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2nd World Congress on
Otolaryngology and Wound Care

August 30, 2021

Adipose-derived stromal vascular fraction enhances cutaneous wound healing in an animal model

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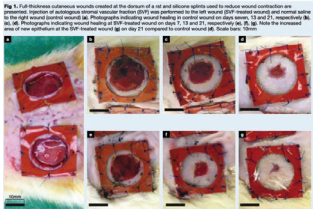
Introduction: Limited data exist regarding the correlation between adipose-derived stromal vascular fraction (SVF) and wound healing. The aim of this study was to investigate the direct effect of intradermally injected SVF on full-thickness cutaneous wounds in a murine model.

Materials and Methods: Wistar rats were divided into four groups (A, B, C and D) according to their day of euthanasia (day 3, 7, 16 and 21). Inguinal fat pad was excised and SVF enzymatically extracted. Full-thickness cutaneous wounds were created on each side of the dorsum; SVF injected intradermally at one side while the contralateral wound served as control receiving normal saline. Postoperatively, evaluation of wound healing was performed by planimetry (percentages of wound contraction, epithelialisation and total wound healing) on days 0, 3, 5, 7, 10, 13, 16 and 21, and histology and immunochemistry (cellular infiltration score, collagen production score, neoangiogenesis and epithelial thickness) on days 3, 7, 16 and 21. Additionally, measurement of the growth factors VEGF-A, PDGF and TGF-β1 was performed by RT-PCR, following m-RNA isolation from tissue samples.

Results: Despite the high rate of wound contraction, it was significantly lower in the SVF-treated wounds on day 21 (p=0.037). On days 13, 16 and 21, the percentages of epithelialisation were higher in the SVF-treated wounds (p=0.026, p=0.048 and p=0.05, respectively). Histologically, the number of new vessels was significantly higher in the SVF-treated wounds compared with controls on days seven (p=0.028) and 16 (p=0.027). This increased angiogenesis was also confirmed by immunohistochemistry and by increased expression of the angiogenic growth factor VEGF-A which was observed in treated wounds compared to control wounds on day 3. No significant differences were found between treated and control wounds regarding cellular infiltration score, collagen production score and epithelial thickness.

Conclusions: Data indicate that intradermally injected SVF increases angiogenesis and enhances epithelialisation in full-thickness cutaneous wounds in rats.



Biography

Eleni Karagergou was born in Thessaloniki and graduated from Medical School of Democritus University of Thrace. She was specialized in plastic and reconstructive surgery in United Kingdom, and she is a member of Royal College of Surgeons of Edinburgh (MRCSEd). Her PhD thesis was on adipose stem cells, and she is a fellow of the European Board of Plastic Reconstructive and Aesthetic Surgery. She is currently working as a consultant plastic surgeon at Papanikolaou General Hospital in Thessaloniki, Greece, and she has a special interest in regenerative medicine and adipose derived regenerative therapies.

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