Introduction

Current trends in the treatment of deep burns recommend early removal of the eschar and rapid coverage of raw areas with autologous dermoepidermal grafts. Early treatment offers clear advantages: reduction of infection risks, hydroelectrolytic losses, and caloric requirements and a better recovery in a shorter time.\(^1\)\(^3\)

When however it is not possible, owing to the extent and the depth of the burn, to find sufficient healthy donor areas for autologous grafts, it is necessary to use alternative solutions involving the coverage of areas subjected to early escharectomy with skin substitutes or the more expensive “living skin equivalents”.

Despite the great number of methods available commercially, homologous skin is still today the best skin substitute existing (Table I).\(^3\)\(^6\) Homologous skin acts as a physiological and mechanical barrier and

<table>
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<th>Advantages</th>
<th>Disadvantages</th>
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<td>* Reduction of hydroelectrolytic and protein losses</td>
<td>* Risk of transmission of infectious diseases</td>
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<td>* Reduction of metabolic needs</td>
<td>* Immunogenicity</td>
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<td>* Reduction of bacterial charge and infections</td>
<td>* Organizational costs of obtaining of skin</td>
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<td>* Reduction of pain</td>
<td>* Need of skin bank</td>
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<td>* Protection of autografts</td>
<td>* Scarce availability</td>
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<td>* Improvement of patient’s general condition</td>
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<td>* Haemostasis</td>
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<td>* Facilitation of physiotherapy</td>
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Table I - Advantages and disadvantages of homologous skin

Fig. 1 - Homologous skin - temporary cover.

Fig. 2 - Cuono technique.
can be used as a temporary cover (Fig. 1); the coverage can be permanent if the Cuono technique is used (Fig. 2).  

**Historical background**

The use of homologous skin for transplants dates back many years. After the first use of variable-thickness autologous grafts by Reverdin in 1869, numerous publications reported on homologous skin grafts. In the early 1950s the grafting of homologous skin was a routine technique in the treatment of severely burned patients at the Brooke Army Medical Center in San Antonio, Texas. This was the period of the creation of the US Navy Skin Bank at Bethesda in Maryland, which marked the beginning of the modern era of skin banks. In the USA there are some 300 tissue banks, of which at least 50 provide skin. Tissue and skin banks now operate all over Europe, including Italy, and in many countries outside Europe.

Clearly one of the most important aspects of the use of homografts is related to the possibility of their preservation for use at some subsequent date, maintaining their integrity and viability. An important breakthrough in this field was made in 1949, when Polge challenged upon the cryoprotective properties of glycerol in cells that were deep-frozen and then defrozen.

Numerous experimental studies were carried out, and Cochrane described a technique of controlled freezing and preservation in liquid nitrogen at -196 °C in 15% glycerol.

**Skin bank: tasks and aims**

A skin bank is responsible for obtaining, preparing (or processing), and preserving donor skin. During all phases of the production process, the skin bank has to make use of standardized procedures that can be documented (e.g. microbiological tests and viability tests *in vivo* and *in vitro*) that guarantee the integrity and viability of the processed skin. In other words, it provides quality control for the finished product.

**Sources of skin**

Skin is obtained by a skin bank surgeon (in our case, a physician from our centre), following the notification of a donor by a regional centre for transplant referral or directly by a hospital. The skin is removed after the donor's heart has ceased to beat, as part of a multi-organ transplant in an operating theatre; this procedure can however be performed in the morgue up to 12 h after death.

If the body is refrigerated, the possible time for removal of the skin extends up to 24 h.

The donor, when found, is subjected to a series of tests regarding his or her general condition. It is necessary to be able to exclude the presence of any pathologies that might be dangerous for the recipient. Tests are therefore made for HIV 1-2, HTLV 1-2, HBV, HCV, syphilis, cytomegalovirus, and toxoplasma.

A search is made for the presence of neoplasias and neurological and autoimmune diseases; microbiological tests are conducted for aerobes, anaerobes, fungi, and yeasts. Finally, if the donor is deemed suitable, a clinical file is compiled that records the consent for the transplant and the operating procedure for skin removal.

The skin is removed in conditions of absolute asepsis and is then placed in special sterile containers containing physiological solution. The containers are kept in ice and sent to the skin bank for further processing.

During this procedure skin samples are taken for culture tests for aerobic and anaerobic bacteria, fungi, and yeasts.

Depending on the burns centre's needs, the skin is cooled for short-term use or else deep-frozen for preservation in liquid nitrogen at -196 °C. When the
skin is cooled in a refrigerator at +4 °C, the maintenance solution is changed every three days, along with the antibiotics and the sterile containers; samples are also taken for control culture tests. Skin treated in this manner can be used for up to 21 days. If the skin is not needed for short-term use, it is deep-frozen within 72 h of removal. This procedure is performed using a programmable cryofreezer, or “planner”, after each single strip of skin has been placed, unrolled, in special heat-sealed envelopes containing cryoprotective liquid.

During this procedure it is extremely important to follow rigorous parameters in order to be sure of obtaining the freezing curve most appropriate for the preservation of the skin’s integrity and viability. Cryopreserved skin can be used for up to five years, and is always ready for use. To guarantee its integrity and viability, it has to be defroasted before use by rapid heating in a thermal bath at 37 °C, passing from -196 °C to 0 °C in 3-4 min.2,3

Conclusion

Early escharrectomy, followed by immediate coverage of raw areas, is now standard care in seriously burned patients.

RESUME. L’Auteur considère l’organisation et les buts d’une banque de la peau dans un centre des brûlures. Il considère en outre les avantages et les désavantages de la peau homologue dans les greffes, et fournit des renseignements sur l’histoire des greffes cutanées dans le traitement des brûlures. L’Auteur ensuite décrit quelques aspects de l’organisation d’une banque de la peau, et les méthodes pour trouver, enlever et conserver le matériel cutané. Le risque de la transmission d’une maladie à travers l’infection est toujours présent mais les techniques modernes de dépistage peuvent le surmonter. La technique de Cuono s’est démontrée une technique de greffage très utile. Les banques de la peau jouent un rôle très important, particulièrement en l’absence de la disponibilité d’autogreffes.


This paper was received on 21 December 2001.
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G. WHITAKER INTERNATIONAL BURNS PRIZE-PALERMO (Italy)
Under the patronage of the Authorities of the Sicilian Region for 2005

By law n. 57 of June 14th 1983 the Sicilian Regional Assembly authorized the President of the Region to grant the Giuseppe Whitaker Foundation, a non profit-making organisation under the patronage of the Accademia dei Lincei with seat in Palermo, a contribution for the establishment of the annual G. Whitaker International Burns Prize aimed at recognising the activity of the most qualified experts from all countries in the field of burns pathology and treatment.

Law n. 23 of December 2002 establishes that the prize becomes biannual.

The next prize will be awarded in 2005 by the month of September in Palermo at the seat of G. Whitaker Foundation.

The amount of the prize is fixed at Euro 20,660.00.

The Adjudicating Committee is composed of the President of the Foundation, the President of the Sicilian Region, the Representative of the Accademia dei Lincei within the G. Whitaker Foundation, the Dean of the Faculty of Medicine and Surgery of Palermo University, the President of the Italian Society of Plastic Surgery, three experts in the field of prevention, pathology, therapy and functional recovery of burns, the winner of the prize awarded in the previous year and a legal expert nominated in agreement with the President of the Region as a guarantee of the respect for the scientific purpose which the legislators intended to achieve when establishing the prize.

Anyone who considers himself/herself to be qualified to compete for the award may send by January 31st 2005 a detailed curriculum vitae to: Michele Masellis M.D., Secretary-Member of the Scientific Committee G. Whitaker Foundation, Via Dante 167, 90141 Palermo, Italy.