CDB SEMINAR

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16:00~17:00 C1F, Auditorium

Evolution of cerebral cortical Development

Summary

Understanding how the mammalian isocortex (neocortex) evolved to its present complex state is a fascinating topic for neuroscience, genetics, bioinformatics and comparative biology. To gain further insights we study the development of various extant species. Our aim is to correlate cortical cell numbers and neuronal cell types with the elaboration of cortical progenitor populations and their modes of proliferation in different species. There are several progenitors, i.e. the ventricular radial glia, the subventricular intermediate progenitors and subventricular (outer) radial glia types, but the contribution of each to cortical layers and cell types through specific lineages is not fully understood. Recent comparisons of the proportions of these progenitors in various species during embryonic neurogenesis have revealed the elaboration and cytoarchitectonic compartmentalization of the germinal zone, with alterations in the proportions of various types that can be included among the intermediate progenitors.

Across species, larger and more diverse intermediate progenitor populations correlate with brain size and cortical cell diversity. The challenge is to relate the radial and tangential expansion of the neocortex with the changes in the proliferative compartments during mammalian evolution and with the analysis of transcriptomes and clones derived from the various sectors of the developing brain. Increased knowledge of neuronal numbers, cell types and their molecular taxonomy is redefining anatomy. The "fractal-like" progression of cortical sub-compartmentalization is potentially induced and modulated by local and distant signals during neocortical development and this result in relative amplification or diminution of selected neurogenetic events that drive forebrain evolutionary changes. Understanding the molecular and cellular interactions regulating the divisions of these intermediate progenitors not only has implications for cortical evolution but also relates to stem cell biology and illuminates the pathomechanisms of several cortical developmental disorders.

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