

Role of cortical interneuron migration for establishment of area specificity of the cortex

Fujio Murakami

(Osaka University, Graduate School of Frontier Biosciences, Neuroscience Laboratory, Professor)

【Outline of survey】

Neurons in the brain consist of projection neurons and local circuit neurons. Most of the former neurons are excitatory, while the latter are inhibitory. Brain functions rely on the balance between these two components. Recent studies have revealed: although excitatory neurons in the cerebral cortex were generated in the ventricular zone of the cortical anlage, GABAergic inhibitory neurons were generated in the basal telencephalon which was formed in the ventral part of the forebrain and then tangentially migrated into the cerebral cortex. Recently we studied the mechanism of the migration of the cortical GABAergic neurons, by using GAD67-GFP (green fluorescent protein)-knock-in mice and found that the mode of migration of these neurons is far more complicated than previously thought and that these neurons migrate to various directions even in the marginal zone. The issue to be addressed is how the GABAergic neurons are distributed and positioned in the cerebral cortex. Considering that there is area-specificity in the cerebral cortex, two possible mechanisms can be speculated: 1) the destiny of the GABAergic neurons is determined before the onset of the migration and they migrated to the destined position; alternatively, 2) they randomly migrated to the area and thereafter obtained the nature corresponding to each area they migrated and positioned. In the present study, we will examine these two hypotheses and possible participation of the GABAergic inhibitory neurons in the acquirement of area-specificity.

【Expected results】

Our research would elucidate mechanism of cortical interneuron migration and provides important insights into understanding the mechanisms of various development-associated brain disorders.

【References by the principal researcher】

- Tanaka D, Nakaya Y, Yanagawa Y, Obata K and Murakami F (2003) Multimodal tangential migration of neocortical GABAergic neurons independent of GPI-anchored proteins. *Development* 130, 5803-5813.
- Hatanaka Y, Hisanaga S, Heizmann CW and Murakami F (2004) Distinct Migratory Behavior of Early- and Late-born Neurons Derived from the Cortical Ventricular Zone. *J. Comp Neurol.* 479.1-14

【Term of project】 FY 2005 - 2009

【Budget allocation】 80,600,000 yen

【Homepage address】 <http://square.umin.ac.jp/murakami-lab/>