Sepideh Hagvall et al., J Tissue Sci Eng 2017, 8:4(Suppl)
DOI: 10.4172/2157-7552-C1-040

Decellularized and recellularized hearts as a next generation test system in drug discovery

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Three-dimensional (3D) cell culture systems have gained increasing interest in drug discovery and tissue engineering due to their evident advantages in providing more physiologically relevant information (based on cell–cell and cell–extracellular matrix (ECM) interactions) and more predictive data for *in vivo* tests. Here, we aim to set-up and develop a 3D cardiac model, that recapitulate cardiac physiology, through: perfusion de-cellularization of rodent hearts (dH2O, PBS, 4% sodium deoxycholate (SDC) solution, PBS for 6 hours), characterization, and re-cellularization of decellularized hearts. We have shown an almost complete removal of nuclear components through several cycles of decellularization, and confirmed by nuclear staining and DNA quantification assay. Further, collagen, elastin and GAGs have been observed as the ECM contents. Isolated human cardiac progenitor cells were covered the decellularized heart. Positive cells for cardiovascular specific markers such as Nkx2.5, troponin C, CD31 and α-actin has been detected in the recellularized heart. The decellularized whole heart retains the natural architecture of cardiac ECM, which may have the potential to promote stem cell differentiation, cardiac regeneration and angiogenesis. Much effort is still needed to assure reproducibility, high throughput analysis, compatible readout techniques, and automation to establish standardized and validated 3D cell culture models.

Biography

Sepideh Hagvall has received her PhD in Molecular Biology at Gothenburg University, Sweden. She has joined Bioengineering laboratory at the University of California Los Angeles (UCLA) as a Post-Doctoral Researcher in 2005 and became Research Director at the Cardiovascular Tissue Engineering Laboratory in 2008. She was appointed as Assistant Professor in 2010 at the Department of Surgery at David Geffen School of Medicine at UCLA and as an Associate Principal Scientist at AstraZeneca.

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