

## ABSTRACT

Treatment of full-thickness wounds remains a significant clinical challenge. One of the treatment strategies for skin wounds is the use of acellular dermal matrix (ADM). Available ADMs are processed from cadaveric skin or of animal origin (including porcine or bovine skin). To date, ADMs prepared from human skin derived from living donors are not available.

The aim of the study was to create a human biological dressing that could be used in the treatment of full-thickness wounds (burns, injuries, ulcerations).

Human skin was collected from living donors qualified for abdominoplasty (tummy tuck). The material was taken from the skin fold removed during the surgery. Three different processing methods were used for the decellularization process. Then, the effectiveness of the process of decellularization on the structure of new ADMs was assessed using histochemical and immunohistochemical techniques. In addition, the *in vivo* therapeutic potential of the new ADMs was assessed with the full thickness skin wound mouse healing model. To better understand the effect of the new ADMs on the wound healing, targeted expression profiling of genes encoding proteins important in the healing process was performed.

All three proposed skin processing methods used in this study allowed to effectively remove cells from the processed material. However, significant differences were observed in the presence of cellular components of the ADMs, namely human leucocyte antigen class I ABC (HLA class I ABC), Talin type 1/2, and proteoglycan NG2 (neural/glial antigen 2). Moreover, the applied skin processing processes influenced the preservation of the extracellular matrix components in terms of collagen type I, III, IV and VII. Finally, new ADMs prepared from human skin collected from living donors during abdominoplasty surgery could serve as a safe and efficient method of treating full-thickness wounds in experimental wound healing model.

In conclusion, a protocol for the decellularization of the skin of patients undergoing abdominoplasty operations was developed, which can be used for the production of biological dressings. The applied decellularization process has a significant impact on the purity, structure and therapeutic properties of ADM.