Resurfacing Arthroplasty in Patients Younger than Fifty Years at Surgery. The meeting will also feature a poster teaser session and six invited podium talks of innovative work from invited Section members.

11:45 AM–12:45 PM

Industry Connect:
An Ongoing Discourse with the FDA
With Support from MTF Biologics

Organized by: Industry Engagement Committee
Organizers: Michael Lehmicke, Sr. R&D Group Manager, Depuy Synthes and Lara Ionescu Silverman, Director R&D, DiscGenics, Inc.

This session is the third in a series, continuing an open discussion with the FDA which was started at the Industry Connect session in 2016 (Orlando) and continued in San Diego. The session will include presentations and discussion of timely regulatory topics relevant to orthopaedic product development. Specific topics this year will include a review of the recently published FDA guidance documents for regenerative medicine and minimally manipulated products, and a presentation of two case studies covering advanced regulatory topics. 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.

Speakers and Discussion Panelists:
Tanner Howe, *President and CEO, AgNovas Healthcare*

David Armbruster, *MS, MSE, Sr. Group Manager, Biomaterials R&D, DePuy Synthes*

Aric Kaiser, *MS, Expert Biomedical Engineering, Center for Devices and Radiological Health, FDA*

Scott P. Bruder, *MD, PhD, Founder & CEO, Bruder Consulting & Venture Group*

CME is not available for this session.

11:45 AM–12:45 PM

Meet the NIH

Organized by: ORS New Investigator Mentoring Committee
Organizers: Roger Cornwall, MD, Cincinnati Children's Hospital and Hicham Drissi, PhD, Emory University

This NIH-Investigator Networking session will 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. All NIH officers at the ORS meeting will be invited to attend this session.

A boxed lunch will be provided.

Registration Required.

1:00 PM–2:00 PM

ORS 2018 Keynote Speaker, Dr. John P.A. Ioannidis
True and Useful Research Results:
Mission Impossible?

John P.A. Ioannidis, MD, DSc, is the C.F. Rehnborg Chair in Disease Prevention at Stanford University, and he is Professor of Medicine, Professor of Health Research and Policy, and Professor of Biomedical Data Science at the School of Medicine; Professor of Statistics at the School of Humanities and Sciences; co-Director of the Meta-Research Innovation Center at Stanford; and Director of the PhD program in Epidemiology and Clinical Research at Stanford University. He trained at the University of Athens (MD, and DSc in Biopathology), Harvard (internal medicine) and Tufts (infectious diseases and clinical epidemiology) and held appointments at Tufts, Johns Hopkins, NIH, University of Ioannina, Harvard, and Imperial College before joining Stanford. His paper on "Why Most Published Research Findings are False" has been the most-accessed article in the history of Public Library of Science (>2 million hits). He is also the author of 6 literary books in Greek, two of which were shortlisted for best book of the year Anagnostis awards. He has authored >800 papers in peer-reviewed journals, 68% of them as single/first/last author and he is Highly Cited Researcher according to Thomson Reuters in both Clinical Medicine and in Social Sciences. Citation indices: h=156, m=7 per Google Scholar (h=126 per ISI and Scopus). His current citation rate of ~2,500 new citations per month per Google Scholar suggests that he is among the 20 scientists worldwide who are currently the most commonly cited, and the currently most-cited physician. He considers himself privileged to have learned and to continue to learn from interactions with students and young scientists (of all ages) from all over the world and he loves to be constantly reminded that he knows next to nothing.

2:15 PM–3:15 PM
ORS Excellence in Orthopaedics Awards Session

Kappa Delta, Orthopaedic Research & Education Foundation Paper Presentations

Kappa Delta Young Investigator Award
Nelly Andarawis-Puri, PhD
Promoting Effective Tendon Healing and Remodeling

Kappa Delta Ann Doner Vaughn Award
Johnny Huard, PhD
Adult Stem Cells, Blood Vessels, and Angiogenesis: Major Determinants for Musculoskeletal Tissue Repair After Injury, Disease, and Aging

Kappa Delta Elizabeth Winston Lanier Award
Paul E. Beaulé, MD, FRCSC
Unravelling the Hip Pistol Grip / CAM Deformity: Origins to Joint Degeneration

OREF Clinical Research Award
Gregory B. Maletis, MD
Optimizing Anterior Cruciate Ligament Reconstruction: Individualizing the Decision Making Process Using Data from the Kaiser Permanente ACLR Registry

4:45 PM–5:15 PM
Techniques Workshop: How Mechanical Testing Can Enhance Your Research Studies

Organized by: **Biomomentum Inc.**
Mechanical testing is imperative in experimental studies as an outcome measure to assess and confirm the effects of numerous treatments on musculoskeletal tissues. Not only does mechanical testing offer direct and fast results – on the same day, it also evaluates the structure and function of the tissues. Due to the nature of musculoskeletal tissues – commonly anisotropic, porous, viscoelastic composite materials with diverse mechanical properties – Biomomentum has developed an important expertise and tools for mechanical testing procedures. We provide a broad range of testing capabilities including compression, tension, bending, torsion, friction, shear, 3D normal indentation, and novel mappings methods. This workshop will present different studies where mechanical testing has been added to the study protocol and helps prove the value of functional testing to obtain rapid and reliable outcomes.

CME is not available for this workshop.

6:30 PM–7:30 PM
Early Career After Party: Celebrate Diversity

Organized by: ORS Associate Members Forum
Organizers: Karl Lewis, PhD, Indiana University School of Medicine and Edward Bonnevie, PhD, University of Pennsylvania

Join us for an early career networking event. This fun and relaxed event is an opportunity for early career investigators to interact and learn about one another in an informal setting.

Registration required.

6:45 PM–8:45 PM
Research Interest Group: Growth Factors

Organizers: Dominik Haudenschild, PhD, University of California Davis and Peter van der Kraan, PhD, Radboud University Medical Center

Growth factors are essential to every aspect of orthopaedic research, from tissue development and homeostasis to wound healing, and are critical to tissue-engineering efforts. The RIG goal is to encourage intimate discussions with speakers and attendees on GFs in orthopedic research. One speaker will provide an overview, and 3-5 speakers will present exciting new data for discussion. The theme will be how cellular responses to the GFs are directed by the extracellular matrix "context."

7:00 PM–10:00 PM
ORS 5th Annual Gala: Celebrate Excellence

Join us for our 5th Annual Gala where we will celebrate our distinguished 2018 award recipients and newly inducted ORS fellows. The evening will begin with a cocktail reception, followed by dinner and dessert.

Registration Required. Tickets must be purchased no later than Saturday, March 10 at 12 noon.

SUNDAY, MARCH 11, 2018 SESSIONS 9:45 AM – 10:45 AM

TIME	SPOTLIGHT SESSION 16 Hip Disorders	SPOTLIGHT SESSION 17 Joint Reconstruction	SESSION 18 Bone Progenitors and Stem Cells	SESSION 19 Osteoarthritis
ROOM	**Celestin D-E**	**Empire A**	**Empire CD**	**Empire B**
Moderators	Joan Bechtold, PhD and Megan Killian, PhD	David Hamiton, PhD and Anna Spagnoli, MD	Elizabeth Bradley, PhD and Sophie Verrier, PhD	Dana Carpenter, PhD and Ruth Ochia, PhD
9:45 AM	**SPOTLIGHT SPEAKER** 	**SPOTLIGHT SPEAKER** 	Paper No. 0091 **Role of ATP Signaling in Primary Cilium-Mediated Mechanotransduction in Human Skeletal Stem Cells** Mathieu Riffault, David Hoey	Paper No. 0097 **Diabetes Mellitus Accelerates Progression of Osteoarthritis in Streptozotocin-Induced Diabetic Mice by Deteriorating Bone Microarchitecture, Bone Mineral Composition, and Bone Strength** Huajun Wang, Xiaofei Zheng, Simin Luo, Michelle Derynck, Rik Lynch, Zhengang Zha, Chunfeng Zhao
9:55 AM	Christopher Peters, MD **Surgical Management of Young Adults With Hip Pathonanatomy**	Daniel Saris, MD, PhD **The Role of Joint Homeostasis in Biological Joint Reconstruction**	Paper No. 0092 **Dissecting Out the Relative Contributions of Human Perivascular Stem/Stromal Populations in Adult Bone Repair** Carolyn A. Meyers, Lei Zhang, Leslie Chang, Jiajia Xu, Catherine Ding, Erin Zou, Noah Yan, Elizabeth Helmke, Kristen Broderick, Justin Sacks, Bruno Peault, Aaron W. James	Paper No. 0098 **Chondro-Protective Mechanism of Statin** Mengxi Lv, Yilu Zhou, Tiange Zhang, Liyun Wang, X. Lucas Lu
10:05 AM		**With Support from Bioventus**	Paper No. 0093 **Layer-by-Layer Enabled Nanofibrous Biomimetic Periosteum for Allograft Repair and Reconstruction** Xinping Zhang, Tao Wang, Yuankun Zhai, Marc Nuzzo	Paper No. 0099 **Progranulin Regulation of Autophagy Contributes to Its Chondroprotective Effect in Osteoarthritis** Fengjin Guo, Aubryanna Hettinghouse, Eric Strauss, Chuan-Ju Liu
10:15 AM	Paper No. 0085 **Acetabular Version Increases During Adolescence Secondary to a Reduction in Anterior Femoral Head Coverage** George Grammatopoulos, Paul Jamieson, Johanna Dobransky, Kawan Rakhra, Sasha Carsen, Paul E. Beaulé	Paper No. 0088 **Murine Model of Progressive Orthopaedic Wear Particle-Induced Chronic Inflammation and Osteolysis** Jukka Pajarinen, Akira Nabeshima, Tzuhua Lin, Taishi Sato, Emmanuel Gibon, Eemeli Jämsen, Laura Lu, Karthik Nathan, Zhenyu Yao, Stuart Goodman	Paper No. 0094 **Age-Related Decline in Osteogenesis Depends on Inactivation of Protein Kinase A by Endogenous Protein Kinase Inhibitor Gamma** Bryan S. Hausman, Xin Chen, Hyonmin Choe, Ozan Akkus, Edward M. Greenfield	Paper No. 0100 **Relationships Between Metabolic Syndrome, Adiposity, and the Gut Microbiome in a Mouse Model of Load-Induced Osteoarthritis** Jason D. Guss, Sophia N. Ziemian, Marysol Luna, Derek T. Holyoak, Gabriel G. Guisado, Taylor N. Sandoval, Sebastian Roubert, Marjolein C.H. van der Meulen, Steven R. Goldring, Christopher J. Hernandez
10:25 AM	Paper No. 0086 **Statistical Shape Modeling to Quantify Variation in Femoral Geometry in Patients With Hip Dysplasia** Brecca M. Gaffney, Jeffrey Nepple, John C. Clohisy, Lauren Westen, Michael D. Harris	Paper No. 0089 **Cobalt-Mediated Inflammatory Cytokine Secretion Is Altered by Bacterial Lipopolysaccharide** Helen Lawrence, Louise Davidson, Sami A. Anjum, Jim P. Holland, John A. Kirby, Alison J. Tyson-Capper, David J. Deehan	Paper No. 0095 **Rapid CRISPR-Based Reverse Genetic Screening in the Adult Zebrafish Skeleton** Claire Watson, Rehaan Bhimani, Adrian Monstad-Rios, Ronald Kwon	Paper No. 0101 **Depletion of Glycoshingolipids Induces the Excessive Response of Chondrocytes Under Mechanical Stress Condition** Shinji Matsubara, Tomohiro Onodera, Eijiro Maeda, Momma Daisuke, Masatake Matsuoka, Rikiya Baba, Kazutoshi Hontani, Zenta Joutoku, Kentaro Homan, Toshiro Ohashi, Norimasa Iwasaki
10:35 AM	Paper No. 0087 **Are There Disease-Specific Articular Cartilage Wear Patterns in Various Pre-Arthritic Hip Disorders?** Cecilia PascualGarrido, George Grammatopoulos, Perajit Eamsobhana, Jeffrey Nepple, Paul E. Beaulé, John Clohisy	Paper No. 0090 **The Effects of Cobalt and Chromium Ratios on the Chemokines Il-8 and Mcp-1 and the Intercellular Adhesion Protein Icam-1** Ross Whitlock, Janine Struve, Dorothee Weihrauch, James T. Ninomiya	Paper No. 0096 **Glutamine Metabolism Is a Critical Regulator of Osteoblast and Adipocyte Specification in Mesenchymal Stem Cells** Yilin Yu, Leyao Shen, Deepika Sharma, Everett Knudson, Courtney M. Karner	Paper No. 0102 **A Unifying Framework for Evaluating Cartilage Lubrication: Expressing the Stribeck Curve as a Function of Interstitial Fluid Load Support Derived From Finite Element Analysis** Janne Toivo Mäkelä, Benjamin G. Cooper, Rami K Korhonen, Mark W. Grinstaff, Brian D. Snyder

SUNDAY, MARCH 11, 2018 SESSIONS 3:30 PM – 4:30 PM

TIME	SESSION 20 NIRA—Knee and Hip	SESSION 21 NIRA—Cartilage Disease, Injury, and Repair	SESSION 22 NIRA—Bone Disease, Injury, and Aging
ROOM	**Celestin D-E**	**Empire A**	**Empire CD**
Moderators	Paul E. Beaulé, MD and Nico Verdonschot, PhD	Donald Anderson, PhD and Jeremy Mac, DDS, PhD	Kenneth Kozloff, PhD and Deborah Mason, PhD
3:30 PM	Paper No. 0103 **The Impact of Variation in Head Center and THA Stem Offset on the Capsular Contribution to Joint Stability** Casey A. Myers, Daniel N. Huff, Paul J. Rullkoetter	Paper No. 0111 **14-3-3e Is a Molecular Switch Controlling Macrophage Phenotypic Polarization in Inflammatory Arthritis** Wenyu Fu, Aubyanna Hettinghouse, Chuanju Liu	Paper No. 0120 **Load-Induced Expansion of Periosteal Primitive Sca1+ and Pre-Osteogenic Prrx1+ Cell Populations Is Absent in Aged Mice** Pamela Cabahug-Zuckerman, Chao Liu, Alesha Castillo
3:36 PM	Paper No. 0104 **IL-4 Reverses Wear Particle Induced Osteolysis by Modulating Macrophage Polarization and Bone Turnover** Jukka Pajarinen, Tzuhua Lin, Akira Nabeshima, Taishi Sato, Emmanuel Gibon, Eemeli Jämsen, Tahsin Khan, Zhenyu Yao, Stuart Goodman	Paper No. 0112 **Impact of Broad Regulatory Regions on Gdf5 Function in Hip Development and Susceptibility to Injury** Ata M. Kiapour, Jiaxue Cao, Mariel Young, Terence D. Capellini	Paper No. 0121 **Super-Healer Mice Exhibit Superior Bone Quality in Bone Fracture Healing via Modulation Osteoblastogenesis and Osteoclastogenesis** Xuying Sun, Xueqin Gao, Sarah Amra, Zhenhan Deng, Charles Huard, Xiaodong Mu, Johnny Huard
3:42 PM	Paper No. 0105 **Is Inflammasome Reactivity Required for Metal-Induced Delayed Type Hypersensitivity Potentiated Osteolysis?** Lauryn Samelko, Marco Caicedo, Kyron McAllister, Joshua Jacobs, Nadim Hallab	Paper No. 0113 **Systemic RNA Interference Therapy for Rheumatoid Arthritis Joints Through Novel Nanopieces Delivery** Koichi Okamura, Brandon Vorrius, Yupeng Chen, Hongchuan Yu, Chathuraka Jayasuriya, Douglas C. Moore, Hirotaka Chikuda, Michael G. Ehrlich, Qian Chen	Paper No. 0122 **Prevalence of Musculoskeletal Diseases and Risk Factors for Osteopenia/Osteoporosis in Young Adults With Cerebral Palsy** Daniel G. Whitney, Edward Hurvitz, Zachary French, Elie Ellenberg, Maureen Devlin, Michelle Caird, Mark Peterson
3:48 PM	Paper No. 0106 **Are PEEK-Based Materials Suitable as Potential Hip Replacement Bearing Surfaces? The Most Comprehensive Tribological Assessment to Date: Wear, Friction, and Wear Particles Assessment** Salah Hammouche	Paper No. 0114 **Highly Efficient Stepwise Differentiation of Human iPSCs Into Chondrocytes** Chia-Lung Wu, Amanda Dicks, Nancy Steward, Shaunak Adkar, Vincent Willard, Farshid Guilak	Paper No. 0123 **Injectable Triphasic Biomaterial Resorbs and Increases Bone Formation in Ovariectomized Rat Metaphyseal Defects of the Femur** Jonathan Shaul, Peggy Lalor, Shane Woods, Scott Bruder, Ronald Hill
3:54 PM	Paper No. 0107 **Soft Tissue Balance in Total Knee Arthroplasty Is Sensitive to Subtle Adjustments to Component Alignment** Joshua D. Roth, Colin R. Smith, Jeremy A. Riley, Stephen M. Howell, Maury L. Hull, Darryl G. Thelen	Paper No. 0115 **Methylation of 4-aminobutyrate Aminotransferase (abat) by Dnmt3b Regulates Chondrocyte Metabolism and the Development of OA** Jie Shen, Cuicui Wang, Daofeng Li, Ting Wang, Audrey McAlinden, Regis O'Keefe	Paper No. 0124 **Combining Vascular Bundle and Osteoinductive Scaffold Improves Bone Repair and Angiogenesis in Critical Size Bone Defect in Rats** Toshiyuki Kawai, Chi-chun Pan, Yaichiro Okuzu, Yoshitaka Shimizu, Shuichi Matsuda, William J. Maloney, Yunzhi Peter Yang
4:00 PM	Paper No. 0108 **Impact of Different Medial Patellofemoral Ligament Reconstruction Strategies on the Patellofemoral Contact Pressure** Andreas M. Seitz, Daniel Dornacher, Sabine Lippacher, Manfred Nelitz, Anita Ignatius, Lutz Dürselen	Paper No. 0116 **Variation in Susceptibility to Post-Traumatic Osteoarthritis in Recombinant Inbread Mouse Strains Suggests Genetic Contributions** Nobuaki Chinzei, Muhammad F. Rai, Shingo Hashimoto, Eric J. Schmidt, Ken Takebe, James M. Cheverud, Linda J. Sandell	Paper No. 0125 **Dental Pulp Derived Stem Cells Are More Effective for Critical Bone Defect Treatment Compared to Bone Marrow Derived Msc** Christian Männel, Corina Vater, Julia Bolte, Maik Stiehler, Michael Gelinsky, Stuart B. Goodman, Stefan Zwingenberger
4:06 PM	Paper No. 0109 **Effects of Patellofemoral Osteoarthritis on Joint Contact Stress Dduring a Downhill Walking Task: A Modeling Study** Jonathan A. Gustafson, John J. Elias, G. Kelley Fitzgerald, Scott Tashman, Richard E. Debski, Shawn Farrokhi	Paper No. 0117 **C'-CEO Mitigates OA Pathogenesis and Relieves Pain in a Rodent Model of OA** Daniel Leong, Angela Wang, Lidi Liu, Jennifer Hindieh, Jack Lin, Sun J. Kim, David Hirsh, David C. Spray, John Hardin, Luis Cardoso, Neil J. Cobelli, Hui B. Sun	Paper No. 0126 **Assessing Fracture Resistance of Human Cortical Bone With Clinically Viable Raman Spectroscopy** Mustafa Unal, Sasidhar Uppuganti, Selin Timur, Ozan Akkus, Anita Mahadevan-Jansen, Jeffry S. Nyman
4:12 PM	Paper No. 0110 **Changes in Movement Patterns During Stair Climbing From Two to Eight Years After ACL Reconstruction Are Associated With Patient-Reported Outcomes** Arielle G. Fischer, Jennifer C. Erhart-Hledik, Constance R. Chu, Jessica L. Asay, Thomas P. Andriacchi	Paper No. 0118 **In Vivo Translation of an Injectable Chondrocyte-Laden Micro-Scale "Noodle" to Promote Cartilage Repair** Minwook Kim, Mackenzie L. Sennett, Blair S .Ashley, Brendan D. Stoeckl, Eiki Koyama, James L. Friedman, Alexander L. Neuwirth, Elizabeth A. Henning, Nancy Pleshko, Jason A. Burdick, David R. Steinberg, Robert L. Mauck	Paper No. 0127 **Osteoclasts Respond to Stress Concentrations** Suphannee Pongkitwitoon, John Boyle, Yousef Abu-Amer, Guy Genin, Stavros Thomopoulos
4:18 PM		Paper No. 0119 **Functional Brain Imaging Biomarkers of Central Sensitization of Pain in Knee Osteoarthritis Predicts Poor Outcome and Chronic Postoperative Pain After Total Knee Arthroplasty** Thomas Kurien, Diane Reckziegel, Sarina Iwabuchi, William J. Cottam, Robert W. Kerslake, Kimberley L. Edwards, Kristian K. Petersen, Lars Arendt-Nielsen, Thomas Graven-Nielsen, Dorothee P. Auer, Brigitte E. Scammell	Paper No. 0128 **Loss of P53 Compensates Osteopenia in Murine Mysm1-deficiency** Melanie Haffner-Luntzer, Anna Kovtun, Verena Fischer, Katja Prystaz, Anita Ignatius, Martina Gatzka

SUNDAY, MARCH 11, 2018 SESSIONS 3:30 PM – 4:30 PM

TIME	SESSION 23 NIRA—Regenerative Medicine: Gene Therapy, Progenitors, and Stem Cells	SESSION 24 NIRA—Spine, Tendon, and Ligament
ROOM	Empire B	Celestin F-H
Moderators	Ralph Marcucio, PhD Aand Ronen Schweitzer, PhD	Jeffrey Lotz, PhD and Jeffrey A. Weiss, PhD
3:30 PM	Paper No. 0129 **Deficiencies in Female Skeletal Muscle Regenerative Capacity of Tumor Necrosis Factor Transgenic Mice** Nicole D. Paris, Alanna Klose, Richard D. Bell, Emily Wu, Edward M. Schwarz, Joe V. Chakkalakal	Paper No. 0138 **Mixed-Lineage Leukemia-4, an Epigenetic Regulator, Is Important for Musculoskeletal Patterning and Development** Deepanwita Pal, Younghoon Jang, Kai Ge, Ronen Schweitzer
3:36 PM	Paper No. 0130 **Regulated Ex Vivo Regional Gene Therapy for Bone Repair Using an Inducible Caspase-9 Suicide Gene System** Sofia Bougioukli, Brandon Ortega, Venus Vakhshori, Osamu Sugiyama, Amy Tang, Jay R. Lieberman	Paper No. 0139 **The Effect of Different Immobilization Periods on Mmps (2, 3, 9, And 13) Activity in Aclr Murine Model** Yusuke Nakagawa, Amir H. Lebaschi, Susumu Wada, Samuel Green, Zoe M. Album, Liang Ying, Xiang-Hua Deng, Scott A. Rodeo
3:42 PM	Paper No. 0131 **Stem Cell-Guided Immunomodulation of Macrophage Activation in 2D and 3D** Danielle R. Bogdanowicz, William N. Levine, Edward A. Botchwey, Helen H. Lu	Paper No. 0140 **WITHDRAWN**
3:48 PM	Paper No. 0132 **Meniscus Cell Migration Through Dense Fibrous Networks Is Regulated by Nuclear Mechanics** Su-Jin Heo, Kwang Hoon Song, Xuan Cao, Breanna N. Seiber, Vivek B. Shenoy, Jason A. Burdick, Robert L. Mauck	Paper No. 0141 **Biologic Augmentation of Repair of Chronic Rotator Cuff Tear Using Tendon Stem/Progenitor Cell (TSC) Sheets** Issei Komatsu, Yaron Sela, Jianying Zhang, James H-C Wang, Christopher C. Schmidt, Mark Baratz
3:54 PM	Paper No. 0133 **Multi-Modal Image Registration and Spatial Analyses to Unravel Angiogenic-Osteogenic Coupling** Robert J. Tower, Ling Qin	Paper No. 0142 **Disc-On-A-Chip: A Microfluidic Mouse Intervertebral Disc Organ Culture Device to Study Disc Degeneration** Li Xiao, Jingyi Li, Li Jin, James P. Landers, Xudong Li
4:00 PM	Paper No. 0134 **Tissue-Engineered Total Meniscal Replacement Using a Fiber-Reinforced Scaffold in a Two-Year Ovine Model** Jay M. Patel, Salim A. Ghodbane, Andrzej Brzezinski, Charles J. Gatt, Michael G. Dunn	Paper No. 0143 **In Vivo Diurnal Lumbar Intervertebral Disc Deformation Patterns Vary by Spinal Level** John T. Martin, Alexander B. Oldweiler, Charles E. Spritzer, Brian J. Soher, Melissa M. Erickson, Adam P. Goode, Louis E. DeFrate
4:06 PM	Paper No. 0135 **WITHDRAWN**	Paper No. 0144 **Detection of Internal Tissue Disruptions Within Injured Intervertebral Discs via Magnetic Resonance Elastography** Benjamin A. Walter, Prasath Mageswaran, Elizabeth Yu, Safdar Khan, William S. Marras, Arunark Kolipaka
4:12 PM	Paper No. 0136 **Gender Differences in Tibial Fracture in Normal and Muscular Dystrophic Mouse Models** Zhenhan Deng, Xueqin Gao, Xuying Sun, Sarah Amra, Yan Cui, Johnny Huard	Paper No. 0145 **Disc Degeneration and Chronic Back Pain Are Decreased by Toll-Like Receptor 4 Inhibition in an Animal Model** Emerson Krock, Magali Millecamps, Laura S. Stone, Lisbet Haglund
4:18 PM	Paper No. 0137 **Loss of Dnmt3b in Chondrocytes Leads to Delayed Angiogenesis and Fracture Repair** Cuicui Wang, Yousef Abu-Amer, Regis O'Keefe, Jie Shen	

SUNDAY, MARCH 11, 2018 SESSIONS 5:30 PM – 6:30 PM

TIME	SPOTLIGHT SESSION 25 Arthroplasty Outcomes Research	SESSION 26 Trauma and Fractures: Clinical	SESSION 27 Knee Mechanics and Gait Analysis	SESSION 28 Disc Imaging and Mechanics
ROOM	**Celestin D-E**	**Empire CD**	**Empire B**	**Celestin F-H**
Moderators	Evan Flatow, MD and James Ninomiya, MD	Zbigniew Gugala, MD, PhD and Philipp Leucht, MD	Ali Hosseini, PhD and Ron Zernicke, PhD	Svenja Illien-Junger, MD and Raghu N. Natarajan, PhD
5:30 PM	**SPOTLIGHT SPEAKER** 	Paper No. 0149 **Patient Level Value Analysis in Orthopaedics: A Model Using Operative Ankle Fractures** Dylan McCreary, Anthony Dugarte, Sandy Vang, Heather Marlowe, Brad Plowman, Brian Cunningham	Paper No. 0155 **Longitudinal Changes in the Total Knee Joint Moment After ACLR Correlate With Cartilage Thickness Changes** Jennifer Erhart-Hledik, Constance R. Chu, Jessica Asay, Julien Favre, Thomas Andriacchi	Paper No. 0161 **Associations Between Disc Biochemical Composition and Vertebral Body Fat Fraction Using Quantitative MRI** Roland Krug, Misung Han, Aaron Fields, Gabby B. Joseph, Justin Cheung, Maya Mundada, Alice Rochette, Thomas M. Link, Jeffrey Lotz
5:40 PM	Joel Gagnier, ND, MSc, PhD **Patient Reported Outcome Measures in Orthopaedics**	Paper No. 0150 **The Pooled Rate and Risk Factors for Prolonged Opioid Use After Surgery or Trauma: A Systematic Review and Meta-(regression) Analysis** Amin Mohamadi, Jimmy J. Chan, Jayson Lian, Casey L. Wright, Arden Marin, Edward K. Rodriguez, Arvind von Keudell, Ara Nazarian	Paper No. 0156 **Changes in Anticipatory Postural Adjustments Preceding Gait Initiation During Learning of a Novel Motor Task** Sophia Ulman, Robin M. Queen, Divya Srinivasan	Paper No. 0162 **A Magnetic Resonance Imaging Framework for Quantifying Intervertebral Disc Deformation In Vivo: Reliability and Application to Diurnal Variations in Lumbar Disc Shape** John T. Martin, Alexander B. Oldweiler, Charles E. Spritzer, Brian J. Soher, Melissa M. Erickson, Adam P. Goode, Louis E. DeFrate
5:50 PM		Paper No. 0151 **Predictors of Complications Following Initial Treatment of Proximal Humerus Fractures: A Study of 32,768 Fractures** Lauren L. Nowak, Michael D. McKee, Emil H. Schemitsch	Paper No. 0157 **Effect of ACL Reconstruction and Meniscus Repair on Anterolateral Rotational Instability of the ACL Injured Knee: Quantitative Assessment of the Pivot Shift Phenomenon Using Triaxial Accelerometer** Mai Katakura, Hideyuki Koga, Ichiro Sekiya, Toshifumi Watanabe, Masafumi Horie, Hiroki Katagiri, Koji Otabe, Toshiyuki Ohara, Kaori Nakamura, Kenta Katagiri, Hiroko Ueki, Takeshi Muneta	Paper No. 0163 **In Vivo Human Intervertebral Disc Strain From 3D MRI and Its Degeneration-Dependent Variation** John M. Peloquin, Kyle D. Meadows, Edward J. Vresilovic, Dawn M. Elliott
6:00 PM	Paper No. 0146 **Unstable Knees in Happy Patients: Limitations of a Static Clinical Evaluation Following Total Knee Arthroplasty** David F. Hamilton, Daniel Mandziak, Alexandria Sehgal, Colin R. Howie, Richard Burnett	Paper No. 0152 **Morbidity, Mortality and Cost of Osteoporotic Fractures—Should Proximal Humerus Fractures Be Taken as Seriously as Hip Fractures?** Carola F. van Eck, Christopher M. Klein, Hithem Rahmi, Karl B. Scheidt Scheidt, Mark Schultzel, Brian K. Lee, John M. Itamura	Paper No. 0158 **The Impact of Surgery on Patellar Bone Strain in Patients With Crouch Gait** Erika B. Ramirez, Jason Rhodes, Alex Tagawa, Olivia Coca, Clare K. Fitzpatrick	Paper No. 0164 **Evaluating Range of Motion During Dynamic In-Vivo Cervical Spine Motions in Spondylosis Patients** Guo Tao, Kamran Z Khan, Yu Yan, Thomas D. Cha, James D. Kang, Guoan Li
6:10 PM	Paper No. 0147 **Venous Thromboembolism Following Total Knee Arthroplasty—Does Race Matter?** Nicholas Bedard, S. Blake Dowdle, David DeMik, Timothy Brown, Yubo Gao, John Callaghan	Paper No. 0153 **Ligamentous Lisfranc Injuries: Direct Biomechanical Comparison of Dorsal Plate Fixation and Transarticular Screws** Ankit Bansal, Daniel A. Carlson, John R. Owen, Seth A. Cheatham, D.S. Blaise Williams III, Jennifer S. Wayne, Stephen L. Kates	Paper No. 0159 **Six-Degree-of-Freedom Tibiofemoral and Patellofemoral Joint Motion in Healthy Overground Gait** Marcus G. Pandy, Shanyuanye Guan, Lucas T. Thomeer, Anthony G. Schache, Richard de Steiger, Hans A. Gray	Paper No. 0165 **Redundant Sensitization Mechanisms in the Degenerative IVD to Mechanical Loading at Physiological Strain Levels** Joshua D. Stover, Corban Bothell, Jared L. Zitnay, Brandon Lawrence, Jeffrey A. Weiss, Robby D. Bowles
6:20 PM	Paper No. 0148 **Medial Unicompartmental Knee Arthroplasty and Alignment: Should We Correct to Neutral?** Stephanie C. Petterson, Adriana J. Gonzalez, Kevin D. Plancher	Paper No. 0154 **The Short-Term Impact of Concussion in the NHL: An Analysis oOf Player Longevity, Performance, and Financial Loss** Sergio M. Navarro, Rowland W. Pettit, Heather S. Haeberle, William C. Frankel, Salvatore J. Frangiamore, Prem N. Ramkumar	Paper No. 0160 **Hip Biomechanical Deficits Addressed Through Neuromuscular Training in Anterior Cruciate Ligament Reconstructed Athletes** Christopher Nagelli, Samuel Wordeman, Stephanie Di Stasi, Joshua Hoffman, Tiffany Marulli, Timothy E. Hewett	Paper No. 0166 **Three-Dimensional Computerized Tomography Evaluation of the Effects of Cage Height on Morphological Changes of the Lumbar Spine Following Extreme Lateral Interbody Fusion** Edward S. Abarado, Koji Akeda, Kevin Cheng, Nozomu Inoue, Koichi Masuda, Akihiro Sudo

ORS
Orthopaedic Research Society

MONDAY MEETING DETAIL

6:45 AM–7:45 AM
Research Interest Group
ORS Musculoskeletal Biology Workshop at Sun Valley: MRI for Early Osteoarthritis Detection—Basic and Clinical Approaches

Novel magnetic resonance imaging (MRI) techniques have been introduced recently to identify early indications in osteoarthritis (OA). MRI may be useful to identify biomechanical changes associated with cartilage degeneration by estimating altered strains and material properties with matrix degradation. Clinically, relaxometry techniques can be used to image cartilage ultrastructure and evaluate cartilage properties, but also can be used to evaluate meniscus and ligament. Novel techniques have been established to assess proteoglycan, include sodium MRI, gagCEST, dGEMRIC, and T1rho. The utility of these techniques in clinical applications can be demonstrated, including use of parametric mapping in comparative effectiveness studies. More robust analysis can be assessed with texture analysis, in which there is a detection of the spatial variation of individual pixel values. Moreover, deep learning models recently have been applied to solve joint tissue segmentation tasks, relaxation time feature extraction and morphology anomaly detection. Innovations in the big data analytics field have brought several multidimensional visualization methods with which to compare individual patients as a "point-cloud" in multidimensional space, overcoming the inherent limitations of single endpoints. Those approaches allow for the integration of imaging data with other sources. Several challenges remain, including the need for sensitive and specific imaging biomarkers that predict damage outcomes, and the desire to relate imaging biomarkers to tissue biomechanics. These concepts will be discussed by Drs. Corey Neu, Valentina Pedoia, and Hollis Potter in the manner of the Musculoskeletal Biology Workshops at Sun Valley in which discussion time equals or exceeds presentation time, questions and discussion do not need to wait until the end of the talk, and there is strong audience participation, especially from young investigators.

8:00 AM–9:30 AM
Scientific Workshops

✦WORKSHOP✦
Limb Regeneration: What Can We Learn from Animal Models for Human Translation?

Organizers: Jessica Lehoczky, PhD, Brigham Women's Hospital and Jessica Whited, PhD, Brigham and Women's Hospital

Orthopaedic patients with limb injuries secondary to trauma or disease can benefit from novel therapeutic approaches to address tissue injury or amputation. While humans have negligible innate composite tissue regeneration in limbs following injury, some non-human vertebrates have highly regenerative limbs/appendages. Basic research focused on regeneration in these species will lead to a molecular understanding of innate tissue renewal in vertebrates, and can ultimately be leveraged into translational research efforts. This workshop will introduce three model organisms currently used to gain a mechanistic understanding of limb/appendage regeneration in vertebrates.

Blastema Physiology and Induced Skeletal Regeneration in Mammals
Ken Muneoka, PhD, Texas A&M University

Lizard Tail Regeneration as an Instructive Model of Enhanced Healing Capabilities in an Adult Amniote
Thomas Lozito, PhD, University of Pittsburgh

Identifying Transcriptional Networks Associated with Appendage Regeneration
Randal Voss, PhD, University of Kentucky

✦WORKSHOP✦
In Vivo Bone and Joint Loading—How and Why Should We Measure It?

Organizers: Karen L. Troy, PhD, Worcester Polytechnic Institute and Darryl D. D'Lima, PhD, Scripps Clinic

It is not possible to directly and non-invasively measure the actual forces, stresses, and strains that are transmitted through bones and joints. Yet, design of orthopaedic implants, engineered tissue constructs, and interventions to promote healthy tissue adaptation all depend upon this knowledge. This workshop will feature three presenters who have made significant advances in measuring joint and tissue loading in healthy and clinical populations. Experimental techniques, limitations, and areas of opportunity will be identified and discussed.

Computational Modeling Approaches to Estimate In Vivo Bone Strain
Karen L. Troy, PhD, Worcester Polytechnic Institute

In Vivo Measurement of Knee Joint Contact Forces
Darryl D. D'Lima, PhD, Scripps Clinic

In Vivo Computational Prediction of Knee Joint Contact Forces
B.J. Fregly, PhD, Rice University

A Practical Guide for Performing Human In Vivo Bone Strain Measurements
Charles Milgrom

✦WORKSHOP✦
New Biological and Biomechanical Approaches to Orthopaedic Management of Pediatric Neuromuscular Disorders

Organized by: Pediatric Orthopaedic Society of North America (POSNA) and ORS
Organizers: Roger Cornwall, MD, Cincinnati Children's Hospital and Brian Snyder, MD, PhD, Boston Children's Hospital

Pediatric neuromuscular disorders include a heterogeneous array of severely disabling conditions for which multiple opportunities exist for truly game-changing innovation. Historically, virtually all pediatric neuromuscular disorders have been approached with similar simplistic orthopedic strategies: stretch or cut muscles that are tight, cut the bones if cutting the muscles doesn't work, brace muscles that are weak, and resort to a wheelchair when braces don't work. However, recent research, is leading to new disorder-specific therapies, which address underlying biological and biomechanical mechanisms and proactively mitigate deforming forces on the developing skeleton. This workshop will highlight these advances and opportunities in presentations and discussions led by clinician-scientists and clinician-engineers who both actively research and actively treat pediatric neuromuscular disorders. Participants from diverse backgrounds (science, engineering, medicine, surgery, industry) will be able to identify novel collaborations, hypotheses, and development opportunities in this wide-open field of musculoskeletal research.

Pediatric Neuromuscular Disorders: How Can Biology and Engineering Help Alleviate the Burden of Disease?
Brian Snyder, MD, PhD, Boston Children's Hospital

Success Stories: Game Changers in Spinal Muscular Atrophy and Duchenne's Muscular Dystrophy
Benjamin Alman, MD, Duke University

Shifting the Paradigm of Neuromuscular Contractures: Lessons From Neonatal Brachial Plexus Injury
Roger Cornwall, MD, Cincinnati Children's Hospital

Cerebral Palsy: Incorporating New Techniques and Technology into a Physiological Paradigm
James McCarthy, MD, Cincinnati Children's Hospital

✦WORKSHOP✦
Evaluation of Implant Failure: The Role of MRI and Retrieval Analysis

Organized by: *The Hip Society and ORS*

Organizers: Douglas E. Padgett, MD, Hospital for Special Surgery and Timothy M. Wright, PhD, Hospital for Special Surgery

While the success and longevity of joint replacement is well documented, implant failure can and does occur. The introduction of some newer designs and bearings over the past decade have unfortunately resulted in the need for early revision. Many of these failures were biologically driven and were not recognized clinically. This workshop will focus on the clinical presentations of some of these failures, the role of enhanced imaging techniques such as MRI to assess the array biologic responses observed and finally discuss the role that implant retrieval analysis can play in understanding some of the mechanisms by which these phenomena occur.

The Clinical Evaluation and Workup of the Failed Implant
Mathias P.G. Bostrom, MD, Hospital for Special Surgery

The Use of MR in Evaluating the Failed Implant
Hollis G. Potter, MD, Hospital for Special Surgery

The Role of Implant Retrieval in Evaluating Failed Implants
Timothy M. Wright, PhD, Hospital for Special Surgery

8:00 AM–9:30 AM
JOR Publications Workshop: How to Get Your Research Articles Submitted, Accepted, and Cited

Attendees will learn how to prepare a good manuscript, navigate the submission and peer review process, and maximize discoverability post publication. Topics include manuscript preparation, author guidelines, online submission, editorial evaluation, peer-review, and making the most of social media to get your work the attention it deserves.

Speakers will include:

Linda Sandell, *PhD, Editor in Chief, JOR*

Farshid Guilak, *PhD, Editor in Chief, Journal of Biomechanics*

Stuart Goodman, *MD, PhD, Associate Editor, JOR*

Mia Ricci, *Executive Editor, Wiley*

Beth Brenner, *Managing Editor, JOR*

8:00 AM–9:30 AM
Negotiating for Success

Organized by: ORS New Investigator Mentoring Committee and ORS Women's Leadership Forum
Organizers: X Sherry Liu, PhD, University of Pennsylvania and Jennifer Woodell-May, PhD, Zimmer Biomet

Negotiation is a crucial skill for professional success; however academic training does not typically prepare us to negotiate successfully. Negotiation can be regarded as an interactive communication process that has significant impact on career development and advancement. Many scientists believe they are unable to negotiate their position, and as a result, they do not negotiate to improve their professional circumstances. This program will cover useful techniques and strategies for negotiating in industry and academics and will include three short talks given by senior ORS members who have chaired numerous recruitment and promotion committees. At the end of each talk, attendees will have the opportunity to ask the expert for advice on improving their negotiation strategies for success.

Negotiating in Academics: New Faculty Hire
Dawn Elliott, PhD, University of Delaware

Negotiating in Industry
Hua Zhu (David) Ke, MD, UCB Pharma

Negotiating in Academic Medicine: An Academic Clinicians' Perspective
Kristy Weber, MD, University of Pennsylvania

11:00 AM – 11:30 AM
Technique Workshop: Advanced Histomorphometry of Musculoskeletal Systems

Organized by: **BIOQUANT Image Analysis Corporation**
Speaker: Prof. Oran Kennedy, Royal College of Surgeons in Ireland

This workshop will present analytical methods for histology in various musculoskeletal systems, with a basis in digital pathology. Quantitative analysis of trabecular and cortical bone phenotypes, articular cartilage, dynamic responses of cortical bone, osteolytic tumor growth, and implant osseointegration will be considered. Additional comments will be shared on recent successes and remaining challenges in the automated analysis of skeletal muscle.

Objectives:

- Document the basic methods necessary to prepare and image histology for analysis by histomorphometry.
- Summarize analysis protocols for a variety of tissues in musculoskeletal systems.
- Share recent advances and remaining challenges in the analysis of skeletal muscle.

11:45 AM–12:45 PM
Embracing Diversity: Challenge & Opportunities With Support from MTF Biologics

Organized by: ORS New Investigator Mentoring Committee
Organizers: Karl Lewis, PhD, Indiana University and X. Sherry Liu, PhD, University of Pennsylvania

Science has long benefited from the cross-pollination of ideas among cultures. Today, our orthopaedic research community is strongly multicultural and growing with increased diversity in many forms. These diverse dimensions not only include gender, race, ethnicity, age, or research disciplines, but also each individual's uniqueness. Indeed, diversity unlocks innovation as advancement of science and technology is often led by a research team with diverse backgrounds. It has become increasing important to address diversity in academic and research environments. The talks during this session will cover ways to address diversity in grant writing, as well as recruiting and retaining diverse hire pools.

Facing Challenges for Diversity in Academics
Mitchell Schaffler, PhD, The City College of New York

How to Diversify Your Hire Pool
Christopher Hernandez, PhD, Cornell University

Maintaining a Diverse Research Environment
Natalie McCabe Zwerger, Esq., Center for Strategic Solutions

4:30 PM–5:30 PM

ORS Debate:
Osteoarthritis (OA) Is a Disease of Bone

The ORS Program Committee invites you to participate in our second Annual Meeting Debate. ORS Past President David Burr will propose the motion that osteoarthritis is a disease of bone, specifically the subchondral bone at the joint. Professor Christopher Little will argue that joint pathology in osteoarthritis is driven by cartilage changes. Dr. Tamara Alliston will set the context for the debate, lead the questioning and keep the debaters honest. Audience participation is critical to the session, including questions from the floor and audience votes before and after the debaters have each made their case. Come join us and get involved in the ORS Great Debate!

Moderator:
Tamara Alliston, PhD, University of California San Francisco, Department of Orthopaedic Surgery

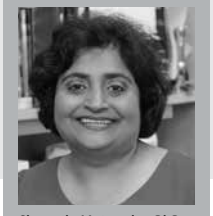
Arguing For the Motion:
David B. Burr, PhD
Indiana University School of Medicine

The role of subchondral bone in the progression of osteoarthritis has been controversial for 50 years. The observation that subchondral sclerosis was nearly always present in end-stage disease led to the conclusion that the increased stiffness caused by a thicker subchondral bone plate detracted from the bone's ability to attenuate the loads imposed on the joint cartilage, increasing cartilage stresses and initiating the process of joint deterioration. We have been misled by this observation, leading some to conclude that early bone changes are not part of the pathogenic process because subchondral densification is not apparent prior to cartilage loss. But the observation that increased plate thickness occurs subsequent to the initiation of cartilage deterioration does not address whether other changes to subchondral bone that occur prior to overt cartilage deterioration contribute to the disease. There is now accumulating evidence that preventing the physiologic increase in remodeling rate in the early phases of joint disease before detectable cartilage changes will delay or prevent progressive deterioration. Moreover, bone marrow lesions are apparent before the radiologic appearance of OA, and have been shown to be a strong predictor of progressive disease. Such studies provide fundamental evidence that OA is very much a bone disease for without bone changes, joint destruction does not occur.

Arguing Against the Motion:
Christopher B. Little, BVMS, PhD
University of Sydney, Kolling Institute

This debate hinges on reasoning issues that are central to the human condition: we tend to believe only what we can see, and we infer causality based on the temporal appearance of these observations. In psychology, these internalized cognitive processes contribute to the theories of "confirmation bias" and "illusory correlation." So, what's the relevance to this debate? Because we have always had imaging tools that allow us to "see" change in bone before cartilage, we infer both primacy and causality to bone in OA pathophysiology. As scientists, you would think we should know better, but evolutionary psychology will tell us that reasoning is a developed and learned human response that emerged to resolve the problems posed by living in collaborative groups, not to solve abstract, logical problems or draw conclusions from new data. You will need to fight this evolutionarily engrained "reasoning," and rather use the experimental rather than observational data that will be presented, that allows causality rather than illusory correlation to be apportioned. The results may surprise or even disturb you, but as fully evolved OARSI scientists you will only be able to reach one conclusion: osteoarthritis is a disease initiated in and driven by change in cartilage.

MONDAY, MARCH 12, 2018 SESSIONS 9:45 AM – 10:45 AM

TIME	SESSION 29 Osteolysis and Adverse Soft Tissue Reaction	SPOTLIGHT SESSION 30 Musculoskeletal MRI	SESSION 31 Bone Cells	SPOTLIGHT SESSION 32 Tissue Regeneration	SPOTLIGHT SESSION 33 Spinal Injury
ROOM	**Celestin D-E**	**Empire A**	**Empire CD**	**Empire B**	**Celestin F-H**
Moderators	Darryl D. D'Lima, PhD and Ryan Willing, PhD	Louis E. DeFrate, MD and Yang Xia, PhD	Donna Pacicca, MD and Andre van Wijnen, PhD	Nathaniel Dyment, PhD and Stavros Thomopoulos, PhD	Nadeem Chahine, PhD and Hiroshi Kawaguchi, MD, PhD
9:45 AM	Paper No. 0167 **Self-Reported Pain Levels Correlate With Biomarkers of Innate and Adaptive Immune Reactivity in TJA Patients** Lauryn Samelko, Marco Caicedo, Kyron McAllister, Joshua Jacobs, Nadim Hallab	**SPOTLIGHT SPEAKER** 	Paper No. 0176 **Regulation of Bone Mass by FGF Signaling Pathways** Jennifer A McKenzie, Kannan Karuppaiah, Craig Smith, Matthew J. Silva, David M Ornitz	**SPOTLIGHT SPEAKER** 	**SPOTLIGHT SPEAKER** 
9:55 AM	Paper No. 0168 **Periprosthetic and Distant Organ Responses to Corrosion of Modular Head-Neck Junctions of Total Hip Replacements Retrieved Postmortem** Deborah J. Hall, Robin Pourzal, Jennifer L. Wright, Stephanie M. McCarthy, Joshua J. Jacobs, Robert M. Urban	Sharmila Majumdar, PhD **Morphological and Functional Magnetic Resonance Imaging of the Musculoskeletal System**	Paper No. 0177 **Insulin Receptor Deletion in S100a4-Lineage Cells Disrupts Bone Homeostasis Independent of Systemic Insulin Resistance** Alayna Loiselle	Catherine Kuo, PhD **Embryonically Informed Tendon Tissue Engineering and Regeneration**	Dino Samartzis, DSc **Spinal Phenomics and Its Clinical Relevance**
10:05 AM	Paper No. 0169 **Effects of Antioxidant Blending on In Vitro Cytokine Production of Oxidized UHMWPE Pseudo Wear Debris** Tomoyo Yutani, Keita Uetsuki, Naohide Tomita		Paper No. 0178 **MicroRNA-138 Inhibits Osteogenic Differentiation and Mineralization of Human Dedifferentiated Chondrocytes by Regulating RhoC and the Actin Cytoskeleton** Hongjun Zheng		
10:15 AM	Paper No. 0170 **Evaluation of Zoledronate, Cytochalasin D, and Desferrioxamine on Osseointegration in an Intra-Medullary Femoral Implant Model** William H. Leatherwood, Benjamin A. Bortner, Reid W. Draeger, Laurence E. Dahners, Janet Rubin, Paul S. Weinhold	Paper No. 0173 **MRI UTE-T2* Shows High Incidence of Cartilage Subsurface Matrix Changes 2 Years After ACL Reconstruction** Ashley A. Williams, Matthew R. Titchenal, Aditi Guha, Constance R. Chu	Paper No. 0179 **Yap1 Is Essential for Osteoclastogenesis Through a Teads-Dependent Mechanism** Liming Zhao, Yuting Wang, Chao Song, Hanfeng Guan, Jun Xiao	Paper No. 0182 **RNA-Seq Analysis of the Healing Flexor Tendon in the MRL Mouse Reveals Altered Inflammatory, Fibrotic, and Cell Cycle Regulation** David Abplanalp, Jacob G. Kallenbach, Margaret A.T. Freeberg, Andre van Wijnen, Hani A. Awad	Paper No. 0185 **Effect of Spinal Fusion on Adjacent Segment Discs—An In-Vivo Longitudinal Patient Study** Kamran Z. Khan, Thomas Cha, Yu Yan, James Kang, Kirkham B. Wood, Guoan Li
10:25 AM	Paper No. 0171 **Peek Knee: In-Vivo and In-Vitro Studies** Zhonglin Zhu, You Wang	Paper No. 0174 **Susceptibility-Weighted Magnetic Resonance Imaging Detects Epiphyseal Cartilage Neovascularization Following Complete Femoral Head Ischemia in a Piglet Model of Legg-Calvé-Perthes Disease** Casey P. Johnson, Luning Wang, Brooke Kirkham, Cathy S. Carlson, Ferenc Toth, Olumide Aruwajoye, Harry K.W. Kim, Jutta M. Ellermann	Paper No. 0180 **Loss of JAB1 in Osteoblasts Leads to Impaired Differentiation and Postnatal Bone Formation** Guang Zhou, Murali Mamidi, William Samsa	Paper No. 0183 **Scarless Healing Cascade Initiates Early in Injured MRL/MpJ Tendons** Juan Paredes	Paper No. 0186 **The Degeneration of Adjacent Intervertebral Discs Negatively Influences Union Rate of Osteoporotic Vertebral Fracture: A Multicenter Cohort Study** Shinji Takahashi, Masatoshi Hoshino, Mohammad Suhrab Rahmani, Ryuichi Sasaoka, Kazushi Takayama, Hiromitsu Toyoda, Hiroaki Nakamura
10:35 AM	Paper No. 0172 **Macrophage Can Accelerate Corrosion Within THR Modular Junctions When Stimulated by Wear Debris** Divya R .Bijukumar, Shruti Salunkhe, Dalton Morris, Deborah Hall, Mathew Thoppil Mathew, Robin Pourzal	Paper No. 0175 **In Vivo MRI Quantification of Human Disc Compression and Flexion/Extension** Kyle Meadows, John Peloquin, Edward Vresilovic, Dawn Elliott	Paper No. 0181 **Bone-Chip System to Monitor Osteogenic Differentiation Using Optical Imaging** Dmitriy Sheyn, Doron Cohn-Yakubovich, Shiran Ben-David, Sandra De Mel, Virginia Chan, Christopher Hinojosa, Norman Wen, Geraldine Hamilton, Dan Gazit, Zulma Gazit	Paper No. 0184 **Deletion of Adamtsl2 in Limb and Tendon Mimics Geleophysic Dysplasia and Suggests a Non-Autonomous Role for Tendon in the Regulation of Bone Growth** Dirk Hubmacher, Ronen Schweitzer, Suneel S. Apte	Paper No. 0187 **A Novel Animal Model of Cervical Radiculopathy: Mechanical Allodynia, Glial Cells Activation, Cytokines Elevation, and MRI Characterization** Nianye Zheng, Xiaodong Liu, Ri Zhang, Idy Ho, Jiankun Xu, Hao Yao, Jiali Wang, Jiang Yue, Xinluan Wang, Ling Qin

MONDAY, MARCH 12, 2018 SESSIONS 1:00 PM – 2:00 PM

TIME	SESSION 34 Hip and Knee Arthroplasty: Kinematics and Gait	SESSION 35 Hip Morphology, Imaging, and Biomechanics	SESSION 36 Mechanobiology	SESSION 37 Osteoarthritis Pathophysiology	SESSION 38 Spine: Modeling and Mechanics
ROOM	**Celestin D-E**	**Empire A**	**Empire CD**	**Empire B**	**Celestin F-H**
Moderators	Philip C. Noble, PhD and Timothy Wright, PhD	Clare Fitzpatrick, PhD and Michael Harris, PhD	Meghan McGee-Lawrence, PhD and Joseph Wallace, PhD	Anthony Ratcliffe, PhD and Linda Sandell, PhD	Vijay K. Goel, PhD and Matthew H. Pelletier, PhD
1:00 PM	Paper No. 0188 **Intraoperative Soft Tissue Balance/Kinematics and Clinical Evaluation of Kinematically vs. Mechanically Aligned Total Knee Arthroplasty** Tomoyuki Matsumoto, Koji Takayama, Kazunari Ishida, Shinya Hayashi, Shingo Hashimoto, Masanori Tsubosaka, Yuichi Kuroda, Shinsuke Kirizuki, Kazuhiro Takeuchi, Katsuhiko Haneda, Hirotsugu Muratsu, Ryosuke Kuroda	Paper No. 0194 **Biomechanical Effect of Anterior Hip Impingement on Lumbar Intradiscal Pressure** Anthony N. Khoury, Juan Gomez-Hoyos, Samrat Yeramaneni, Hal Martin	Paper No. 0200 **The Role of Osteoblast Lineage Cells in Anabolic Response to Mechanical Loading** Heather M. Zannit, Matthew J. Silva	Paper No. 0206 **Association of Synovial Fluid and Serum Tryptophan Pathway Metabolites With Osteoarthritis Pain and Severity** Samuel Adams, Ivan Spasojevic, Janet Huebner, Virginia Kraus, Dana Nettles	Paper No. 0212 **Adjacent Segment Disc Deformation During Dynamic In-Vivo Cervical Spine Motions in Spondylosis Patients** Guo Tao, Kamran Z. Khan, Yu Yan, Thomas D. Cha, Guoan Li
1:10 PM	Paper No. 0189 **In-Vivo 3-Dimensional Bi-Cruciate Retaining Total Knee Arthroplasty Inter-Limb Gait Symmetry Analysis** Paul Arauz, Yun Peng, Young-Min Kwon	Paper No. 0195 **Medialization of the Acetabular Center of Rotation Following Periacetabular Osteotomy Is Most Predictive of Changes in Hip Contact Stress** Holly D. Thomas, Elise Femino, Michael C. Willey, Jessica E. Goetz	Paper No. 0201 **Osteoblast-Induced Osteoclast Differentiation Following Loading Changes Under Postmenopausal Conditions** Hollie Allison, Laoise M. McNamara	Paper No. 0207 **Associations Between Metallosis and Tissue Metal Concentration in Autopsy-Retrieved TKA** Christina M. Arnholt, Joshua B. White, Genymphas B. Higgs, Daniel W. MacDonald, Julie A. Lowell, Meredith R. Perkins, William M. Mihalko, Steven M. Kurtz	Paper No. 0213 **Prediction of Lumbar Spine Tissue Mechanics for People With and Without a Transtibial Amputation Using Multiscale Modeling Techniques** Jasmin Honegger
1:20 PM	Paper No. 0190 **Continuously Monitoring Knee Recovery After Total Knee Arthroplasty: Gait Knee Flexion Is a better Metric Than Maximum Knee Flexion** Ryan M. Chapman, Lyndsi Ross-Trevor, Wayne E. Moschetti, Douglas W. Van Citters	Paper No. 0196 **PROMIS vs. Legacy Patient-Reported Outcomes in Patients Undergoing Surgical Treatment for Developmental Dysplasia of the Hip** Cecilia Pascual-Garrido, Deborah Li, Elizabeth Yanik, Jeffrey Nepple, Marcin Wasko, John Clohisy	Paper No. 0202 **ECM-Receptor Interaction Pathway Is Highly Correlated to Perlecan/HSPG2 mRNA Level in Bone Under Loading** Shaopeng Pei, Sucharitha Parthasarathy, Ashutosh Parajuli, X. Lucas Lu, Catherine B. Kirn-Safran, M. Cindy Farach-Carson, Liyun Wang	Paper No. 0208 **14-3-3 Epsilon Is a Novel Component of Pgrn/tnfr2 Receptor Complex to Mediate Pgrn's Protective Role in Chondricytes and Osteoarthritis** Wenyu Fu, Young-su Yi, Yuanjing Ding, Chuanju Liu	Paper No. 0214 **Effects of Specimen Geometry and Boundary Conditions on Fiber Engagement and Mechanical Properties** Minhao Zhou, Semih E. Bezci, Grace D. O'Connell
1:30 PM	Paper No. 0191 **Comparison of Posterior-Stabilized, Cruciate-Retaining and Medial-Stabilized Implant Motion In Overground Gait** Marcus G. Pandy, Shanyuanye Guan, Tony Young, Michelle M. Dowsey, Peter Choong, Hans A. Gray	Paper No. 0197 **Contributions of the Cam Morphology and the Capsule-to-Femoroacetabular Impingement** K.C. Geoffrey Ng, Hadi El Daou, Marcus J.K. Bankes, Ferdinando Rodriguez y Baena, Jonathan R.T. Jeffers	Paper No. 0203 **Ischemic Stroke Inhibits Exercise-Induced Bone Gains in the Distal Femur** Nicholas J. Hanne, Andrew J. Steward, Greet Kerckhofs, Sriharsha V. Pinnamaraju, Tatjana N. Parac-Vogt, Jacqueline H. Cole	Paper No. 0209 **Pericellular Matrix Is Highly Sensitive to Cartilage Degeneration in Early Post-Traumatic Osteoarthritis** Daphney R. Chery, Qing Li, Junyu Lu, Biao Han, Ling Qin, X. Lucas Lu, Motomi Enomoto-Iwamoto, Lin Han	Paper No. 0215 **Ligaments Slackness and Multifidus Muscle Atrophy Have a Major Role in Lumbar Spine Stability** Michele Baldoni, Weiyong Gu
1:40 PM	Paper No. 0192 **Knee Balance Assessment During Cementation Is Detrimental to Initial Tibial Tray Fixation** Yashar Behnam, J. Bohannon Mason, Hayden Wilson, Paul Rullkoetter, Chadd Clary	Paper No. 0198 **Zero Echo Time MRI of Bone: Assessing Femoroacetabular Impingement** Ryan Breighner, Eric Bogner, Bryan T. Kelly, Matthew F Koff, Hollis G. Potter	Paper No. 0204 **Cyclic Hydrostatic Pressure Remodels the Intermediate Filament Network and Enhances Osteogenic Gene Expression in Mesenchymal Stem Cells** Elena Stavenschi, David A. Hoey	Paper No. 0210 **MicroRNA-365 Regulates Cartilage Homeostasis by Controlling IL-6 Cytokine Expression Range via Switching Between Dichotomous Targets in Mice and Humans** Yun Gao, Nan Hu, Zhiyu Huang, Pengcheng Liu, Jing Ding, Kun Yang, Qian Chen	Paper No. 0216 **Ex Vivo Biomechanical Evaluation of a Combined Annulus Fibrosus and Nucleus Pulposus Hydrogel Repair in a Large Animal Model of Severe Intervertebral Disc Herniation Injury** Warren W. Hom, Huizi A. Lin, Nimrod Korda, Josaua S. Desai, Philip Nasser, Andrew C. Hecht, Steven B. Nicoll, James C. Iatridis
1:50 PM	Paper No. 0193 **Validation of Model-Predicted Tibial Tray Micromotion in Cementless TKR** Alessandro Navacchia, Chadd W. Clary, Hayden Wilson, Yashar Behnam, Irene Sintini, Abraham Wright, Paul Rullkoetter	Paper No. 0199 **The Acetabular and Spino-Pelvic Morphologies Are Different in Subjects With Symptomatic Cam Morphology** George Grammatopoulos, Andrew Speirs, Geoffrey Ng, Charles Riviere, Kawan Rakhra, Mario Lamontagne, Paul E. Beaulé	Paper No. 0205 **Substantial Repair of Diffuse Damage in Bone Ex Vivo Can Occur Through Physicochemical Mechanisms** Leila Mehraban Alvandi, Donna Chen, Zeynep Seref-Ferlengez, Robert Majeska, Mitchell Schaffler	Paper No. 0211 **Impact of Broad Regulatory Regions on Gdf5 Function in Knee Development and Susceptibility to Osteoarthritis** Steven Pregizer, Ata M. Kiapour, Mariel Young, Zun Liu, Jiaxue Cao, Vicki Rosen, Terence D. Capellini	Paper No. 0217 **Multigenerational Growth Approach to Incorporate Residual Stress in an Intervertebral Disc Finite Element Model With Validation in Multi-Axial Loading** John DeLucca, John Peloquin, Edward Vresilovic, Dawn Elliott

MONDAY, MARCH 12, 2018 SESSIONS 2:15 PM – 3:15 PM

TIME	SESSION 39 Implant Materials	SESSION 40 Cartilage and Synovium: Inflammation	SPOTLIGHT SESSION 41 Bone and Cartilage Repair	SESSION 42 Tendon and Ligament: Mechanics and Mechanobiology	SESSION 43 Disc Biology
ROOM	**Celestin D-E**	**Empire A**	**Empire CD**	**Empire B**	**Celestin F-H**
Moderators	J.J. Trey Crisco, PhD and Kenneth A. Mann, PhD	Ru L. Bryan, PhD and Mary B. Goldring, PhD	Dianne Little, DVM, PhD and Robert L. Mauck, PhD	Peter Amadio, MD and Denitsa Docheva, PhD	Grace O'Connell, PhD and Nam V. Vo, PhD
2:15 PM	Paper No. 0218 **Using Multibody Dynamic Simulation to Predict Effect of Implant Design, Alignment, and Activity Type on Tibial Post Contact Forces in Posterior Stabilized Total Knee Arthroplasty** Sourabh Boruah, Orhun K. Muratoglu, Kartik M. Varadarajan	Paper No. 0224 **Genetic Ablation of INOS in TNF-Tg Mice With Inflammatory Erosive Arthritis Prevents Lymph Node Expansion and Decreases Synovial Infiltrates** Richard Bell, Emily Wu, Lianping Xing, Christopher Ritchlin, Edward Schwarz	**SPOTLIGHT SPEAKER**  Fergal O'Brien, PhD **Scaffold-Based Delivery of Nucleic Acid Therapeutics for Enhanced Bone and Cartilage Repair**	Paper No. 0233 **The Role of Connexin 43 in Tendon Enthesis Development and Response to Loading** Hua Shen, Andrea G. Schwartz, Roberto Civitelli, Stavros Thomopoulos	Paper No. 0239 **Tenomodulin as a Novel Molecule Maintaining Intervertebral Disc Homeostasis** Dasheng Lin
2:25 PM	Paper No. 0219 **The Roles of Stress, Lipids, and Reactive Oxygen Species in the Oxidation of UHMWPE** Matthew S. Herzig, Barbara H. Currier, Douglas W. Van Citters	Paper No. 0225 **Orphan Nuclear Receptor NR4A2 Expression in the Human TNF-Alpha Transgenic Model of Arthritis** Kimberlee Mix, Cullen Lilley, Andrea Alarcon, Mindy Ngo, Jackeline Araujo		Paper No. 0234 **Loss of Fibroblast Growth Factor Rreceptor Signaling in Connective Tissues Leads to Knee Joint Contractures and Decreased Tibiofemoral Spacing in the Murine Hindlimb** Michael A. Sonnenfelt, Connor C. Leek, Kendra K. Wernlé, Kannan Karuppaiah, David M. Ornitz, Megan L. Killian	Paper No. 0240 **The Role of Caspase-3 Gene in Intervertebral Disc Degeneration Due to Injury and Aging** Takashi Ohnishi, Hideki Sudo, Takeru Tsujimoto, Norimasa Iwasaki
2:35 PM	Paper No. 0220 **In Vitro Effects of the Wear Particles of Highly Cross-Linked Polyethylene, Polyether-Ether-Ketone, and Cobalt-Chromium-Molybdenum on Serum Cytokine Profiles and T-Cell Responses** Zhe Du, Zhonglin Zhu, Bing Yue, Zhanchun Li, You Wang	Paper No. 0226 **Early Supplemental α2-macroglobulin Attenuates Cartilage and Bone Damage by Inhibiting Inflammation in Collagen II Induced Arthritis Model** Shengchun Li, Xiaochun Wei, Min Zhang, Jin Deng, Xianwen Shang, Yanxiang Zhang, Lei Wei		Paper No. 0235 **How Simulated Pathological Niche Regulates Cell-Mediated Extracellular Matrix Degradation in Tendon: Analysis of Tissue Transcriptome and Biomechanical Loss of Function in a Murine Explant Model of Tendon Rupture** Stefania L. Wunderli, Agnese Beretta Piccoli, Unai Silvan, Jess G. Snedeker	Paper No. 0241 **Myofibroblasts Differentiation in Disc Degeneration: A Possible Contribution of Local and Non-Local Cells** Yan Peng, Tiffany Y. Au, Wai-Kit Tam, Yi Sun, Kathryn S. Cheah, Kenneth M.C. Cheung, Victor Y.L. Leung
2:45 PM	Paper No. 0221 **Is Blocking IL-17 a Viable Treatment Strategy for Metal Hypersensitivity Immune Responses to Implant Debris?** Lauryn Samelko, Marco Caicedo, Kyron McAllister, Joshua Jacobs, Nadim Hallab	Paper No. 0227 **GDF11 Attenuates Inflamatory Arthritis Through Antagonizing NF-κB Signaling Pathway** Welwei Li, Wenhan Wang, Krasimir Vasilev, Yunpeng Zhao	Paper No. 0230 **Genetic Engineering of Human Mesenchymal Stem Cells for Spatially Defined Osteochondral Tissue Engineering** Nguyen P.T. Huynh, Jonathan M. Brunger, Catherine C. Gloss, Franklin T. Moutos, Charles Gersbach, Farshid Guilak	Paper No. 0236 **Tendon-Specific Insulin Receptor Deletion Does Not Recapitulate the Diabetic Tendinopathy Phenotype Observed in Obese/ Diabetic Mice** Valentina Studentsova, Alayna Loiselle	Paper No. 0242 **Involvement of Autophagy in Intervertebral Disc Degeneration and Its Contribution to Cell Homeostasis With the Maintenance of Notochordal Phenotype** Takashi Yurube, Masaaki Ito, Yuji Kakiuchi, Yoshiki Takeoka, Kenichiro Kakutani, Toru Takada, Yutaro Kanda, Shingo Miyazaki, Ryosuke Kuroda, Kotaro Nishida
2:55 PM	Paper No. 0222 **Is Carcinogenic Chromium Found in Organs of Total Joint Arthroplasty Patients?** Ilona Swiatkowska, Frederick W. Mosselmans, Cody Wyles, Joseph J. Maleszewski, Johann Henckel, Barry Sampson, Dominic B. Potter, Robert T. Trousdale, Alister J. Hart	Paper No. 0228 **Modulation of Fibroblast-to-Macrophage Ratio in Synovium by Proinflammatory Cytokine and Corticosteroid: Implications for OA and Therapeutics** Robert M. Stefani, Amy M. Silverstein, Saiti S. Halder, Colden M. Lyons, Eben G. Estell, Jae Han Lee, Gerard A. Ateshian, J. Chloe Bulinski, Roshan Shah, Clark T. Hung	Paper No. 0231 **Use of Coacervate to Deliver BMP2 and sFlt1 Enhances Human Muscle-Derived Stem Cell-Mediated Cartilage Repair in an MIA-Induced Osteoarthritis Model** Xueqin Gao, Haizi Cheng, Ying Tang, Sarah Amra, Hassan Awada, Xuying Sun, Aiping Lu, Zhenhan Deng, Charles A. Huard, Bing Wang, Yadong Wang, Johnny Huard	Paper No. 0237 **Induced Deletion of Biglycan in Mature Tendon Reveals a Surprising Role During Adulthood** Zakary M. Beach, Kelsey A. Robinson, Ashley B. Rodriguez, Snehal S. Shetye, Stephanie N. Weiss, Thomas H. Adams, Sheila M. Adams, Mei Sun, David E. Birk, Louis J. Soslowsky	Paper No. 0243 **Differential Response of Intervertebral Disc Compartments to Systemic TNFa Over Expressing Mice** Deborah J. Gorth, Irving M. Shapiro, Makarand V. Risbud
3:05 PM	Paper No. 0223 **Sensitivity and Specificity of Metal Ion Level in Predicting Head-Neck Taper Corrosion in Metal-on-Polyethylene Total Hip Arthroplasty** Yun Peng, Paul Arauz, John MacAuliffe, Elizabeth Sridhar, Olivia Stoddard, Young-Min Kwon	Paper No. 0229 **Bone Resorption Markers in the Synovial Fluid of the Hip Joint With Subchondral Insufficiency Fracture of the Femoral Head: A Comparison With Rapidly Destructive Arthrosis of the Hip Joint** Yusuke Kubo, Goro Motomura, Satoshi Ikemura, Hiroyuki Hatanaka, Takeshi Utsunomiya, Shoji Baba, Koichiro Kawano, Takuaki Yamamoto, Yasuharu Nakashima	Paper No. 0232 **Controlled Delivery of rAAV Vectors via Supramolecular Polypseudorotaxane Gels for Cartilage Tissue Engineering Approaches** Ana Rey Rico, Jagadesh K. Venkatesan, Gertrud Schmitt, Angel Concheiro, Henning Madry, Carmen Alvarez-Lorenzo, Magali Cucchiarini	Paper No. 0238 **Micro-Scale Mechanical Load Transfer, Damage, and Structure of Rat Plantaris Tendon** Andrea H. Lee, Dawn M. Elliott	Paper No. 0244 **Effects of Interleukin-17a on Intervertebral Disc Degeneration: Interleukin-17a Can Be a Potential Therapeutic Target for Treating Degenerative Discs** Kaori Suyama, Daisuke Sakai, Noriaki Hirayama, Kou Sakabe, Masahiko Watanabe

MONDAY, MARCH 12, 2018 SESSIONS 5:45 PM – 6:45 PM

TIME	SPOTLIGHT SESSION 44 Knee Restoration	SESSION 45 Cartilage and Synovium: Mechanics and Mechanobiology	SESSION 46 Bone— Mechanics	SESSION 47 Regenerative Medicine 2	SESSION 48 Meniscus
ROOM	**Celestin D-E**	**Empire A**	**Empire CD**	**Empire B**	**Celestin F-H**
Moderators	Carl W. Imhauer, PhD and Jason Shearn, PhD	Cathy Carlson, DVM, PhD and Ronald June, PhD	Kirk McGilvray, PhD and Elise Morgan, PhD	Catherine K. Kuo, PhD and Jessica Whited, PhD	Lawrence Bonassar, PhD and Lutz Duerselen, PhD
5:45 PM	**SPOTLIGHT SPEAKER**  Lynn Snyder-Mackler, PhD **Rehab and Knee Arthroplasty— Prevention and Treatment Today and Beyond**	Paper No. 0248 **Impact of Cartilage Particulates on Synovium-Cartilage Tribology and Synovium Mechanobiology** Eben G. Estell, Lance A. Murphy, Krista M. Durney, Amy M. Silverstein, Andrea R. Tan, Roshan P. Shah, Gerard A. Ateshian, Clark T. Hung	Paper No. 0254 **Transport And Morphological Properties Of Cartilage-bone Interface At Nano-scale** Behdad Pouran, Amir Raoof, Matthijs de Winter, Vahid Arbabi, Ronald Bleys, Jos Malda, Amir A. Zadpoor, Harrie Weinans	Paper No. 0260 **Cell-Secreted Extracellular Matrix, Independent of Cell Source, Promotes the Osteogenic Differentiation of Human Stromal Vascular Fraction** Jenna N. Harvestine, Hakan Orbay, Jonathan Y. Chen, David E. Sahar, J. Kent Leach	Paper No. 0266 **Nanostructure and Biomechanics of Fibrocartilage Pericellular Matrix: Roles of Collagen V** Chao Wang, Qing Li, Su-Jin Heo, Sheila M. Adams, Motomi Enomoto-Iwamoto, Robert L. Mauck, David E. Birk, Lin Han
5:55 PM		Paper No. 0249 **The Response of Articular Cartilage to Microgravity** Jamie Fitzgerald, Jamie Endicott, Cathleen Moscibricki	Paper No. 0255 **Effect of Ex Vivo Ionizing Radiation on Static and Fatigue Properties of Mouse Vertebral Bodies** Shannon R. Emerzian, Megan M. Pendleton, Alfred Li, Jennifer W. Liu, Joshua S. Alwood, Grace D. O'Connell, Tony M. Keaveny	Paper No. 0261 **Chondroitin Sulfate Proteoglycans Digestion of Bone Marrow Stromal Cell Sheet With ChABC Promote Neurite Elongation In Vitro and Axonal Regeneration In Vivo** Akinori Okuda, Takamasa Shimizu, Hideki Shigematsu, Eiichiro Iwa, Masato Tanaka, Tadanobu Onishi, Yasuhiko Morimoto, Keisuke Masuda, Yusuke Yamamoto, Manabu Akahane, Yasuhito Tanaka	Paper No. 0267 **Baseline Biochemical Changes in Meniscus F ollowing ACL Injury Can Predict Cartilage Degeneration at 2 Years** Joseph Knox, Valentina Pedoia, Amy Wang, Xiaojuan Li, Benjamin Ma
6:05 PM		Paper No. 0250 **Effect of Different Compressive Stress Patterns During Articulation on Cartilage Stiffness: A Microindentation Study** Catherine S. Yuh, Tony Chen, Mehdi Khoshgoftar, Suzanne Maher, Markus A. Wimmer	Paper No. 0256 **Microarchitectural Adaptations in Rat Maternal Bone Induced by Pregnancy and Lactation Exert Protective Effects Against Future Estrogen Deficiency** Chantal M. de Bakker, Laurel Leavitt, Hongbo Zhao, Yihan Li, Casey Krickus, Mengting Huang, Wei-Ju Tseng, X. Sherry Liu	Paper No. 0262 **Dystrophin Restoration by CRISPR/Cas9-Mediated Gene Editing Improves Properties of Muscle Progenitor Cells** Polina R. Matre, Jianbo Wu, Xiaodong Mu, Aiping Lu, Rithica Deepak, Radbod Darabi, Johnny Huard	Paper No. 0268 **Obesity and Meniscus Coverage Affect the In Vivo Properties of Cartilage** Amber T. Collins, Micaela Kulvaranon, Charles Spritzer, Louis DeFrate
6:15 PM	Paper No. 0245 **Identifying Neuromuscular Improvements and Remaining Deficits of Patients Before and After Total Knee Arthroplasty Relative to Asymptomatic Function During Gait** Jereme B. Outerleys, Michael J. Dunbar, Janie L. Astephen Wilson, Cheryl L. Hubley-Kozey	Paper No. 0251 **Roles of Collagen V in the Structure and Mechanics of TMJ Condyle Cartilage: A Fibro-Hyaline Hybrid** Prashant Chandrasekaran, Qing Li, Chao Wang, Mei Sun, Louis J. Soslowsky, David E. Birk, Lin Han	Paper No. 0257 **Alterations of the Interstitial Fluid Flow Around Osteocytes in a Rat Model of Disuse Osteoporosis** Vittorio Gatti, Michelle J. Gelbs, Michael B. Gerber, Susannah P. Fritton	Paper No. 0263 **ACL Rupture-Induced Intra-Articular Recruitment of Peripheral Blood Mobilized Stem Cells Is CXCR4-Dependent** Mackenzie M. Fleischer, Michael D. Newton, Samantha E. Hartner, Meagan Salisbury, Christopher J. Bush, Perry Altman, Stephen B. Luczak, Asheesh Bedi, Tristan Maerz, Kevin Baker	Paper No. 0269 **Can Decellularized Meniscus by High Hydrostatic Pressure Be an Alternative to Meniscus Allograft?— Compared with Deep Frozen Meniscus** Naoto Watanabe, Mitsuru Mizuno, Junpei Matsuda, Naoko Nakamura, Koji Otabe, Hisako Katano, Nobutake Ozeki, Yuji Kohno, Tsuyoshi Kimura, Kunikazu Tsuji, Hideyuki Koga, Akio Kishida, Ichiro Sekiya
6:25 PM	Paper No. 0246 **Correlation of Viable Chondrocyte Density to 1-year Revision and Failure Rates After Osteochondral Allograft Transplantation in the Knee** James L. Cook, Aaron M. Stoker, Mauricio Kfuri, Lasun O. Oladeji, James P. Stannard	Paper No. 0252 **The Role of Mechanosensitive Ion Channels in Mechanoregulation of Prenatal Joint Morphogenesis** Cristian Parisi, Vikesh V. Chandaria, Niamh C. Nowlan	Paper No. 0258 **Biomechanical and Densitometric Response of the Proximal Femur to Teriparatide** Joyce H. Keyak, Thomas F. Lang, Divya Shah, Julio Carballido-Gamio	Paper No. 0264 **Gene-Activated Scaffolds Incorporating Star-Shaped Polypeptides Accelerate Bone Tissue Regeneration In Vitro and In Vivo** David P. Walsh, Rosanne Raftery, Irene Mencia Castano, Andreas Heise, Sally-Ann Cryan, Fergal O'Brien	Paper No. 0270 **RNA Microarray Comparison of Meniscus in Patients With and Without Concomitant Knee Osteoarthritis** Muhammad F. Rai, Bo Zhang, Lei Cai, Rick W. Wright, Linda J. Sandell, Robert H. Brophy
6:35 PM	Paper No. 0247 **A Novel Rodent Model of Total Knee Arthroplasty** Justice U. Achonu, Mikhail Gurevich, Martin Kaczocha, Sardar M.Z. Uddin, David E. Komatsu	Paper No. 0253 **Age-Dependent Mechanical Regulation of Histone Modifications in Mesenchymal Stem Cells** Su-Jin Heo, Eric N. Dai, Robert L. Mauck	Paper No. 0259 **Determinants of Femoral Neck Strain During Dynamic Tasks** Ana Rey Rico, Mariana Kersh, Saulo Martelli, Roger Zebaze, Ego Seeman, Marcus Pandy	Paper No. 0265 **Faster Repair in Acute and Chronic Cartilage Defects in Large Animal Studies With Bioreactor Manufactured Grafts** David Wendt, Andreja Vukasovic, M. Adelaide Asnaghi, Petar Kostesic, Helen Quasnichka, Wael Kafienah, Alan Ivkovic, Ivan Martin	Paper No. 0271 **Dynamic Loads Distributed Through the Medial Meniscus Are Variable Across Knees During Gait** Caroline Brial, Tony Chen, Amanda Wach, Russell F. Warren, Peter A. Torzilli, Suzanne A. Maher

ORS
Orthopaedic Research Society

TUESDAY MEETING DETAIL

8:00 AM–9:30 AM
What Does Your CV/Resume Say About You?

Organized by: ORS New Investigator Mentoring Committee and ORS Women's Leadership Forum
Organizers: Karen Troy, PhD, Worcester Polytechnic Institute; Nancy Pleshko, PhD, Temple University; Mary Goldring, PhD, Hospital for Special Surgery

Ever wondered what makes an ideal CV/Resume in order to be hired for a new job or promoted at your company/university? Your CV/Resume is a window into who you are, as a scientist, and as a trainee, employee, or faculty member, so you need to make sure that it is telling the best story possible. This program will explore and examine the key aspects of a CV/Resume with great tips and pointers on what to do and not to do when preparing these documents. We have assembled 3 excellent speakers to explore this topic based on their experiences in academia, and industry with a focus on bioengineering.

The program will begin with 3 short talks on various aspects of CV/Resume writing including, but not limited to, how to organize your CV, what you should include, how to make the best impression, and what not to include. Following the short talks, we will have tables set up around the room for participants to ask experts in the field about how to improve their individual CVs. This program is geared towards biomedical engineering careers, but is ideal for the early career investigator as well as those who are beginning or about to complete the tenure process, and those looking to progress in their industry positions. Please make sure that you come with a copy of your CV/Resume and questions for the experts to make this the most productive session possible.

What Does Your CV/Resume Say About You for Finding a Job/Being Promoted in Industry?
Jamie Williams, PhD, Robson Forensic, Inc.

What Does Your CV/Resume Say About You for Promotion in Academic Medicine?
Regis O'Keefe, MD, PhD, Washington University

What Does Your CV/Resume Say About You for Promotion in Academia or in Engineering?
Joan Bechtold, PhD, University of Minnesota, MMRF and Excelen

Registration Required.

8:00 AM–9:30 AM
Scientific Workshops

✦WORKSHOP✦
In Vivo MicroCT Imaging: Longitudinal Assessment of Skeletal Microstructure, Strength, and (Re)modeling Dynamics

Organizers: Bettina M. Willie, PhD, McGill University and Shriners Hospital for Children and X. Sherry Liu, PhD, University of Pennsylvania

Micro computed tomography imaging enables unprecedented 3D visualization of tissue microstructure non-destructively, and has thereby emerged as a gold standard method to assess bone structure, geometry, and microarchitecture. An important advance in MicroCT technology in recent years is in vivo imaging of small animals. This imaging strategy not only minimizes the number of animals required while enhancing statistical power, but also provides new insight into musculoskeletal disease, injury, and repair processes through an added temporal dimension. Moreover, a recent implementation of MicroCT technology in clinical applications, namely high-resolution peripheral quantitative CT (HR-pQCT), enables longitudinal assessment of skeletal alterations at microscale of humans. The aim of the workshop is to bring together scientists and clinicians to discuss current imaging protocols and image processing methodology related to longitudinal MicroCT imaging in preclinical and clinical studies.

Preclinical Longitudinal MicroCT Imaging
Ralph Müller, PhD, ETH Zurich

Clinical In Vivo MicroCT Imaging
Steven Boyd, PhD, University of Calgary

Biomechanical In Vivo MicroCT Imaging
Enrico Dall'Ara, PhD, University of Sheffield

✦WORKSHOP✦
Cell Autonomous and Non-Cell Autonomous Mechanisms of Aging

Organizer: Johnny Huard, PhD, The University of Texas Health Science Center at Houston

Aging is arguably the most important, yet poorly understood aspect of biology. There is compelling evidence to support the hypothesis that the underlying cause of aging is the cell autonomous, time-dependent accumulation of stochastic damage to cells, organelles, and macromolecules. It is also clear from parabiosis, serum transfer, and cell ablation studies that cell non-autonomous mechanisms play important roles in driving degenerative changes that arise as the consequence of spontaneous, stochastic damage. However, the relative contribution of cell autonomous and non-autonomous mechanisms to systemic aging in different organisms is unclear. The goal of this workshop is to educate and inform participants that the process of aging specific cell and/or tissue types has effects on not only neighboring cells, but also on the rate of systemic aging. The major goal will be to identify drugs or agents to target critical pathways that drive aging in these specific types of cells or tissues, which may result in therapeutic approaches to extend healthy aging as well as delay aging-related disorders, such as osteoathritis (OA).

Identification and Characterization of Key Cell and Tissue Types That Contribute to Driving Systemic Aging
Laura Niedernhofer, MD, PhD, The Scripps Research Institute

Identification of Key Cell Autonomous and Non-Autonomous Signaling Mechanisms Involved in Driving Systemic and Local Aging
Paul Robbins, PhD, The Scripps Research Institute

Effect of Tissue and Cell Type-Specific Aging on Stem Cell and Stem Cell Niche Function
Johnny Huard, PhD, The University of Texas Health Science Center at Houston

✦WORKSHOP✦
Advances in Understanding Early Post-Traumatic Osteoarthritis

Organizers: Dominik Haudenschild, PhD, University of California Davis and Blaine Christiansen, PhD, University of California Davis

Joint injuries initiate changes in joint tissue homeostasis that often culminate in osteoarthritis. A focus of current research is to mechanistically connect the initial injury event, and the eventual osteoarthritis. This workshop will highlight advances in identifying the acute injury-responses in different joint tissues, with a focus on the early responses that determine the trajectory of disease progression. This workshop will bring together the unique perspectives of the presenters who have each approached the identification of early OA differently in their research. The goal is to establish a more comprehensive understanding of the interplay between early post-injury changes in gene expression, cartilage repair and remodeling, and the generation of biomarker "profiles" in the injured joint. An additional focus will be how the early responses can vary across different genetic backgrounds.

Injury-Induced Changes in Transcription During the Acute Phase
Gabriela Loots, PhD, Lawrence Livermore National Laboratories

Genetic Variation Affects Transcriptional Responses to Joint Injury
M. Farooq Rai, PhD, Washington University

Mechanical Interplay Across the Osteochondral Junction
Andrew Pitsillides, BSc(Hons), PhD, Royal Veterinary College University of London

TIME	SESSION 49 LATE BREAKING SESSION
ROOM	**Empire A**
Moderators	Michel Assad, PhD and Virginia Ferguson, PhD
8:00 AM	Paper No. 2096 **3D Bioprinting Spatial Gradients of VEGF to Enhance Vascularization for Bone Tissue Engineering** Fiona E. Freeman, Eben Alsberg, Daniel Kelly
8:07 AM	Paper No. 2097 **Bioabsorbable Solid Scaffold With Cell-Seeded Hydrogel Improves Early Cartilage Neotissue Synthesis and Strength** Jennifer R. Ibanez, Hannah Zlotnick, Alexander Leonard, Nathan Friedman, Alan J. Grodzinsky
8:14 AM	Paper No. 2098 **The Effect of a Biphasic Apatite/Calcium Sulfate Bone Graft Substitute Conjugated With Different Dosages of Bisphosphonate on Bone Defect Healing in Rats** Christina Perdikouri, Eva Lidén, Michael Diefenbeck
8:21 AM	Paper No. 2099 **Osteogenic Induction by Bmp-2cmRNA In Vivo** Chris Evans
8:28 AM	Paper No. 2100 **Raloxifene Treatment Enhances Bone Response to Mechanical Tibial Loading in Mice** Alycia Berman, Alexis Pulliam, Katherine Powell, Matthew Allen, Joseph Wallace
8:35 AM	Paper No. 2101 **Single Cell RNA-seq Reveals mRNA Expression Changes in Specific Cell Types Following Sclerostin Inhibition** Ugur Ayturk, Joseph Scollan, Christina Jacobsen, Matthew Warman
8:42 AM	Paper No. 2102 **Cortistatin Protects Against Osteoarthritis Through Interplaying With TNF/TNF Receptor Signaling Pathway** Weiwei Li, Ruize Qu, Xiaomin Chen, Krasimir Vasilev, John Hayball, Yunpeng Zhao
8:49 AM	Paper No. 2103 **The Genetics of Osteolysis After Total Hip Arthroplasty: Two Genome Wide Scans With Meta-Analysis** J. Mark Wilkinson, Scott Macinnes, Konstantinos Hatzikotoulas, Anne Marie Fenstad, Karan Shah, Lorraine Southam, Ioanna Tachmazidou, Geir Hallan, Harvard Dale, Kalliope Panoutsopoulou, Ove Furnes, Eleftheria Zeggini
8:56 AM	Paper No. 2104 **Early Synovial B-Cell Infiltration as a Potential Mechanism Underlying the Pathogenesis of the OA of Obesity** Eric M. Schott, Jacquelyn A. Lillis, Christopher W. Farnsworth, John P. Ketz, Cheryl Ackert-Bicknell, John M. Ashton, Steven R. Gill, Robert A. Mooney, Michael J. Zuscik
9:03 AM	Paper No. 2105 **Increasing Vascular Response to Injury Improves Tendon Healing Outcome in Aged Rats** Corinne N. Riggin, Stephanie N. Weiss, Ashley B. Rodriguez, Susan M. Schultz, Chandra M. Sehgal, Louis J. Soslowsky

TUESDAY MEETING DETAIL

3:00 PM–4:00 PM
ORS Closing Session: ORS Achievement Awards & 2018 Inauguration Ceremony

ORS Marshall R. Urist Lecturer
Molly Stevens, PhD

Force & Motion Foundation/ORS Young Scientist Scholarship
Hayden L. Wilson, BS
University of Denver

Force & Motion Foundation/ ORS Young Scientist Travel Grants
Ryan Chapman, MS, Dartmouth College
James Charles, PhD, University of Pittsburgh
David Hamilton, PhD, University of Edinburgh, UK
Robert Kent, BSE, Hospital for Special Surgery
Jing-Sheng Li, MS, PT, Boston University
Andreas Seitz, PhD, MSc, Ulm University, Germany
Tomohiro Shimizu, MD, PhD, Hokkaido University, Japan
Kyle Snethen, PhD Student, Clemson University
Holly Thomas, BS, University of Iowa
Sophia Ulman, BSE, Virginia Tech

AAOS/ORS Woman's Health Issues Advisory Board (WHIAB) Award
Jennifer A. McKenzie, PhD
Onyekachi E. Nnabue, BS

ORS/RJOS Young Female Investigator Travel Grant
Nguyen Gwen Huynh
Sophia Ziemian

Presentation of ORS New Investigator Recognition Awards (NIRA)

ORS Research Section Awards
ORS International Section of Fracture Repair Awards
ORS Meniscus Section Awards
ORS Orthopaedic Implants Section Awards
ORS Preclinical Models Section Awards
ORS Spine Section Awards
ORS Tendon Section Awards

ORS Presidential Inauguration
Gloria Matthews, DVM, PhD

ORS NIRA Supporters

CONGRATULATIONS **2018 GRANT RECIPIENTS!**

ORS/OREF Travel Grants in Orthopaedic Research Translation

Mengcun Chen, University of Pennsylvania

Shohei Higuchi, Dept. of Orthopaedic Surgery, Dokkyo Univ. Koshigaya Hospital

Muhammad Johan, Department of Orthopedic Surgery, Graduate School of Biomedical and Health Sciences, Hiroshima University

Tsuyoshi Iida, Department of Orthopaedic Surgery, Keio University School of Medicine

Munekazu Kanemitsu, Department of Orthopaedic Surgery, Graduate School of Biomedical and Health Sciences

Mai Katakura, Tokyo Medical and Dental University

Masahiro Maruyama, Department of Orthopaedic Surgery, Stanford University School of Medicine

Kanto Nagai, University of Pittsburgh

Takashi Ohnishi, Department of Orthopaedic Surgery, Faculty of Medicine and Graduate School of Medicine Hokkaido University

Tomohiro Shimizu, Department of Orthopaedic Surgery, University of California, San Francisco

Shinji Takahashi, Osaka City University

Takeru Tsujimoto, Hokkaido University

Susumu Wada, Hospital for Special Surgery

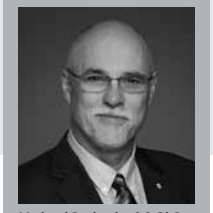
Kohei Yabuno, Rinku General Medical Center

IFMRS Travel Grants

Congratulations to the recipients of an IFMRS Travel Grant. ORS is a member organization of the IFMRS, an international, not for profit federation of musculoskeletal research societies dedicated to promoting excellence in the field of bone and mineral research. The IFMRS mission is to advance musculoskeletal research globally in order to prevent and treat musculoskeletal diseases by collaborating with international societies to share resources, raise public awareness and provide education.

Pamela C. Cabahug-Zuckerman, New York University
Vittorio Gatti, PhD, City University of New York
Chao Liu, MASc, PhD, New York University
Mathieu Riffault, PhD, Trinity College Dublin
Severin Ruoss, PhD, Balgrist University Hospital
Li Jasmine Xiao, PhD, University of Virginia

TUESDAY, MARCH 13, 2018 SESSIONS 9:45 AM – 10:45 AM

TIME	SESSION 50 Implant Wear	SESSION 51 Cartilage: Osteoarthritis	SESSION 52 Bone Repair: Biological Mechanisms and Enhancements	SPOTLIGHT SESSION 53 Muscle	SESSION 54 Emerging 3D Printing Strategies for Musculoskeletal Regeneration
ROOM	**Celestin D-E**	**Empire A**	**Empire CD**	**Empire B**	**Celestin F-H**
Moderators	Orhun Muratoglu, PhD and Heidi-Lynn Ploeg, PhD	Di Chen, PhD and Denis Evseenko, MD, PhD	Chelsea Bahney, PhD and Terrence McIff, PhD	Christopher Mendias, PhD, ATC and Gretchen U Meyer, PhD	Conor T. Buckley, PhD and Lynne Jones, PhD
9:45 PM	Paper No. 0272 **Sensitivity of Total Knee Replacement Volumetric Wear to Femoral Center of Rotation-A Parametric Finite Element Study** Steven P. Mell, Markus A. Wimmer, Hannah J. Lundberg	Paper No. 0278 **ERα Deletion From Mature Osteoblasts Increases Severity of Load-Induced Osteoarthritis in Mice** Sophia N. Ziemian, Olufunmilayo O. Adebayo, Amanda M. Rooney, Natalie H. Kelly, Derek T. Holyoak, F. Patrick Ross, Marjolein C.H. van der Meulen	Paper No. 0284 **Altering Spacer Material and Micro-Topography in the Masquelet Technique: Effects on Factor Expression and Bone Regeneration** Sarah McBride-Gagyi, Zacharie Toth, Matt Roi, Brendan King, Stephanie Podgorny, Emily Evans, J. Tracy Watson, Daemeon Nicolaou	**SPOTLIGHT SPEAKER**  Michael Rudnicki, OC, PhD **Molecular Regulation of Muscle Stem Cell Function**	Paper No. 0293 **Converging Melt Electrospinning Writing and Extrusion Based Bioprinting for Cartilage Tissue Engineering** Mylene de Ruijter, Alexandre Ribeiro, Inge Dokter, Miguel Castilho, Jos Malda
9:55 AM	Paper No. 0273 **Development of a Geometric Model of THR to Assess Occurrence and Location of Impingement** Gregory Pryce, Bismaya Sabu, Mazen Al-Hajjar, Jonathan Thompson, Tim Board, Sophie Williams	Paper No. 0279 **Effect of Long-Term Voluntary Exercise on the Metabolomic Profiles of Synovial Fluid From High-Fat Diet-Induced Obese Mice** Alyssa Carlson, Rachel Rawle, Cameron Wallace, Kathryn Howe, Erika Barboza, Albert Batushansky, Timothy M. Griffin, Ronald June	Paper No. 0285 **Activation of Hedgehog (Hh) Signaling Pathway Enhances the Bone Regeneration Mediated by the Delivery of VEGF and BMP-6 Tethered to a Novel Polysaccharide Scaffold in a Critical-Sized Rat Mandibular Defect** Matthew Miller, Logan McColl, Michael R. Arul, Jonathan Nip, Vedavathi Madhu, Gina Beck, Kishan Mathur, Vashaana Sahadeo, Jason Kerrigan, Jared Christophel, Abhijit Dighe, Sangamesh Kumbar, Quanjun Cui		Paper No. 0294 **Treatment of Critical Size Femoral Bone Defects With Hybrid Scaffolds of 3D Plotted Calcium Phosphate Cement and Mineralized Collagen Matrix** Anna Carla Culla, Corina Vater, Julia Bolte, Tino Köhler, Bruno Zwingenberger, Tilman Ahlfeld, Alexander Pape, Jan Oberländer, Maik Stiehler, Stuart Goodman, Michael Gelinsky, Stefan Zwingenberger
10:05 AM	Paper No. 0274 **The Effect of Manufacturing Tolerances and Assembly Force on Volumetric Wear in THA** Thom Bitter, Dennis Janssen, Imran Khan, Tim Marriott, Elaine Lovelady, Nico Verdonschot	Paper No. 0280 **Final 24-Month Results of a Phase II Randomized Study to Determine the Efficacy and Safety of Genetically Engineered Allogeneic Human Chondrocytes Expressing Tgf-β1 in Patients With Grade 3 Chronic Degenerative Joint Disease of the Knee** Gurdyal Kalsi, Javad Parvizi, Dale Bramlet, David Romness, Ali Guermazi, Moon Noh, Michael A. Mont	Paper No. 0286 **Recombinant CXCL12 and Mechanical Loading Enhance Cortical Defect Repair** Chao Liu, Shahar Qureshi, Rebecca Scotto, Alesha Castillo		Paper No. 0295 **Transcription-Factor-Driven Osteogenesis in Mechanically Strong 3D Printable and Injectable Biodegradable Scaffolds** Hosam A-D A Awwad, Lalitha Thiagarajan, Kevin M. Shakesheff, James E. Dixon
10:15 AM	Paper No. 0275 **Oxide Ceramic Femoral Heads Contribute to Polyethylene Liner Degradation** Bryan J. McEntire, Giuseppe Pezzotti, Wenliang Zhu, Nobuhiko Sugano, Elia Marin, Kengo Yamamoto, Naomichi Nishiike, Tsubasa Hori, Ryan Bock, B. Sonny Bal	Paper No. 0281 **Blocking TGF-β1 With Oral Losartan Administration Improves Microfracture-Mediated Cartilage Repair** Hajime Utsunomiya, Xueqin Gao, Gilberto Nakama, Sarah Amra, Zhenhan Deng, Haizi Cheng, Sarah E. Frazier, Sudheer K. Ravuri, Julia L. Goldman, Walter R. Lowe, William G. Rodkey, Marc J. Philippon, Tamara Alliston, Johnny Huard	Paper No. 0287 **Pharmacologically Targeting Beta-Catenin to Rejuvenate Fracture Healing in Mice** Yoon Hae Kwak, Tomasa Barrientos, Bridgette Furman, Benjamin A. Alman	Paper No. 0290 **Rescued Myogenic Potential of Muscle Stem Cells Isolated From Contractured Muscle in Children With Cerebral Palsy Using Cytidine Analog 5-Azacytidine** Andrea A. Domenighetti, Johanna Hendriksen, Angela M. Taylor, Margie A. Mathewson, Henry G. Chambers, Richard L. Lieber	Paper No. 0296 **Biomechanical Characterization of a Novel Collagen-Infused 3D Printed Polymer Scaffold for Partial Meniscus Replacement and Its Chondroprotective Ability** Salim A. Ghodbane, Jay Patel, Andrzej Brzezinski, Tyler M. Lu, Charles Gatt, Michael Dunn
10:25 AM	Paper No. 0276 **Does Corrosion Loosen the Taper Connection of Femoral Components in Total Hip Replacements?** Genymphas B. Higgs, Daniel W. MacDonald, Julie Lowell, Alexander Padayatil, William M. Mihalko, Ryan L. Siskey, Jeremy L. Gilbert, Clare M. Rimnac, Steven M. Kurtz	Paper No. 0282 **Anti-Inflammatory Properties of SM04690, a Small Molecule Inhibitor of the Wnt Pathway, as a Potential Treatment for Knee Osteoarthritis** Vishal Deshmukh, Timothy Seo, Maureen Ibanez, Sunil KC, Luis Dellamary, Charlene Barroga, Yusuf Yazici	Paper No. 0288 **Inhibition of Interleukin-6 Trans-Signaling Improves Compromised Fracture Healing After Severe Trauma** Kathrin Kaiser, Anna Kovtun, Katja Prystaz, Melanie Haffner-Luntzer, Georg H. Waetzig, Stefan Rose-John, Anita Ignatius	Paper No. 0291 **Activation of Brown/Beige Fat Regulates Muscle Regeneration After Ischemia-Reperfusion Injury** Chantal Nguyen, Zili Wang, Lawrence Lee, Mengyao Liu, Shingo Kajimura, Hubert Kim, Brian Feeley, Xuhui Liu	Paper No. 0297 **Evaluating Osteointegration of Load Bearing Additive Manufactured Scaffolds in an Ovine Femoral Condyle Defect Model** Shaaz Ghouse, Natalie Reznikov, Oliver R. Boughton, Gordon Blunn, Justin Cobb, Molly Stevens, Jonathan Jeffers
10:35 AM	Paper No. 0277 **In-Vitro Wear of Cross-Linked UHMWPE Under Simulated Activities of Daily Living** Alice de Courcy-Grylls, Fiona Hadfield, Catherine Hardaker, Bethany Lowe	Paper No. 0283 **The Influence of Gelatin Hydrogel Including Eicosapentaenoic Acid on the Osteoarthritis Progression In Vivo** Masanori Tsubosaka, Shinya Hayashi, Shinsuke Kihara, Junpei Nagata, Yuichi Kuroda, Kazuhiro Takeuchi, Masahiko Haneda, Shinsuke Kirizuki, Koji Takayama, Shingo Hashimoto, Tomoyuki Matsumoto, Yasuhiko Tabata, Ryosuke Kuroda	Paper No. 0289 **Conditional Deletion of Runx1 in Myeloid Precursor Cells Delays Fracture Healing Due to Differential Resorption of Mineralized Bone and Cartilage Matrix at the Fracture Callus** David N. Paglia, Judith Kalinowski, Marc Hansen, Joseph Lorenzo, Hicham Drissi	Paper No. 0292 **Inhibition of NF-κB Signaling Delays Cell Senescence and Rescues Defective Muscle Phenotypes in Progeria Mice** Xiaodong Mu, Jing Zhao, Wanqun Chen, Paul Robbins, Laura Niedernhofer, Johnny Huard	Paper No. 0298 **The Combination Effect of Functionally-Graded Scaffold and Bone Marrow-Derived Mononuclear Cells on Treatment of Early Stage Steroid-Induced Osteonecrosis of the Femoral Head in Rabbits** Masahiro Maruyama, Akira Nabeshima, Chi-Chun Pan, Arnaud Bruyas, Anthony Behn, Jukka Pajarinen, Tzu-hua Lin, Michiaki Takagi, Stuart B. Goodman, Yunzhi Peter Yang

TUESDAY, MARCH 13, 2018 SESSIONS 12:45 PM – 1:45 PM

TIME	SESSION 55 Knee: Kinematics and Modeling	SESSION 56 Cell and Tissue Imaging	SPOTLIGHT SESSION 57 Bone Repair	SESSION 58 Muscle	SESSION 59 Foot and Ankle
ROOM	**Celestin D-E**	**Empire A**	**Empire CD**	**Empire B**	**Celestin F-H**
Moderators	Yefei Dai, PhD and Lisa Larkin, PhD	Tristan Maerz, PhD and Simo Saarakkala, PhD	Hicham Drissi, PhD and Vaida Glatt, PhD	Joe Chakkalakal, PhD and David T. Corr, PhD	Jarrett Cain, DPM and Jennifer Nichols, PhD
12:45 PM	Paper No. 0299 **Strains at the Medial Collateral Ligament and Tibiofemoral Contact Mechanics During High Tibial Osteotomy** Andreas M. Seitz, Manfred Nelitz, Anita Ignatius, Lutz Dürselen	Paper No. 0305 **Parametric Imaging of Collagen Structural Changes in Human Osteoarthritic Cartilage Using Optical Polarization Tractography** Mohammadreza Ravanfar, Ferris Pfeiffer, Chantelle Bozynski, Yuanbo Wang, Gang Yao	**SPOTLIGHT SPEAKER**  Kurt Hankenson, DVM, PhD **CREative Mouse Models to Dissect the Complex Cell Biology of Bone Regeneration**	Paper No. 0314 **HMGB2 Induces Adipogenesis and Fat Infiltration Into Skeletal Muscles Through HMGB2-PDGFRα Cascade** Deokcheol Lee, Noboru Taniguchi, Narantsog Choijookhuu, Yoshitaka Hishikawa, Katsuaki Sato, Hiroaki Kataoka, Martin Lotz, Etsuo Chosa	Paper No. 0320 **Bone Mineral Density (BMD) in the Foot Is Decreased in Adults With Diabetes Mellitus** Jacob H.T.. Hornbuckle, Matthew W. Kindig, Brandt C. Buckner, David R. Haynor, William R. Ledoux
12:45 PM	Paper No. 0300 **An Experimental and Computational Modeling Framework for Evaluation of In-Vivo Knee Mechanics** Azhar A. Ali, Erin M. Mannen, Xiangyi (Cheryl) Liu, Walter Schmidt, Paul Rullkoetter, Kevin B. Shelburne	Paper No. 0306 **Near-Infrared Spectroscopy Predicts the Compositional and Biomechanical Properties of Porcine Engineered Cartilage** Shital Kandel, William Querido, Jessica M. Falcon, Farzad Yousefi, Daniel J. Reiners, Minwook Kim, Robert L. Mauck, Nancy Pleshko		Paper No. 0315 **Inhibition of Calpain Prevents Early Atrophy After Rotator Cuff Tendon Release in Sheep** Severin Ruoss, Philipp Kindt, Linus Oberholzer, Marco Rohner, Ladina Jungck, Sara Abdel-Aziz, Daniel Fitze, Andrea B. Rosskopf, Karina Klein, Brigitte von Rechenberg, Christian Gerber, Karl Wieser, Martin Flück	Paper No. 0321 **3D-CT Stress Test for the Assessment of CFL Insufficiency** Shohei Higuchi, Satoru Ozeki, Yoko Masuda, Masato Ogawa, Yuki Tochigi
1:05 PM	Paper No. 0301 **Tibial Bony Morphology and Tibiofemoral Laxity Predict Knee Mechanics During Compression** Robert N. Kent, Dean Wang, Mark J. Amirtharaj, Brendan M. Hardy, Thomas L. Wickiewicz, Andrew D. Pearle, Carl W. Imhauser	Paper No. 0307 **Nanopieces Nucleic Acid Delivery Platform-Based Theranostics for Orthopaedic Imaging and Therapy** Hongchuan Yu, Yupeng Chen, Saisanjana Kalagara, Qian Chen	**With Support from Bioventus**	Paper No. 0316 **Release of Chronic Suprascapular Nerve Compression Reverses Muscle Fatty Infiltration in Mice** Zili Wang, Mengyao Liu, Lawrence Lee, Hubert Kim, Brian Feeley, Xuhui Liu	Paper No. 0322 **Quantitative Evidence Demonstrating Kinematic Symmetry of the Ankle in the Gait Cycle** Bradley C. Campbell, Stephen Canton, MaCalus V. Hogan, William Anderst
1:15 PM	Paper No. 0302 **Abnormal Tibiofemoral Kinematics Is Associated With Biochemical Alterations in Meniscal Matrix—A 3 Year Longitudinal Study After ACL Reconstruction** Alexander R. Markes, Matthew Tanaka, Joseph Knox, Qunjie Zhong, Valentina Pedoia, Xiaojuan Li, Benjamin Ma	Paper No. 0308 **In Vivo Monitoring of Structure and Function Following Neural Stretch Injury via SHG Microscopy and Intra-Operative Nerve Stimulation** Matthew J. Gluck, Christina M. Beck, Angelos Skodras, Damien Laudier, Mary E. Fowkes, James C. Iatridis, Paul J. Cagle, Michael R. Hausman	Paper No. 0311 **Absence of the Terminal Complement Complex Manifests in Low Bone Mass and Impaired Fracture Healing** Yvonne Hägele, Zhaozhou Ren, Anna Kovtun, Anna Rapp, Stephanie Bergdolt, Verena Fischer, Markus Huber-Lang, Anita Ignatius	Paper No. 0317 **The lncRNA Kratos Is Essential for Myogenesis and Muscle Homeostasis** Eleonora Guadagnin, Kenneth Walsh, Ronald L. Neppl	Paper No. 0323 **Tracking of Adipose-Derived Stem Cells in Tissue In Vivo and Their Effects on the Repair of Achilles Tendon Defects** Jolanta B. Norelli, Dawid P. Plaza, Anish M. Varghese, Drew Stal, Hudson Liang
1:25 PM	Paper No. 0303 **How Does Total Knee Replacement Alignment Influence Biomechanical Performance? An In Vivo Analysis of a Unique Population** David E. Williams, Andrew Metcalfe, June Madete, Gemma Whatling, Pete Kempshall, Mark Forster, Kathleen Lyons, Cathy Holt	Paper No. 0309 **Development of Longitudinal, Noninvasive Ultrasonography to Assess Scar Formation During Flexor Tendon Healing** Jessica Ackerman, Alayna Loiselle	Paper No. 0312 **Wnt/β-Catenin Signaling Regulates Chondrocyte-to-Osteoblast Transformation During Endochondral Repair** Sarah A. Wong, Tiffany Shao, Diane P. Hu, Theodore Miclau, Chelsea S Bahney, Ralph S. Marcucio	Paper No. 0318 **Muscle Injury Enhances Heterotopic Ossification by Stimulating Local Bone Morphogenetic Protein Production** La Li, Hang Lin, Yangzi Jiang, He Shen, Rocky Tuan	Paper No. 0324 **In Vivo Effects of Hyaluronidase Injection in a Murine Model of Tendinopathy** Sabah N. Rezvani, Jun Li, Anna Plaas, Vincent M. Wang, John Sandy
1:35 PM	Paper No. 0304 **Sex Differences in Knee Jolt in Anterior Cruciate Ligament-Injured Athletes During Single Leg Landing** Joseph A. Panos, Timothy E. Hewett	Paper No. 0310 **Computational Models of the Knee Joint Can Be Generated From Clinical Contrast-Enhanced CT With Adequate Accuracy by Utilizing an Automated Segmentation Method** Mika E. Mononen, Katariina A.H. Myller, Sami P. Väänänen, Rami K. Korhonen, Juha Töyräs, Jukka S. Jurvelin	Paper No. 0313 **Determining the Role of Osteoblast Lineage Cell Derived VEGF in Osteogenic Processes During Fracture Repair** Evan G. Buettmann, Jennifer McKenzie, Nicole Migotsky, Pei Hu, Matthew J. Silva	Paper No. 0319 **Increased Expression of FGF21 From Dystrophic Skeletal Muscle Affects Bone Homeostasis by Regualting Osteoclastogenesis in Dystrophic Mice** Baoli Qian, Shumin Zhou, Justin Hicks, Dwayne Carney, MaCalus V. Hogan, Hongshuai Li	Paper No. 0325 **Effect of Sclerostin Antibody Treatment on Delayed Tendon-Bone Healing in a Rabbit Model** Lu Hongbin

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TUESDAY

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Philadelphia, PA 19103
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www.ndriresource.org
The National Disease Research Interchange (NDRI) is a 501(c)(3) not-for-profit, NIH-funded organization that provides project-driven human biospecimen service to academic and corporate scientists. NDRI has 35 years of experience globally distributing human biospecimens for research. Our extensive recovery network has the expertise to provide anatomical structures, organs, and tissues with annotated data.

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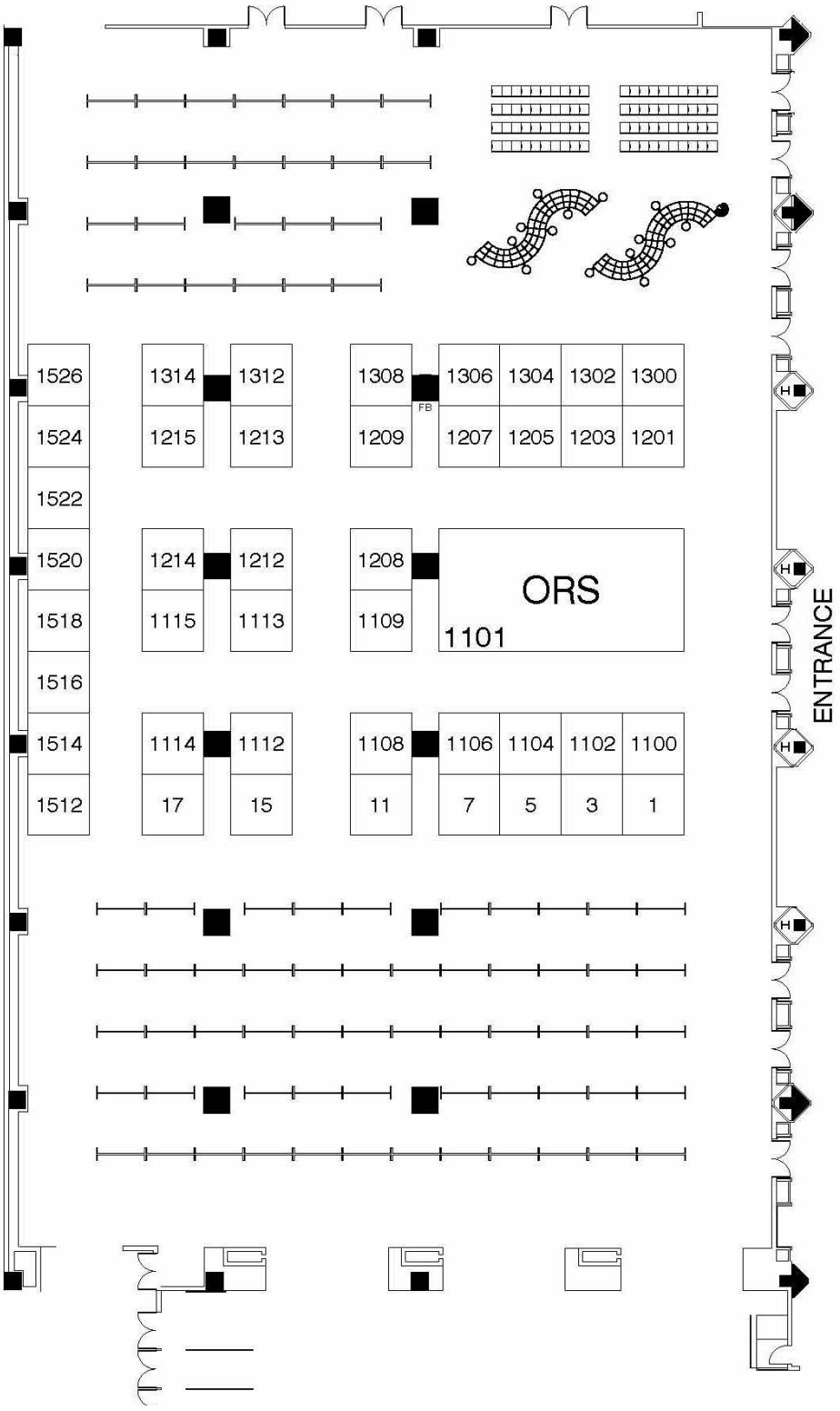

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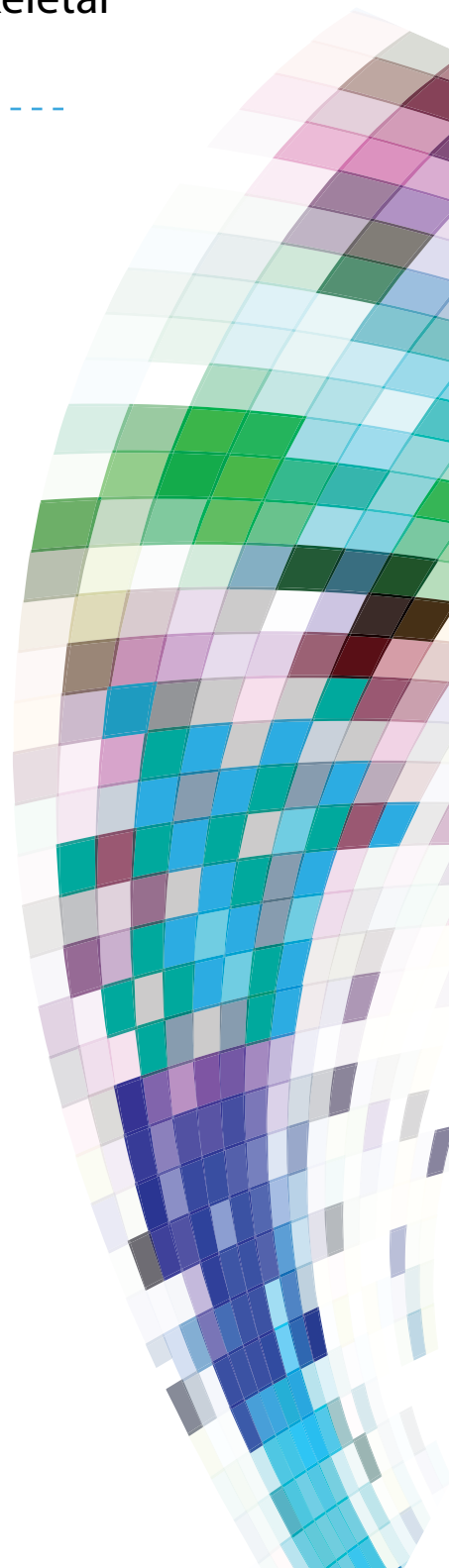

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