Human Stem Cells for Cardiac Repair with Tissue Engineering Approaches

Speaker:
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Tuesday 19th April
Starts 6:30 PM
(Networking and refreshments available from 6:00 PM)

Venue: The Unicorn Club, MHSOBA
Melbourne High School, Forrest Hill, South Yarra

All welcome

Abstract

Heart failure is an end-stage heart disease and the current definitive treatment has been restricted to heart transplantation, an option severely limited by the shortage of heart donors. Cardiac tissue engineering with stem cells provides a potential solution to this limitation.

Human induced pluripotent stem (iPS) cells are promising source of autologous cardiomyocytes to repair and regenerate lost myocardium for treatment of heart disease. We have successfully generated functional human cardiomyocytes from human iPS cells. Implanting these human iPS cell-derived cardiomyocytes into in vivo tissue engineering chambers in immunocompromised rats resulted in contractile engineered constructs with human cardiac cells retained within a host fibrocellular stroma and were vascularized by host neovessels. Thus, human iPS cell-derived cardiomyocytes can be used to engineer functional cardiac tissue for studying pathophysiological development of cardiac disease, drug discovery and future generation of cardiac tissue for surgical replacement of infarcted myocardium.

We have also recently identified a novel population of human cardiac resident stem cells (CRSCs), which are positive for W8B2 antigen. $W8B2^+$ CRSCs isolated from adult human atrial appendages can self-renew and are highly clonogenic. $W8B2^+$ CRSCs can differentiate into cardiogenic cells which were responsive to electrical stimulation, as well as into endothelial and smooth muscle cells, and can undergo adipogenesis, osteogenesis and chondrogenesis. When implanted as cell sheets into an in vivo vascularized tissue engineering chamber, $W8B2^+$ CRSCs survived for 4 weeks post-implantation and were found to promote neovascularisation. Intramyocardial injection of $W8B2^+$ CRSCs into the infarcted myocardium of immunocompromised rats produced beneficial structural and functional effects. Therefore, $W8B2^+$ CRSCs may be an ideal cardiovascular cell source for tissue engineering and for autologous cell therapies in patients with cardiovascular diseases.

Biography

After completing a PhD from University of Strathclyde (UK) in 2005, Dr Lim spent 4 years post-doc research at The Hatter Cardiovascular Institute (University College London, UK) focused on cardioprotection research, in particular the role of the mitochondria permeability transition pore and the translational value of ischemic conditioning. In June 2010, he joined the O'Brien Institute (now part of St Vincent's Institute of Medical Research) and was appointed as the leader of the Cardiac Regeneration team in 2012. His group focuses on combining stem cell technology and tissue engineering approach to repair and regenerate damaged heart.

Registration

Please register your attendance at http://www.medigrafaustralia.com.au

Note that attendance will attract 1.5 CPD points for EA members.

Location

The Unicorn Club is next to the MHSOBA Scoreboard in the South-West Corner of the Melbourne High School grounds. Access the grounds from the Alexandra Ave. gate.

Parking is available along the top drive and near the Unicorn Club. The South Yarra station and Toorak tram are a 350m walk down Yarra St.