

COLLABORATIVE IBEC INTERNATIONAL PhD PROGRAMME

Position

1. Project Title:
Cell Competition in Colorectal Cancer
2. Research project/ Research Group description

Colorectal cancer (CRC) is often initiated by the permanent activation of the Wnt pathway, frequently driven by mutations in the tumor suppressor gene *APC*. These mutations lead to increased cell proliferation, reduced cell death, and impaired differentiation, enabling *APC*-mutant cells to dominate healthy cell populations in the intestine. However, *APC*-mutant cells do not simply outcompete healthy cells passively; they actively suppress the growth of their healthy counterparts. Despite this, the epithelial dynamics underlying this interaction remain poorly understood.

Our group has developed advanced in vitro models of primary intestinal epithelia, using both healthy and *APC*-mutant cells. These monolayers, which recapitulate key features of in vivo intestinal tissue in a simplified layout, provide a unique opportunity to study epithelial dynamics at the single-cell level.

This research project will investigate the process of cell competition in CRC using an integrative approach. Combining in vitro experiments, in silico simulations, and theoretical modeling, the study aims to uncover the mechanisms driving cell competition and deepen our understanding of CRC development.

3. Job position description

We are seeking a motivated and enthusiastic PhD candidate to join our interdisciplinary research project focused on epithelial dynamics in colorectal cancer (CRC). This position provides an exciting opportunity to investigate the mechanisms of cell competition between healthy and *APC*-mutant cells in the intestinal epithelium—a critical process in CRC initiation and progression. The research will involve both experimental and theoretical approaches, enabling the candidate to develop expertise in both fields.

The successful candidate will work with state-of-the-art in vitro models of primary intestinal epithelia that closely replicate the architecture and behavior of in vivo tissue. These models will be used in combination with computational simulations and theoretical modeling to study cell competition dynamics at the single-cell level.

Key responsibilities include designing and performing experiments with primary intestinal epithelial cells, developing in silico models to simulate epithelial dynamics, and integrating experimental and simulated data to draw meaningful conclusions.

The ideal candidate should hold a Master's degree in biophysics, bioengineering, biology, or a related field. A strong interest in cell biology, cell physics, and computational modeling is essential. The candidate should have the ability and enthusiasm to bridge experimental and computational approaches to tackle critical questions in cancer biology.

Group Leader at IBEC

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