

DEVITALIZED XENOGENIC VASCULAR GRAFTS TRANSPLANTATION: 1-YEAR FOLLOW UP

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Limited amount of suitable for transplantation autologous vascular prostheses of small diameter (≤ 6 mm) and traumaticity of their deriving stimulate to search of alternative kinds of vascular grafts. One of the most perspective approaches is using biological prostheses based on xenogenic arteries. However the technologies of their treatment based on application of aggressive chemical reagents to reduce immunogenicity have been ineffective till now.

The conception of this study is based on the use of physical factors: low temperatures and electron beam irradiation to damage the cells of vascular wall as the main causes of immunogenicity to create biological vascular grafts.

Materials and methods: Porcine intrathoracic arteries were derived from mature animals. Isolated vessels were frozen down to liquid nitrogen temperature. Thawed on water bath vessels were subjected to electron beam irradiation in the experimental dose. Morphological structure and ultrastructure of devitalized arteries were estimated as well as their biomechanical properties. Xenotransplantation under the skin of Wistar rats have been done to estimate biocompatibility and immunogenicity degree. Experimental vascular surgeries were performed to rabbits with using devitalized xenoarteries as vascular prostheses.

Results. Freezing led to partial desquamation of endothelium layer and initial damages of smooth muscle cells. The following irradiation resulted in a complete damage of all cellular components of vascular wall while connective tissue structure was mainly preserved. Used physical factors increased strength parameters of treated arteries in longitudinal and radial directions while elasticity in the area of physiological loading did not differ from the native vessels. Xenotransplantation have demonstrated the absence of manifested immunogenic rejections. Experimental vascular xenotransplantation have shown high-grade patency of devitalized arteries during 12 months at least. Acute thrombosis, stenosis and aneurysm dilatations were absent during all the observation term, while preserving of structural integrity and gradual remodelling of bioprostheses.

Conclusion. The developed devitalization method allows the creation of biological hypoimmunogenic vascular grafts based on xenogenic arteries, which are promising to be studied in clinic.