Institute of Medical Biology
A*STAR

Seminar Announcement

- All Are Welcome -



Speaker: **Dr Enzo R. Porrello & Dr James E. Hudson**

School of Biomedical Sciences,
The University of Queensland, Brisbane,
QLD 4072, Australia.

Title : "A microRNA-dependent mechanism for scarless healing of the neonatal and adult heart"

Date : 18 June 2015 (Thursday)
Time : 11.00am – 12.00pm
Venue : Aspiration Theatrette, Matrix Level 2M, Biopolis
Host : Dr Drew Titmarsh
(Tel: 6407 0273, email: drew.titmarsh@imb.a-star.edu.sg)

Abstract of the Seminar:

The adult mammalian heart has an extremely limited capacity for regeneration, which represents a substantial barrier in cardiovascular medicine. In contrast, we recently identified a brief window during early post-natal life when the mammalian heart retains a robust capacity for cardiac regeneration following injury. Cardiac regeneration in neonatal mice involves proliferation of pre-existing cardiomyocytes, in the absence of any appreciable fibrotic scarring. Cardiac regenerative capacity is progressively lost during the first two weeks of postnatal life, although the molecular mechanisms that govern this developmental transition are still poorly understood. We have recently undertaken extensive transcriptional and epigenetic profiling of the regenerative vs. non-regenerative neonatal heart. These studies have uncovered a unique transcriptional signature that defines the neonatal cardiac regenerative response, including a number of protein-coding genes and non-coding RNAs that are implicated in cardiomyocyte proliferation and extracellular matrix remodelling. One of these candidates, miR-29a, was found to be specifically up-regulated in the regenerative neonatal (but not adult) heart following myocardial infarction (MI). Gain- and loss-of-function studies in neonatal and adult mice revealed a critical anti-fibrotic role for the miR-29 family following MI. Liposome-mediated delivery of miR-29a to the adult heart following MI resulted in improved cardiac function, reduced fibrosis, prevented adverse cardiac remodelling and was associated with repression of a number of fibrotic genes including *Col1a1* and *Col3a1*. Finally, *in vitro* studies using bioengineered human heart tissue confirmed the therapeutic potential of miR-29a in a human setting. These findings define a transcriptional signature for neonatal heart regeneration and identify miR-29 as a key player mediating scarless healing of the neonatal and adult heart.

About the Speakers:

Dr Enzo R. Porrello

Dr. Porrello received his Bachelor of Biomedical Science (Honours) and PhD in Physiology from The University of Melbourne. He was subsequently awarded a prestigious travelling fellowship from the National Health and Medical Research Council and National Heart Foundation of Australia to undertake postdoctoral training at UT Southwestern Medical Center in Dallas, USA, under the guidance of Prof. Eric Olson, a preeminent figure in cardiac biology. His research has been recognized by a number of prestigious awards including the UQ Foundation for Research Excellence Award, A.K. McIntyre Prize (Australian Physiological Society) and the UT Southwestern Postdoctoral Achievement award. Dr. Porrello relocated to the School of Biomedical Sciences at The University of Queensland in 2012 to establish the Cardiac Regeneration Lab, which he currently co-heads together with Dr. James Hudson. Their research group focuses on understanding the molecular mechanisms that guide post-natal heart development and regeneration.

Dr James E. Hudson

Dr. Hudson completed a double major in Chemical and Biological Engineering at The University of Queensland before completing a PhD at The Australian Institute of Bioengineering and Nanotechnology. Dr. Hudson was subsequently awarded a prestigious German Cardiology Society postdoctoral fellowship to undertake postdoctoral training in Göttingen, Germany, under the guidance of Prof. Wolfram-Hubertus Zimmermann, a prominent cardiac tissue engineering researcher. Supported by a research fellowship from the National Health and Medical Research Council of Australia, Dr Hudson relocated to the School of Biomedical Sciences at The University of Queensland in 2013, where he currently co-heads the Cardiac Regeneration Lab together with Dr. Enzo Porrello. Their research group focuses on understanding the molecular mechanisms that guide post-natal heart development and regeneration.