

Title of the project: Biomechanics of Pancreatic Cancer



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Project Description:

Pancreatic cancer has kept for decades one of the poorest prognosis in medicine. Historically, cancer research has focused on the cancer cells per se, but increasing evidences show that stroma – cancer cell interactions are fundamental for cancer development. This is particularly relevant for stromal pancreatic stellate cells, which are responsible for the desmoplastic stroma in pancreatic cancer. Stellate cells promote cancer cell proliferation and invasion, and their mechanical responses are conditioned by the presence of cancer cells. Stellate cells can be either activated or quiescent. Activated stellate cells can change the mechanical properties of the stroma. This effect may indeed modulate angiogenesis, and consequently interfere with the correct delivery of drugs to the tumoral region.

Project aims

This project aims to characterize the biomechanical properties of stromal stellate cells and their interaction with cancer cells, and how their communication may determine cancer progression and metastasis.

Research Plan

There are alternatives research plans (tailored to the student's interest) to be discussed in the first one to one meeting with the PI.

Key techniques: Biophysical and cell biology techniques: Magnetic tweezers, immunofluorescence, Western blot, tissue culture, organotypic cultures, elastic pillars.

References:

Lachowski D, Cortes E, Pink D, Chronopoulos A, Karim SA, Morton JP, del Río Hernández A. **Substrate rigidity controls activation and durotaxis in pancreatic stellate cells.** [Scientific Reports 2017](#)

Chronopoulos A, Robinson B, Sarper M, Cortes E, Auernheimer V, Lachowski D, Attwood S, García R, Ghassemi S, Fabry B & del Río Hernández A. **ATRA mechanically reprograms pancreatic stellate cells to suppress matrix remodelling and inhibit cancer cell invasion.** [Nature Comms 2016](#)

Sarper M, Cortes E, Lieberthal TJ, del Río Hernández A. **ATRA modulates mechanical activation of TGF- β by pancreatic stellate cells.** [Scientific Reports 2016](#)

Robinson BK, Cortes E, Rice AJ, Sarper M, del Río Hernández A. **Quantitative analysis of 3D extracellular matrix remodelling by pancreatic stellate cells.** [Biology Open 2016](#)