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### A bi-layer and biomimetic scaffold for tissue engineering of vascular graft

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**Background & Aim:** Tissue engineering vascular graft (TEVG) is an advanced method for cardiovascular disease treatment. A major obstacle to the development of TEVG is the biomimetic scaffold component. Scaffold requirements include matching the mechanical, biological and structural properties with those of native vessels. Aim of this work is to fabricate and characterization of bi-layered, biodegradable and biomimetic scaffold based on poly-(glycerol sebacate) PGS and poly-( $\epsilon$ -caprolactone) PCL.

**Materials & Methods:** Electrospun bi-layer scaffold was composed of inner layer; fabricated from PGS:PCL (2:1) and outer layer made from PCL since the inner/outer thickness was 2:1. Structural and mechanical properties of the scaffold were assessed and compared to the blood vessels. Hemocompatibility was evaluated using normal human whole blood according to the ISO 10993 4.

**Results:** The scanning electron microscope (SEM) results showed that the fibers have a uniform diameter less than  $1\ \mu$  and surface porosity of the structure is more 85% and it was interconnected. Mechanical evaluation of the bi-layer scaffold showed that its elastic modulus ( $12.8\pm 1.4$  MPa), elongation ( $210\pm 21.7\%$ ) and ultimate strength ( $1.6\pm 0.4$  MPa) were comparable with those of native vessels. Hemocompatibility tests according to hemolysis, platelet adhesion and blood coagulation time revealed that the scaffold was highly hemocompatible that it would be related to biomimetic structure in addition to chemical composition.

**Conclusion:** This study suggests that the bi-layered PGS:PCL (2:1)/PCL fibrous scaffolds mimicked the structure and mechanical properties of native vine tissues and would potentially be suitable for the TEVG. Morphology of fibers has a significant effect on blood compatibility and mechanical properties in electrospun scaffold and may lead to proper biological response.

#### Biography

Anousheh Zargar Kharazi is an Assistant Professor of Biomaterials Science and Engineering in the Department of Advanced Technology in Medicine, Isfahan University of Medical Sciences, Iran. She has received her Bachelor's degree in Mechanical Engineering from Isfahan University of Technology, Master's degree in Biomechanics from the Iran University of Science and Technology and PhD in Biomaterials from the Isfahan University of Technology, Iran. Her research interests are finite element modeling, application of composites in biomaterials, fabrication and characterization of implants, etc. Tissue engineering of vascular grafts is her special research field.

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