



Open Position

Master Thesis

“Functional characterization and differentiation of mesenchymal stromal cells and fibroblasts in the context of bone regeneration”

We are currently looking for a motivated student of biotechnology, biology or other applicable disciplines to support our group for the following topic: ***Functional characterization and differentiation of mesenchymal stroma cells and fibroblasts in the context of bone regeneration***. The position is open from now on.

Background: Bony tissue possesses the remarkable and almost unique capacity to completely regenerate after injury without the formation of scar tissue. During the process of bone repair, both, mesenchymal stromal cells (MSCs) and fibroblasts, interact in the healing cascade. The healing process starts immediately after tissue injury in a phylogenetically programmed manner with clotting (closing the gap) and an immune reaction (fighting possible intruders). Soon after, the hematoma/granulation tissue starts to develop according to the cells, their secreted signaling molecules and the extracellular matrix in which they are embedded. Immune cells are among the cells able to survive and function under the challenging conditions in the hypoxic hematoma. Thus, they are responsible for the pattern of signaling molecules that steer the early healing phases. Fibroblasts make up the majority of the cells in a mature granulation tissue and thus are the starting point of any healing tissue, whereas MSCs are considered the “can do it all” in regenerating tissue. Amazingly, fibroblasts do have the capacity to differentiate into adipocytes, chondrocytes and osteoblasts if given the right stimulus – a capacity that has been accredited mostly to MSCs. On the other hand, stem cells do have the ability to express fibronectin and collagen matrices that are indistinguishable from that of fibroblasts – the question arises: how similar / different are fibroblasts and MSCs?

Objective of the Master Thesis project: The main objectives of the proposed project are 1) the characterization of both cellular subsets based on the expression of selective marker and 2) the analyses of the interplay of both cellular subsets with the immune system in the context of bone regeneration.

The first objective will include flow cytometry analysis with an already established marker set. The second objective will include *in vitro* assays to evaluate similarities/differences of both, MSCs and fibroblasts, with regard to the formation of extracellular matrix and their capacity to differentiate into the three layers of osteoblasts, chondrocytes and adipocytes under different inflammatory conditions.

What we expect: We are looking for a student with basic experiences in cell culture techniques and flow cytometry. The applicant should be enthusiastic and motivated and should have the willingness to work in a team.

What we offer: Our group focuses on the interplay of the bone and the immune system during bone regeneration, which is a relative young and interdisciplinary innovative scientific field (osteoimmunology). Thus, we will offer an experienced environment that combines both, experts of the field of bone biology and experts of the field of immunology. We will further provide a supportive team that will fully train and teach the applicant during the Master Thesis.

CHARITÉ - UNIVERSITÄTSMEDIZIN BERLIN

Gliedkörperschaft der Freien Universität Berlin und der Humboldt-Universität zu Berlin



Ortho**load**