Brain/MINDS Beyond Human MRI Database

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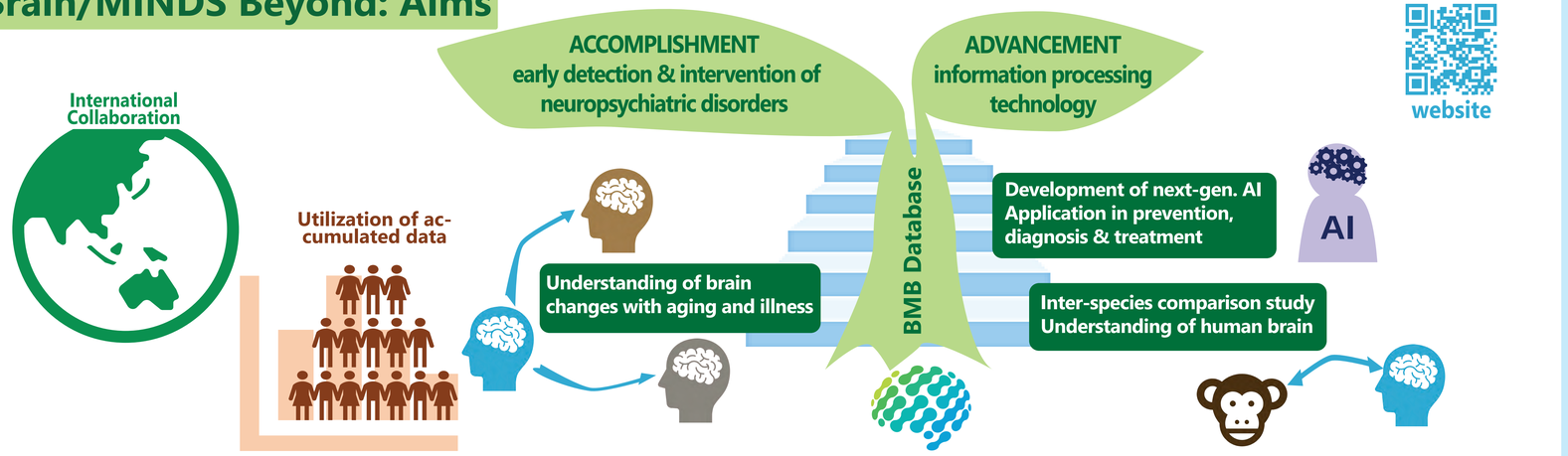
AMED

Brain/MINDS Beyond: Aims



Brain/MINDS Beyond has been actively working towards establishing a brain imaging database since its launch in 2018. Brain imaging data has expanded in quality and quantity because of the progress of analysis methods and measurement techniques and the development of domestic and international collaborative studies. This database aims to develop a framework to manage and provide large-scale MRI datasets on healthy populations and neuropsychiatric disorders across life-span in Japan for promoting international collaborations.

The database acquires cross-sectional and longitudinal data (brain images & clinical data) of mental and neurological disease . The focus disease areas are as follows.

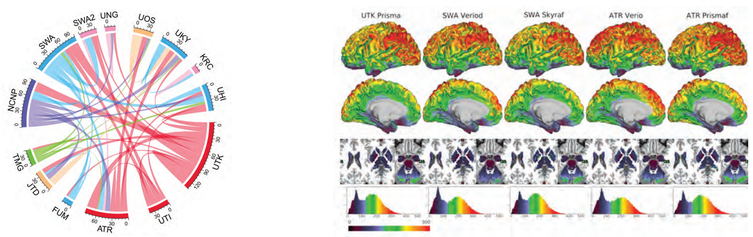
Developmental Disorders (ASD/ADHD), Depression, Bipolar Disorder, Chronic Pain, Schizophrenia, Eating Disorders, Epilepsy, Parkinson's Disease, & Alzheimer's Disease

The pre-onset stages of psychiatric and neurological disorders are also measured in an exploratory manner and a predictive biomarker search is also conducted.

Harmonization method of MRI in the BMB

MRI data are said to have systematic errors depending on the device and method of imaging. In order to promote research using MRI among multiple institutions, the BMB-HBM MRI working group is developing an analysis method to harmonize and standardize data of each institution by removing system-specific errors from MRI data. This method is expected to enable accurate characterization of individual differences and diseases in the future.

- Standardization and harmonization of MRI protocol (HARP)
- Standardization of pre-treatment analysis methods
- Travelling subject methods
- Statistical modelling



Brain/MINDS Beyond brain MRI harmonization protocol developed in accordance with the Human Connectome Project

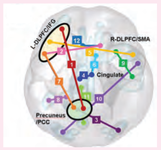
Data sharing and quality control (QC)

Brain MRI images of neuropsychiatric disorders acquired at multiple centres are managed centrally, including pre-processing, and made available to national and international researchers in an accessible way. This database is also working towards standardising the QC of Incidental Findings (IFQC).

Studies using datasets

● Obtaining useful information on treatment options

- Identifying disease subtype
- Quantifying the spectrum of psychiatric disorders

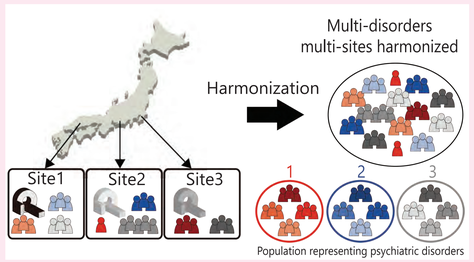


Ichikawa et al., Scientific Reports, 2020

● Development of Harmonization method to reduce site difference

- The differences between sites are modelled and compensated using travelling subject method.

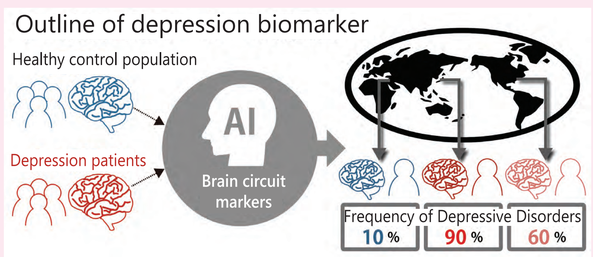
Pulished in "Kyoto Shimbun" (April 19, 2019)



Yamashita et al., PLOS Biology, 2019

● Uniform analysis of data acquired from different sites

- Development of brain circuit biomarker of depression valid at any site using machine learning
- Efforts towards clinical appication



Yamashita et al., PLOS Biology, 2020

Open Brain Imaging Big Data

1627 MRI data
5 neuro-psychiatric disorders & healthy subjects
14 institutions
9 traveling subjects

DecNef Project

Introduced at NHK "Ohayō Nippon" (August 31, 2021)

Tanaka et al., Scientific Data, 2021

Open Datasets

Users: domestic (1/3), overseas (2/3)

★accounts of dataset download (2022/5)

●SRPBS Multidisorder Connectivity Dataset
(restricted release, 1625) **50**★

●SRPBS Multidisorder MRI Dataset
(restricted release, 1627) **50**★

●SRPBS Multidisorder MRI Dataset
(unrestricted release, 1410) **118**★

●SRPBS Traveling Subject MRI Dataset
(restricted release, **9** subjects, **12** sites, **143** image data) **64**★

Data
1) Resting state functional connectivity (mat)
2) Brain imaging dataset (NIFTI) – rsfmri, T1w, fieldmap
3) Participant demographics
4) README
5) MRI protocols

Publications using the datasets
- Internal to AMED projects (SRPBS, BMB researchers) > 14
- External to AMED > 5

Tutorials on imaging and integrated analysis methods etc.
Young MRI researchers are welcome!

Human brain MRI Project

Brain/MIND Beyond's mission is to elucidate pathological conditions and develop preventive, diagnostic and therapeutic methods through brain imaging analysis of human and non-human primates, and to promote international collaboration through public access to data.

Dr. Saori Tanaka (ATR) will introduce databases in Public Open Lecture (Japanese, 7/3 afternoon@Okinawa Convention Center).

An opportunity to know more!