

## POSTER SESSION 3

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### P780

#### Devitalized biological vascular grafts: 3 years follow up

D. Byzov; N. Chizh; E. Shevchenko; I. Mikhaylova; B. Sandomirsky  
*Institute for Problems of Cryobiology and Cryomedicine, Kharkiv, Ukraine*

Increased number of peripheral arteries' pathology worldwide and coronary artery diseases as well lead to progressive need in small diameter ( $\leq 6$ mm) vascular grafts. Xenogeneic tissues treated with modern biotechnological approaches reducing immunogenicity degree may solve the problem of vascular grafts' deficit. Technologies of decellularization/devitalization with different chemicals show some serious shortcomings. Nowadays use of physical factors to reduce immunogenicity is considered as very promising.

**The research aim:** We used two physical factors: low temperatures and electron beam irradiation to create hypo-immunogenic small-diameter biological vascular grafts based on xenogeneic arteries.

**Materials and methods:** The research objects were porcine intrathoracic arteries. Isolated vessels were frozen to  $-196^{\circ}\text{C}$  and after following thawing they were irradiated with electron beam. Morphology of treated arteries was estimated by electron and optical microscopy. Strength- and burst-tests have been done to study biomechanical properties of vessels. To study biocompatibility and immunogenicity the vessels were subcutaneously implanted to rats. Experimental xenotransplantation of

devitalized arteries into abdominal aorta position to rabbits was performed to estimate hemocompatibility and patency of treated arteries.

**Results:** Freezing with following ionizing irradiation resulted in a complete deendothelization and significant destruction of smooth muscle cells. Connective tissue fibers of vascular wall were mainly preserved. Used physical factors increased strength parameters of arteries in longitudinal and radial directions. Subcutaneous implantation of arteries has shown the formation of significant cellular rejection in the group of native arteries. While any signs of inflammation in the group of devitalized arteries were noted. Acute thrombosis after the xenotransplantation were absent. For today the maximum duration of postsurgical observation makes 3 years. To 14th month after the surgery the grafts were seeded by recipient's fibroblasts and smooth muscle cells predominantly from the side of lumen and adventitia. Intensive growth of newly-formed connective tissue fibers were noted within vascular wall.

**Conclusion:** Combined action of low temperatures and ionizing irradiation allows reducing of xenogeneic arteries' immunogenicity and designing of integrally functioning hypo-immunogenic small-diameter biological vascular grafts. Positive results of experimental transplantation testify about prospects of further clinical study which may lead to development of low temperature xenogeneic tissues bank.