

# SEMS: RESEARCH PROJECT DESCRIPTION

## 1. Project Background and Description

Project Title: Nanobioarrays for studying the role of receptor crosstalk in vascular smooth muscle

Vascular smooth muscle cells (VSMCs) play a central role in the onset and progression of many cardiovascular diseases, from atherosclerosis to vascular injury. While normally exhibiting a contractile phenotype that is required to set the tone in the vessel wall, VSMC can switch to a synthetic/migratory phenotype that leads to a remodeling of the vascular extracellular matrix as a key step e.g. in the development of atherosclerosis. Or previous work has suggested that arterial vascular smooth muscle cells respond to mechanical stimuli (stiffness, hydrostatic pressure) by changing their behavior. However it is still unclear how the VSMC mechanosensing is affected by the chemical composition of the extracellular matrix, which is changing during disease progression. We have recently set up nanobioarrays that will allow us to tackle this question in detail (Hawkes et al, Farraday Discussions, 2019).

## 2. Project Scope

*Three research project objectives*

Here we want to A) use advanced image analysis to define a set of morphological features and classes that can be used to quantitatively characterize VSMC phenotypes; B) develop nanobioarrays to interrogate mechanosensing in response to the changing extracellular matrix health and disease.

## 3. Desired Skills from the Student

*Key skills needed for the PhD project*

The ideal student is motivated and keen to learn. All techniques have been established in the lab, but a good understanding of cell biology, biochemistry and/or biophysics is desirable.

## 4. Supervisory Team

*Add supervisory team details*

*Primary: (Name (inc title). Thomas Iskratsch*

*Secondary: (Name (inc title)/ department or company if outside SEMS). Matteo Palma (SBCS)*

*Additional: (Name (inc title)/ department or company if outside SEMS).*