Structural and physical characteristics of the dermal decellularized structures evaluation

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Introduction. Decellularized biomaterials derived from the biological tissues are ideal for tissue engineering applications because they mimic the biochemical composition of the native tissue. The physical and structural properties of the scaffold are important in the fields of tissue engineering and regenerative medicine [1-11].
Material and methods. Study material was 20 decellularized dermal grafts. 10 samples were obtained from piglets slaughtered in the slaughterhouse. Other tissues (n=10) were received from the donor from the Human Tissue and Cell Bank of the Republic of Moldova following the recommendations of the university ethics committee. Extracellular matrices were obtained by decellularization with 0.5% sodium dodecyl sulfate/0.1% EDTA solution [12, 13, 15]. The evaluation of the structural characteristics was carried out by the histological examination with hematoxylin and eosin, scanning electron microscopy (SEM) and the quantification of the amount of deoxyribonucleic acids (DNA). Assessment of the physical characteristics included analysis of extracellular matrix (ECM) volume porosity [13-16], density [17-20], and swelling rate [16, 17].
Results. By histological examination we revealed fewer cells in decellularized tissues compared to non-decellularized ones. More than 80.5% of nucleic acids were removed from porcine matrix and 82.5% of genetic material - from decellularized human dermal structures. A mean correlation and inverse dependence of -0.43 was shown between porosity and swelling rate of decellularized dermis.
Conclusions. The decellularization process significantly ($P<0.05$) removed the cellular components while preserving the connective three-dimensional structure of the dermal matrices clearly shown by quantification of the amount of DNA and microscopic examination of the structures
Keywords: evaluation, structure, dermis, decellularization.

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