

C23

Integrative capacity and functional competence of detergent-decellularized xenogeneic pulmonary valves

Artur Lichtenberg¹, Igor Tudorache², Serghei Cebotari², Marc Suprunov¹, Payam Akhyari¹, Greta Tudorache², Axel Haverich², Andres Hilfiker²

¹*Dep. of Cardiac Surgery, Heidelberg, Germany*, ²*Dep. of Cardiothoracic, Transplantation and Vascular Surgery, Medical School Hannover, Hannover, Germany*

Objectives:

The regenerative ability of implanted xenogeneic decellularized heart valves is still discussed controversial. The aim of this study was to evaluate the in-vivo integration capacity of decellularized xenogeneic porcine pulmonary valves (PV) in comparison to allogeneic ovine grafts.

Method:

Six porcine and six ovine PV were decellularized using detergents (0.5% Sodium-deoxycholate/0.5% SDS). The valves were implanted into the orthotopic position in sheep as conduits. Three of each were echocardiographically investigated and harvested after 3 and 6 months, respectively. For morphological evaluation of explanted PV, H&E-, Elastica van Gieson-, Pentachrome-, von Kossa-, collagen-IV-, perlecan-, eNOS-, α -actin-, procollagen-I-immunostaining, and electron microscopy were performed.

Results:

All implanted PV were functionally competent without insufficiency, stenosis, significant macroscopic degeneration or thrombosis. Microscopic evaluation showed a similar in-vivo endothelial and interstitial scaffold reseeding in both group with distinct increase of reseeding extension after 6 months. Significantly higher expansion of the neo-intima hyperplasia was observed in xenogeneic PV as compared to allogeneic grafts. No significant calcification was found in both groups.

Conclusions:

Exclusive of significantly higher neo-intima hyperplasia the integrative ability and functionality of xenogeneic decellularized PV were similar up to 6 months as compared to allogeneic valves. Possible further continued increase of the neo-intima thickness of xenogeneic valve tissue and the potential influence of it on the late function of implanted valves have to be demonstrated in future long-term animal experiments.