

Open Position

Master Thesis (m/w/d)***“Influence of the adaptive immune system on extracellular matrix formation in a bone healing context”***

We are currently looking for a motivated student of biology, immunology, biochemistry, biotechnology or other applicable disciplines eager to perform a master thesis in the interdisciplinary field of **osteimmunology and cellular biomechanics**. The position is available from the **1st of October 2019** onwards for a minimum duration of 6 month.

Background and scope of the work:

We recently reported that cells of the adaptive immune system influence extracellular matrix (ECM) formation during bone fracture healing. Specifically, T cells contribute to the organization of collagenous matrices. Immunocompromised mice lacking mature T cells (TCR $\beta\delta$ -/-) displayed severe dysregulation in collagen deposition and osteoblast distribution, leading to impaired healing¹. In patients, a delayed fracture healing was associated with an ‘aging’ of the adaptive immunity, which is accompanied by an enrichment of terminally differentiated CD8(+) effector memory T cells². Therefore, positive and negative regulators of bone healing are existing within the T cell population, making the specific T cell composition an important influencing factor.

In this project, we will investigate how different T cell subsets from a naïve or experienced phenotype influence ECM expression and deposition in an *in vitro* tissue formation model. Tissue formation processes will be simulated by using macroporous 3D biomaterials under immune-modulated conditions. Therefore, fibroblasts seeded in the biomaterial will be treated with conditioned media of activated T cell subsets during ECM formation. The composition of the newly formed matrix will be analyzed using immunohistological stainings, qPCR, western blot, ELISA and mass spectrometry. The mechanical properties will be determined by mechanical compression tests and contraction analyzes. The gained insights will help to elucidate the influence of the immune system on early matrix formation and understand recent *in vivo* observations.

What we provide:

Training and support in an interdisciplinary research field
Instruction on 3D cell culture and various analysis methods
A friendly, collaborative and communicative environment

What we expect:

Solid cell culture experience
Basic experience in gene expression analysis (qPCR) and western blotting
Enthusiasm and strong motivation as well as team work capabilities

If you are interested, please contact: **Sophie Schreivogel (sophie.schreivogel@charite.de)**

1. El Khassawna, T. *et al.* T Lymphocytes Influence the Mineralization Process of Bone. *Frontiers in immunology* **8**, 562 (2017).
2. Reinke, S. *et al.* Terminally Differentiated CD8+ T Cells Negatively Affect Bone Regeneration in Humans. *Science Translational Medicine* **5**, 177ra36-177ra36 (2013).