Synopsis of Original Research Paper

Exploring small molecules that modulate behaviors of human epidermal keratinocyte stem cells

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Reconstruction of epidermal sheets from isolated human epidermal keratinocytes has realized autologous transplantation onto patients with extensive burns. Isolated keratinocytes from human skin have heterogeneity in their proliferative capacity and in ability for regeneration of the epidermis. Keratinocyte stem cells have the greatest proliferative capacity and can produce a progeny large enough to entirely reconstitute the epidermis of an adult human for a lifetime. The stem cells are also available for gene therapy against inherited epidermal disorders such as junctional epidermolysis bullosa. Therefore, increasing self-renewal of keratinocyte stem cells in culture facilitate regenerative medicine using autologous keratinocytes. To address these issues, we explored small molecules that can expand keratinocyte stem cells in vitro. We screened a number of compounds and found three molecules that could increase the number and size of keratinocyte colonies. These molecules enhanced attachment speed but not efficiency of keratinocytes after inoculation, suggesting that rapid adhesion of keratinocytes is crucial for maintenance and self-renewal of human epidermal keratinocyte stem cells.