

# Brain Neural Network

Elucidation of the Principles of Formation and Function of the Brain Neural Network and Creation of Control Technologies



## [Research and Development Objectives]

Clarification of the control mechanisms of neural circuit operation and its formation

### Program Supervisor (PS)

#### OZAWA Seiji

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This R&D area aims to elucidate the molecular and cellular mechanisms of the generation, development, and regeneration of the brain neural network; to investigate how neural networks composed of a variety of elements in individual brain areas work and express their specific functions; and to clarify how the brain works as a coherent system by integrating the activities of these local networks. On the basis of such research, it also aims to create technologies for controlling the process of formation and activities of the brain neural network.

Specific approaches may include elucidation of the molecular mechanisms of development, differentiation, regeneration, target recognition, and migration of neurons (components of neural networks) and glial cells that significantly influence neural network formation and functions; elucidation of the mode of neural network activities by combining new technologies, such as visualization of specific neurons with the use of specific expression molecules and fluorescent proteins, simultaneous recording of activities of many neurons, and local stimulation with a caged compound; research to clarify the relationship of higher order brain functions with synaptic events through the combination of research at the network and system levels in model animals and research on the regulatory mechanism of synaptic transmission at the molecular and cellular levels; elucidation of the mechanism of neural network reorganization at the critical period or after brain damage; and creation of technologies for intervention in its process.

### R&D Area Advisors

ISA Tadashi	Professor, Kyoto University
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TSUDA Ichiro	Professor, Hokkaido University
NISHIZAWA Masatoyo	Professor Emeritus, Niigata University Fellow, Brain Research Institute
HONMA Sato	Professor, Hokkaido University
WADA Keiji	Director, National Center of Neurology and Psychiatry

Started in 2010 . . . . 1st period

System analysis of the structure and function of higher order neural circuits integrating sensory information

**ITO Kei**

Associate Professor, The University of Tokyo

Started in 2010 . . . . 1st period

Architecture of functional neural circuits in the cerebral cortex

**OHKI Ken-ichi**

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Started in 2010 . . . . 1st period

Elucidation of working principles within neural networks controlling language

**SAKAI L.Kuniyoshi**

Professor, The University of Tokyo

Started in 2010 . . . . 1st period

Roles of cell adhesion molecules in the formation of hippocampal neuronal circuitry

**TAKAI Yoshimi**

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Started in 2010 . . . . 1st period

Elucidation of the molecular basis of signaling cascades underlying plastic neuronal circuits via development of new probing and control technologies

**BITO Haruhiko**

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Started in 2010 . . . . 1st period

Elucidation of mechanisms of neural network reorganization and functional recovery after brain injury

**YAMASHITA Toshihide**

Professor, Osaka University

Started in 2011 . . . . 2nd period

Neuron-glia interaction in long-term remodeling of synapses in vivo

**NABEKURA Junichi**

Professor,  
National Institute for Physiological Sciences

Started in 2011 . . . . 2nd period

Modes of motor information processing in primate cerebro-cerebello-basal ganglia networks

**HOSHI Eiji**

Project Leader,  
Tokyo Metropolitan Institute of Medical Science

Started in 2011 . . . . 2nd period

Neurophysiological investigation of mechanisms of cognitive memory network in the cerebral cortex of macaques

**MIYASHITA Yasushi**

Project Professor, Juntendo University

Started in 2011 . . . . 2nd period

Neuronal individuality providing neural circuit formation and cell assembly

**YAGI Takeshi**

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