

11. BIOLOGICAL SKIN TISSUE ENGINEERING FOR WOUND DRESSINGS

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Introduction. Modern and smart dressings are becoming more and more sought after. Their values consist not only in a protective barrier but also in a beneficial environment for healing, biocompatibility, self-dissolving, the possibility of realising therapeutic agents, minimal human involvement, that would actively support the healing process of wounds. Dressings with extracellular matrix, hydrogel, collagen are an example of such innovative products that facilitate wound healing, providing an humid environment in which cells can thrive, while the wound can still breathe and exudate can be self-drained.

Aim of study. To create the tissue engineering, decellularized extracellular sheets, sponges, hydrogels from the porcine derma, small intestinal submucosa, for the wound dressing.

Methods and materials. For one year period, from the pigs' tissues, were obtained: decellularized extracellular matrix from dermis; collagen suspension from dermis; hydrogels from dermis; decellularized scaffolds from mucosa and submucosa of small intestine; collagen suspension from mucosa with small intestine submucosa; hydrogels from the mucosa with small intestine submucosa. Extracellular matrices from skin and intestine were obtained by decellularization with 4% sodium deoxycholate, 0.1% sodium dodecyl sulphate solution, 0.25% Trypsin, sodium hydroxide, Triton X-100. Collagen extraction was performed by treating with 0.1 M NaOH and 0.5 M acetic acid containing porcine pepsin. Preparation of the hydrogel was performed in HCl solution with porcine pepsin. The products obtained were compared with non-treated native tissue samples. Tissue evaluation included examination of the decellularized samples with hematoxylineosin and DNA quantification assays. For the morphological evaluation H&E staining was performed.

Results. Histological examination has not revealed any presence of cells in tissues, decellularized in accordance with the protocols. More than 99% of the nucleic acids were removed from the decellularized bovine matrix.

Conclusion. Regenerative medicine is advancing from a wound healing approach based on obtaining smart dressings. Hydrogels, sponges, foils, collagen can play a key role in wound care and facilitating the tissue engineering strategies, acting as a scaffold for stem cells and carrier, source of bioactive molecules and drugs.