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Tangential Migration in Neocortical Development

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Abstract

During cortical development, different cell populations arise in the basal telencephalon and subsequently migrate tangentially to the neocortex. However, it is not clear whether these cortical cells are generated in the lateral ganglionic eminence (LGE), the medial ganglionic eminence (MGE), or both. In this study, we have generated a three-dimensional reconstruction to study the morphological formation of the two ganglionic eminences and the interganglionic sulcus. As a result, we have demonstrated the importance of the development of these structures for this tangential migration to the neocortex. We have also used the tracers DiI and BDA in multiple experimental paradigms (whole embryo culture, *in utero* injections, and brain slice cultures) to analyze the routes of cell migration and to demonstrate the roles of both eminences in the development of the cerebral cortex. These results are further strengthened, confirming the importance of the MGE in this migration and demonstrating the early generation of tangential migratory cells in the LGE early in development. Finally, we show that the calcium-binding protein Calretinin is expressed in some of these tangentially migrating cells. Moreover, we describe the spatiotemporal sequence of GABA, Calbindin, and Calretinin expression, showing that these three markers are expressed in the cortical neuroepithelium over several embryonic days, suggesting that the cells migrating tangentially form a heterogeneous population.

Keywords

development; embryo; ganglionic eminences; cerebral cortex; tangential migrations; rat

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