

TITLE

How hair follicle stem cells sense external change

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ABSTRACT

Stem cell (SC) activity is subject to non-cell-autonomous regulation from the local microenvironment, or niche. In adaption to varying physiological conditions and the ever-changing external environment, the SC niche has evolved with multifunctionality that enables SCs to detect these changes and to communicate with remote cells/tissues to tailor their activity for organismal needs. The cyclic growth of hair follicles is powered by the activation of hair follicle stem cells (HFSCs). We categorize HFSC niche cells into 3 functional modules, including signaling, sensing and message-relaying. Signaling modules, such as dermal papilla cells, immune cells and adipocytes, regulate HFSC activity through short-range cell-cell contact or paracrine effects. Macrophages capacitate HFSC niche to sense tissue injury and mechanical cues. In this talk, I will use the pilosympathetic niche as an example to demonstrate how different component cells are integrated into a functional regulatory unit to modulate HFSC activity and how such niche structures are maintained throughout the life. I will also highlight how such a localized internal HFSC niche is connected through the brain to the external environment, enabling HFSCs to communicate with and respond to the external environmental changes.