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A Functional Role of RB-Dependent Pathway in the Control of Quiescence in Adult Epidermal Stem Cells Revealed by Genomic Profiling

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Abstract Continuous cell renewal in mouse epidermis is at the expense of a pool of pluripotent cells that lie in a well defined niche in the hair follicle known as the bulge. To identify mechanisms controlling hair follicle stem cell homeostasis, we developed a strategy to isolate adult bulge stem cells in mice and to define their transcriptional profile. We observed that a large number of transcripts are underexpressed in hair follicle stem cells when compared to non-stem cells. Importantly, the majority of these downregulated genes are involved in cell cycle. Using bioinformatics tools, we identified the E2F transcription factor family as a potential element involved in the regulation of these transcripts. To determine their functional role, we used engineered mice lacking *Rb* gene in epidermis, which showed increased expression of most E2F family members and increased E2F transcriptional activity. Experiments designed to analyze epidermal stem cell functionality (i.e.: hair regrowth and wound healing) imply a role of the Rb-E2F axis in the control of stem cell quiescence in epidermis.

Keywords Epidermis · Hair follicle · Stem cells · CD34 · E2F · Microarrays · Rb · Genomic profile

Abbreviations

SC	Stem cells
HFSC	Hair follicle stem cells
DP	Dermal papilla
HG	Hair germ
K15	cytokeratin 15
Itgα6	Integrin alpha 6

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