

Title of Project : Glial assembly: a new regulatory machinery of brain function and disorders

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【Purpose of the Research Project】

Neurons communicate with one another by forming neuronal circuits (NCs), which play a major role in expressing the brain function. Our brain also contains other cell types that are collectively called glia. Glial cells also communicate with one another and form glial circuits (GCs). Communication among neurons and that among glial cells are intrinsically different: glial communication being much slower and more gradual than neuronal communication. Long-range communication by glial cells often covers a macroscopic brain area, interacts with and affects the activity of NCs, and thereby controls the brain function. The purpose of this project is to clarify the mechanism that underlies the formation of gigantic GCs (glial assembly) and to understand how they control the brain function. We also aim to clarify how abnormalities in glial assembly are related to the pathophysiology of neuropsychiatric disorders.

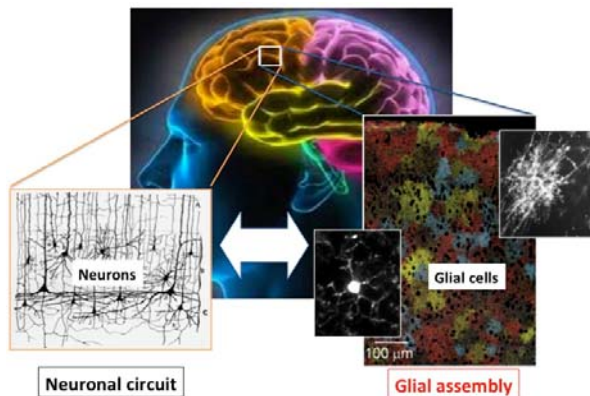


Fig.1 Interaction between NCs and glial assembly is crucial for the brain function.

【Content of the Research Project】

This research project will be conducted by three research teams.
Team A01 Regulation of brain function by glial assembly: Molecules involved in the glial communication will be identified. Interaction of glial assembly with NCs and its effect on the NC activity will also be studied.

Team A02 Regulation of brain maturation by glial assembly: We will study how the interaction between glial assembly and NCs is developmentally regulated, and clarify how the maturation of this interaction is associated with the expression of brain function.
Team A03 Glial disorders: Glial involvement in neuropsychiatric disorders whose pathophysiology is still under extensive investigation, such as schizophrenia, autistic spectrum disorders, pain disorders and demyelinating diseases, will be studied.

【Expected Research Achievements and Scientific Significance】

- 1) The mechanism controlling the formation of glial assembly and its role in the postnatal brain development will be clarified, with special emphasis on glia-dependent control of NC remodeling.
- 2) The mechanism through which glial assembly regulates the NC activity, and thereby the brain function, will be clarified.
- 3) A novel concept, Glial disorders, will be established. It is hypothesized that dysfunction of glial cells are involved in pathophysiology of various neuropsychiatric disorders. The goals of the research are identification of subtypes of the neuropsychiatric disorders caused by the abnormal glial assembly function (glial disorders), and development of innovative and fundamental treatments for those disorders.

【Key Words】

Glial assembly: a gigantic glial network that interacts with NCs and influence its activity

【Term of Project】 FY2013-2017

【Budget Allocation】 1,193,300 Thousand Yen

【Homepage Address and Other Contact Information】

<http://square.umin.ac.jp/glialassembl/>