

A phase I study of ICX-SKN, an allogeneic living skin replacement

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INTRODUCTION

ICX-SKN is a bioengineered skin substitute being developed by Intercytex as an alternative to autologous skin grafting. This first-in-man open-label study was designed to evaluate safety, integration and persistence of ICX-SKN when used to replace an electively-excised full-thickness skin ellipse from the arm.

MATERIALS AND METHODS

ICX-SKN comprises allogeneic human dermal fibroblasts (HDFs) embedded in autolyzed collagen. During the manufacturing process, HDFs are initially supported in a fibrin scaffold; this is gradually replaced by a cell-synthesized extracellular collagen matrix which provides tensile strength, flexibility and durability to the construct. It was postulated that this autolyzed collagen matrix combined with allogeneic dermal fibroblasts would be more efficacious and persist longer in the wound than existing products.

Six female subjects volunteered to undergo a surgical skin excision (15mm x 5mm) from the inner aspect of the upper arm. The lesion was

filled with a tailored graft of ICX-SKN which was secured using sterile adhesive strips (Fig. 1). The graft was covered with non-adherent gauze and a semi-occlusive dressing.

Fig. 1



Subjects were monitored for four weeks after which the ICX-SKN graft was fully excised for histological and chromogen *in situ* hybridisation (CISH) analysis.

RESULTS

No serious adverse events occurred; ICX-SKN was very well tolerated with minimal local inflammation. Healing was rapid and complete wound closure was seen in all subjects by Day 28 (Figs 2, 3, 4, 5). All grafts appeared to be well integrated with an excellent aesthetic appearance; there was minimal alteration of the skin surface contours with no distortion of the wound margins.

Fig. 2



Fig. 3



Fig. 4



Fig. 5



All grafts remained healthy throughout and showed evidence of good vascularity.

Histologically, in five of six subjects, the graft was overlaid by a keratinised epidermis complete with stratum corneum and spinous layer. In a sixth subject the epidermis was incomplete with a small keratin inflammatory crust over part of the surface. The dermis showed full-thickness organising granulation tissue with fibroblast proliferation. Vascular proliferation was seen in the superficial sub-epidermal region with a focal non-specific moderate inflammatory cell infiltrate comprising lymphocytes with occasional neutrophils and eosinophils. Integration of ICX-SKN into surrounding host tissue was excellent and seamless (Fig. 6).

Fig. 6



CISH analysis showed persistence of Y-chromosome-positive graft cells in four subjects, predominantly at the centre of each graft; cell numbers were similar to positive controls.

CONCLUSION

Existing skin substitutes designed for wound closure and restoration of normal skin function generally break down in the wound and contribute to wound healing by secondary intent. ICX-SKN, an autolyzed human dermal substitute, showed evidence of rapid wound healing with re-epithelialisation and stable integration of the graft with host tissue. This study suggests that ICX-SKN has the potential to become a true living skin replacement and merits its further clinical development.

