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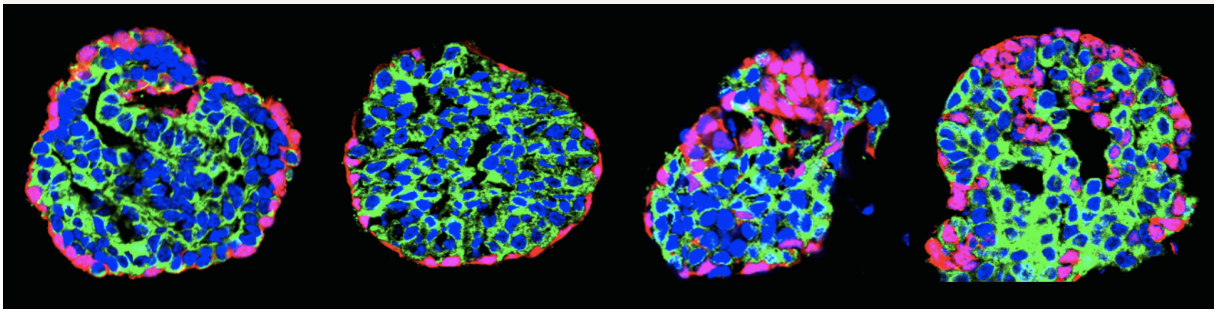

Discovery of the mechanisms regulating stem cell fate

Publication in Nature Communications: researchers from the Université Libre de Bruxelles (ULB) discovered the key role of the collagen and extracellular environment in regulating the fate of stem cells.

Stem cells (SCs) ensure tissue morphogenesis during development and their physiological turnover during adult life. SCs are also critical for the regeneration of adult tissues after injuries. The mammary gland and the prostate are composed by basal and luminal cells that sustain the replenishment of their own lineage during physiological conditions. Mutations that stimulate cancer development and regenerative stimuli increase the differentiation potential of stem cells. However, the underlying molecular mechanisms promoting this expansion of SC fate are poorly understood.

In a study published in Nature Communications, researchers led by Prof. Cédric Blanpain, MD/PhD, investigator of the WEL Research Institute, Director of the Stem Cells and Cancer Laboratory, and Professor at the Université Libre de Bruxelles, discovered that collagen signaling and extracellular matrix stiffness control SC fate.

Using multidisciplinary approaches combining analysis of the behavior of SCs, organoids culture, single cell sequencing, and functional experiments, JIANG and colleagues have investigated how collagen signaling and matrix stiffness regulate SC fate.

Though molecular profiling SCs under different matrix, the researchers identified a specific collagen signaling cascade as regulator of SC fate. Pharmacologically blocking or genetic knockout the components of this signaling cascade suppressed the ability of basal cells to differentiate into luminal cells. “ It was fascinating to uncover that Collagen signaling is a

common mechanism controlling SC fate across different tissues such as mammary gland and prostate" said Dr.Chen Jiang, the first author of the paper.

"Our findings reveal a conserved mechanism by which the composition and stiffness of the extracellular environment regulate SC fate in mammary gland and prostate, providing key insights how SC fate is regulate by the composition of the matrix. It will be important to define how these mechanisms contribute to tissue regeneration, tumor initiation, and tumor progression. Targeting collagen signaling could be important to suppress tumor development." comments Cédric Blanpain, the director of this study.

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Journalists should credit Nature Communications as the source of the covered story.

Collagen signaling and matrix stiffness regulate multipotency in glandular epithelial stem cells in mice.
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