

The Editorial

Stem Cells of Epidermis: A Critical Introduction

Stem cells are the cells having some distinguishing characteristics like longevity, high capacity of self-renewal and differentiation, quiescence and highly error-free proliferation. Almost all stem cells have the potential of lineage reprogramming, i.e. inter-conversion of cell lineages. They also have the potential to differentiate into almost all kinds of cells. These cells have been found in almost every organs of human body. Pool of stem cells found in epidermis is termed as Epidermal Stem Cells (Blanpain and Fuchs, 2006).

Many researchers around the world have reported different kinds of stem cells in skin, based on their cell surface makers, while they have not categorized these cells chronically (De Rosa and De Luca, 2012). It is worth mentioning here that all kinds of stem cells reported in skin, i.e. keratinocyte stem cells, limbal stem cells, hair follicle and bulge stem cells, SG (sebaceous gland) stem cells, and spinous keratinocytes express specific types of cytokeratin protein (e.g. K1, K3, K5, K10, K12, K14, K15, K19 etc.) on their surfaces (Bose et al., 2013; Forni et al., 2012; Ghadially, 2012).

Biologists have defined that almost all of these stem cells share single origin, i.e. Basal Layer of Embryonic Skin. As the embryonic skin passes the developmental stages, the basal layer produces two mother stem cells of skin, keratinocyte stem cells, and so called Limbal Stem Cells (in cornea) (Chee et al., 2006; Lavker and Sun, 2000).

Keratinocyte stem cells give rise to the cells expressing Cytokeratin proteins on their surfaces. So, all the cells expressing cytokeratin are tracked back to these stem cells in origin, while undergone natural lineage reprogramming or differentiation (Potten and Booth, 2002). The stem cells in the basal-layer give rise to keratinocyte stem cells which can be found in the basal layer of the adult skin (Kaur et al., 2004). During the developmental stages, this basal layer, containing keratinocyte

stem cells, gives rise to limbal invagination of corneal region, a lineage conversion mechanism happens, and the keratinocyte stem cells are naturally reprogrammed into the limbal stem cells as shown in figure 1 (Dua and Azuara-Blanco, 2000; Pellegrini et al., 2001).

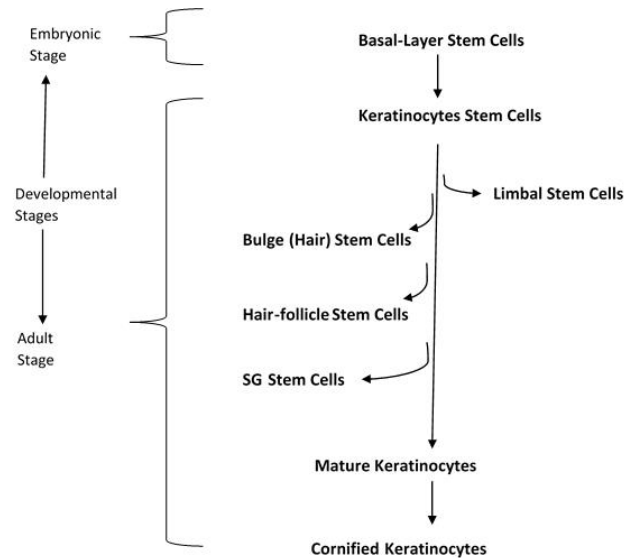


Figure 1: Proposed hierarchy of epidermal stem cells

In basal layer of the epidermis, the keratinocyte stem cells give rise to bulge, hair follicle, and SG stem cells when placode formation takes place.

In future, we need studies to find out which kind of cytokeratin protein is expressed early in these cells. In another word it would be helpful to define the order of cytokeratin expression regarding these lineage developmental processes from embryonic to mature skin and from embryonic basal layer to the formation of cornified epithelial cells.

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