Seminar

Oct. 23 (Mon), 2017.
16:00～17:30

Vanue: Building B2, 4th floor, meeting room 426

Talk Title: Pluripotent Stem Cells: From Physiology to Cell Therapy, Disease Models and Test Systems

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Abstract

We aimed at generating iPS cell- derived cardiomyocytes (CMs) and their molecular and functional characterization in comparison to CMs derived from established ES cells on a transcriptomic and electrophysiological level. To select only one lineage, e.g. the cardiac lineage, and to allow for the identification of the transplanted cells, transgenic ES and iPS cells were used. They contained a vector with two cloning sites for EGFP and a puromycin resistance for selection under the α-MHC promoter. To demonstrate the ability of ES cells for regenerative medicine and tissue repair, cardiomyocytes differentiated from ES cells were injected into the cryo- infarcted left ventricular wall of adult wild type mice. Translation from the laboratory into the clinic is one of the remaining key issues remaining for applied stem cell research.

Reprogramming of fibroblasts from patients with LQT3 or CPVT syndrome by ectopic expression of the Yamanaka's transcription factors resulted in generation of iPS cells for disease modelling. This novel approach may also enable patient-specific cell replacement therapies which appear to be an indispensable prerequisite for a later use in clinics.

Within two European consortia, ESNATS and DETECTIVE, under my coordination we developed a battery of toxicity tests using human ES or human iPS lines subjected to different standardised culture protocols. Tests will cover embryoid bodies in different developmental stages and differentiated derivatives, including gamete and neuronal lineages, complemented with test systems for hepatic metabolism. Predictive toxicogenomics and proteomics markers will be identified. The individual tests will be integrated into an "all-in-one" test system. To enable future industrial use, we will prepare automating and scaling up of hESC culture. The predictivity, quality and reproducibility will be evaluated in a proof of concept study. Benefits are to increase safety due to better predicitvity of human test systems, to reduce, refine and replace animal tests, to lower testing costs, and to support medium/high throughput testing.

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