EPITHELIAL CELL BIOLOGY JUNIOR GROUP

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OVERVIEW

Tumour cells evolve into a progressively complex interplay of heterogeneous tumour cells with their tissue microenvironment, which influences their proliferation and malignancy. Identifying the signalling mechanisms and cell types that sustain this complexity is one of the major goals in cancer biology. In adult skin, epithelial progenitor cells have been identified as the cell of origin of skin carcinomas. Several studies have been instrumental in defining regulatory pathways controlling their proliferation and/or differentiation. However, the identification of extrinsic factors modulating stem cell behaviour is not yet fully established. Using the skin as a model system, based on mouse genetics and human samples, our research aims to understand how the skin, epithelial progenitor cells have been identified as the cell of origin of skin carcinomas. Several studies have been instrumental in defining regulatory pathways controlling their proliferation and/or differentiation. However, the identification of extrinsic factors modulating stem cell behaviour is not yet fully established. Using the skin as a model system, based on mouse genetics and human samples, our research aims to understand how the skin stem cell niche and regulate skin homeostasis and regeneration, and how, when perturbed, this may lead to cancer. This information may provide insights for the future development of regenerative and anti-cancer therapies.

“During 2015, we continued our efforts to uncover novel events controlling the behaviour of skin stem cells, with the aim of opening up new insights into the mechanisms that control their regenerative characteristics and how, when disrupted, these may result in cancer.”

RESEARCH HIGHLIGHTS

Regulation of epidermal progenitor cells’ self-renewal and differentiation

We continue to explore how tissues acquire an adequate control of cell division and differentiation. In particular, we study the contributions of mitotic and cytoskeletal proteins in the regulation of skin progenitor’s self-renewal through oriented cell divisions, using mouse epidermal development as a model system.

Contributions of immune cells to the skin stem cell niche in homeostasis

We have recently identified a novel connection between macrophages and skin progenitor cells that modulates their stem cell properties and regenerative potential. We are expanding these results to decipher how other signals and immune cells are connected with the skin stem cell niche and regulate skin regeneration.

Contributions of inflammatory responses in cancer stem cell maintenance and tumour progression

The formation of tumours and their progression to malignancy undoubtedly involves the contributions of the tumour microenvironment. Identifying the signalling mechanisms and cell types that contribute to tumour initiation and progression to malignancy is instrumental for the identification of potential targets for clinical applications to eradicate tumours.

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Figure (A): Skin carcinoma showing presence of a high density of inflammatory cells within the tumour. *Arrows point to some immune cells.

Figure (B): Inset showing a magnification of immune infiltrates within the tumour.