

Analyses of architecture and functions of cerebral networks by target neuron-selective activity suppression and tract-tracing approaches

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【Outline of survey】

To elucidate the basic framework of complex and fine neural networks in the brain is very important for understanding a wide variety of brain functions based on the networks. Especially, it is essential to know about the mode of information processing in circuits linking the cerebral cortex (i.e., the frontal lobe) and the basal ganglia. The present study is designed to analyze the architecture and functions of the cortico-basal ganglia circuits or their component neurons. One attempt is made to develop a methodological approach to target neuron-selective activity suppression with a new lentiviral vector system in primates, thus examining changes in behavioral pattern and neuronal activity in response to motor and cognitive tasks. Another attempt is made to establish an anatomical system for target neuron-selective retrograde transneuronal tract-tracing with a recombinant rabies viral vector, thereby investigating multisynaptic inputs to a particular neuronal population.

【Expected results】

Our original approach enables us to not only perform target neuron-selective retrograde transneuronal tract-tracing by means of a recombinant rabies viral vector, but also achieve target neuron-selective activity suppression with the aid of a recently developed lentiviral vector pseudotyped with the envelope protein of rabies virus. The outcome of the present study is novel and crucial to clarify the architecture of cortico-basal ganglia networks involved in higher brain functions.

【References by the principal investigator】

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- Miyachi, S., Lu, X., Inoue, S., Iwasaki, T., Koike, S., Nambu, A., Takada, M. (2005) Organization of multisynaptic inputs from prefrontal cortex to primary motor cortex as revealed by retrograde transneuronal transport of rabies virus. **J. Neurosci.**, 25:2547–2556.

【Term of project】 FY2008–2012

【Budget allocation】

127,700,000 yen (direct cost)

【Homepage address】

<http://www.tmin.ac.jp/index.html>