Goal2 Realization of ultra-early disease prediction and intervention by 2050.

Comprehensive Mathematical Understanding of the Complex Control System between Organs and Challenge for Ultra-Early Precision Medicine

Project manager

(selected in 2020)

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Leader's institution

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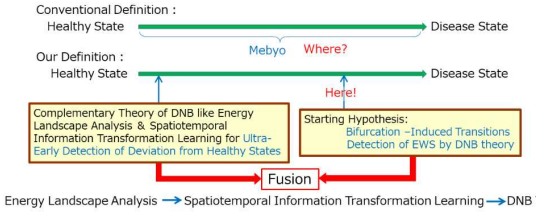
R&D institutions

The Univ. of Osaka, Kyushu Univ., Institute of Science Tokyo, The Univ. of Tokyo, Univ. of Toyama, Nagoya Univ., Univ. at Buffalo, Fujita Health Univ., Keio Univ., National Institute of Informatics, The Jikei Univ. School of Medicine, Kagawa Univ., Nagoya Institute of Technology, Chiba Institute of Technology, Tokyo City Univ., Hiroshima Univ., Kyoto Univ., Kyoto Pharmaceutical Univ., Hirosaki Univ., and National Center for Child Health and Development

Summary of the project

We will establish **integrated research between mathematical studies** with mathematical data analysis and modeling analysis, and **experimental studies** on physiological interaction and control between organs. In particular, we develop **DNB (Dynamical Network Biomarkers) theory** and **its complementary theory & AI like spatiotemporal information transforming learning to detect the pre-disease states (Mebyo) and deviation from healthy states, respectively,** at ultra-early timing before tipping points to disease states and propose methodology for **Ultra-Early Medicine** based on such ultra-early detection as well as treatments with **control theory** on physiological networks. The long-term purpose of this project is to realize **a society equipped with ultra-early disease prediction and intervention systems** by 2050.

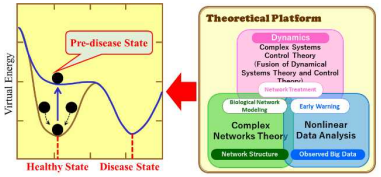


Milestone by 2030

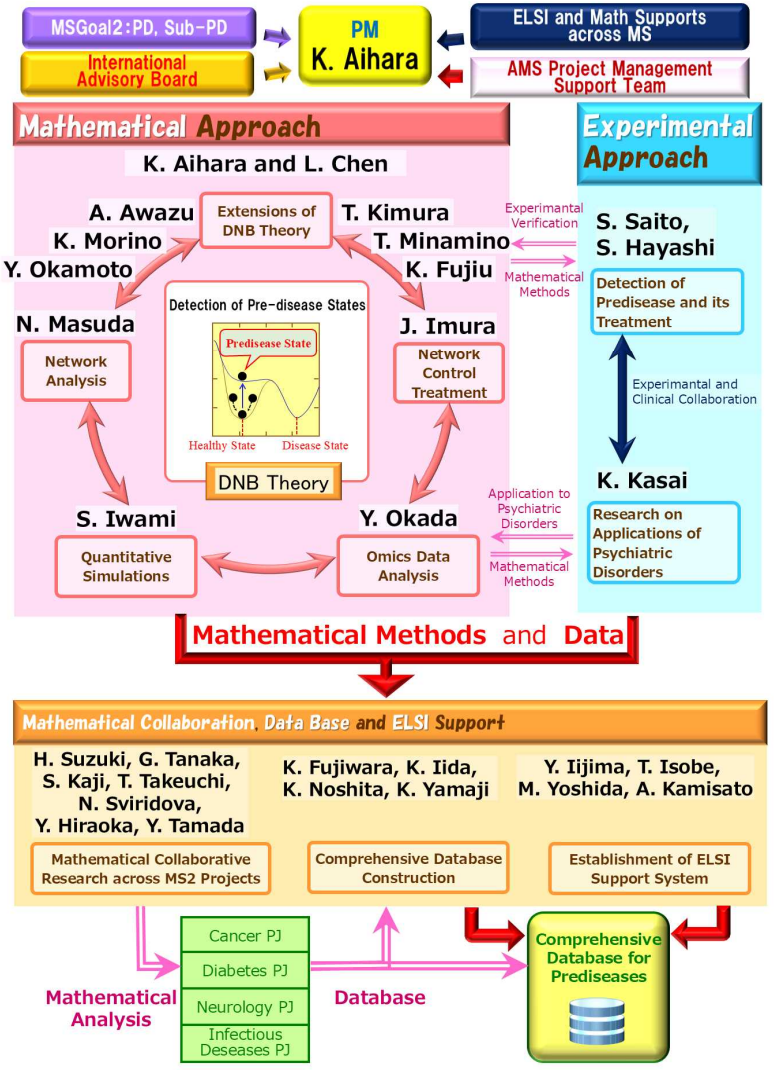
Based on mathematical & AI studies, we will develop **methodology of network medicine** to detect early warning signals of diseases in the pre-disease states before diseases will really occur and to **cure imminent diseases before the onsets by network control**.

Milestone by 2025

We will develop methodology for **detecting early warning signals of diseases in pre-disease states before the onsets** by analyzing various biological and medical data on the basis of mathematical data analysis and mathematical modeling analysis.



Project structure



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