Maryam Eslami, J Cell Sci Ther 2015, 6:2
http://dx.doi.org/10.4172/2157-7013.S1.032

OMICS International
conferenceseries.com

5th World Congress on
Cell & Stem Cell Research
March 23-25, 2015 DoubleTree by Hilton Chicago - North Shore, USA

# Synthesis of scaffold for heart valve based on molecular patterns and study of its effects (mechanically, biologically collagen 1 and elastin genes expression) on valvular interstitial cells

**Maryam Eslami**
Harvard Medical School, USA

The incidence and prevalence of heart valve disease is increasing worldwide and the number of heart valve replacements is expected to increase significantly in the future. By mimicking the main tissue structures and properties of human heart value, 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 for providing the mechanical, elastic and tensile strength of TEHVs. Using biological, mechanical and Real Time PCR experiments, the relative collagen 1 and elastin genes expression levels obtained for three samples of each examined valvular interstitial cells (VICs)-seeded scaffolds including electrospun poly (glycerol sebacate) (PGS)-poly (ε-caprolactone) (PCL) micro fibrous scaffolds, methacrylatedgelatin (GelMA) and methacrylated hyaluronic acid (HAMA) based hydrogel-only and the composite (consists of PGS-PCL and hydrogel) scaffolds. Sheep mitral valvular interstitial cells were encapsulated in the hydrogel and evaluated in hydrogel-only, PGS–PCL scaffold-only, and composite scaffold conditions. Although the cellular viability and metabolic activity were similar among all scaffold types, the presence of the hydrogel improved the three-dimensional distribution of mitral valvular interstitial cells. As seen by similar values in both the Young's modulus and the ultimate tensile strength between the PGS–PCL scaffolds and the composites, micro fibrous scaffolds preserved their mechanical properties in the presence of the hydrogels. Our results showed that the level of relative expression of collagen and elastin genes was higher in the VICs- encapsulated composite scaffolds compared to PGS-PCL-only and hydrogel-only scaffolds and the difference was statistically significant ($P<0.05$). The maximum difference of elastin and collagen 1 genes expression was between the composite scaffold and the hydrogel-only scaffold, with the most and the least quantity, respectively. The VICs-encapsulated composite scaffold was observed to be more inductive to ECM secretion over the PGS-PCL-only and hydrogel-only scaffolds. This composite scaffold can serve as a three-dimensional structure model for heart valve tissue engineering with the capability of providing the necessary mechanical-properties such as, elasticity and tensile strength and the ability to grow, repair and be remodeled as a tissue.

## Biography

Maryam Eslami graduated with MD (2010), Ph.D. (2014) degrees. She then joined Harvard Medical School (Harvard-MIT Division of Health Sciences and Technology) as a part of her Ph.D. dissertation in the field of heart valve. She has carried out some broad research on orthopedic fractures and has published a book and papers in this field. Her U.S and PCT patent achieved the rank of "Best 2008 Invention" from WIPO (World Intellectual Property Organization of the United Nations) and she has received the title of "Best 2008 Women inventor" from WIPO and 6 Gold Medals and 6 Honorary Diplomas in the Contests and Fair of the Inventors in Geneva and South Korea. International and national awards for her research were one of the fundamental achievements that she has received. Now she is a research Vice President of Tehran Paramedical School, Azad University.

maryam.eslami2010@gmail.com

## Notes: