Synopsis of Original Research Paper

Development of regenerating compounds for cleaner dermal restoration

Hideaki Sumiyoshi

Regenerative Medicine, Division Basic Clinical Science, Tokai University School of Medicine

It is generally known that a serious dermal injury causes scar formation. The cleaner dermal restoration, that is scar-less regeneration, is an important theme in the next stage of regenerative medicine for keeping the quality of life of patients. Our previous study indicated that the scar tissue made a different composition of collagen fiber from that in normal dermal tissue. Artificial dermis has been utilized clinically for accelerating wound healing in the field of skin regenerative medicine. However, because of the inefficient re-epithelialization, conventional artificial dermis requires the subsequent epidermal auto-transplantation.

In the present study, we have developed a novel artificial dermis containing "jellyfish" collagen that accelerates skin regeneration through both re-epithelialization and granulation tissue formation. Since the jellyfish (Aurelia aurita) collagen is water soluble, the artificial dermis was prepared as a mixture of porcine type I collagen and jellyfish collagen. The effect was evaluated in vivo using the skin full-thickness wound mouse model. The results indicated that, the collagen film with jellyfish promoted epidermal cell migration. On the other hand, collagen sponge with jellyfish enhanced fibroblast infiltration into the granulation tissue. Subsequently we determined the most effective content ratio of the porcine and jellyfish collagens, and further examined the combinatorial effect of collagen film and sponge materials. Additionally we tried the freeze and drying procedure under t-butyl alcohol solvent, to mimic native dermal collagen fiber structure.

We developing new artificial dermis could also call "artificial skin" because more physiological infiltration both of donor keratinocytes and fibroblasts like native wound restoration. Experiments are in progress to demonstrate that accelerate cleaner dermal healing without scar formation when used with additional time span. It provides a novel devise that can be used in the variety range of skin diseases instead of the conventional manners.