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Expression of *collagen 1* and *elastin* genes in mitral valvular interstitial cells within micro fiber reinforced hydrogel

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Objective: The incidence of heart valve disease is increasing worldwide and the number of heart valve replacements is expected to increase in the future. By mimicking the main tissue structures and properties of heart valve, tissue engineering offers new options for the replacements. Applying an appropriate scaffold in fabricating tissue-engineered heart valves (TEHVs) is of importance since it affects the secretion of the main extracellular matrix (ECM) components, *collagen 1* and *elastin*, which are crucial in providing the proper mechanical properties of TEHVs.

Materials & Methods: Using real-time polymerase chain reaction (PCR) in this experimental study, the relative expression levels of *collagen 1* and *elastin* were obtained for three samples of each examined sheep mitral valvular interstitial cells (MVICs)-seeded onto electrospun poly (glycerol sebacate) (PGS)-poly (ε-caprolactone) (PCL) microfibrous, gelatin and hyaluronic acid based hydrogel-only and composite (PGS-PCL/hydrogel) scaffolds. This composite has been shown to create a synthetic three-dimensional (3D) microenvironment with appropriate mechanical and biological properties for MVICs.

Results: Cell viability and metabolic activity were similar among all scaffold types. Our results showed that the level of relative expression of *collagen 1* and *elastin* genes was higher in the encapsulated composite scaffolds compared to PGS-PCL-only and hydrogel- only scaffolds with the difference being statistically significant ($P<0.05$).

Conclusion: The encapsulated composite scaffolds are more conducive to ECM secretion over the PGS-PCL-only and hydrogel-only scaffolds. This composite scaffold can serve as a model scaffold for heart valve tissue engineering.

Biography

Maryam Eslami graduated with MD (2010), PhD (2014) degrees. She joined Harvard Medical School (Harvard-MIT Division of Health Sciences and Technology) following her PhD dissertation in the field of heart valves and is continuing this field with her students and collaborators. She has carried out research on orthopedic fractures and has published a book and papers in these fields in numerous journals and spoken on this subject at several congresses. Her U.S and PCT patent achieved the rank of "Best 2008 Invention" from WIPO (World Intellectual Property Organization of the United Nations). She has received the title of "Best 2008 Women inventor" from WIPO and won 6 Gold Medals and 6 Honorary Diplomas in Contests and Fairs for Inventors in Geneva and South Korea, and international and national awards for her research.

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