THE NATIONAL SKIN BANK

Operates in the Laboratory of Experimental Surgery

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INTRODUCTION

The establishment of the Israeli Skin Bank in the Hadassah Burn Unit, along with the encouragement and support of the Ministry of Defense (IDF), has contributed to multidisciplinary studies aimed at improving burn injuries, care and treatment. The projects center on skin preservations, skin grafts, models for drug testing and skin. The skin Bank was assessed and registered for ISO 9001 on 24.11.2001.

1. Skin Preservation:

In Israel, homologous human skin graft, preserved for delayed application has become a basic tool in burn treatment and plastic surgery. We have designed and tested a mouse recipient model for evaluation and direct comparison of skin preservation procedures. This model is simple to use, requires a minimum of maintenance and expertise, and has clinical relevance since it is concerned primarily with the clinical performance of the preserved skin. Presently, this model is used by us as a quality control test for stored skin, addressing questions such as: what is the best preservation method for skin (glycerolyzation or cryopreservation). For how long can cryopreserved skin be stored and still remain effective as a skin substitute? In some experiments it replaces or minimizes the use of the "classical" nude mouse model which is very expensive and complicated.

2. A Composite Skin Graft:

In a parallel project, we have designed and evaluated several modifications of the "composite skin graft" and its performance after transplantation to athymic mice. A composite graft consisting of authologous cultured epidermis and allogeneic dermis has been shown to have long-term function and to be a successful and durable skin replacement. In vitro version of the composite skin graft developed by us, multiple epithelia (epidermis) grown in vitro is combined before grafting with mesh cadaveric dermis, prepared by mild trypsinization. Good grafting

results were obtained with this "instant recombinated skin graft" in athymic mice. We believe that the present modification may be useful clinically. Presently, the possibility of using cryopreserved skin specimens unsuitable for allogenic transplantation as a source for dermis in the "instant recombinated skin graft" is investigated. It is hoped that full use may be made of outdated skin specimens stored in tissue banks

3. Skin Biotechnology:

The skin is one of the largest organs of the body and the epidermis in one of the major cell-renewal systems. To fulfill its role in protection (preventing contamination, injury, decrease in water, electrolyte and protein losses, and reducing heat loss), the epidermis is tough, cohesive and has a highly resistant outer layer. We have developed a series of models to study cutaneous injury in vivo and in vitro settings. The dangers of nonconventional warfare, use of sulfur mustards and white phosphor, have become especially threatening since the Gulf War. The wound healing animal model (guinea pig) designed by us addresses specific questions on wound healing processes and treatment modalities. Presently, the possible use of superoxide dismutase as a free radical scavenger to reduce the toxic effect of phosphor is being investigated. (This project is sponsored by the IDF). In view of rising criticism of the use of animals in toxicological testing, we have developed a test combining organ and cell cultures: The agent(s) to be examined is applied directly on small skin specimens at variable concentrations and for defined periods. Thereafter, the keratinocytes (skin cells) are cultivated and their growth potential (repair) determined. An additional advantage of this test is that it also enables evaluation of "protecting agents". Finally, the direct effect of the agent(s) on cultured keratinocytes (wound healing) is also determined.

4. Special Burn Research:

Mustard gas is a warfare agent that still needs specific antidote or protocols for successful treatment. Early surgical excision, laser ablation and enzymatic debridment are studied as modalities for treatment, as well as the use of free radical scavengers.

5. Smoke Inhalation:

Several in vivo models are studied in order to introduce the use of recombinant surfactant and bronchoalveolar lavage (BAL) for smoke inhalation injuries.