



THE DANISH
SOCIETY FOR
MATRIX BIOLOGY

Newsletter

No. 9, December, 2020

From the Chairwoman

Welcome to the Christmas edition of our 9th Newsletter! It has been a tough year for everyone. We have had to postpone our physical annual meeting from March to an online virtual meeting on 8th December. We had 43 participants in total spanning across US, Italy, Finland and Sweden in addition to our local Danish delegates!

This year our plenary speaker was Prof. Veli-Matti Kähäri (University of Turku, Finland) who gave an interesting talk about the tumor microenvironment in cutaneous squamous cell carcinoma while our other invited speaker, Prof. Jeremy Turnbull (University of Liverpool and University of Copenhagen), shared with us their promising result on the next-generation heparin and glycomimetics as therapeutics. In addition, we had five oral presentations (selected abstracts) in the running for a travel grant sponsored by Tebu-bio and the winner was Marie-Louise Thorseth, a PhD student in the Madsen lab at the Center for Cancer Immune Therapy, Herlev Hospital.

I would like to welcome three new board members, Choé Yeung (treasurer) from Bispebjerg Hospital, Rebecca Miller from the University of Copenhagen and Kent Søe from Southern Denmark University. However, Abbas Jafari, Marie Kveiborg and Niels Behrendt have stepped down and I would like to take this opportunity to thank their tremendous contribution to the society as we (DSMB) would not be as successful and financially healthy as of now if it wasn't for their time and effort into the organisation of every meeting. My appreciation also extends out to our current board and members as well, especially for your support and patience throughout these stressful times.

In this edition of the newsletter, we have included a lab introduction from A/Prof. Kent Søe, new board member, as we continue to strive and expand our matrix research areas. I also wanted to remind you to sign up for the #THEmeshwork career development event in January. Further information is provided in this newsletter.

Finally, we would like to wish you all a Merry Christmas and Happy New Year and we look forward to another year of exciting seminars and new matrix research in 2021. Take care and stay safe!

Sincerely,

Christine Chuang

Chairwoman

Christine Chuang (BMI, KU)
cchuang@sund.ku.dk

Secretary

Monika Bayer (ISMC, Bispebjerg Hospital)
monika.lucia.bayer@regionh.dk

Treasurer

Chloé Yeung (ISMC, Bispebjerg Hospital)
chloe.yeung@gmail.com

Council Members

Kent Søe (Dept. Clinical Research, SDU)
kent.soe@rsyd.dk

Rebecca Miller (ICMM, KU)
rmiller@sund.ku.dk

Daniel Madsen (CCIT, Herlev Hospital)
daniel.hargboel.madsen@regionh.dk

Webmaster

Alejandro Mayorca Guiliani (BRIC, KU)
alejandro.mayorca@bric.ku.dk



Lab introduction

Kent Sørensen, PhD – associate professor, Clinical Cell Biology, Dept. of Pathology, Odense University Hospital & Dept. of Clinical Research, University of Southern Denmark, Odense

Scientific career

1992 – 1998: Master of Science in biology at Aarhus University, Denmark

1998 – 2006: In my first years as scientist, I did my PhD in Germany over 4 years followed by 4 years as postdoc and junior group leader. In this period, I worked as a biochemist within the research field of DNA Repair and Apoptosis with focus on Topoisomerase I and p53. Department of Biochemistry, Leibniz Institute for Age Research – Fritz-Lipmann-Institute, Friedrich Schiller University, Jena, Germany

2006 – 2018: I joined the group (Clinical Cell Biology, Vejle Hospital) of Jean-Marie Delaissé and started my specialization in bone research. Very soon, the osteoclast caught my very special attention. Senior researcher (2006-2011), assistant professor (2012-2014, University of Southern Denmark), and associate professor (2014-2018, University of Southern Denmark).

2019 – present: In 2019 I moved to Odense and continued my research as associate professor. I am now in charge of my own research team within the Research Unit of Pathology, Odense University Hospital / University of Southern Denmark.

Overview

In my research, the center of attention is the human osteoclast, the only bone resorbing cells of the body. Osteoclasts resorb bone relatively fast when compared to the much slower bone formation processes conducted by osteoblasts. Therefore, it is important that osteoclast activity does not get out of control. If this would happen, there would be a risk of triggering a pathological condition such as osteoporosis. My scientific attention is focused on:

- Regulation of osteoclasts through cell-cell fusion [1–5]
- Regulation of osteoclasts through two bone resorption modes [6–11]
- Osteoclasts of different individuals behave differently in vitro and in vivo [5,8,10]
- Epigenetic regulation of osteoclasts in vitro and in vivo [5,10]
- Personalized treatment of patients with bone disease (osteoporosis, cancer, HIV, rare bone diseases)

By nature, bone is rich in extra cellular matrix – extremely rich! In bone, collagen, and especially collagen type I, is very common. It is not only rich in bone itself, but also in the bone marrow space. In my research, I have found that precisely the extra cellular matrix is an important regulator of osteoclast fusion, aggressiveness of bone resorption, and coupling to bone formation.

Examples from my research where matrix plays an important role

Osteoclast fusion

Osteoclast precursors are situated in the bone marrow, but in order to become osteoclasts they must fuse – this occurs at the bone surface. We have shown that collagen in the bone marrow and the mineralized bone surface plays a central role in the fusion process. Contact with these two different types of matrix induces differentiation and a heterogeneity that is required for their fusion. In my recent reviews [12,13], I highlight the importance of precisely matrix to control fusion. Please see Figure 1 for inspiration.

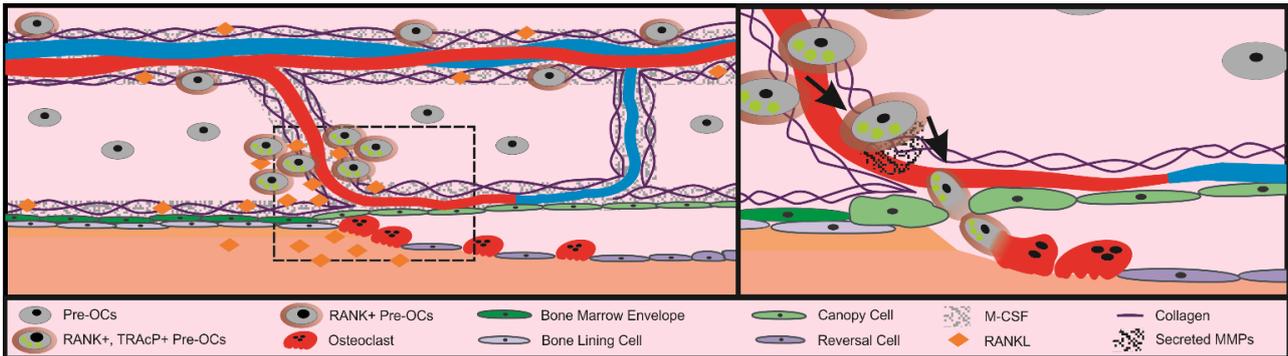


Figure 1. Published in [13]

Osteoclast bone resorption

Through a series of publications [6,7,9,14], we have shown that osteoclasts have two different modes to resorb bone (please see Figure 2): 1) pit-mode, where the osteoclast remains immobile during bone resorption. Due to insufficient levels of active collagenase, cathepsin K, collagenolysis is incomplete and a gelatine-like layer is formed at the bottom of the cavity. This terminates the bone resorption process. 2) trench-mode, the osteoclast also starts out in pit-mode, but because of higher levels of cathepsin K collagen is efficiently removed and this allows the osteoclast to remain active, making deep and long resorption cavities. Thus, the presence or absence of demineralized collagen matrix regulates the resorption mode of the osteoclast. Recently, we have shown that this may be of clinical relevance due to different drug-sensitivity of osteoclasts in pit- and trench-mode ([6,7,14–16]), and because we have shown that it is linked to e.g. human aging [10] and gender [8]. We have shown that epigenetics plays a key role in regulating this behaviour [5,10] and much of my research is currently focussed on exploring this in further detail. The importance of epigenetics in regulating osteoclasts is highlighted by our very recent findings that smoking renders the osteoclasts more aggressive by facilitating the trench-mode of bone resorption (manuscript in preparation).

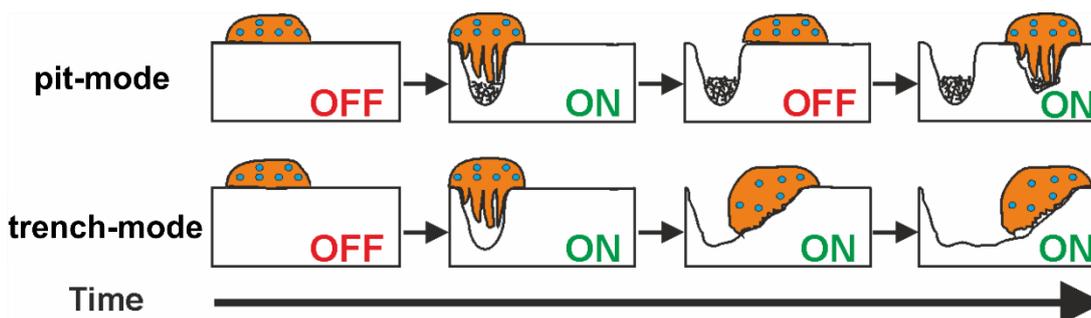


Figure 2. Modified from [6]

Collagenolysis during bone resorption favors coupling to bone formation

We have shown that precursors for the bone forming osteoblasts have a collagenolytic activity that directly can assist the osteoclast in bone resorption [17,18]. It is our hypothesis that this contact with collagen will cause the osteoblast precursors to differentiate into a bone forming osteoblast and thereby ensure coupling to bone formation. More details about this research can be found in our recent review [19].



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2020 DSMB Annual Meeting

8th December

Thank you to all the speakers, poster presenters, organizing committee and members for participating and sharing your research in our 3.5 hours of virtual webinar. Here are some screenshots (thanks Chloé) and feedback from our best oral presentation awardee:

I attended this year's DSMB annual meeting and was proud to win best oral presentation.

Although the circumstances only allowed for a virtual meeting this year, I found it as interesting and educational as I remember from the past meetings. It is always exciting to get an insight into the very diverse areas of matrix biology. I am looking forward to attending next year's meeting, hopefully in person.

Marie-Louise Thorseth

PhD Student, National Center for Cancer Immune Therapy, Herlev Hospital, Denmark



Old and new board members



Matrix Biology PhD course report

4th-6th November, Bispebjerg Hospital, Copenhagen

This year we managed to get the go-ahead to teach the course in person and it took place at the Institute of Sports Medicine Copenhagen (ISMC), Bispebjerg Hospital. The course aims to provide a comprehensive background on extracellular matrix from genetics, to synthesis, assembly, organisation and remodelling, and signalling back to the cells.

Our usual international speakers Karl Kadler (Wellcome Trust Centre for Cell-Matrix Biology, UK) and Graham Riley (U. East Anglia, UK) gave their lectures over zoom, which was broadcasted in the seminar room. Despite the physical barrier, this year's cohort of students were just as engaged as ever, asking many questions using the online platform Menti.com. Our Danish resident lecturers were René Svensson (ISM), Janine Eler (BRIC/KU), Mike Davies (KU), Niklas Rye Jørgensen (Rigshospitalet), Magnus Ågren (Copenhagen Wound Healing Center), Peter Schjerling (ISMC), Clara Prats (KU), Niels Behrendt (Finsen lab/KU), Costanza Montagna (ISMC), and Chloé Yeung (ISMC).



Question and answer time with Karl Kadler and the students over Zoom.

Our normal program with lots of group work to encourage active participation was reduced to a single essential practical session with students working in pairs. Other than increased spacing between individuals, the presence of hand sanitisers and face masks and visors, the course went just as well as previous years. The students were the stars of the three-day course with participants from Aarhus University and DTU also in attendance. We got to hear a diverse range of topics in really excellent and engaging presentations. New for myself were projects on cultured meats, bacterial biofilm filled with ECM, and using ECM as a reservoir for drug delivery!



Overall, there was positivity on all feedback forms and everyone found something they enjoyed or useful to their PhD, whether it was a specific lecture, getting to hear other students' talks or getting the opportunity to present and get feedback on their own research. "Format is perfect for busy PhD students", "I liked that the speakers were not only from Denmark", "Thanks for a wonderful course :)" and "Thanks for a few nice days" were some of the lovely comments we got.

If you would like to learn more about the course or have any suggestions for next year's program please contact the course co-ordinator, Chloé Yeung (chloe.yeung@gmail.com).

Chloé Yeung
Postdoc, Institute of Sports Medicine Copenhagen, Bispebjerg Hospital



#THEmeshwork

At the end of summer, a group of 7 early career researchers (ECRs), including one working in Denmark, initiated a global, informal platform for ECRs (PhD students, postdocs and new PIs) working in the extracellular matrix (ECM) field to:

- Discuss/troubleshoot their ECM research problems
- Connect with each other to make friends and new collaborations worldwide
- Develop their research careers

#THEmeshwork costs nothing to join and all the virtual events are free. We have a messaging platform on Slack where researchers can connect to each other, ask for advice, learn about new publications and new product recommendations. We organise a monthly one-hour online meeting that alternates between scientific sessions and career development sessions.

Scientific sessions are in the relaxed and informal lab-meeting format where two ECRs working on a similar theme give 10-minute presentations, followed by a lively discussion with the attendees led by two established PIs. Our first scientific session took place on 22 October and the theme was "ECM & Cancer". Julie Di Martino (Icahn School of Medicine at Mount Sinai, USA) and Ines Velazquez Quesada (Temple University, USA) presented their work and Edna Cukierman (The FOX CHASE Cancer Center, USA) and Ryan Petrie (Drexel University) chaired a lively discussion that then continued on the Slack platform. Our last meeting of 2020 took place 17 December and the theme was "ECM & Fibrosis". Nuno Coelho (St. Michael's Hospital, Canada) and Joan Chang (Wellcome Trust Centre for Cell-Matrix Research, UK) presented and the chairs were Birgit Leitinger (Imperial College London, UK) and Alexander Nyström (University Freiburg). There were many questions from the 47 attendees and all agreed that the sharing and discussion of exciting, unpublished data in this relaxed format was really engaging.

Career development sessions feature 2-6 new/established PIs that give a 3-5-minute introduction and a moderator who drives the discussion on the chosen theme (e.g. grant/funding success, open





access, etc) by asking questions from the attendees. Our first career development session was “How to be Successful with Grants” and our expert panel were Abigail Mackey (KU/ISMC), Boris

Hinz (University of Toronto), Dan Marendra (Drexel University) and Nicole McNeil Ford (NIH) who imparted lots of useful advice and anecdotes of their experience.

We look forward to welcoming DSMB members at #THEmeshwork or at our next event on Thursday 21 January, 4pm - 5pm (Copenhagen time) which will be a career development session “Effective communication delivering and engaging presentation”. #THEmeshwork welcomes researchers at all stages. To join, simply email themeshwork202@gmail.com. To register for the latest event or find out more information, visit our website <https://themeshwork2020.wixsite.com/info>



#THEmeshwork team are Nuno Coelho, Julie Di Martino, Valerio Izzi, Tia Jones, Pauline Nauroy, Ines Velazquez Quesada, and Chloé Yeung.



UK
Proteoglycans 2021

The UK Proteoglycans 2021 is a meeting to showcase proteoglycan research in the UK that also welcomes non-UK attendees. We are keen to hear about groups who would like to learn more about GAGs or who have problems they would like our input into. If you would like to be added to the attendee list please email douglas.dyer@manchester.ac.uk.

Douglas Dyer

Group Leader, Wellcome Trust Centre for Cell-Matrix Research and The Lydia Becker Institute, The University of Manchester, UK



Membership

Our membership (100 DKK) includes free registration to our annual meeting, 3-4 newsletters a year, updates on position openings and conferences as well as eligibility for travel grants to local and international matrix meetings. We also appreciate any extra donations and will acknowledge your contribution in our next newsletter. Please remember to EMAIL with "Membership" as the subject your name and receipt of your payment to dsmb.dk@gmail.com.

You can pay by any of these options:

- 1) Transferring via MobilePay to **46151** (Danish Society for Matrix Biology). Please indicate "DSMB membership and the name" on the payment **OR**
- 2) Transferring to the DSMB bank account: Reg: 1551 Account: 1227130 (Danske bank). Please indicate "DSMB membership and the name" on the bank transfer **OR**
- 3) Email our treasurer Chloé Yeung (chloe.yeung@gmail.com) if you need to transfer from an international account or use an alternative method.

