ORS Spine Section
Orthopaedic Research Society
Monthly Newsletter

Spinal Column

July 2023

ORS
Orthopaedic Research Society

ORS 2024 Annual Meeting
February 2-6, 2024 | Long Beach, CA

The 2024 Annual Meeting: Abstract and Award Submissions, RIG Applications, and Open Door

Abstract submissions are open for the 2024 ORS Annual Meeting. This is your opportunity to be a part of history when ORS celebrates 70 Years of musculoskeletal research, February 2-6 in Long Beach, CA. For more information, guidelines on submission, and a list of topics, click the link below. Abstract submissions will be open until Monday, August 28.

Submit Your Abstracts

Applications are open for **Research Interest Groups** (RIGs) to take place at the Annual Meeting. RIGs foster the thoughtful exchange of ideas within the global multi-disciplinary community of the ORS by providing the opportunity to engage in informative, transformative, and live discussion with colleagues in a specific area of musculoskeletal research, whether basic, applied, or clinical. To explore content that is complementary or different to the ORS Annual Meeting, RIGs are encouraged to focus on unique approaches, methodologies, diseases, or connections that inspire brainstorming across our multi-disciplinary groups.

Apply to Have Your RIG at the Annual Meeting

Awards and grant submissions are also now being accepted for the Annual Meeting. For more detailed information on any of these great opportunities, click the link below.

Apply for Awards and Grants

Open Door 2024 will take place February 2, 2024 as part of the Annual Meeting. The goal of Open Door is to get students excited about the possibility of future careers in the musculoskeletal sciences, introducing them to a wide variety of professional pathways and work performed by ORS members. If you are interested in supporting or assisting with ORS Open Door 2024, please contact Meghan McGee-Lawrence at mmcgeelawrence@augusta.edu by August 31.

Get Involved with Open Door

Research Section Member Spotlight

Name and Degree:

James A. Coppock, PhD

Current Title and Department:

Post-doctoral Research Scientist; Department of Biomedical Engineering

Undergraduate Degree:

Biomedical Engineering; Georgia Institute of Technology

Graduate Degree:

Biomedical Engineering; Duke University

Who do you consider your mentors?

I'm deeply grateful for the mentorship and support I've received from current and former lab mates in the Musculoskeletal Bioengineering Lab as well as my doctoral advisor, Lou DeFrate, my uncle John Votaw, and my wife Nikki. Their support has been instrumental in shaping my academic career and has encouraged me to constantly seek new opportunities to develop innovative methods that address meaningful challenges in our field.

What is your specific area of interest in research?

Broadly, I'm interested in the design and development of computational methods that allow us to improve personalized medicine by integrating multi-modal data, such as medical imaging, clinical records, and wearable sensor data, to help us improve clinical decision making and the development of therapeutics.

What are you currently working on?

I most recently wrapped up a project where I developed and validated a novel deep-learning-based diffeomorphic image registration algorithm that enables us to accurately, and expediently evaluate spinal mechanics in response to dynamic activity, *in vivo.*

That said, I actually just recently defended my dissertation (just last week!), so I'm currently buttoning-up and transitioning my projects to other members of the Spine Team while I seek out my next role.

What has been the biggest challenge for you lately in your research?
Collecting large, well-curated datasets to train new deep-learning-based models will always be a challenge in human subjects' research, particularly for those directed at novel or niche applications.

What are projects are you looking forward to?
I'm looking forward to exploring how generative AI models may be used to enhance our ability to train and validate new models.

What do you like to do outside of your work?
I enjoy doing triathlons, woodworking/crafting and spending time with my wife and Bernese Mountain Dog, Lincoln.

What is the last book you read?
The last book I read was a blank book. I was trying to see if I could read my own thoughts by staring at a blank page. It didn't work, but it was an interesting experiment!

What is the most unusual/unexpected item sitting on your desk right now?
On my desk at home, I have a fossilized orange that I took with me after Georgia Tech won the Orange Bowl in 2014 – at the time I worked as a student athletic trainer for the GT Sports Medicine team, so the orange is part of a larger Georgia Tech-themed shrine.

Find or Post Spine Events on the Orthopaedic Events Calendar

An orthopaedic events calendar has been added to the ORS website. The events listed are of potential interest to those in the orthopaedic community. ORS Members are welcome to submit applicable events at no charge through the Submit Event button at the top of the calendar on the site. Institutions or sponsors interested in posting an event are welcome to do so in exchange for a donation to ORS. For information, please email ors@ors.org.

Find or Post Events

LearnORS, the online education platform from the ORS, offers a complete learning experience in a format designed to meet learners' educational needs. Each LearnORS course delivers eLearning training materials from one online location. ORS Members receive a discounted rate for all courses.

Residency programs and newly matched medical students are encouraged to take advantage of our special **LearnORS Residency Bundle**. This is a bulk option for a residency program to purchase discount access to all LearnORS courses for as many residents as they have in their program. Individuals can also purchase the courses offered in the Residency Bundle, or create a custom bundle to fit their specific educational needs at a discounted price.

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Paper Review

MRI-Based Measurement of In Vivo Disc Mechanics in a Young Population Due to Flexion, Extension, and Diurnal Loading
Meadows KD, Peloquin JM, Newman HR, Cauchy PJK, Vresilovic EJ, Elliott DM.
JOR Spine 2023.

The authors hypothesized that measuring *in vivo* IVD function may be useful for investigating the etiology of intervertebral disc (IVD) degeneration and low back pain (LBP). Namely, because

current methods for assessing IVD degeneration (e.g., static imaging/Pfirrmann grading) have limited accuracy in determining the sources of low back pain (LBP), measurement of the mechanical function of the disc may provide a better indication of disc health and function.

The authors recruited 16 asymptomatic subjects (8f/8m) with a mean age and body mass index (BMI) of 25.9 ± 2.6 years and 23.7 ± 2.3 kg/m2, respectively; each subject's L1-L2–L5-S1 IVDs were analyzed (n=80 IVDs total). Magnetic resonance (MR) images were collected at 08:00AM/19:00PM; T1-weighted FLASH, T2-relaxation times, and T2-weighted images were used to evaluate IVD mechanics, composition and Pfirrmann grade, respectively. IVD mechanics were assessed by quantifying changes in spinal mechanics under three conditions – flexion/extension (AM-only), and diurnal loading. Axial strains were evaluated using a diffeomorphic image registration (ANTs) technique. Axial strain, T2 relaxation time, Δ-Wedge angle, and A-P shear displacement were the primary outcome measures in this study. The authors evaluated the effects of level, sex, and region (diurnal loading/strain) on primary outcomes using linear-mixed-effects modeling.

Meadows et. al found that flexion and extension resulted in significant level-dependent disc strains, changes in wedge angle, and A-P shear displacement. Flexion caused higher strains in the lower lumbar levels, while extension caused higher strains in the upper lumbar levels. Notably, flexion produced larger magnitudes of changes in all three measures compared to extension – an interesting finding considering the observation that flexion loading often provokes LBP and that herniation of the annulus fibrosus may be associated with aberrant flexion loading. No ostensible effect of BMI, steps walked, or sex were observed in the present study. This finding may be related to the homogeneity of the subject sample and temporal resolution of the FLASH sequence (32 minutes), which may have limited the ability to capture larger time-and-load-dependent IVD deformations. Nevertheless, the findings of this study provide an important baseline to compare future studies against and furthermore highlights the potential utility of measuring IVD health, *in vivo*. Accordingly, future work could help contextualize the results of the present study by quantifying the accuracy (e.g., using zero-strain studies) and sensitivity of similar registration paradigms to correlates of IVD function across a broader subject sample (e.g., BMI, T2/T1rho relaxation times) using sequences with faster acquisition times.

View the latest job openings available via the ORS Career Center

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