**Abstract**

The functional and structural performance of a 5 cm synthetic small diameter vascular

graft (SDVG) produced by the copolymerization of polyvinyl alcohol hydrogel with low

molecular weight dextran (*PVA/Dx* graft) associated to mesenchymal stem cells

(MSCs)-based therapies and anticoagulant treatment with heparin, clopidogrel and

warfarin was tested using the ovine model during the healing period of 24 weeks. The

results were compared to the ones obtained with standard expanded

polyetetrafluoroethylene grafts (*ePTFE* graft). Blood flow, vessel and graft diameter

measurements, graft appearance and patency rate (PR), thrombus, stenosis and collateral

vessel formation were evaluated by B-mode ultrasound, audio and color flow Doppler.

Graft and regenerated vessels morphologic evaluation was performed by scanning

electronic microscopy (SEM), histopathological and immunohistochemical analysis. All

*PVA/Dx* grafts could maintain a similar or higher PR and systolic / diastolic laminar

blood flow velocities were similar to *ePTFE* grafts. CD14 (macrophages) and α-actin

(smooth muscle) staining presented similar results in *PVA/Dx/MSCs* and *ePTFE* graft

groups. Fibrosis layer was lower and endothelial cells were only detected at graft-artery

transitions where it was added the MSCs. In conclusion, *PVA/Dx* graft can be an

excellent scaffold candidate for vascular reconstruction, including clinic mechanically

challenging applications, such as SDVGs, especially when associated to MSCs-based

therapies to promote higher endothelialization and lower fibrosis of the vascular

prosthesis, but also higher PR values.