

Skin engineering

The future treatment for burns and wounds

The reconstruction of body tissue after trauma or other pathological conditions is a difficult problem in medicine. Rapid resurfacing of acute or chronic skin defects is an important objective in wound reconstruction. The human body has limited capacity to regenerate skin so conventionally wounds are covered with skin graft which can be partial thickness or full thickness.

Tissue engineering is a technique which applies principles and methods of engineering and life science to develop biological substitute to restore, maintain or improve functions. The aim is to produce unlimited supply of anti-rejection tissues or tissue substitutes for rapid recovery.

The Department of Orthopaedics and Traumatology, Faculty of Medicine, HKU has successfully produced a skin substitute by cell culture techniques. Skin cells from neonatal rats can be cultivated to a maximum of 500 times in size for the production of compound living skin, consisting of dermis and epidermis. This promising advancement in skin engineering will become an alternative to auto graft in the future treatment for severe burns.

The conventional treatment of skin reconstruction for severe burns is to transfer skin cells from less indispensable regions of a patient to other indispensable regions. However, the supply is limited and there is always donor site morbidity. Rejection may also occur.

With the recent advancement of skin engineering in HKU, we are approaching the goal of unlimited production of anti-rejection skin. However, the production of skin graft is still in the stage of laboratory experiments and pre-clinical studies. Besides, the production of skin graft is very expensive. For example, a piece of graft in the size of a circle of 10 cm diameter costs US\$500. The cost of production of graft alone is enormous for the treatment of a patient suffering from 50% burnt. Therefore, the future goal of skin engineering will be cost reduction, aiming at the development of a low-cost skin bank allowing unlimited supply