Engineering fibroblast diversity

Summary

In the last two decades, many studies have revealed that fibroblasts display significant functional heterogeneity, with fibroblast functions varying by their anatomical location and microenvironment.

How **fibroblast diversity** is established and maintained is still an open question. In the present project, we will focus on c**onnective tissue (CT) fibroblasts associated to skeletal muscle.** The objective of the PhD is to understand how a progenitor differentiates into the different **fibroblast populations** of muscle attachment. It is thus proposed to identify the **molecular signals**, the 3D-environment and the mechanical parameters that drive a progenitor to a differentiated fibroblast specific to the different connective tissues types of muscle attachment.

This highly interdisciplinary PhD thesis proposes to exploit biomechanics and tissue engineering approaches available at BMBI lab (UTC) to address embryonic cell response in a 3D-environment. Once the molecular signals are identified in 2D cell culture systems by the IBPS team specialized in developmental biology, 3D culture and mechanical stimulation in bioreactors will be implemented to mimic the biochemical and physical stimuli to which cells are exposed in vivo.

Fibroblast differentiation to specialized fibroblasts (**fibrogenesis**) shares key regulators with **fibrosis**. In addition to deciphering the contribution of environment to fibroblast diversity, we anticipate that our investigations will be an essential step to address fibrosis mechanisms observed in tendon scaring and muscle dystrophies.