ORS Spine Section
Orthopaedic Research Society
Monthly Newsletter

Spinal Column

May 2025

In This issue:

Interview with New *JOR Spine* Editor-in-Chief

Could you tell us a bit about your career in spine research and how you got interested in spine?

I originally started in cartilage biomechanics, specifically fluid-solid interactions at the matrix level. I got interested in the direction dependent flow through the CEP and was introduced by Jill Urban to nutrient transport in the IVD. Compared to cartilage, the IVD was so much more complex and interesting. This is what started my life-long curiosity about the disc and spine. Initially I focused on IVD biomechanics, mechanobiology and solute transport as it pertains to physiology and pathophysiology. This then transformed into disc regeneration and the role of the notochordal cell. Recently, I am exploring the role of spinal and disc biomechanics and mechanobiology in scoliosis. Throughout this journey, the mix of engineering, biology and the clinics have always stimulated me to think deeper and to keep a multidisciplinary approach to the spine.

What do you think was the key to success of the JOR Spine?

As preclinical spine research expanded and came into prominence, this was never fully adopted by any of the major spine journals. About the time that *JOR Spine* was started, the pendulum was even swinging back toward mostly clinical papers. With the desire to build a higher impact spine-specific scientific platform, the Spine Section of ORS started *JOR Spine* to fill this niche. Its success is, I think, due to a combination of factors. The enthusiasm and support of the ORS Spine Section drove the supply of content. Its members were also instrumental in disseminating it and increasing its impact to the wider spine community. This was also well guided and wisely managed by the founding Editors-in-Chief.

What do you see the main challenge ahead for the JOR Spine and the spine research community?

In general, scientific research globally will have some major funding challenges in the coming years. It may be difficult to keep producing impactful research in the plentiful fashion that we have been doing in recent years. This means that journals may be vying to disseminate the best content from a dwindling source. It will be challenging for *JOR Spine* to keep growing in prominence and to serve its scientific spine research community.

What is your vision for the next five years of the JOR Spine?

To meet this challenge, the associate editors and I would like to broaden the content of *JOR Spine* to include all the diverse and new aspects of spine research. We would also like to help the spine research community to raise the impact of their important work and to aid in the development of spine researchers' careers. This will not be easy, but we are very motivated to try our best.

A Message from the Spine Chair

Dino Samartzis, DSc, *Professor,* Department of Orthopedic Surgery at Rush University
Chair, ORS Spine Section

Dear ORS Spine Section Members,

We are excited to have **Dr. Keita Ito** as the new Editor-in-Chief of *JOR-Spine*, the official journal of our ORS Spine Section. Dr. Ito is a globally respected leader in musculoskeletal research, and we are confident that under his stewardship, *JOR-Spine* will continue to thrive as a high-impact platform for cutting-edge spine science.

As we embark on this new chapter for *JOR-Spine*, we invite all members of our community to actively support the journal — not just by submitting your best work, but by serving as peer reviewers. The peer review process is the cornerstone of academic publishing, and it is only as strong as the community that upholds it.

Too often, we hope for quick and thoughtful reviews for our own submissions — but we must also be willing to offer the same for others.

Reviewing is not merely a task; it is an opportunity to:
· Provide critical insights and uphold the integrity of spine research
· Engage with the latest findings and shape the direction of the field
· Give back to the scientific community that supports your own work
· Demonstrate our shared commitment to academic excellence

We ask that if you are invited to review for *JOR-Spine*, please accept the invitation and return your reviews in a timely and constructive manner. Your contributions help maintain the rigor, relevance and reputation of the journal.

If you are interested in reviewing for *JOR-Spine*, please email ors@ors.org with your name, email and organization.

Together, let's support *JOR-Spine* and ensure its continued success as a leading voice in spine research.

With appreciation,

Dino Samartzis, DSc,
Professor, Department of Orthopedic Surgery at Rush University
Chair, ORS Spine Section

Save the Date

Spine Section Roster 2025-2026

Chair - **Dino Samartzis, DSc**, *Rush University*

Past Chair - **Simon Tang, PhD, MSCI,** *Washington University of St Louis*

Chair Elect - **Karin Wuertz-Kozak, PhD, MBA,** *Rochester Institute of Technology*

Secretary - **Rahul Gawri, MD, PhD,** *McGill University*

Treasurer - **David Nuckley, PhD,** *Stryker*

Education Co-Chair - **Svenja Illien-Junger, PhD,** *Emory University School of Medicine*

Education Co-Chair - **Ana Chee, PhD**, *Rush University Medical Center*

JOR Spine Liaison - **Cheryle Seguin, PhD,** *The University of Western Ontario*

Translational Taskforce - **Morgan Giers, PhD**, *Oregon State University*

Industry Liaison - **Anthony Kirilusha, PhD,** *Credence*

Membership Co-Chair - **Dmitriy Sheyn, PhD,** *Cedars-Sinai Medical Center*

Membership Co-Chair - **Derek Rosenzweigh,**

Research Chair - **Gabriela Graziani, PhD,** *Polytechnic*

Clinical Society Liaison - **Ashish Diwan, MD, PhD,** *University of Adelaide*

Member-at Large - **Chitra Dahia, PhD,** *Weill Cornell Medical College*

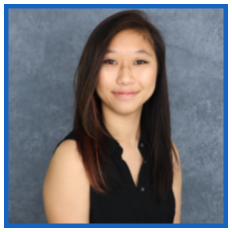
PhD, *McGill*

University of Milan

Member-at-Large - **Graciosa Quelhas Teixeira, PhD,** *Ulm University Clinic*

Funding Agency Liaison - **Laurel Kuxhaus, PhD**, *National Institute of Health*

Spine Membership Committee



Dmitriy Sheyn, PhD, *Cedars Sinai Medical Center*

Derek Rosenzweig, PhD, *McGill University*

Neharika Bhadouria, PhD, *Icahn School of Medicine at Mount Sinai*

Giselle Kaneda, *Cedars-Sinai Medical Center*

Andres Bonilla, DVM, PhD, *Colorado State University*

Jordy Schol, **MSc**, *Tokai University School of Medicine*

Luca Ambrosio, MD, *Campus Bio-Medico University of Rome*

Publication Highlights

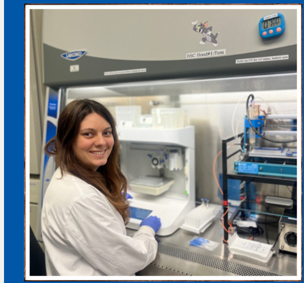
The Membership Committee aims to highlight the most prominent studies published by the Spine Section members in next newsletter. Please share your most impactful papers with us, and we will make an effort to include them in the upcoming newsletters. To be considered, please send a Word Document including the following:

1. Full reference
2. Link to the original paper

3. 100-Word digest of the study
4. Graphical abstract, optional

Send all published work to Derek Rosenzweig, PhD.

Research Section Member Spotlight



Meet Laura

Laura Bouret, MSc
Biomedical Engineering, Polytechnique Montréal, Canada
MSc, Biomedical Engineering, École Nationale Supérieure des Mines de Saint-Étienne, France

"I am primarily interested in biofabrication techniques and model development. My work focuses on creating representative in vitro systems using 3D bioprinting to study interactions between cancer cells and their surrounding microenvironment - particularly in bone metastases - and to test localized, innovative treatments within these models. I aim to develop tools that improve the predictive value of preclinical studies and support their transition to early-stage therapeutic evaluation."

The following paper has been reviewed by Laura Bouret.

Paper Review

Flexible Support Material Maintains Disc Height and Supports the Formation of Hydrated Tissue Engineered Intervertebral Discs *in Vivo*

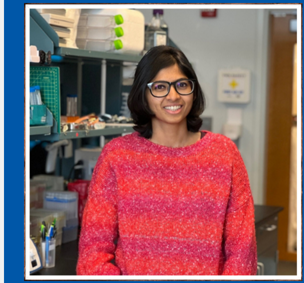
JOR Spine. 2024 Aug 5;7(3):e1363
https://doi.org/10.1002/jsp2.1363

Alikhan B. Fidai, Byumsu Kim, Marianne Lintz, Sertac Kirnaz, Pravesh Gadjradj, Blake I. Boadi, Maho Koga, Ibrahim Hussain, Roger Härtl, **Lawrence J. Bonassar**
(*authors in bold represent Spine Section Members)

Intervertebral disc (IVD) degeneration is a major contributor to spine-related disability and chronic pain. Tissue-engineered IVDs (TE-IVDs) are a promising therapeutic option to restore native disc function and structure. However, challenges remain in ensuring mechanical support and tissue integration after implantation. Conventional support strategies often rely on stiff materials to preserve disc height, but this can lead to complications such as implant failure or poor integration over time. These materials may lack the flexibility needed to accommodate physiological loading while maintaining disc hydration and structure. This study investigated whether a more flexible support material could improve implant stability and support tissue formation under physiological loading conditions in a large animal model, which better reflects human discs anatomy and mechanics.

The researchers developed flexible support cages using FlexiFil (FPLA), a thermoplastic co-polyester, and compared them to standard, stiffer poly(lactic acid) (PLA) cages. The design of the flexible cage was informed by a previously developed finite element model of the minipig cervical spine, which helped identify stress concentrations and guided improvements in cage geometry. Mechanical testing was performed to evaluate how each material responded to compression and deformation. For *in vivo* evaluation, TE-IVDs supported by FPLA or PLA cages were implanted into the cervical spines of minipigs for six weeks. X-rays were used to monitor disc height over time, and T2 MRI scans at the endpoint assessed tissue hydration.

Mechanical testing showed that flexible FPLA cages could withstand greater compression than standard PLA cages without visible damage, indicating improved resilience under load. In the animal study, TE-IVDs supported by FPLA cages preserved disc height over six weeks and showed improved tissue hydration, as measured by MRI. Even when some implants became slightly displaced, FPLA-supported constructs maintained better disc height than PLA or discectomy controls. These results highlight the benefits of using a softer, more adaptable material to support tissue-engineered discs, both in terms of mechanical function and biological integration.



Meet Janitri

Janitri Venkatachala Babu, MSc
Wuertz-Kozak's Lab, Biomedical Engineering, Rochester Institute of Technology, Rochester, NY, USA
MSc, Regenerative Medicine, Manipal University, India

"I'm currently dissecting how TRPC6 drives disc pathology at the molecular level. Using Hyp9, a selective TRPC6 agonist, I map the downstream signaling cascades triggered by channel activation. My next step is to pinpoint whether PKC, MAPK, NF-κB, or their crosstalk drive this response and to identify actionable nodes for therapeutic intervention."

The following paper has been reviewed by Janitri Venkatachala Babu.

Paper Review

Senolytic Treatment for Low Back Pain

Science Advances, 11, eadr1719 (2025)
DOI:10.1126/sciadv.adr1719

Matthew Mannarino, **Hosni Cherif**, Saber Ghazizadeh, Oliver Wu Martinez, Kai Sheng, Elsa Cousineau, Seunghwan Lee, Magali Millecamps, **Chan Gao**, Alice Gilbert, Cedric Peirs, Reza Sharif Naeini, Jean A. Ouellet, Laura S. Stone, **Lisbet Haglund**
(*authors in bold represent Spine Section Members)

Cellular senescence is increasingly implicated in degenerative spine pathologies. Senescent cells (SnCs) accumulate in ageing intervertebral discs (IVDs) and harbor a senescence-associated secretory phenotype (SASP) that fuels inflammation, matrix breakdown and, ultimately, low-back pain (LBP). Senolytic drugs that selectively eliminate SnCs have shown promising results in vitro and ex vivo, but their ability to relieve pain in vivo had not been tested. Mannarino et al. focused on two specific senolytic agents: o-Vanillin, a natural compound previously demonstrated by the investigators to reduce SnC burden and SASP factor release in human IVD cells in vitro, and RG-7112, a synthetic inhibitor of the p53/MDM2 complex and an FDA-approved cancer drug, also shown to have in vitro efficacy in IVD cells.

For this study, lumbar discs from wild-type and SPARC-null mice were first cultured ex vivo to confirm that o-vanillin and RG-7112, alone or combined, suppressed SASP cytokines. Middle-aged SPARC-null mice (7 months) already exhibiting IVD degeneration and pain then received weekly oral gavage of vehicle, o-vanillin (HO), RG-7112 (HR), or four dose-splitting combinations for eight weeks. The combination arms explored different dosing strategies, including full doses of both drugs (HO + HR) and potentially combinations involving half doses (referenced as HO+LR, LO+HR, LO+LR). Axial and radicular pain were tracked bi-weekly using von Frey, acetone, tail-suspension and grip-strength tests. End-point analyses included histological grading of IVD degeneration, vertebral micro-CT, immunofluorescent quantification of p16Ink4a positive SnCs and spinal-cord pain markers, and Luminex measurement of SASP mediators.

Both senolytics improved every behavioral pain metric by week 4 and further by week 8, with their combination (HO+HR) outperforming its respective monotherapies. Dual treatment cleared more than 50 % of p16Ink4a positive cells in nucleus pulposus and annulus fibrosus, suppressed SASP (e.g., IL-6, TNF-α and CXCL-10), and reduced SnCs as well as CGRP, GFAP and CD11b expression in dorsal-horn neurons in the spinal cord. Structural rescue accompanied these molecular changes: discs showed lower degeneration grades, increased volume, and adjacent vertebrae displayed higher bone volume fraction with thicker, more numerous trabeculae. Notably, this is the first study to link senolytic clearance with both histological regeneration and functional pain relief in an in vivo model, advancing senolytics from symptomatic relief toward true disease modification. The dose-responsive synergy between o-vanillin and RG-7112 suggests that targeting multiple SnC survival pathways may overcome cellular resistance and enhance efficacy, positioning senolytic combinations as a promising translational strategy for chronic LBP.

There are some previous examples in the Spinal Column archives.
https://www.ors.org/research-section-newsletters/

Orthopaedic Research Society

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