DANDRITE
Danish Research Institute of Translational Neuroscience
Nordic EMBL Partnership for Molecular Medicine

DANDRITE Topical Seminar

by visitor Kouichi Hasegawa

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From 13:00 – 14:00

Aud. 6, 3rd floor, building 1170, room 347
Aarhus University, Ole Worms Allé 3, 8000 Aarhus C

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Understanding and Controlling Human Pluripotent Stem Cell Renewal and Differentiation with Materials

Chemically defined conditions for large-scale production and quality-control of human pluripotent stem cells (hPSCs including ES and iPS cells) is required for their application in transplantation therapies and drug screening. However, little is known about the molecular mechanisms of hPSC self-renewal, which impairs the identification of targets for applying chemical compounds to develop a chemically-defined culture system. Two growth factors bFGF and TGFβ are believed to be necessary extrinsic signaling molecules for hPSC self-renewal. Indeed most of the available culture systems include these growth factors. However, the molecular function of bFGF and TGFβ in the regulation of hPSC transcriptional networks and self-renewal are still poorly understood, and there are no compounds that can substitute for these factors. In a hypothesis driven small chemical library screening approach, we have identified novel signaling cascades and chemical compounds that regulate hPSC self-renewal and differentiation. Utilizing these compounds, we have developed a growth factor-free hPSC defined culture medium in which only 2 proteins are required. We have also developed a novel sphere culture system with 2 polymers instead of using recombinant protein matrixes. These medium and culture system will dramatically reduce the cost of hPSC research and applications, and may generalize hPSC therapies in future.

Host: Group Leader Mark Denham, DANDRITE