**Title:** tissue engineering: autologous full-thickness skin substitute for healing chronic wounds

**Background:** Chronic wounds, including venous and arteriosclerotic leg ulcers, diabetic foot ulcers, decubitus and trauma induced wounds, represent a major problem in our society. These wounds occur with high incidence and exist for prolonged periods of time and therefore have a great socioeconomic impact. The problem increases as the average age of the population increases and therefore new therapies in wound healing are continuously being sought.

The aim of this study is to develop an autologous, full-thickness skin substitute and to evaluate its efficiency and applicability in closing long-standing ulcers that have proven nonresponsive to the currently available wound-healing therapies (topical therapy, antibiotic treatment, surgical debridment, external compression).

**Method:**
We included 20 patients with long-standing ulcers of which 13 venous and arteriosclerotic (65%), 3 diabetic (15%), 3 trauma-induced and 1 burn wounds (5%). Age of patients varies from 57 to 91 (average 75). The lesions were present since at least two years. A single punch biopsy (diameter cm 0,6) or a surgical biopsy (cm 1,5x1) obtained from the patient’s upper leg were required. After 3-4 weeks we obtained three autologous products on collagen support: fibroblasts, fibroblasts and keratinocytes and keratinocytes. Sheets of keratinocytes present basal melanocytes; between keratinocytes and fibroblasts we observe basement membrane. Antibiotic should be administered only if patients has documented infection. Depending on ulcers depth and dimensions our patients underwent multiple applications (at least two).

All procedures were performed with the Ethics Committee approval and patient consent.

**Results:**
The success rate in culturing biopsies was 100%. The skin substitute visibly resembled an autograft.
Ten of the 13 (77%) chronic venous ulcers (size 6-300 cmq) healed between 8 and 48 weeks.
One of the 3 (33%) diabetic ulcers (size 3-28 cmq) healed within 12 weeks.
Three (100%) trauma induced ulcers (size 4-6 cmq) healed between 6 and 12 weeks.
One (100%) burn ulcer (size 12 cmq) healed within 4 weeks.
Skin substitutes were very well tolerated and pain relief was immediate after application.

**Conclusion**

The application of this novel skin substitute provides a promising new therapy for healing chronic wounds resistant to conventional therapies.