STEM CELL SOCIETY
SINGAPORE

STEM CELL CLUB

Thursday 8 July 2010 • Aspiration Theatrette, Matrix Building Level 2M,
30 Biopolis Street, Singapore 138671

Programme

4.30 - 5.30pm	Dr Shin-Ichi Nishikawa Group Director, Laboratory for Stem Cell Biology, RIKEN Center for Developmental Biology "The pathway of hematopoietic stem cell development explained"
5.30 - 6.00pm	Annual General Meeting 2010 of Stem Cell Society Singapore Only for members of SCSS
6.00pm	Network Social Provided by Stem Cell Society Singapore. Only for members of Stem Cell Society Singapore.

SPEAKER

Dr Shin-Ichi Nishikawa

The pathway of hematopoietic stem cell development explained

Abstract

Hematopoietic stem cell (HSC) is the most extensively studied stem cell, but yet its developmental pathway in mammals has not been fully explained. While it is established that the definitive HSC that maintains a life-long maintenance of hematopoietic system appears around E10-11 during embryogenesis, none of intermediate stages in the course of HSC differentiation from mesoderm has not been specified until recent years.

In this seminar, I will introduce our attempts to define this course. According to our model updated by the latest results, 4 distinct stages exist between mesoderm and dHSC. The first stage is Flk1+Etv2/ER71+ population appearing in the yolk sac of E7.0-7.5 embryo. As null mutation of etv2/er71 gene results in complete block of differentiation of endothelial and hematopoietic lineages, this is the major diverging point of those two lineages. Our analysis using Etv2 double KO ES cells suggests that Etv2 is involved directly in commitment of endothelial cells (EC) and HSC rather than indirectly via regulation of Flk1. The next stage in the HSC pathway is defined as Flk1+Runx1+GATA1+VECAD+. Etv2 expression is also maintained in this stage. While the major population derived from this stage is primitive hematopoietic cells, a small fraction of cells proceeds to the dHSC pathway. We have evidence that VECAD and GATA1 are downregulated in this stage, but definition of this stage requires further study. Subsequently, VECAD is re-induced in the embryo and resulting VECAD+Runx1+ hemogenic endothelial cells are integrated into the luminal wall of developing vascular system such as dorsal aorta and umbilical artery. Finally, CD45+ cells bud out from this Runx1+ endothelial cells by the down-regulation of molecules involved in maintaining cell-cell junction of endothelial cells. With this new definition of intermediate stages in dHSC differentiation pathway, we are investigating the molecules that regulate the decision making towards HSC.

Biography

Dr. Nishikawa is Director of the laboratory for Stem Cell Biology at RIKEN Center for Developmental Biology (CDB) and also Deputy Director of CDB. The major interest of his group is the molecular and cellular mechanisms governing development of hematopoietic stem cells.

Shin-Ichi Nishikawa was born in 1948 and studied medicine at Kyoto University from 1967 to 1973. There he also obtained his doctorate. As Humboldt Research Fellow he worked together with Professor Klaus Rajewsky at the Institute of Genetics at Cologne University from 1980 to 1982. From 1993, Nishikawa was full professor at the Graduate School of Medicine, Department of Molecular Genetics, Kyoto University. While his research interest is diverse, he made important contributions to each field through t works on the differentiation of B-cells, the function of tyrosine kinase receptors of the PDGFR family, the differentiation of haematopoietic stem cells and the development of peripheral lymphatic tissues. Professor Nishikawa became one of the leading stem cell biologists. Through his more than 200 publications he has gained high international reputation in his area of specialization.