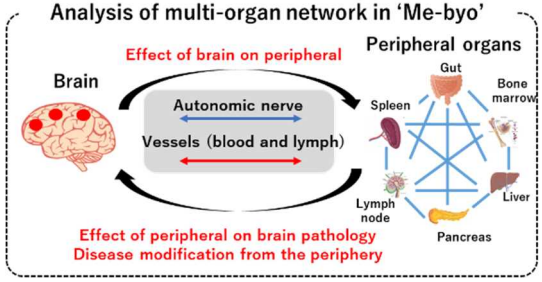
R&D item

1～4. Brain and multi-organ network in Alzheimer's disease, vascular dementia and Parkinson's disease dementia

Progress until FY2023

1. Outline of the project

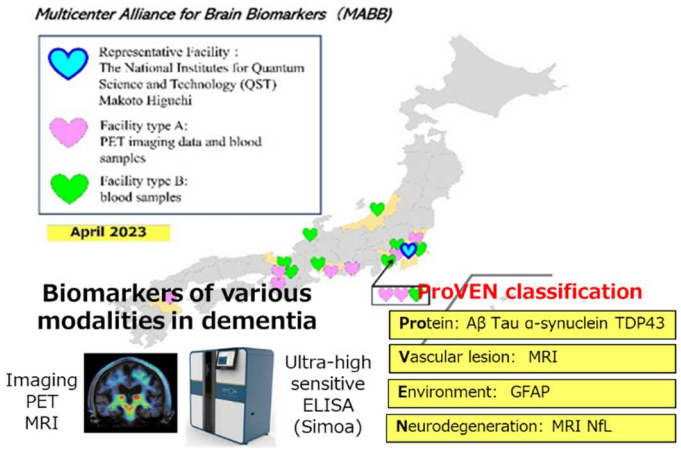
Alzheimer's disease (AD) vascular dementia, and Parkinson's disease dementia are the three major dementias. We aim to elucidate the multi-organ network in these dementias by mathematical analysis using novel mouse models and human cohorts to develop risk prediction and prevention methods. We will use a model in which the causative protein starts to accumulate in "Me-byo" state and symptoms develop later, enabling us to analyze the preclinical stages of various pathological conditions. We are also conducting human cohorts in preclinical conditions.



2. Achievement in 2023

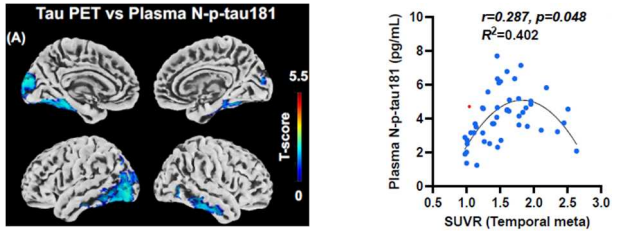
A multicenter cohort of 'Me-byo' for dementia

The MABB (multicenter alliance for brain biomarkers) 'Me-byo' cohort, in which 18 institutions are currently participating, is a multicenter alliance that promotes the development of imaging and blood biomarkers. The MABB research is characterized by the availability of secondary use of data and samples from other clinical studies, which will accelerate validation of biomarkers.

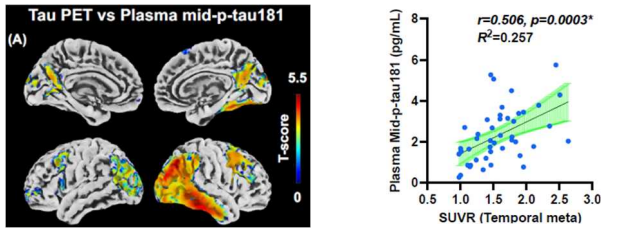


In analyzing this pre-disease cohort, our research group is focusing on the **ProVEN** classification, which is a more comprehensive categorization of dementia.

Specifically, this involves analyzing pathological proteins such as amyloid β and tau (Protein), brain inflammatory environment (Environment), vascular lesions (Vascular), and neurodegeneration (Neurodegeneration) using biomarkers in body fluids, MRI, and PET. This year, we have developed a novel highly sensitive detection system (ELISA) for phosphorylated tau (p-tau) in blood, which is one of the most important markers that accumulates in AD and is correlated with neural damage.



With conventional ELISA methods for measuring p-tau, the correlation with tau accumulation observed in PET was lost, particularly as the pathology progressed.



With the novel ELISA method for measuring p-tau, the correlation with tau accumulation observed in PET was maintained.

3. Future plans

Various types of data will be collected from original disease models and dementia "Me-byo" cohorts. Furthermore, we will identify candidate biomarkers that contribute to early diagnosis through data-driven analysis of multi-organ networks, and try to predict and prevent the development of dementia.