P34. Physical Properties And Calcification Potential Of Adapt®-treated Kangaroo Pericardium - an Ideal Tissue Alternative For Percutaneous Heart Valves

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OBJECTIVES: Percutaneous valve replacement depends on the collapsibility and compressibility of the valve, deployment stents, advances in biomaterials, anticalcification treatment and tissue-stent attachment. In the present study, we evaluated the physical properties and calcification potential of ADAPT®-treated kangaroo pericardium as a possible tissue substitute for construction of a percutaneous heart valve.

METHODS: Kangaroo pericardium (n=5) was decellularized, crosslinked (0.05% glutaraldehyde), treated with the ADAPT® anticalcification process and compared with bovine pericardium (n=5), treated in the same way. Control tissues were crosslinked with 0.2% glutaraldehyde only. In vitro assessment included physical properties (ultimate strength, young's modulus), crosslink stability (shrinkage temperature), resistance to enzymatic degradation and histology. In vivo assessment consisted of post-implant histology and calcification potential (absorption spectrophotometry) after 8 weeks in the subcutaneous rat model.

RESULTS: Kangaroo pericardium compared to bovine pericardium revealed a reduced tissue diameter (0.28 ± 0.07 versus 0.64 ± 0.09 mm), comparable tensile strength (13.27 ±1.75 versus 10.50 ± 8 MPa) and higher Young's modulus (118.22 ± 15.78 versus 83.16 ± 3.5 MPa). The calcification potential of ADAPT®-treated kangaroo pericardium was significantly ($p<0.01$) less than ADAPT®- treated bovine pericardium (0.68 ± 0.13 versus 1.08 ± 0.14 ug/mg).

CONCLUSIONS: ADAPT®-treated Kangaroo pericardium is more compressible and collapsible than bovine pericardium. Ultimate strength and resistance to enzymatic degradation reflects enhanced crosslinking. The low calcification potential and reduced tissue diameter make the tissue attractive as a heart valve substitute. The physical characteristics of ADAPT®-treated kangaroo pericardium suggest an ideal alternative for design and manufacturing of a percutaneous heart valve.