

Molecular Networks for the Regulation of Cell Polarization in Migrating Cells and Neurons

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【Outline of survey】

In response to extracellular and intracellular signals, cell exhibits a polarized morphology with adhering neighboring cells and extracellular matrix. Cell polarization is a fundamental process that makes cells enable to exert specific physiological roles in tissues. A migrating cell has front-rear polarity for directional and persistent migration, and a neuron is highly polarized and comprised of two structurally and functionally distinct parts, an axon and dendrites. The molecular mechanisms by which cell polarization is regulated remain largely unknown. The purpose of our research is to clarify the signaling networks for the cell polarity formation and maintenance in migrating cells and neurons. Our study also aims to reveal the regulatory mechanisms of the cytoskeleton and adhesion, and a selective protein and vesicular transports involved in the cell polarization. We have been studying the Rho family small GTPases, Par complex and CRMP-2. Our research interests are focused on mode of actions of these molecules on the cell polarization.

【Expected results】

It is a fundamental issue in cell biology, developmental biology, and neuroscience to understand the control mechanisms of the cell polarization in migrating cells and neurons. Our study will provides us with whole pictures of the molecular mechanisms of the cell polarity formation, maintenance, and a selective protein and vesicular transports. We hope that our research on molecular regulatory mechanisms for cell morphogenesis sheds light on the therapeutic approaches of inflammation, atherosclerotic disease, nephritis, and psychiatric and neurological disorders.

【References by the principal investigator】

- Neuronal polarity: from extracellular signals to intracellular mechanisms. Arimura N, and Kaibuchi K, Nat Rev Neurosci, 8, 194-205, 2007
- GSK-3 β regulates phosphorylation of CRMP-2 and neuronal polarity. Yoshimura T, Kawano Y, Arimura N, Kawabata S, Kikuchi A, and Kaibuchi K, Cell, 120, 137-149, 2005

【Term of project】 FY2008-2012

【Budget allocation】

150,000,000 yen (direct cost)

【Homepage address】

<http://www.med.nagoya-u.ac.jp/Yakuri/>