

Effects of hydrogel grafts combined with adipose mesenchymal stem cells on healing of full-thickness skin defects

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Objectives: To develop and substantiate the restoration technology of cutaneous integuments' integrity by means of the complex transplant consisting of the hydrogel and the autologous mesenchymal stem cells from the adipose tissue.

Methods: From 25 laboratory animals two experimental groups (the group with application of hydrogel and the autologous mesenchymal stem cells from the adipose tissue, and also the control group with spontaneous regeneration of wound defect) have been formed. The area of the wound surfaces was defined on 0, 10th and 20th days after transplantation. The skin biopsy material of all animal experimental groups was examined on the 20th day after the procedure. The first result of the clinical application of the developed restoration technique of the integumentary tissues wound defect in the conditions of a chronic arterial tissue ischemia is presented.

Results: It has been found out that hydrogel is a universal matrix for generating a complex skin transplant with mesenchymal stem cells from the adipose tissue. It serves a universal cell frame and matrix to transfer mesenchymal stem cells from the adipose tissue providing good conditions for the growth, differentiation and implantation of the cells coated on it. In the experiment a reliably higher rate of the wound surface regeneration was observed in the animals with the transplant application in comparison with the control group. The first experience of a clinical application of the developed technique has shown a high rate of restoration of integrity of integuments' defects in the conditions of a chronic arterial ischemia of tissues.

Conclusions: The use of a complex transplant from hydrogel and mesenchymal stem cells from adipose tissue has shown the possibility of high-grade restoration of integrity of the integument both in the laboratory animals and in humans.

Keywords: mesenchymal stem cells, treatment of wounds

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