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Tissue-engineered product from human umbilic cord for wound healing

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Problem statement: The products creation for the reconstruction of damaged tissues is an urgent problem in biomedical research. We have fabricated a biotechnological product consisting of acellular Wharton's jelly human umbilical cord with non-immunogenic and regenerative properties.

The purpose of the study was to evaluate the effect of a biotechnological product from the umbilical cord on the human dermal fibroblasts metabolic activity *in vitro* and wound healing *in vivo*.

Methodology: The method of detergent decellularization of Wharton jelly in our own modification allowed us to fabricate a tissue-engineering product with the properties of the original regenerative material.

The cytotoxicity of the tissue-engineered product investigated by a colorimetric test of human dermal fibroblasts metabolic activity. The effect of the product on full-thickness skin wounds healing studied on white mice. Animals of the control group did not receive the tissue-engineering product into the wound.

Findings: The biotechnological product does not exhibit cytotoxic properties. The formation of granulation tissue at the bottom of the defect proceeds more dynamically in the presence of acellular product. It served as an adhesive

substrate for cells with fibroblast-like morphology. At the same time, there were no detected massive leukocyte infiltration and edema in the perifocal areas.

Conclusion and Significance: The non-cytotoxic cell-free human umbilical cord matrix can be an ideal substrate for adhesion and colonization by stromal cells when used as a wound dressing for deep skin and soft tissue injuries.



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