Form 1-5-2

Japan-U.S. Brain Research Cooperation Program
Researchers Dispatched to the U.S. Program FY2012: Report

Field:__Molecular/cell_____

1. Researcher

Name Hitoshi Gotoh
Title Assistant Professor
Affiliation: Department of Biology, Kyoto Prefectural University of Medicine

2. Research Title: Mechanisms of NG2 cell differentiation in telencephalon

3. U.S. Joint Researchers/Institutes
Please give the name, title and affiliation.

Akiko Nishiyama, Professor. Department of Physiology and Neurobiology, University of Connecticut

4. Research Period, from/to (mm/dd/yyyy):
From 09/01/2012 to 02/21/2013

5. Abstract, Results, and Research Significance (300 Words):

NG2 cells are major proliferating cells in the adult brain. They generate oligodendrocytes and NG2 cells but they give rise not only to NG2 cells but also to astrocytes in the embryonic ventral telencephalon. NG2 cells show lineage plasticity in disease conditions such as focal ischemia, thus it is important to analyze how lineage plasticity is regulated. In order to analyze the mechanism that regulates astrocytogenesis from NG2 cells, I focused on Nkx2.1 transcription factor, which is present in stem cells in the medial ganglionic eminence (MGE). I crossed Nkx2.1 KO mice with NG2-Cre:Z/EG mice and found that astrocytes are still generated even in the knockout embryos. In order to analyze the direct lineage of MGE cells, I performed cross transplant assay. When MGE cells are transplanted into ventral telencephalon, they mainly gave rise to NG2 cells. However, I found that LGE cells are the major source of NG2-derived astrocytes. Since Gsh2 transcription factor regulates the cell type derived from LGE, we are now preparing Gsh2 transgenic mice.

As another project, I identified enhancer region that regulates NG2 expression in NG2 cells. Because NG2 proteins are present not only in NG2 cells in the CNS but also in other cell types, such as pericytes, chondrocytes, or hair cell progenitor. The enhancer showed high specificity in the NG2 cells, thus it is useful for analysis of functional genes in NG2 cells. Moreover, I identified several transcription factors that regulate expression of NG2 gene, which is important for understanding how differentiation and maintenance of NG2 cell are regulated. I am now preparing the manuscript of NG2 enhancer project.

6. Other (Research concerns, particular points of note):
Nothing

*Please attach any reference materials as necessary.