S4-1.6

Evaluation of Ultrasound Application for the Decellularization of Small Caliber Vessels

T. Malcova[1,2], V. Nacu[1], Gh. Rojnoveanu[2], B. Andrée[3] and A. Hilfiker[3]

[1] *Laboratory of tissue engineering and cell cultures, Nicolae Testemitanu State University of Medicine and Pharmacy, Republic of Moldova*

[2] *Department of Surgery no. 1 "Nicolae Anestiadi", Nicolae Testemitanu State University of Medicine and Pharmacy, Republic of Moldova*

[3] *Leibniz Research Laboratories for Biotechnology and Artificial Organs (LEBAO), Department of Cardiothoracic, Transplantation and Vascular Surgery, Hannover Medical School, Hannover, Germany*

Decellularized matrices for tissue engineering seem to be an attractive material for providing biological vascular grafts for patients with advanced peripheral arterial disease who require bypass surgery, but do not have suitable autologous small-caliber vessels (<6 mm diameter). Currently, a variety of decellularization (DC) techniques have been proposed such as physical, chemical, and/or enzymatic methods; however, identifying an optimal protocol resulting in preservation of favorable physiochemical properties of the vascular scaffold is still elusive. The goal of the proposed study was to examine the capacity of sonication to completely decellularize small-diameter blood vessels when applied alone, to test the effect of waves' parameters on the processing quality and matrix microarchitecture preservation, and to evaluate the possibility to reduce the time required for cell removal when ultrasound is used in combination with non-ionic detergents. Contradictory to other DC protocols reported previously, we were not able to record completely or even partially cell removal in all studied groups. Interestingly, the combination of conventional chemicals, as Triton X-100, with physical method did not result in improving the DC efficiency and did not offer tissue permeabilization and easier chemicals access towards deeper tissue layers. In addition, when high sonication power was applied, significant destruction of the vessel matrix was determined. In summary, the use of sonication had no beneficial effect on DC in this study.