

BRAIN MAPPING BY INTEGRATED NEUROTECHNOLOGIES FOR DISEASE STUDIES (BRAIN/MINDS)

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There is an emerging interest in brain-mapping projects in countries across the world, including the USA, Europe, Australia and China. In 2014, Japan started a brain-mapping project called Brain Mapping by Integrated Neurotechnologies for Disease Studies (Brain/MINDS). I am one of the Project Leaders of Brain/MINDS, with Dr. Atsushi Miyawaki. Brain/MINDS aims to map the structure and function of neuronal circuits to ultimately understand the vast complexity of the human brain, and takes advantage of a unique non-human primate animal model, the common marmoset (*Callithrix jacchus*) (Okano et al., *Philos Trans R Soc Lond B Biol Sci.*, 2016). The common marmoset is a small New World primate that has been used extensively as biomedical research models. The advantage of marmoset includes its high reproductive efficiency and the availability of transgenic technologies (Sasaki et al., *Nature*, 2009). With this technology, we generated transgenic model marmosets of neurodegenerative diseases by the lentiviral mediated overexpression of disease-causative mutant proteins. Furthermore, we could generate knock-out technologies of common marmoset using genome editing technologies for the generation of transgenic marmoset model of autism and psychiatric disorders (paper in preparation).

In Brain/MINDS, the RIKEN Brain Science Institute acts as a central institute. The objectives of Brain/MINDS can be categorized into the following three major subject areas: (i) structure and functional mapping of a non-human primate brain (the marmoset brain); (ii) development of innovative neurotechnologies for brain mapping; and (iii) human brain mapping; and clinical research. Brain/MINDS researchers are highly motivated to identify the neuronal circuits responsible for the phenotype of neurological and psychiatric disorders, and to understand the development of these devastating disorders through the integration of these three subject areas.

