

## ORS Workshop History - Past Five Years

2022 Workshops	Title	Organizers	Speakers
<b>1</b>	Energy Metabolism in Bone and Cartilage	Audrey McAlinden, PhD, Roman Eliseev, MD, PhD	Mitchell Coleman, PhD, Jie Shen, PhD, Michelle Delco, DVM, PhD, Roman Eliseev, MD, PhD, Anyonya Guntur, PhD, Courtney Karner, PhD
<b>2</b>	Single cell transcriptomics approaches to analyze musculoskeletal tissues	Ling Qin, PhD, Farshid Guilak, PhD	Farshid Guilak, PhD, Ling Qin, PhD, Benjamin Levi, MD, Jeffrey Moffitt, PhD
<b>3</b>	Unraveling role of cell metabolism and senescence in intervertebral disc health and disease	Makarand Risbud, PhD, Nam Vo, PhD	Makarand Risbud, PhD, Nam Vo, PhD, Lisbet Haglund, PhD,
<b>4</b>	Genome editing for mechanistic insight and treatment of musculoskeletal disorders	Brian Diekman, PhD, Chris Nelson, PhD	Brian Diekman, PhD, Robby Bowles, PhD, Amy Wagers, PhD
<b>5</b>	Preclinical Models of Impaired Fracture Healing	Chelsea Bahney, PhD, Uma Sankar, PhD	Georg Duda, PhD, Melanie Haffner-Luntzner, PhD, Hamish Simpson, DM, Melissa Kacena, PhD, Kent Leach, PhD, Nicole Ehrhart, VDM
<b>6</b>	Human cell-derived microphysiological systems: an emerging model for orthopaedic research	Stuart Goodman, MD, PhD, Bruce Bunnell, PhD	Danilo Tagle, PhD, Gordana Vunjak-Novakovic, PhD, Alan Grodzinsky, ScD, Hani Awad, PhD, Hang Lin, PhD
<b>7</b>	Education in Orthopaedics	Sonia Bansal, PhD	Joe Towles, PhD, Laurel Kuxhaus, PhD, Jennifer Weiser, PhD
<b>8</b>	Antidepressants for Osteoarthritis?	Fadia Kamal, PharmD, PhD, Reyad Elbarbary, PharmD, PhD, Michael Zuscik, PhD	Beth Winkelstein, PhD, Fadia Kamal, PharmD, PhD, Robert Gallo, PhD
<b>9</b>	Advancing orthopaedic science globally through digital learning	Jonathan Gustafson, PhD	Jonathan Gustafson, PhD, Karl Lewis, PhD, Jennifer Westendorf, PhD
<b>10</b>	Interfaces in Orthopaedic Research (Guest Nation-BORS-United Kingdom)	Deborah Mason, PhD, Catherine Pendegrass, PhD	J Mark Wilkinson, PhD, Catherine Pendegrass, PhD, Wasim Khan, PhD, Deborah Mason, PhD
2021 Workshops	Title	Organizers	Speakers

<b>1</b>	Machine Learning to Artificial Intelligence - Basic Concepts and Techniques for Orthopaedic Researchers, Clinicians and Surgeons	Xiaodu Wang, PhD and Melissa Knothe Tate, PhD	Sastry Chilukuri, MBA, Xiaodu Wang, PhD, Melissa Knothe Tate, PhD and Valentina Padoia, PhD
<b>2</b>	Measuring Skeletal and Implant Arthrokinematics In-Vivo	Trey Crisco, PhD, Bardiya Akhbari and Michael Rainbow, PhD	Julian Beveridge, PhD, Michael Rainbow, PhD, Trey Crisco, PhD, Amy Lenz, PhD, Emily Lalone, PhD and Bardiya Akhbari
<b>3</b>	Applications of Machine Learning from Diagnostics to Prognostics	Karen Kruger, PhD and Yaxia Zhang, MD, PhD	Hollis Potter, MD, Mark Albert, PhD and Jennifer Nichols, PhD
<b>4</b>	Redefining Hip Dysplasia and Instability Mechanics Using Biomechanical Metrics	Geoffrey Ng, PhD and Michael Harris, PhD	Andrew Anderson, PhD, Michael Harris, PhD, Jessica Goetz, PhD, Geoffrey Ng, PhD and Paul Beaulé, MD
<b>5</b>	Biomechanics of Forearm Instability	Lauren Vernon, PhD and Francisco Rubio, MD	Deana Mercer, MD, Nathan Hoekzema, MD, Jorge Orbay, MD, Robert Gray, MD
<b>6</b>	The role of portable ultrasound in musculoskeletal disease	Bart Lubberts, MD, PhD	Bart Lubberts, MD, PhD, Noortje Hagemeyer, MD, Rohan Bhimani, MD, MBA, Jirawat Saengsin, MD and Jonathan Lans, MD, PhD
<b>7</b>	Exosomes in musculoskeletal applications	Chenfung Zhao, MD	Steven Moran, MD, Sarah Dallas, PhD and Mark Hamrick, PhD
<b>8</b>	Clinical Applications of Stem Cells -South Korea	Jun Ho Park, MD and Tae-Joon Cho, MD, PhD	Shin Yoon Kim, MD, PhD, Chul Won Ha, MD, PhD and Chris Jo, MD, PhD
<b>9</b>	Intersection of Fracture Healing and Infection	Josh Wenke, PhD and Chelsea Bahney, PhD	Zachary Working, PhD, Laura Certain, MD, PhD, Josh Wenke, PHD And Andrea Garcia, PhD
<b>10</b>	Designing and Implementing Multi-Centered Clinical Research Programs	Susan Bukata, MD and Prism Schneider, MD, PhD	Susan Bukata, MD, Michael Ominsky, PhD, Saam Morshed, PhD, Laura Tosi, MD and Mohit Bhandari, MD
<b>11</b>	Additively Manufactured Implants - Cool parts, but how far have we advanced on material safety and characterization?	Alejandro Espinoza, PhD and Mathew Mathew, PhD	Gene Kulesha, Laura Gilmour, Matthew Shomper and Robin Pourzal, PhD
<b>2020 Workshops</b>	<b>Title</b>	<b>Organizers</b>	<b>Speakers</b>
<b>1</b>	Implementing Compression Models of OA in Mice and Rats (ORS Preclinical Models Section)	Blaine Christiansen, PhD and Deva Chan, PhD	Blaine Christiansen, PhD, Tristan Mearz, PhD and Marjolein van der Meulen, PhD

2	Digital Patient Outcomes using Sensors as Wearable Monitors: Opportunities, Methods and Applications. (Organized by ICORS)	Bernd Grimm, PhD and Dominic Thewlis, PhD	Bernd Grimm, PhD, Dominic Thewlis, PhD, Benedikt Braun, MD, PhD and Manuela Ernst, PhD
3	Good Laboratory Practices: Not Just For Industry? (ORS Industry Engagment Committee)	Lara Silverman, PhD and Judd Day, PhD	Michael Jamieson, DRSc, David Spenciner, ScM, MBA and Peggy Lalor, PhD
4	Skeletal Muscle Homeostasis: Understanding the genetic and molecular regulation of muscle function and its impact on bone health	Ronald Nepl, PhD and Julia Charles, MD, PhD	Ronald Nepl, PhD, Vandana Gupta, PhD and Lynda Bonewald, PhD
5	A Debate for the Need for New Orthopaedic Biomaterials (ORS Orthopaedic Implants Section)	William Mihalko, MD, PhD	Patricia Campbell, PhD, Steve Kurtz, PhD, Nadim Hallab, PhD, Jeremy Gilbert, PhD, Orhun Muratoglu, PhD and Kenneth Urish, MD, PhD
6	From Osteoimmunology to Immunotherapy: A Progress Report	Georg Duda, PhD and Katharina Schmidt-Bleek, PhD	Katharina Schmidt-Bleek, PhD, Stuart Goodman, MD, PhD and Ralph Marcucio, PhD
7	Single Cell Omics for Musculoskeletal Research (Organized by IFMRS)	Jennifer Westendorf, PhD and M. Farooq Rai, PhD	Chia-Lung Wu, PhD, Terrence Capellini, PhD and Nidhi Bhutani, PhD
8	Recent Advances in Intervertebral Disc Repair (Organized by ICORS)	Fackson Mwale, PhD and John Antoniou, MD, PhD	Fackson Mwale, PhD, Mauro Alini, PhD, Daisuke Sakai, MD, PhD and Devina Purmessur, PhD
9	A multidisciplinary platform for the development of personalised medical implant technologies (Guest Nation - Australia)	David Ackland, PhD and Peter Lee, PhD	Peter Lee PhD, Mark Taylor, PhD, Hala Zreiqat, PhD and Bogdan Soloman, PhD
10	Osteoarthritis: Novel molecular determinants revolutionize our understanding of the disease pathology (ORS and DGOU)	Susanne Graessel, PhD and Henning Madry, MD	Susanne Graessel, PhD, Henning Madry MD and Frank Zauke, PhD
11	Mechanochemical Signaling in Bone: A Workshop in Honor of Dr. Christopher R. Jacobs	Lidan You, PhD and Ronald Kwon, PhD	Henry Donahue, PhD, Alesha Castillo, PhD and Tim Stearns, PhD
12	Advances of Nanomedicine in Treating Musculoskeletal Diseases	Bingyun Li, PhD and Jessica Jennings, PhD	Yi-Xian Qin, PhD, Yusaf Khan, PhD, Barbara Boyan, PhD and Bingyun Li, PhD
<b>2019 Workshops</b>	<b>Title</b>	<b>Organizers</b>	<b>Speakers</b>
1	Animal Models of Comorbidities in Fracture-Healing Research (Organized by ORS Preclinical Models Section and ORS International Section of Fracture Repair (ISFR)	Michael Lehmiche, PhD and Melanie Haffner-Luntzer, PhD	Kurt Hankenson, DVM, PhD, Anita Ignatius, DVM and Roman Pfeifer, MD

2	Advances of 3D Printing and Biofabrication in Orthopaedics ( <i>Organized by the ORS Women's Leadership Forum</i> )	Sophie Verrier, PhD and Deana Mercer, MD	Mia Woodruff, PhD, Lawrence Bonassar, PhD and Christina Salas, PhD
3	Treating Osteoarthritis by Targeting Bone Cartilage Crosstalk: Taming TGF-beta	Xu Cao, PhD and Tamara Alliston, PhD	Tamara Alliston, PhD, Xu Cao, PhD and Farshid Guilak, PhD
4	Zebrafish: An Emerging Model for Orthopaedic Research	Ronald Kwon, PhD and Ryan Gray, PhD	Jenna Galloway, PhD, Björn Busse, PhD, Ryan Gray, PhD and Matthew Harris, PhD
5	Updates in multi-disciplinary approaches for stem-cell based cartilage regeneration ( <i>Organized by International Combined Orthopaedic Research Societies ICORS</i> )	Gun-Il Im, MD, PhD and Ted Miclau, MD	Brian Johnstone, PhD, Martin Stoddart and Gun-Il Im, MD, PhD
6	Managing Infection in Orthopaedic Trauma: Reaching Consensus and the Role of Emerging Technologies ( <i>In collaboration with Orthopaedic Trauma Association - OTA</i> )	Emil Schemitsch, MD	David Hak, MD, Aaron Johnson, MD, Joseph Wenke, PhD, Aaron Nauth, MD and Peter Giannoudis, MD
7	The Role of Macrophages and Immune Cells in the Progression of Osteoarthritis ( <i>Organized by the ORS Women's Leadership Forum</i> )	Jennifer Woodell-May, PhD	Jennifer Elisseeff, PhD, Steven Olson, MD and Christopher Little, BVMS, PhD
8	Ex Vivo Explant Models: Unique Insights Offered by Studying Disease in a Dish	Spencer Szczesny, PhD	Jess Snedeker, PhD, X. Ed Guo, PhD and Simon Tang, PhD
9	Can we prevent post-traumatic osteoarthritis: where are we now, and where are we going?	Deborah Mason, PhD	Fiona Watt, PhD, Deborah Mason, PhD and Christian Lattermann, MD
10	Reproducibility in Modeling and Simulation of the Knee: Academic, Regulatory, and Industry Perspectives	Carl Imhauser, PhD	Carl Imhauser, PhD, Andrew Baumann, PhD and Cheryl Liu, PhD
11	Plasticity of Cell Fate in Musculoskeletal Tissues ( <i>Organized by the ORS Women's Leadership Forum</i> )	Alice Huang, PhD	Kathryn Cheah, PhD, Benjamin Levi, MD and Jessica Lehoczky, PhD
12	The Microbiome and Musculoskeletal Disease	Chris Hernandez, PhD and Michael Zuscik, PhD	Christopher Hernandez, PhD, Julia Charles, MD, PhD and Michael Zuscik, PhD
<b>2018 Workshops</b>	<b>Title</b>	<b>Organizers</b>	<b>Speakers</b>
1	Osseointegrated Prosthetic Limbs: Recent Developments and Future Directions	Mark Ehrensberger, PhD and Sujee Jayapalida, PhD	Rickard Brånemark, MD, PhD, James P. Beck, MD, Jeremy Gililland, MD and Jonathan Forsberg, MD, PhD

2	Regenerative Rehabilitation: The role of mechanotherapies used to optimize regenerative medicine outcomes	Chris Evans, PhD	Chris Evans, PhD, Vaida Glatt, PhD and Martin Stoddart, PhD
3	Advances in Understanding Early Post-Traumatic Osteoarthritis	Dominik Haudenschild, PhD and Blaine Christiansen, PhD	Gabriela Loots, PhD, M Farooq Rai, PhD and Andrew Pitsillides, BSc, PhD
4	Cell Autonomous and Non-Cell Autonomous Mechanisms of Aging	Johnny Huard, PhD	Johnny Huard, PhD, Laura Neidernhofer, PhD and Paul Robbins, PhD
5	Limb Regeneration: What Can We Learn from Animal Models for Human Translation?	Jessica Lehoczky, PhD and Jessica Whited, PhD	Ken Muneoka, PhD, Thomas Lizito, PhD and S Randal Voss, PhD
6	Outcome measures in Orthopaedic Research of the Joints and Spine (Organized by ORS Industry Engagement Committee (IEC) and ORS Spine Section)	Sally Liarno, PhD and Saeed Khayatzaadeh, PhD	David Hamilton, PhD, BSc (hons), MCSP, Stefano Bini, PhD and Nadeen Chahine, PhD
7	In vivo and in vitro techniques to study skeletal muscle growth and regeneration	Christopher Mendias, PhD and Gretchen Meyer, PhD	Esther Dupont-Versteegden, PhD and Gretchen Meyer, PhD
8	The Scientific Legacy of Adele Boskey: From Biomineralization Mechanisms to Bone Quality (Organized by ORS Women's Leadership Forum)	Nancy Pleshko, PhD and Susan Bukata, MD	Barbara Boyan, PhD, Marjolein van der Meulen, PhD and Cathleen Raggio, MD
9	The evolution of total joint arthroplasty: a historical review of hip, knee, and shoulder prosthesis design advances (Organized by ORS Industry Engagement Committee (IEC) & ORS Orthopaedic Implants Section)	Christopher Roche, MSE, MBA and Dennis Janssen, PhD	Evan Flatow, MD, John Callaghan, MD and Michael Mont, MD
10	In vivo bone and joint loading - how and why should we measure it?	Karen Troy, PhD and Darryl D'Lima, PhD	Karen Troy, PhD, Darryl D'Lima, PhD and BJ Fregly, PhD
11	In vivo MicroCT Imaging: Longitudinal Assessment of Skeletal Microstructure, Strength, and (Re)modeling Dynamics	Bettina Willie, PhD and X. Sherry Liu, PhD	Ralph Müller, PhD, Steven Boyd, PhD and Enrico Dall'Ara, PhD
12	Functional analysis the key to the next revolution in the treatment and prevention of hip and knee arthritis (Organized by Canadian Orthopaedic Research Society)	Fackson Mwale, PhD and Albert Yee, MD, MSc	Mario Lamontagne PhD, Janie Wilson, PhD, David Wilson, PhD and Paul Beaulé, MD
13	New Biological and Biomechanical Approaches to Orthopedic Management of Pediatric Neuromuscular Disorders (Organized by Pediatric Orthopaedic Society of North America and ORS)	Roger Cornwall, MD and Brian Synder, MD, PhD	Brian Snyder, MD, PhD, Benjamin Alman, MD, Roger Cornwall, MD and James McCarthy, MD

14	Normal and Neoplastic Osteogenesis Signaling: Targeted Therapeutic Opportunities ( <i>Organized by Musculoskeletal Tumor Society and ORS</i> )	Francis Lee, MD, PhD and Michelle Ghert, MD	Hicham Drissi, PhD and Bang Hoang, MD
15	Evaluation of Implant Failure: The Role of MRI and Retrieval Analysis ( <i>Organized for The Hip Society and ORS</i> )	Douglas E. Padgett, MD and Timothy Wright, PhD	Mathias Bostrom, MD, Hollis Potter, MD and Timothy Wright, PhD

### ORS Symposia History

2022	Title	Organizers	Speakers
1	Biomaterials for Tendon and Ligament Regeneration: From Bench to Commercialization	Alayna Loiselle, PhD, Hani Awad, PhD, Kathleen Derwin, PhD	Johnna Temenoff, PhD, Anthony Ratcliffe, PhD, Martha Murray, PhD
2	Unmet Clinical Needs - Brainstroming Ideas to Address Clinical Shortcomings in Trauma - Guest Clinical Society - Orthopaedic Trauma Association (OTA)	Michael Archdeacon, MD, Chelsea Bahney, PhD	Michael Archdeacon, MD, Todd McKinley, MD, Joseph Hsu, MD, Philipp Leucht, MD, PhD
2021	Title	Organizers	Speakers
1	The Unmet Clinical Needs in Hip and Knee Reconstructive Surgery: From Bedside to Benchside	ORS and American Association of Hip and Knee Surgeons (AAHKS) William Mihalko, MD, PhD and Jay Parvizi, MD	Brett Levine, MD, Jesse Otero, MD, PhD, Matthew Dietz, MD and Ran Schwarzkopf, MD
2	3D Models for Regenerative Medicine in Orthopedics	Nicola Baldini, MD and Gabriela Graziani, PhD	Gianluca Vadalà, MD, PhD, Denitsa Docheva, PhD and Gabriela Graziani, PhD
3	Cellular senescence as a driver of osteoarthritis: the roles of aging, obesity and the immune system	Brian Johnstone, PhD, and Farshid Guilak, PhD	Brian Johnstone, PhD, Brian Diekman, PhD, Farshid Guilak, PhD and Jennifer Elisseeff, PhD
4	Challenges and Opportunities in Musculoskeletal Infections	Bingyun Li, PhD	Edward Schwarz, PhD, Antonia Chen, MD, MBA, Jeremy Gilbert, PhD and Bingyu Li, PhD
5	Translational Tendinopathy – from bench to bedside and back again	Kathleen Derwin, PhD and Spencer E Szczeny, PhD	Scott Rodeo, MD, Alice Huang PhD, Nat Dymant PhD and Neal Millar, MD, PhD