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The grafting of microscopic skin tissue columns for skin tissue regeneration

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Background: In order to fully restore the structure and function of skin in the both donor and recipient site, a novel grafting with microscopic skin tissue columns (MSTCs) was studied.

Methods: A new technique of grafting that can harvest and transplant the full-thickness MSTCs with 200~1000 um diameter was used. *In vitro* the viability of MSTCs were evaluated. Three different treatments were applied to the swine full-thickness wounds: Open wounds, MSTCs transplantation and STSG (split-thickness skin grafting) transplantation. After grafting, the wound healing rate and contraction rate were investigated. In addition, the morphological and histological evaluations were applied for comparing the outcomes of the donor sites. Furthermore, the MSTCs from human or black hair mouse were transferred to the nude mice for observing the reconstruction of skin appendages. The sweater glands, sebaceous glands, hair follicles in the recipient site were identified.

Results: The MSTCs contained epidermis and dermis can be harvested effectively with much less damage to the donor site. After culturing, the MSTCs presented high proliferation viability especially the cells near by the germinal layer. Full structures of the sweat glands, the sebaceous glands or the hair follicles were carried by MSTCs of 700 um diameter and larger. The donor site was re-epithelialized within 3 days *in vitro*. The wound healing rate in the MSTCs auto-grafting group was lower than that in the STSG group at one week postoperative. After two weeks, wound healing rates in the three groups were the same. However, the contraction rates in the MSTCs or STSG groups were much lower than that in the open wound group. Compared to the STSG grafting and open wound without grafting, MSTCs grafting gained better outcome of wound healing. In addition, the wounds in the donor site after taking MSTCs healed much faster than that in the STSG donor site with much better morphology. Furthermore, human sweat glands, sebaceous glands or hair follicle in the recipient site of mice were identified after human MSTCs xenografting. The black hair grew very well on the recipient site of nude mouse (no hair) after MSTCs of black hair mouse allografting. Full-thickness microscopic skin tissue columns can be harvested effectively with high activity and less damage in the donor site. Grafting of MSTCs improves the outcomes of full-thickness skin defects efficiently with restoring of skin appendages. Our results demonstrate that the MSTCs grafting will become a very promising technique for skin regeneration in clinical practice.

Biography

Min Yao has completed her PhD in Biomedical Science, Department of Plastic Surgery, Kyorin University, School of Medicine, Tokyo, Japan and Postdoctoral studies from California University, Riverside, USA. She has published more than 20 papers in few journals.

Tao Ni has completed his Ph.D. at the age of 32 years from Shanghai Jiaotong Universtiy , School of Medicine, China and no experience of postdoctoral study. He has published 3 papers in reputed journals of repute.

Jinfeng Fu has completed her Ph.D. at the age of 33 years from Kunming Medical Collage China and no experience of postdoctoral study. She was the director of the Burn Research Institution of Yunnan Province and the chief of the Department of Burn Surgery of the Second Affiliated Hospital. She is the Standing member of Chinese Burn Association, Chinese Medical Doctor Association and Cosmetic Doctor Association Scar Chapter. She has published more than 5 papers in reputed journals of repute.

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