# **Progress report 2024**

# **Translational Psychiatry Database (TPDB) Project**

Project Professor: Prof. Kiyoto Kasai Project Lecturer: Prof. Yoshihiro Satomura Prof. Naohiro Okada

Prof. Naohiro Okada Prof. Shinsuke Koike Dr. Sho Yagishita Dr. Kentaro Morita Dr. Shimon Tonsho Dr. Yutaka Sawai

# [ Project Overview ]

This project is part of the "Brain/MINDS 2.0" (Core Organization) under the Japan Agency for Medical Research and Development (AMED). It aims to understand brain functions and disease pathophysiology through the development and application of brain data integration platform. The Department of Neuropsychiatry at the University of Tokyo Hospital plays a central role in constructing and supporting a multi-layered integrated database on human brain function and psychiatric disorders, contributing to the development of diagnostic, therapeutic, and preventive measures for mental illnesses.

# [ Research Content ]

#### Construction of a Multi-Layered Integrated Database on Human Brain Function and Psychiatric Disorders

- Creation of a metadata database integrating human MRI, EEG, epigenome, and genome data, etc.
- Integration and analysis of sub-databases corresponding to different hierarchical levels of brain structure and function.

#### Development of a Mouse Translational Database Considering Development and Environmental Factors

• Database construction to capture the effects of genetic predisposition, social environmental factors, and learning/memory history on brain structure.

#### **Construction and Operation of a Brain MRI Database for Psychiatric Patients**

- Integration of brain MRI images (resting-state functional imaging, structural imaging, diffusion tensor imaging, etc.) collected from multiple institutions nationwide, including both healthy individuals and psychiatric patients.
- After removing personally identifiable information, the database is made available for collaborative use by participating institutions and distributed to applicant organizations.

# [ Future Prospects ]

#### Understanding the Dynamics of Brain Functional Development

- Clarification of psychiatric disorder onset mechanisms through the integration of human and animal model data.
- Development of new disease models that consider environmental influences during the developmental process.

#### **Application to Diagnosis and Treatment**

• Identification of biomarkers for psychiatric

disorders using the constructed database.

• Development of data-driven diagnostic and treatment methods to promote personalized medicine.

#### **Expansion and Utilization of the Data Platform**

- Advancement of data analysis through deep learning technology.
- Strengthening collaboration with partner research institutions and promoting open data utilization.

# [ Activity Report for Fiscal Year 2024 ]

# Launch of the Brain MRI Database for Psychiatric Patients

- Collaboration with medical and research institutions nationwide for data collection and integration.
- Implementation of quality control and standardization for the collected data and provision to researchers.

#### Trial Operation of the Multi-Layered Integrated Database

- Server installation for the integration of human MRI, EEG, and genome data.
- Development of a system for qualitative analysis using natural language processing on free-text data obtained from patient family web surveys and day-care conference records.

#### **Publications**

**Japanese Papers:** 

#### **English Papers:**

Itahashi T, Yamashita A, Takahara Y, Yahata N, Aoki YY, Fujino J, Yoshihara Y, Nakamura M, Aoki R, Okimura T, Ohta H, Sakai Y, Takamura M, Ichikawa N, Okada G, Okada N, Kasai K, Tanaka SC, Imamizu H, Kato N, Okamoto Y, Takahashi H, Kawato M, Yamashita O. Hashimoto RI: Generalizable transportable and resting-state neural characterized by functional signatures networks, neurotransmitters, and clinical symptoms in autism. Mol Psychiatry 2024

Sep 28. doi: 10.1038/s41380-024-02759-3.

- Yanagida Y, Naka I, Nakachi Y, Ikegame T, <u>Kasai K</u>, Kajitani N, Takebayashi M, Bundo M, Ohashi J, Iwamoto K: Development of a method for the imputation of the multi-allelic serotonin-transporter-linked polymorphic region (5-HTTLPR) in the Japanese population. *J Hum Genet* 2024 Sep 25. doi: 10.1038/s10038-024-01296-9.
- Zhao Z, Okada N, Yagishita S, Yahata N, Nitta N, Shibata S, Abe Y, Morita S, Kumagai E, Tanaka K F, Suhara T, Takumi T, <u>Kasai K</u>, Jinde S: Correlations of brain structure with the social behavior of 15q11-13 duplication mice, an animal model of autism. *Neurosci Res* online 2 August 2024. https://doi.org/10.1016/j.neures.2024.07.009
- Kawakami S, Okada N, Satomura Y, Shoji E, Mori S, Kiyota M, Omileke F, Hamamoto Y, Morita S, Koshiyama D, Yamagishi M, Sakakibara E, Koike S, <u>Kasai K</u>: Frontal poleprecuneus connectivity is associated with a discrepancy between self-rated and observerrated depression severity in mood disorders: a resting-state functional magnetic resonance imaging study. *Cereb Cortex* 34: bhae284, 2024. https://doi.org/10.1093/cercor/bhae284

# <u>Conference and Symposium Presentations</u> Conferences in Japan

• 27th Annual Meeting of the Japanese Society for Prevention and Early Intervention in Psychiatry (2024/11/23) – Poster Presentation

"Understanding the Medical Needs of 22q11.2 Deletion Syndrome: Thematic Analysis Using Natural Language Processing"

 29th Annual Meeting of the Japanese Society for Day Care Treatment (2024/12/7) – Poster Presentation

"Changing Roles of Daycare Viewed Through the Words of Medical Professionals, Patients, and Families: Textual Transitions from the 1970s to the Present"

#### **International Conferences**

Lectures and Research Meetings

**Social Activities**