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EFFECTS OF ADULT MESENCHYMAL STEM CELLS IN THE EPIDERMAL REGENERATION

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Objective: To investigate the effects of the adult mesenchymal stem cells (AMSCs) on the epidermal regeneration, *in vitro* living skin equivalents (LSEs) were reconstructed by co-culture of keratinocytes with each of the different cell types (fibroblasts, adipose-derived stem cells (ADSCs), bone marrow mesenchymal stem cells (BMSCs)) as dermal matrix cells.

Method: Characteristics of the epidermal structures together with keratinocyte growth, differentiation, and basement membrane integrity were analyzed by H&E staining. Additionally, immunohistochemistry was used to study the expression patterns of proteins related with wound healing, epidermal proliferation, differentiation, and basement membrane formation. The author also performed high-throughput mRNA sequencing of three types of dermal matrix cells in order to clarify the causes of differences in characteristics between cultured LSEs. The associated protein expression was evaluated by signal intensity scoring and image analysis using immunofluorescence images.

Results: Compared to fibroblast base LSEs, stem cell based LSEs showed similar appearances to normal skin. It can be assumed that the stem cell based LSE is thicker and more real skin-like due to the increased genes that were grouped as EGF-like domain cluster. Moreover, the basement membrane was clearly identified in the stem cell based LSE. Similar phenomenon was also seen in integrin immunoflourescent staining. We also found that galectin-7 was strongly expressed in stem cell based LSEs which seem to have good ability of keratinocyte differentiation. Activin A was increased in AMSCs in high-throughput mRNA sequencing analysis, and was expressed largely in both epidermal and dermal layers in immunofluorescent staining.

Conclusion: The proteins produced from the stem cells of the LSE affects the basal keratinocytes through paracrine effects, and contribute to epidermal proliferation and keratinocyte migration. Especially, activin A may have an important role in wound healing as a mediator in dermal-epidermal interaction.

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