DBMR Research Conference

Langhans Hörsaal Pathologie
Murtenstrasse 31, 3008 Bern

Date: **Monday, March 7, 2022, 5pm – 6pm**

Title: **Mechanical regulation of MSC chondrogenesis. Can we repurpose rehabilitation?**

Speaker: **Prof. Martin J. Stoddart, PhD, FRSB**
AO Research Institute Davos (ARI), Davos, Switzerland

Bio: Prof. Martin Stoddart, FRSB is department head, responsible for the Regenerative Orthopaedics Program at the AO Research Institute Davos (ARI), Switzerland. His interests include the use of patient derived mesenchymal stem cells (MSCs) for bone and cartilage repair, in particular the role of mechanically induced MSC chondrogenesis. This has led to an increased understanding of chondrogenesis under complex physiological loads. More recently he has been investigating markers of human MSC potency to identify sources of donor variation and rectify functionally deficient cell populations.

He completed his bachelors in Biology in 1995 and M.Phil in 1996 at the University of Aberystwyth, UK, and his PhD in Oncology (University of Nottingham, UK -1999). In 2000 he moved to the Laboratory for experimental cartilage research, Zürich and moved to ARI in 2005. He is Professor at Albert-Ludwigs University, Freiburg, Germany since 2015 and Honorary Professor Keele University, UK since 2016. In 2016 he was elected Fellow of the Royal Society of Biology. In 2020 he was recipient of the TERMIS-EU mid-term Career Award. He is the author of over 130 scientific papers and book chapters.

Abstract: It is well established that musculoskeletal system healing is regulated by the mechanical environment experienced after injury. This offers an ideal opportunity to enhance tissue regeneration via rehabilitation protocols, yet most new therapies are developed and studied using static culture.

Multiaxial load bioreactors act as an in vitro test bed for novel cartilage repair strategies. Bone marrow derived mesenchymal stem cells (BMSCs) are frequently used for cell-based cartilage repair. We have demonstrated that shear, superimposed over uniaxial load, induces BMSC chondrogenesis in the absence of exogenous growth factors, namely TGF-β (1), suggesting that this model can be used to pre-screen cartilage therapies in vitro. Within this system, the application of multiaxial load leads to an increase in the production of endogenous TGF-β, while the mechanical load applied activates the endogenously produced TGF-β(1, 2). The applied load also enables the production of growth factor gradients, and this induced anisotropy is an interesting example of localized biological changes generated in response to physical loads.

References:

1. Li Z, Kupcsik L, Yao SJ, Alini M, Stoddart MJ. Mechanical Load Modulates Chondrogenesis of Human Mesenchymal Stem Cells through the TGF-beta Pathway. J Cell Mol Med. 2010;14(6A):1338-46.
2. Gardner OFW, Fahy N, Alini M, Stoddart MJ. Joint mimicking mechanical load activates TGFbeta1 in fibrin-poly(ester-urethane) scaffolds seeded with mesenchymal stem cells. Journal of tissue engineering and regenerative medicine. 2017;11(9):2663-6.

Prof. Martin J. Stoddart has been invited by Prof. Dr. Benjamin Gantenbein, Tissue Engineering for Orthopeadics and Mechano Biology, Bone & Joint Program, Department for BioMedical Research, University of Bern

Next DBMR Research Conference

Monday, April 4, 2022, 5pm – 6pm

Speaker and Title: tbc

The DBMR Research Conference takes place from 5pm – 6pm and will be followed by a sandwich catering.

IMPORTANT:

- It is obligatory to wear a hygiene mask/medical face mask at all times.
- Keep 1.5 m distance to the next person.
- Consumation of Food and Drinks only when seated

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