ORS Spine Section
Orthopaedic Research Society
Monthly Newsletter

Spinal Column

June 2022

Did you know?

JOR Spine in collaboration with the ORS published:
Special Issue: International ORS/PSRS Spine Research Symposium, September 2018

Submit Your Abstract:
ORS PSRS 6th International Spine Research Symposium

ORS PSRS 6th International Spine Research Symposium will provide a forum for discussion of the latest research, medical innovations, and the most advanced scholarship in Spine Research. This symposium will foster a greater understanding of the clinical problems associated with degenerative disc disease and will highlight cutting-edge scientific research in areas of basic biology, epidemiology, disease mechanisms, biomechanics, tissue engineering, and imaging of the intervertebral disc.

Please Note: It is the expectation that authors submitting to the ORS PSRS Meeting will attend the meeting if accepted.

Abstract Submission Deadline: Friday, July 15, 2022

Did you know?
ORS Spine Research Section members will receive a special section member rate for this meeting.

Register & book your flights early - airfare is looking ideal now!

Submit Your Abstract

ORS 2023: Abstract Submission Now Open!

The ORS Annual Meeting is the leading forum for the presentation of high-quality, innovative and transformative research. We invite you to submit your research for consideration for the 2023 scientific program.

ORS provides awards and grants for the early career and established investigator based on high-quality abstracts including **ORS Spine Research Section Podium and Poster Awards**.

Deadline to submit your abstracts: **Monday, August 29, 2022**

ORS Spine Research Section Travel Fellowship
Now accepting applications!

This fellowship is designed to advance an ongoing study or establish new collaborations by providing a mechanism to promote exchange of research methodologies and/or development of pilot data to support larger scale funding.

The fellowship will recognize an applicant and a host PI and provide $1,500 to support the travel of the applicant for research exchange with the host PI.

Deadline for submissions: **September 30, 2022**

Dr. Peter Roughley Award
Now accepting applications!

The ORS Spine Section is happy to announce the establishment of the Dr. Peter Roughley Award named after the late Dr. Roughley who was well known for his seminal contributions to proteoglycan research and their role in both disc and cartilage structure and function.

This award will preserve his legacy in training the future generations of scientists by sponsoring a trainee and mentor exchange to enhance a trainee's knowledge in spine, disc and cartilage biology.

Travel Award Amount: $2,000

Deadline for submissions: **September 30, 2022**

Join Us for the Next ORS Virtual Session!

Registration is exclusively open to ORS Spine Research Section members now!

NIAMS Funding Opportunities and Strategies for Spine Researchers
Thursday July 28, 2022
11:00 AM – 12:30 PM (CENTRAL)

Anthony Kirilusha, **PhD**, Program Director for the Cartilage and Connective Tissue Program at the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) will lead this virtual session focused on NIAMS Funding Opportunities and Strategies for Spine Researchers.

Register to Attend

Research Section Member Spotlight

This issue features **Josette van Maanen MSc, DVM**, **Utrecht University**.

Josette was the recipient of the 2021 Dr. Peter Roughley Award. Learn more about Josette and her visit to Sheffield Hallam University below.

PhD candidate, Faculty of Veterinary Medicine, Department of Clinical Sciences, Utrecht University, The Netherlands

Undergraduate Degree: *BSc Veterinary Medicine, Utrecht University, The Netherlands*

Graduate Degree: *MSc Veterinary Medicine, Companion Animal Health, Utrecht University, The Netherlands*

Who do you consider your mentors?

I consider ***Professor Christine Le Maitre*** *as my mentor for my PhD project. She has extensive knowledge of inflammation in disc degeneration and the use of different models in the disc field. In addition to her help with designing my studies, she was so kind to host me for six weeks in her research group so I could use their facilities and culture systems for my experiments. She made me feel welcome in her research group and I learned a lot from this visit.*

My other mentor is Dr. Bart Gadella. He was my supervisor during my student internships, which I did in the field of reproductive biology. During my internship, he always lent an ear when I was experiencing laboratory or personal difficulties. He taught me to be critical in research and challenged me a lot by giving me projects that were meant for PhD candidates (and not students).

What is your specific area of interest in research?

My PhD focuses on extracellular vesicles (EVs) derived from notochordal cells (NCs). Previously, these NC-derived EVs have been shown to increase a healthier matrix production when applied to nucleus pulposus cells from degenerated discs. In my PhD, I focus on their potential anti-inflammatory effect on these cells. Parallel to this, I characterize these EVs based on their protein markers and apply mass spectrometry to reveal the complete proteome of the EVs.

What are you currently working on?

In the first two years of my PhD, I have worked on optimizing culture systems for nucleus pulposus cells and ways to induce inflammation in these cultures. This year, I have obtained my first results on the anti-inflammatory properties of NC-derived EVs. Based on these results, I have visited the lab of Christine Le Maitre to test the EVs on their disc explant cultures. Now that I have returned to my home university, I will start the analysis of the samples that I collected during this visit. I am looking forward to the results of these studies. Furthermore, I am currently optimizing EV isolation for mass spectrometry. I hope I can soon send my final samples for proteomic analysis.

What has been the biggest challenge for you lately in your research?

The biggest challenge in EV work, in general, are limitations to the available techniques. For example, EVs are so small you cannot visualize them with generally used microscopy techniques. Another example is that the protein quantity of

EVs is low, so protein-based techniques like Western blotting and mass spectrometry might fail because of a too low protein input. This means that when you work with EVs, you must be creative in finding solutions and always be very critical of the limitations of your techniques.

What are projects are you looking forward to?

I am not looking forward to a specific project but more to the part of my PhD where all my separate projects come together. Currently, I am working on different aspects of EVs, including biological testing in multiple culture systems and delineating the proteome of these EVs. These are still separate projects, but in the end, I expect that with all these data, I will be able to tell a complete story about NC-derived EVs.

What do you like to do outside of your work?

Outside of work, I enjoy horseback riding. When I go to the stables, I can completely relax and forget about work. In addition, I enjoy a good hike on the weekend. I try to find as many routes as possible in our neighboring forest. Especially later in the evening, not many people are there, and you can enjoy the quiet. I often spot some wild animals and birds. In the holidays, I challenge myself by going to the mountains in, for example, Germany.

What is the last book you read?

Currently, I am searching for a where to go on summer holiday. Therefore, I am reading books about hiking in mountainous areas in Germany and Austria.

What is the most unusual/unexpected item sitting on your desk right now?

At my lab, we all have flex-work places; therefore, there is a "no-clutter" policy. This means that your desk must be always empty, except for the things you use that day. So, I cannot keep any personal items on my desk in the lab. In my home office, I have a painting of a rabbit that I bought on holiday to the Canary Islands. This picture reminds me of the beautiful nature I saw while hiking there.

The effect of notochordal extracellular vesicles on human and bovine nucleus pulposus explants: Visit to Sheffield Hallam University

Contributed by: ***Josette van Maanen MSc, DVM****, Utrecht*

Pictured: Dr. Peter Roughley

Dr. Roughley was particularly gifted in teaching and mentoring individuals, and always willing to instruct and advise his fellow scientists.

University

Although my mentor, **Christine Le Maitre**, and I already received this award in 2021, I could not travel to Sheffield due to the many COVID restrictions that were in place during that year. We used 2021 to make detailed plans for the visit and prepare everything. Then, from April to May 2022, I visited the laboratory of Christine Le Maitre, PhD at Sheffield Hallam University, UK. Christine Le Maitre is a Professor of Cell Biology and Tissue Regeneration and is the leader of the Tissue Engineering and Biomechanics research group in the Biomolecular Science Research Centre. Over the years, Prof. Le Maitre has gained a unique knowledge of studying the inflammation in degenerating discs. Her lab has developed an in vitro model using intervertebral disc explants. This model mimics the degenerative disc environment and is, therefore, a more relevant model to test potential new treatment strategies for disc degeneration.

I received a warm welcome from Prof. Le Maitre's research group and during my time in Sheffield, I felt a part of this group. I enjoyed experiencing how things work in other labs and learned new techniques, such as the intervertebral disc explant culture and working in a hypoxic glove box. The visit to Prof. Le Maitre's lab has provided me with a unique research experience and allowed me to test notochordal cell-derived extracellular vesicles on both bovine and human species during my visit. Especially the access of the lab to human disc samples is unique and allows me to test the extracellular vesicles on patient samples. The connections of Prof. Le Maitre with many surgeons in the Sheffield hospitals guarantee access to these rare samples. Since the time of the visit was somewhat limited, I have focused mainly on performing the culture experiments. Now all samples have been collected, we will continue working together with Prof. Le Maitre on the analysis of the results.

This award preserves Dr. Roughley's legacy in training the future generations of scientists by sponsoring a trainee and mentor exchange to enhance a trainee's knowledge in spine, disc and cartilage biology.

Journal Article Review

Josette also contributed to this issue's journal article review.

Comparison and optimization of sheep in vivo intervertebral disc injury model

Caroline Constant, Warren W. Hom, Dirk Nehrbass, Eric-Norman Carmel, Christoph E. Albers, Moritz C. Deml, Dominic Gehweiler, Yunsoo Lee, Andrew Hecht, **Sibylle Grad**, **James C. Iatridis**, **Stephan Zeiter**

JOR Spine
Early View 2022

Intervertebral disc (IVD) degeneration is a leading cause of low back pain. IVD degeneration leads to changes in disc structure, such as a decrease in disc height and herniation of inner disc material (nucleus pulposus, NP) through the outer ring of the disc (annulus fibrosus, AF). Large animal models are commonly used for preclinical testing of new repair therapies for IVD degeneration. Sheep models are considered suitable for human spinal pathology because of their similarities in spine anatomy. However, to evaluate the effect of treatments in this species, IVD degeneration must be induced. In literature, different methods for inducing IVD degeneration in sheep have been described, but they lack robustness and standardization. To address these shortcomings, this study uses an in vivo sheep model to evaluate three methods for inducing disc degeneration.

A total of six mature female sheep were included in the study. Degeneration was induced in each animal, at three lumbar levels, by partial NP removal combined with three different AF defect types. The three AF defect types were 1) full-thickness longitudinal cut (slit AF defect), 2) full-thickness cruciate cut (cruciate AF defect), 3) full-thickness removal of part of the AF, creating a rectangular window (box-cut AF defect). The sheep were either evaluated after 1 month or 3 months. Disc height loss and degenerative changes were determined by in vivo CT imaging before surgery, directly after surgery, 2 weeks after surgery, and at euthanasia (1 month or 3 months). After euthanasia, all discs were graded using MRI (Pfirrmann grading) and histopathology.

All injured discs, independent of the type of AF injury, showed a decrease in disc height directly after surgery, 2 weeks after surgery, and 4 weeks after surgery. However, after 3 months, only the cruciate and box-cut defect showed a significant decrease in disc height, whereas the disc height in the slit cut AF defect was restored. Both Pfirrmann and histopathological grading showed an increased degeneration for all defect types. No significant differences were observed between the AF defect types. Bulging of the disc was seen in most of the injured discs, but none of the techniques was capable of inducing disc herniation. These results highlight the robustness of all three techniques to induce disc generation in the sheep model. Minor differences between the techniques, specifically the slit cut AF model,

should be considered when designing in vivo sheep studies.

JOR Spine

Did you miss the last few issues?

Volume 5, Issue 1
March 2022

Volume 4, Issue 4
December 2021

Learn more.

ORS Career Center

ORS Orthopaedic Research Society

ORS Career Center careers.ors.org

Explore the latest opportunities available at the ORS Career Center.
New jobs are posted everyday.

Career Coaching
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Whether you are mid-career professional, a senior executive, or just entering the job market, our experts are ready to critique your existing resume or help you craft a document that gets you noticed.

Reference Checking
Get your references checked, confidentially and professionally so you can be confident your past employers are helping, not hurting, your candidacy.

Career Learning Center
Video and written presentations designed to instruct and entertain, from creating powerful resumes to developing an effective personal network for career success.

careers.ors.org

Check out the latest opportunities available via the ORS Career Center including:

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Heersink School of Medicine - Assistant Professor - Orthopaedic Surgery (Spine)
University of Alabama, Birmingham

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