

Internship proposal (Master or final project engineering school) at LMGP Lab.

Engineering of human muscle microtissues

Abstract:

Engineered muscle tissues can serve as tissue models that complement the conventional 2D cell cultures and animal models. The ability to create human cell-based muscle tissues that resemble the structural and functional properties of native muscle would indeed enable design of accurate *in vitro* models for studies of muscle physiology and development. The challenge consists in engineering arrays of muscle tissues at the mesoscale, small enough to require only few cells, no vascularization and easily viewable, but large enough to recapitulate several main properties of *in vivo* muscle and with an easy access to the cell-generated forces. This project aims at engineering 3D submillimeter-sized muscle tissues from human myoblasts to study how healthy and diseased muscle cells proliferate, assemble, mature and exert forces in a 3D model environment.

Project description:

A major focus of this project consists in investigating the influence of several parameters (cell types, extracellular matrix composition, genetic mutations) that might impact an engineered muscle microtissue in a high-throughput manner and in an environment close to the muscle tissue *in vivo*.

Our approach involves the *in situ* formation of 3D microtissues by culturing human myoblasts embedded within a tunable biopolymeric matrix in a microfabricated platform. Using this platform, we are uniquely able to measure both fine-scale cytoskeletal and extracellular architecture as well as cell-generated forces.

The platforms will be microfabricated by soft lithography. The formation of the muscle microtissues will be assessed by time-lapse microscopy. The degree of cellular maturation will be analyzed by quantifying the expression of early muscle markers by qRT-PCR and by analyzing the morphology and fusion index of immuno-stained myotubes.

Location:

The candidate will work within the Materials and Physical Engineering Laboratory (LMGP), in the Bioengineering group (IMBM).

LMGP Web Site: <http://www.lmgp.grenoble-inp.EN/>

Profile & requested skills:

5th year engineering school student and / or Master student whose training focuses primarily on tissue engineering, biology and biomaterials.

We are looking for highly motivated scientists with an aptitude for teamwork and good communication skills in oral and written English.

Subject could be continued with a PhD thesis: YES

Allowance: Internship allowance will be provided according to the French legislation (~550€/month)

CONTACT

Please send a CV + a cover letter (including names/contact email of 2 referees) + the record of your grades of the 2 past academic years (2013/2014 & 2014/2015) to:

Thomas Boudou

Email: thomas.boudou@grenoble-inp.fr

Phone: 04 56 52 93 29.