The Sixteenth iCeMS SEMINAR

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RIKEN, Center for Developmental Biology Neurogenesis and Organogenesis group

"Self-organized Formation of Cortical Tissue from ESCs"

Date & Time: Venue:

February 27, 2009, 16:00-17:00 Conference Room (#119)

1st Floor of the Research Building 1, iCeMS Complex 2

The mammalian cortex is a highly polarized structure that is patterned in a region-specific manner. We demonstrated self-organized formation of apico-basally polarized cortical tissues from ES cells using an efficient three-dimensional aggregation culture (SFEBg culture). The generated cortical neurons are functional, transplantable and capable of forming proper long-range connections in vivo and in vitro. The regional identity of the generated pallial tissues can be selectively controlled (into olfactory bulb, rostral and caudal cortices, hem and choroid plexus) by secreted patterning factors such as Fgf, Wnt and BMP. In addition, the in vivo-mimicking birth order of distinct cortical neurons permits the selective generation of particular layer-specific neurons by timed induction of cell cycle exit. Importantly, cortical tissues generated from mouse and human ES cells form a self-organized structure that includes four distinct zones (ventricular, early and late cortical-plate and Cajal-Retzius cell zones) along the apico-basal direction. Thus, spatial and temporal aspects of early corticogenesis are recapitulated and manipulatable in this ES cell culture.