CDB SEMINAR

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INSTITUT JACQUES-MONOD, Université Paris Diderot

Friday, November 30, 2012

15:00~16:00 A7F Seminar Room

Migrating transient neurons: organizing activity in patterning of the cerebral cortex

Summary

The neocortex represents the brain structure that has been subjected to a major expansion in its relative size during the course of mammalian evolution. An exquisite coordination of appropriate growth of competent territories along multiple axes and their spatial patterning is required for regionalization of the cortical primordium and the formation of functional areas.

During development, progenitors expressing the Dbx1 homeodomain transcription factor are strategically positioned at boundaries between compartments, including the pallial-subpallial borders in mice, and their location is coinciding with signaling centers. Using genetic tracing and ablation in mice we have shown that at the earliest stages of cerebral cortex development $Dbx1^{+}$ progenitors give rise to subsequent waves of glutamatergic neurons which have the unique characteristics to migrate tangentially at long distance from their generation site and to be transiently present during development. Cortical patterning and the fine tuning of neuronal numbers leading to the formation of functional areas depends on the migration of Dbx1-derived transient neurons. By signaling to cortical progenitors in the mitotic compartment these neurons serve as organizers during development, therefore acting as “mobile signaling units”. Our work points towards a novel general strategy for long-range patterning in large structures whereby morphogens at signaling centers induce the generation of migrating cells which by producing themselves morphogens deliver them at distant locations.

We will discuss how the acquisition of new progenitor domain(s) at patterning centers and of migrating transient signaling neurons in mammals might represent one of the evolutionary steps leading to increase vertebrate brain complexity.

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