

Regulation and interaction of SOX family transcription factors as the basis of neural primordial development

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【Outline of survey】

The problem of how an organ primordium is generated with precise localization and ordered organization in a simple embryonic structure is principal to understanding the entire developmental process. The first major organ primordium formed during embryonic development is that of the neural tissue. By investigating mechanisms of the genesis and regionalization of the neural primordium, we expect to identify principles in organogenesis pertinent to the variety of primordia. We take advantage of our original finding that transcription factor gene *Sox2* is expressed in coordination with the neural development. For instance, the process to initiate *Sox2* expression under the influence of organizer-associated tissues corresponds to the classical "neural induction". We investigate (1) how *Sox2* gene is regulated in early neural development, and (2) how SOX2 and other related transcription factors regulate downstream genes in the following process to regionalize neural tissues. Regulation of *Sox2* gene is achieved by the combinatorial effects of many regulatory sequences, which are strongly conserved among higher vertebrate genomes, validating our approaches to revealing mechanisms that are universal across the phyla.

【Expected results】

According to the regionalization of the neural primordium, specific neurons and/or glias are produced in later development. The problems we address in this study are included in the general issue of stem cell specification, an important issue in the field of regenerative medicine. For instance, understanding of how the neural primordium is generated would provide us with the means to handle neural stem cells, and knowledge of regionalization the primordium tells us how to direct neural stem cells for differentiation into specific neural subtypes.

【References by the principal researcher】

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Tanaka, S., Kamachi, Y., Tanouchi, A., Hamada, H., Jing N. and Kondoh, H. (2004) Interplay of SOX and POU factors in regulation of the *Nestin* gene in neural primordial cells. *Mol. Cell. Biol.*, 24, 8834-8846.

【Term of project】 FY 2005 - 2009

【Budget allocation】 86,700,000 yen

【Homepage address】 <http://www.fbs.osaka-u.ac.jp/labo/01a.html>