STEM CELL SOCIETY
SINGAPORE

STEM CELL SOCIETY SEMINAR

28 June 2012, **Thursday• Aspiration** Theatrette, Matrix Building **Level 2M**, 30 Biopolis Street, Singapore 138671

PROGRAMME

4.00 - 5.00pm	**Dr David Elliott** Monash Immunology and Stem Cell Laboratories (MISCL), Monash University, Australia **"Building the human cardiac cell lineage tree: identifying the initial shoots"**
5.00pm onwards	**Network Social** Only for members of Stem Cell Society Singapore; Non-members who wish to attend Network Social are welcome to sign up for membership at www.stemcell.org.sg/scss_membership.php.
Hosted by	**Dr Filip Laco** Bioprocessing Technology Institute

SPEAKER

Dr. David Elliott

Building the human cardiac cell lineage tree: identifying the initial shoots

Abstract

NKX2-5 is expressed in the heart throughout life. We targeted sequences encoding green fluorescent protein (GFP) to the NKX2-5 locus of human embryonic stem cells (hESCs). NKX2- 5GFP/w hESCs facilitate quantification of cardiac differentiation, purification of hESC-derived committed cardiac progenitor cells (hESC-CPCs) and cardiomyocytes (hESC-CMs). Gene expression studies demonstrated that NKX2-5+ hESC-CPCs and CMs constitute developmentally distinct populations. Furthermore, clonal analysis showed that NKX2-5+ CPCs are capable of giving rise to the three major lineages in the heart, namely cardiomyocytes, smooth muscle and endothelium. GFP+ CMs display a foetal-like action potentials, correlating with the gene expression profile. We have used NKX2-5+ cells to identify VCAM I and SIRPA as novel cell surface markers expressed on cardiac lineages. Flow cytometric temporal profiling of these three markers suggests a progression from a multipotent SIRPA+ population to a myogenically committed NKX2-5+ SIRPA+ VCAM+ population.

Triple positive cells are contractile and express markers of CMs, whereas NKX2-5+SIRPA+ cells also express endothelial and smooth muscle markers. In addition, cultured NKX2-5+SIRPA+ cells give rise to NKX2-5+SIRPA+VCAM1+ CMs. Furthermore, we have identified an NKX2-5+CD34+ cell population, which, when cultured, gives rise to endothelial cells. Therefore, these markers represent tools to investigate the molecular control of lineage specification during human cardiogenesis. NKX2-5 is likely to play a key role in the differentiation of h ESC derived cardiac cells. In order to examine NKX2-5 function we generated hESCs in which both NKX2-5 alleles have been disrupted. Future studies will utilise our NKX2-5 allelic series to focus on the role of NKX2-5 in regulating cell lineage specification and differentiation in human heart development.

Biography

Dr David Elliott completed a PhD in Prof. Richard Harvey's laboratory at the Victor Chang Cardiac Research Institute performing a structure/function analysis of Nkx2-5, a key regulator of cardiogenesis. He identified and characterised a novel, evolutionarily conserved tyrosine rich transactivation domain. Dr Elliott completed his post-doctoral studies at the Gurdon Institute, Cambridge University in Prof. Andrea Brand's laboratory, investigating the role of an E3 ubiquitin ligase, the anaphase-promoting complex, in neural cell function and fate in *Drosophila*. In 2007 he joined the Monash Immunology and Stem Cell Laboratories (MISCL) with Prof. Andrew Elefanty and Ed Stanley working on the generation of purified populations of human heart cells from the in vitro differentiation of human embryonic stem cells (hESCs). In 2010 he established the Cardiac Stem Cell Lab at MISCL and his group continues to use differentiating hESCs as a model of human heart development. His recent research focus has been the identification of cell surface markers for discrete cardiac lineages.