



Dear DSMB Members,

I am delighted to begin this newsletter with heartfelt congratulations to Chloé Yeung (group leader, the Institute of Sports Medicine, Copenhagen), our DSMB treasurer, for receiving the prestigious Rupert Timpl Award at the recent Matrix Biology Europe 2024 meeting in Lyon. Congratulations to Danielle Steffen (postdoc, the Institute of Sports Medicine, Copenhagen), for taking home a poster prize from FEBS. We are equally proud of our Dick Heinegård Young Investigator nominee, Lasse Lorentzen (postdoc, Rigshospitalet), who gave an outstanding presentation representing DSMB at the same event. In this issue, you can read their reflections on the meeting.

In our lab introduction section, we are excited to feature Associate Professor Andrea Heinz, who has established her lab at the LEO Foundation Center for Cutaneous Drug Delivery, Department of Pharmacy, University of Copenhagen. Her research focuses on the structure of the skin in health, aging, and disease, with a particular emphasis on the extracellular matrix protein elastin. We are thrilled to announce that Andrea will also be the plenary speaker at this year's DSMB Annual Meeting.

This year's DSMB Annual Meeting will take place on Monday, 4th November, on the top floor of the Mærsk Tower, University of Copenhagen. In addition to Andrea Heinz's talk on the role of tropoelastin in health, aging, and disease, we will also have early career researchers, Elena Vidal-Calvo (Centre for Translational Medicine and Parasitology, University of Copenhagen & VAR2 Pharmaceuticals ApS) and Chiara Tremolanti (Karolinska Institute, Sweden) to discuss topics on chondroitin sulfate and heparan sulfate. We will also hear from two promising young investigators who will present their postdoctoral research, Kevin Baker (Center for Cancer Immune Therapy, Herlev Hospital) and Casper Søndenbroe (Institute of Sports Medicine Copenhagen). So please register before 30th October!

Looking ahead, DSMB is organizing the 3rd Joint Nordic Matrix Meeting with the German Matrix Society, *Matrix Nexus: the Extracellular Matrix from Molecular Foundation to Life*, from 26-28th March 2025 in Freiburg, Germany. DSMB members can register at member rates. Registration is now open, and you can find further details in the flyer below.

Lastly, I am pleased to announce that DSMB members are now eligible to register for British Society for Matrix Biology (BSMB) meetings at the BSMB member rate, and vice versa. We hope this reciprocal arrangement will foster new collaborations and strengthen our matrix biology community even further. Thank you for your continued support, and I look forward to seeing you at our upcoming events!

Warm regards,
Christine Chuang
Chairwoman, DSMB

Chairwoman

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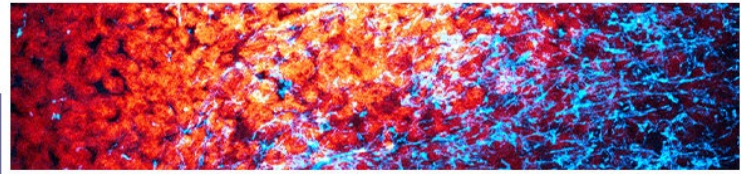
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RECENT EVENTS

MATRIX BIOLOGY EUROPE 2024

24-27 SEPTEMBER, 2024



The Rupert Timpl award from the International Society for Matrix Biology (ISMB) – Chloé Yeung

On 24th September, I attended the MBE meeting, which was held at the École Normale Supérieure de Lyon. This biennial event, organization led by Florence Ruggiero, brings together researchers from Europe to learn about the latest in extracellular matrix research. The meeting started with a Youth@MBE session dedicated to early career researchers – mainly



Chloé on the big stage acknowledging key people and funding

PhD students and postdocs. It was an excellent way to get the newcomers in the matrix field acquainted with one another as well as giving them a friendly platform to present their work. I was especially excited to meet the new Meshwork team, represented by Dimitria Manou (Lund University) and Konstantina Kyriakopoulou (University Clinic Münster), who are doing some amazing things with the new network dedicated to matrix early career researchers!



Chloé with ISMB Secretary Julia Etich (University of Cologne) and ISMB President Nikos Karamanos (University of Patras)

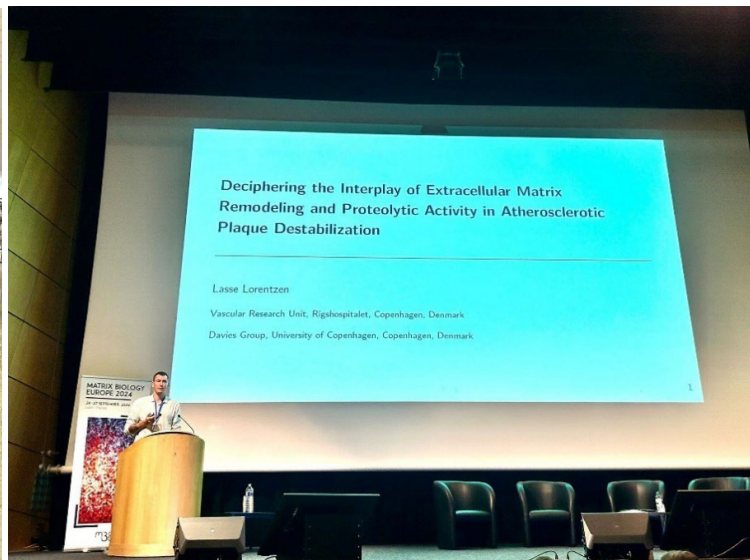
On Wednesday afternoon, I delivered the Rupert Timpl award lecture “Translational significance of circadian clock regulation of tendon matrix homeostasis”. My talk covered the discovery of the tendon clock and its regulation of collagen secretion and “chronomatrix” removal (PMIDs: 24897937, 31907414, 37913834). The prize was awarded for my paper “Disruption of day-to-night changes in circadian gene expression with chronic tendinopathy”, in which we established that human tendons are peripheral clock tissues and identified key organism differences in the regulation of collagen I expression (PMID: 36810732). This work has led to the initiation of a clinical study investigating when is the best time of day to perform exercise therapy for the treatment of chronic patellar tendinopathy

(ClinicalTrials.gov ID NCT06217432) and a project investigating the influence of mechanical loading on the tendon circadian rhythm. I look forward to being able to give an update on these new projects at the next MBE meeting in the fifth largest city in Finland (Oulu) in 2026!

Chloé Yeung is a Group Leader at the Institute of Sports Medicine Copenhagen, Bispebjerg Hospital, Denmark. She is currently guest editing a special issue in the American Journal of Physiology – Cell Physiology on “**The Extracellular Matrix in Exercise Physiology**”. For details, visit: <https://journals.physiology.org/ajpcell/the-extracellular-matrix-in-exercise-physiology>. Furthermore, check out Danielle and Chloé’s excellent recent review on exercise induced circadian rhythm alterations & ECM homeostasis here <https://pub-med.ncbi.nlm.nih.gov/38881419/>

DSMB nominee for the Dick Heinegård Young Investigator award - Lasse Lorentzen

I recently had the pleasure of attending the Matrix Biology Europe (MBE2024) conference in Lyon, France. I had the honor of participating as the DSMB nominee for the Dick Heinegård Young Investigator Award. As a postdoc and early career researcher, I am grateful to DSMB for recognizing the significance and relevance of my research and for giving me the opportunity to go to Lyon and present my findings. I presented my work on using proteomics techniques to study the mechanisms of atherosclerotic plaque destabilization – a life-threatening process where extracellular matrix remodeling plays a central role. Although I did not win the Dick Heinegård award, the feedback and discussions on my work from an audience of international experts in matrix biology has been an incredibly rewarding experience on its own.



(Left) Lasse excited to represent DSMB and explore all MBE has to offer. **(Right)** Lasse presenting his work to a packed Mérieux Amphitheatre as the DSMB Dick Heinegård Young Investigator award nominee.

The MBE2024 conference was a dynamic gathering of researchers from various backgrounds, all passionate about extracellular matrix biology - in all its variety. The sessions were well organized, insightful and covered an impressively wide range of topics, which broadened my understanding of the field and underscored the importance of the extracellular matrix in all aspects of biology. I highly encourage other young researchers to participate in future MBE conferences – and plan to do so myself. The knowledge gained and the connections made are invaluable and contribute greatly to personal and professional growth in the field of matrix biology.

Lasse Lorentzen, PhD

Panum Institute, Department of Biomedical Sciences, University of Copenhagen, Copenhagen, Denmark

Department of Vascular Surgery, Rigshospitalet, Copenhagen, Denmark

DSMB member report – Danielle Steffen

I am a postdoctoral researcher at the Institute of Sports Medicine Copenhagen (ISMC) with Dr. Chloé Yeung and my research interests are in the adaptability of the tendon extracellular matrix to stimuli such as injury and exercise. The travel grant awarded to me from the International Society of Matrix Biology helped me to attend my first Matrix Biology Europe Meeting which was held in Lyon from 24-27 September 2024.



(Left) Outside the Merieux amphitheater with other enthusiastic matrix biologists and **(Right)** Danielle receiving a poster prize from ISMB President Nikos Karamanos (University of Patras) and MBE organizer, Florence Ruggerio.

From the first day at the MBE Meeting, it was apparent that this community was so kind and enthusiastic to be matrix scientists! I really enjoyed that the Youth @MBE session was on the first day because it allowed me to connect with peers from the start of the conference.

The talks at MBE highlighted the complexity and tissue specificity of the ECM. Despite differences in ECM composition and structure across tissues, many researchers were studying how basic components of the matrix maintain homeostasis (when healthy) and perturbed with disease and aging. The talks most interesting to me were those that explored the link between mechanical forces on cells and ECM remodeling, especially in tendons. The breadth of models used to study this was impressive and ranged from electrospun fiber scaffolds and hydrogels to animal models of human disease. The Tendon COST Action satellite meeting was an added bonus to delve into the details of tenocyte mechanosensitivity.

I presented my project on exercise-induced molecular changes in hamstring tendon at the first poster session. Most of the visitors to my poster were not tendon biologists, and this led to many interesting discussions about the function of tendon matrix molecules (e.g. THBS4, COMP) in other tissues. It was also helpful to discuss *in situ* hybridization and imaging methods with other matrix researchers because we are optimizing these protocols at ISMC for human tendon. At the end of the conference, I was fortunate to be awarded with a poster prize from the Federation of European Biochemical Societies.

Tusind tak (English - many thanks) for a great experience at MBE 2024! Looking forward to next year.

Danielle Steffen, PhD

The Institute of Sports Medicine Copenhagen, Bispebjerg Hospital, Denmark



DSMB MEMBER SPOTLIGHTS

Andrea Heinz, Assoc Prof., PhD, Department of Pharmacy, University of Copenhagen

Research environment and research group

My research group is a part of the LEO Foundation Center for Cutaneous Drug Delivery at the Department of Pharmacy. The LEO Foundation Center for Cutaneous Drug Delivery focuses on investigating the skin as a barrier for drug absorption and overcoming the skin barrier using modern drug delivery systems. My research group and I investigate the structure of the skin in health, aging and disease, with particular focus on the extracellular matrix protein elastin. We further develop enzyme-sensitive stimuli-responsive drug delivery systems and protein-based electrospun dressings for the treatment of inflammatory skin diseases that go along with an extensive remodeling of the extracellular matrix.

My basic research group currently consists of three PhD students, two master students, a project student and myself. Moreover, I am co-supervising 4 PhD students. Our research is dependent on external funding and especially the LEO Foundation focusing on the skin and skin diseases has been essential in the last couple of years.



Current research focus

Our current research is focused on elucidating the structure and function of the extracellular matrix proteins elastin and collagen in the skin and the cardiovascular system in health, aging and disease. In this context, we investigate the mechanisms of collagen and elastin degradation by biologically relevant proteases (intrinsic aging) and describing the release and function of bioactive collagen and elastin peptides, so-called matrikines. Moreover, we investigate skin aging processes by studying the oxidation of tropoelastin, the precursor and building block of mature elastin, induced by UV light and oxidizing agents. In this context, we also aim to study the impact of oxidation on tropoelastin's assembly, a step crucial for the formation of elastic fibers in vivo. This work is done in collaboration with Prof. Michael Davies and Assist. Prof. Christine Chuang from the Department of Biomedical Sciences, University of Copenhagen.



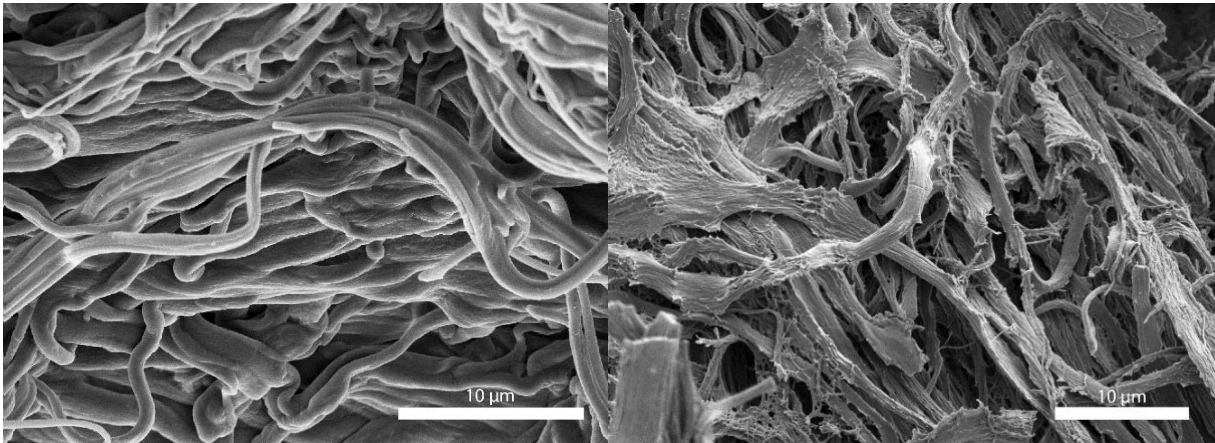
Among a number of master students, group members are the PhD students Anna-Lena Gürtler, Grzegorz Czyrski and Luna Gade Sørensen (adjacent from left to right).

Research journey over the last 15 years

After my PhD in 2008, I became fascinated by the biology of the extracellular matrix of the skin and its macromolecular components such as elastin and collagen. Their long-lasting structural assemblies, which possess impressive biophysical and biomechanical properties that make them crucial for the long-term function of organs and tissues, are still poorly understood. However, the biosynthesis, structural assembly and turnover of the extracellular matrix is critical for our understanding of processes such as skin aging, wound healing and tumor invasion. In the last 15 years, my research group focused on investigating structural properties of elastic fibers, in particular in the skin, and their changes throughout life with regards to

aging processes and pathologies. For instance, we studied changes in the elastic fibers upon skin aging in samples derived from individuals of different ages (see Figure 1 below). Further, we analyzed structural alterations in elastic fibers which are associated with the Williams-Beuren syndrome, a genetic disorder that is characterized by the deletion of the elastin gene on one chromosome of the chromosome pair 7. Another emphasis was placed on the elucidation of enzymatically induced cross-links in mature elastin, which is composed of cross-linked molecules of its precursor tropoelastin. The cross-linking pattern of elastin is still unknown, however, dramatically influences the biomechanical properties of the protein.

In connection with the analysis of elastin's cross-linking pattern, we started developing elastin-like biomaterials biomechanical properties similar to those of the natural biopolymer elastin. We used synthetic elastin peptides, recombinantly produced tropoelastin domains or the full-length precursor tropoelastin and cross-linked these substrates using enzymatic or chemical cross-linkers. We were able to induce the formation of desmosine and other typical elastin cross-links in vitro, which is a big step towards the production of elastin-like biomaterials for the use in tissue engineering.



*Figure 1. Scanning electron micrographs of human skin elastin obtained from a 6-year-old individual (left-hand side), and a 90-year-old individual (right-hand side). The white bars represent 10 μm (adapted from: Mora Huertas AC, Schmelzer CE, Hoehenwarter W, Heyroth F, Heinz A. Molecular-level insights into aging processes of skin elastin. 2016. *Biochimie*. 128-129, 163-173)*

Research Paper Spotlight

Please contact the DSMB board at dsmb.dk@gmail.com to have your research paper considered for the research paper spotlight in our next newsletter.

UPCOMING EVENTS

DSMB annual meeting 2024 – November 4, 2024

2024 Danish Society for Matrix Biology Annual Meeting

Monday 4th November

Level 15 conference room (7.15.92), Mærsk Tower
Panum Institute, University of Copenhagen, Blegdamsvej 3B,
2200 Copenhagen, Denmark



PROGRAM

13.00 – 13.05 Welcome address by the DSMB Chairwoman

13.05 – 13.45 **Andrea Heinz** (LEO Foundation Center for Cutaneous Drug Delivery, Dept. Pharmacy, University of Copenhagen, Denmark) - *“Elastic fibers – molecular assembly and ageing”*

13.45 – 14.05 **Elena Vidal-Calvo** (Centre for Translational Medicine and Parasitology, Department of Immunology and Microbiology, University of Copenhagen & VAR2 Pharmaceuticals ApS, Copenhagen, Denmark) - *“Clinical potential of oncofetal-chondroitin sulfate glycosaminoglycans, agnostic tumor target for pan-cancer therapies”*

14.05 – 14.25 **Chiara Tremolanti** (Karolinska Institute, Stockholm, Sweden) - *“The Role of Heparan Sulfate Sulfatases in the Development of Midbrain Dopaminergic Neurons”*

14.25 – 14.40 **Johanna Kate Farley*** (Lund University, Sweden) - *“A mechanistic role of syndecan-1 and calcium in epithelial-to-mesenchymal transition”*

14.40 – 14.55 **Emma-Marie Bredtoft*** (Nordic Bioscience & KeyBioscience & Department of Biomedical Sciences, University of Copenhagen, Denmark) - *“Inhibiting local active BIGH3 attenuates pathological TGF- β -induced fibrosis progression in vitro”*

14:55 – 15:30 Coffee break (funded by European Union Horizon 2020)

15:20 – 15:30 DSMB AGM

15:30 – 15:50 **Kevin Baker** (Center for Cancer Immune Therapy, Herlev Hospital, Denmark) - *“Hypoxia-regulated ECM changes alter key immune cell population phenotypes in the tumor microenvironment”*

15:50 – 16:10 **Casper Søndebro** (Institute of Sports Medicine Copenhagen, Bispebjerg Hospital, Denmark) - *“Muscle Fibroblasts and Stem Cells Stimulate Motor Neurons in An Age and Exercise-Dependent Manner”*

16:10 – 16:25 **Asta Skovgaard Eriksen*** (Institute of Sports Medicine Copenhagen, Bispebjerg Hospital, Denmark) - *“The Effect of Dynamic Loading and Unloading on Non-Myogenic Muscle Resident Cells in Vitro”*

16.25 – 16.40 **Ask Møbjerg*** (Institute of Sports Medicine Copenhagen, Bispebjerg Hospital, Denmark) - *“An in vitro model to investigate the influence of mechanical loading on the mammalian tenocyte circadian”*

16.40 – 16.55 **Danielle Steffen*** (Institute of Sports Medicine Copenhagen, Bispebjerg Hospital, Denmark) - *“Single nucleus resolution of the human hamstring tendon response to acute heavy resistance exercise”*

16.55 – 17:10 **Sara Jørgensen*** (Department of Vascular Surgery, Rigshospitalet & Department of Biomedical Sciences, University of Copenhagen) - *“IGF-1 treatment of ex vivo cultured atherosclerotic plaques decreases synthesis of MMP-9”*

17.10 – 17.20 Closing remarks

17.20 – 18.00 Networking with light refreshments

To register:

The DSMB annual meeting is free for DSMB members. The annual membership fee is 300 kr. To register and join the DSMB, please visit <https://www.biokemi.eu/event-5845485>. Registration deadline is 30th October.

Contact: dsmb.dk@gmail.com



The Matrix Nexus Freiburg – March 26-28, 2025

Matrix Nexus

The Extracellular Matrix

From Molecular Foundations To Life



The Annual Meeting of the German Society for Matrix Biology will be held as a joint event with the contributions of Denmark, Sweden, Finland, and Belgium. The meeting will take place at the Otto-Krayer-Haus in the vibrant and picturesque city of Freiburg im Breisgau from March 26th-28th, 2025.

A **young researcher pre-meeting** will also be taking place, which includes a social evening event on March 25th and a scientific morning session on March 26th. This pre-meeting is open for all those who are juniors and feel like juniors!

Confirmed speakers include Taina Pihlajaniemi, Federica Genovese, Catherine Bui, Rebecca Miller, Irit Sagi, Christoph Becker-Pauly, Alexander Eckersley, Jeffrey Hubbell, Martin Ehrbar, Aude Beyens, Egor Dzyubenko, Eva Rog-Zielinska, Jozefina Meester, Fatima Mechta-Grigoriou, Alexander Pietras, Michael Kjaer, Patrick Mehlen

Find further details regarding the program and registration at the following link:

<https://www.matrixbiologie.de/annual-meeting-2025/>



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