INPhINIT
"la Caixa" Fellowship Programme

IBEC
Institute for Bioengineering of Catalonia

EXCELENCIA SEVERO OCHOA

IBEC participates in INPhINIT, "la Caixa" Doctoral Fellowship Programme with a set of stimulating PhD projects and excellent research groups to host the fellows

Integrative cell and tissue dynamics group

Group leader: Xavier Trepat (xtrepat@ibecbarcelona.eu)

Visualizing the dynamics of tumor interactions at the nanoscale

Cancer progression is increasingly attributed to the aberrant interaction between cancer cells and their surrounding microenvironment. Non-malignant cell types within this microenvironment can be reprogrammed by cancer cells to perform functions that are otherwise poorly efficient or altogether unavailable to the tumour. The goal of this PhD thesis is to visualize the dynamics between cancer cells and stromal cells. To reach this goal, the student will implement new 3D co-culture systems to analyse the interplay between cancer cells, fibroblasts, and macrophages obtained from patients with epidermal, lung and colorectal cancer.

The student will combine tools in life cell microscopy, super-resolution microscopy, force microscopy, cell and molecular biology, organoid models, and 3D bioprinting. In addition, the project will rely on novel technologies developed in our laboratory including optogenetic probes and rigidity gradients (Labernadie et al, Nature Cell Biology, 2017; Sunyer et al, Science, 2016). The study will be carried out in collaboration with Dr Erik Sahai (Crick Institute, UK) and local clinical groups.

Recent group publications:

1. Labernadie A, …, Trepat X. A mechanically active heterotypic E-cadherin/N-cadherin adhesion enables fibroblasts to drive cancer cell invasion. Nature Cell Biology (2017)

2. Sunyer R, …, Trepat X. Collective cell durotaxis emerges from long-range intercellular force transmission. Science (2016).

3. Casares L, …, Trepat X. Hydraulic fracture during epithelial stretching. Nature Materials (2015).

4. Bazellières E, …, Trepat X. Control of cell-cell forces and collective cell dynamics by the intercellular adhesome. Nature Cell Biology (2015).

Job position description

Candidates should have a background in Physics, Chemistry, Engineering, Biology, or Biomedical sciences