

## Unravelling the cellular dynamics of force mediated tissue expansion

**ARAGONA Mariaceleste (ITALY)** Interdisciplinary Research Institute – Université Libre de Bruxelles – Bruxelles – BELGIUM

**BLANPAIN Cedric (Host supervisor)**

### Abstract

The homeostasis of skin epidermis is ensured by stem cells (SCs) located into specialized microenvironments defined as niches. The basal layer of interfollicular epidermis (IFE) contains SCs and progenitors that generate the stratified layers of the skin. Through lineage tracing experiments using K14CREER and InvCREER, I will study the hierarchical organizations of cell lineages within the IFE during mechanical force mediated tissue expansion. Mechanical force mediated tissue expansion is commonly used to grow extra skin for reconstructive surgery to fix birth defects, severe skin burns or traumas, or for breast reconstruction after breast cancer surgery. Clonal analysis and proliferation kinetic experiments will be performed following the expansion of miniaturized prosthesis placed subcutaneously. Statistical analysis of the clonal behaviour will be used to develop a quantitative model of the cell fate during skin expansion.

Through live imaging microscopy on the LifeAct-EGFP mouse strain I will follow cytoskeletal dynamics during skin expansion in order to verify the role of the cytoskeleton in SCs activation. The relative cytoskeletal tension during tissue expansion will be measured by laser cutting of cell junctions on mT/mG mouse strain. Microarray analysis and single cell gene profiling will be performed in expanded clones to define the molecular mechanisms involved in sensing and mediating tissue expansion. The activity of new candidate genes will be assessed to decipher how these signalling molecules interact with each other to activate SCs and progenitors, maintaining the architecture of the skin and orchestrating tissue expansion in vivo.