CANCER SCIENCE INSTITUTE OF SINGAPORE

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Mechanisms of Cell Programming and Reprogramming

Date: Monday, 16 September 2013
Time: 11am – 12pm
Venue: Centre for Life Sciences (CeLS) Auditorium, Level 1
(28 Medical Drive, Singapore 117456)
Chair: Prof Fu Xin-Yuan

Abstract:

We are interested in the genetic regulatory mechanisms that underlie cell fate control in mammalian development and during the directed conversion of one cell type into another. A mechanistic understanding of cell fate control is central to our ability to modulate intrinsic mechanisms by which stem cells generate biomedically relevant cell types as well as for converting cells for therapeutic purposes. Our focus is on the early events in cell type control, unveiling the means by which transcription factors initially interact with chromatin templates. Understanding how transcription factors can find their gene targets in "naïve" chromatin that has not yet been programmed for activity explains much about the potential and limitations by which we can currently modulate cell fate at will. Our laboratory discovered pioneer transcription factors, such as FoxA, that have the inherent property of binding to their target sites on nucleosomal DNA and thereby enabling or initiating cell type-inducing events in embryonic development. Recent studies of ours and others have revealed pioneer activity for various transcription factors that elicit cell type reprogramming. Yet we have also found chromatin modification states that are refractory to binding by pioneer factors and that impede cellular reprogramming. Diminishing such refractory chromatin states dramatically enhances reprogramming. Current efforts are to determine DNA and chromatin binding features that predict how to control cell fate and to apply those principles to generate cells that will be useful therapeutically, particularly as they relate to pluripotent cells and the liver and pancreatic beta cell lineages.

Biography:

Prof Ken Zaret is currently Co-Director, Epigenetics Program and Associate Director, Institute for Regenerative Medicine at the Perelman School of Medicine, University of Pennsylvania since 2009. He is also the J. Leidy Professor at the Department of Cell and Developmental Biology at the University of Pennsylvania School of Medicine. He has received numerous honors including the Hans Popper Basic Science Award (2002), AAAS Fellow (2007), Joseph Leidy Chair (2009), and NIGMS (2006-2016). He is also on the Board of Directors, International Society for Differentiation, and Advisory Board for BetaLogics/Centocor/J&J and RaNA Therapeutics. Prof Zaret has held many editorial positions and presently serves on the editorial board in Genes & Development, Current Opinion in Genes and Development, Development and Science.