Maurizio Pesce, J Clin Exp Cardiolog 2016, 7:10(Suppl)
http://dx.doi.org/10.4172/2155-9880.C1.053

From cell mechanosensing to pathologic evolution and engineering of the cardiovascular system

Maurizio Pesce
Centro Cardiologico Monzino, Italy

The generation of bioartificial tissues using patient-derived or allogenic (progenitor) cells, has become a clinically relevant opportunity for translation in various branches of medicine, e.g. dermatology, ophthalmology and diabetes care. Despite an always increasing number of patients with cardiovascular diseases, no feasible options exist to produce biomimetic engineered tissues that might be employed as definitive substitutes in cardiovascular medicine. In fact, while stem cells with cardiovascular competence have been identified and characterized, their employment has remained mainly confined to regenerative medicine, with insufficient translation into effective tissue engineering strategies. The devices presently available to replace diseased myocardium, occluded vessels and failing valves is limited to materials with tensile resistance (patches for ventricular reconstruction), autologous vessels (mammary/radial arteries and saphenous vein for aorto-coronary bypass grafts) and mechanical/bio-prosthetic valves; all of which have major limitations such as insufficient mechanical integration, post-engraftment patency reduction and calcification. Merging stem cell biology with recent bio-engineering techniques will be of great help in the production of new bio-synthetic cardiovascular implants. In fact, the design of complex biomaterial patterning in microscale or nanoscale dimensions and novel "High Throughput" screening systems may be exploited to perform synthetic modeling of the tissue self-renewing conditions and to a rapid identification of new biomaterials.

Recent Publications

1. Pesce M and Santoro R (2016) Feeling the right force: How to contextualize the cell mechanical behavior in physiologic turnover and pathologic evolution of the cardiovascular system. Pharmacol Therapeut (in press).
2. Santoro R, Consolo F, Spiccia M, Piola M, Kassem S, Prandi F, Vinci M C, Forti E, Polvani G, FioreG F, Soncini M and Pesce M (2016) Feasibility of pig and human-derived aortic valve interstitial cells seeding on fixative-free decellularized animal pericardium. J. Biomed. Mat. B–Appl. Biomat 104(2):345-356.
3. Ugolini G S , Rasponi M , Pavesi A, Santoro R , Kamm R, Fiore G B, Pesce M, Soncini M (2016) On-chip assessment of human primary cardiac fibroblasts proliferative responses to uniaxial cyclic mechanical strain. Biotechnol Bioeng 113(4):859-69.
4. Piola M, Prandi F, Bono N, Soncini M, Penza E, Agrifoglio M, Polvani G L , Pesce M and Fiore G B (2016) A compact and automated ex vivo vessel culture system for the pulsatile pressure conditioning of human saphenous veins. J. Tissue Eng. Regen. Med. 10(3): E204-E215.
5. Vinci M C, Piacentini L, Chiesa M, Saporiti F, Colombo G I, Pesce M (2015) Inflammatory environment and oxidized LDL convert circulating human pro-angiogenic cells into functional antigen presenting cells. J. Leuk. Biol. 98(3):409-421.

Biography

Maurizio Pesce, PhD, is a Biologist with expertise in cardiovascular tissues regenerative medicine and tissue engineering. His work has been specifically dedicated to the assessment of adult-derived stem cells in cardiac and vascular (re)generation. He currently holds a position as a Group Leader of the Tissue Engineering Unit at the Research division in Centro Cardiologico Monzino in Milano, Italy where he conducts research on pathological readout of cell mechanosensing and novel approaches in vascular, valve and myocardial tissue engineering.

maurizio.pesce@ccfm.it

Notes: