Institute of Medical Biology
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Seminar Announcement

- All Are Welcome -



Speaker : **Professor Kenneth Boheler**
Professor, Department of Physiology, and
Deputy Director, Stem Cell and Regenerative
Medicine Program, Hong Kong University

Title : ***"Chemoproteomics to Capture States of Human Pluripotency, Differentiation and for Drug Targeting"***

Date : **8 November 2013 (Friday)**
Time : **11:00am – 12:00pm**
Venue : **Breakthrough Theatrette, Matrix Level 4**
Host : **Dr Colin Stewart**
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Abstract:

Detailed knowledge of cell surface proteins present on human pluripotent stem cells (hPSCs) and their differentiated progeny would significantly enhance their characterization and clinical applications to regenerative medicine. Through a chemoproteomic approach, we have developed a post-transcriptional cell surface protein inventory of human embryonic stem cells (hESCs), induced PSCs (hiPSCs), and hPSC-cardiomyocytes (CMs). Against a backdrop of human foreskin fibroblasts and mouse embryonic fibroblasts, as well as 50 other cell types, we have determined the utility of over 30 previously untested antibodies for positive and negative selection, while mass spectrometry-verified extracellular domains has facilitated epitope-driven antibody development for previously unreported accessible markers. Comparison of the chemoproteomic-defined surface proteome to a transcriptionally-defined theoretical surface proteome indicated that hPSCs selectively regulate expression of some surface proteins post-transcriptionally. Discordances between RNA and protein ultimately led to the identification of drug targets that proved useful and highly selective for hPSC toxicity, while analysis of the hPSC-CMs has led to the identification of not only novel surface markers, but also signaling pathways that are essential for in vitro differentiation. These results provide unique insights into how hPSCs and their progeny interact with their microenvironment, selectively express surface proteins, and post-transcriptionally control signaling and transport capacities.

About the Speaker:

Kenneth Boheler received his Ph.D. in Physiology and Pharmacology at the University of California San Diego. After completing a post-doctoral fellowship at INSERM U127 in Paris in cardiac molecular biology, he moved to Imperial College as a Lecturer in the Department of Cardiothoracic Surgery, where he studied calcium-handling proteins in heart development and disease. In 1996, he moved to the National Institute on Aging, NIH where he became chief of the Molecular Cardiology and Stem Cell Group. Earlier this year, he relocated to Hong Kong as Deputy Director of the Stem Cell and Regenerative Medicine Consortium. During his time at the NIH, he employed gene-targeting techniques with in vitro differentiation of mouse embryonic stem cells to analyze the role of the ryanodine receptor in excitation-contraction coupling, pacemaker cell activity, and disease development. These in vitro studies evolved into an analysis of biological mechanisms underlying stem cell traits, including pluripotency, and signaling events that promote cardiomyocyte differentiation as well as enhance their maturation potential. Due to the heterogeneity of the in vitro differentiation systems, he recently re-oriented his lab to analyze the surface proteome of mouse and human somatic cells, stem cells and stem cell progeny. This research endeavor is now being exploited for mechanistic insights, immunophenotyping, development of reagents for basic and clinical applications, and for the study of surface proteins involved in monogenic disease disorders.