University of Basel

Department of
Biomedical Engineering

Thesis Proposal

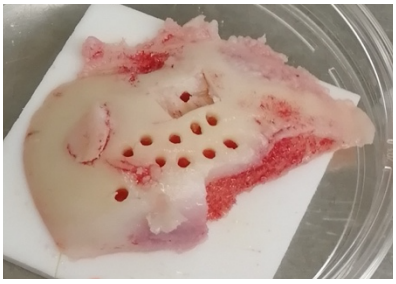
BMP signaling pathway inhibition to modulate regenerative properties of osteoarthritic cartilage-derived chondroprogenitors

Bone orphogenetic protein (BMP) signalling plays a significant role during embryonic cartilage development and has been associated with osteoarthritis (OA) pathogenesis, being in both cases involved in triggering hypertrophy. We have recently demonstrated that BMP-signalling inhibition resulted in reduction of OA hypertrophic traits by bone marrow derived mesenchymal stromal cells. To test whether BMP signaling inhibition can be a viable strategy to repair OA cartilage in this project proposal we will investigate the regenerative properties of chondroprogenitor cells once cultured with BMP-inhibitor.

The aims of this master thesis project are to (i) identify a protocol enabling the isolation chondro-progenitor cells (ChP) from OA cartilage specimens and (ii) to investigate the migration, proliferation and chondrogenic responses of the ChP once exposed to LDN-193189 (i.e., a commercially available BMP type I receptor kinase).

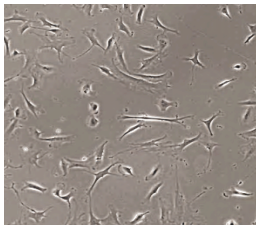
In particular the candidate will use different adhesion assays to isolate the ChP and characterize them by flow cytometry analyses. Once the isolation protocol is established the candidate will assess the capacity of the ChP to migrate and proliferate (using 2D culture protocols) and their capacity to chondro-differentiate (using a 3D micromass culture model) in the presence or absence of LDN-193189.

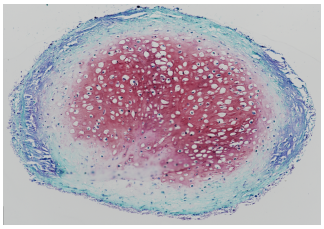
Isolation of ChP from OA cartilage



Migration, Proliferation & chondrogenic capacity of ChP

+ or + BMP inhibitor





Nature of the Thesis

Experimental: 80% Programming: 0% Documentation: 20%

Specific Requirements

Experience with RT-PCR, FACS analyse and cell culture would be helpful

Supervisor and contact person

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