

P171. Mesenchymal Stem Cells And Endothelial Progenitor In Tissue Engineering Of Heart Valves Can Respond Distinctively And Selectively To Biomechanical Signals

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OBJECTIVES: We hypothesize that combined effect of progenitor cells and mechanical factors relevant to cardiac valves can be used to optimize tissue engineered heart valves (TEHV).

METHODS: Bone-marrow-derived mesenchymal and endothelial progenitor cells (MSCs/EPCs) were sequentially co-seeded onto fibronectin-coated-P4HB. TEHV (n = 2) were tested in a static/ continuous flow (100 ml/min) vs dynamic flow (continuous flow and pressure [10 mm Hg] and with increasing pressure [50 mm Hg]) bioreactor.

RESULTS: Static and mechanically stimulated TEHV demonstrated cellular tissue formation within conduits. Exceptions were seen in mechanically stimulated valves with increasing pressure [50 mm Hg]. TEHV demonstrated increased cell growth in static and dynamic flow ($2.46 \times 10^3 \pm 9.93 \times 10^2$ and $1.70 \times 10^4 \pm 3.65 \times 10^3$ fold, respectively, p.

CONCLUSIONS: This in vitro preconditioning regime could be used to guide cellular behavior in a mechanically stimulated microenvironment towards maturation of developing TEHV prior to in vivo implantation.