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

Challenge toward the Control of Intractable Cancer through Understanding of Molecular, Cellular, and Interorgan Networks

Here begins our new MIRAI
MOONSHOT RESEARCH & DEVELOPMENT PROGRAM

Project manager

(selected in 2020)

OHNO Shigeo

Special Contract Professor,
Institute for Diseases of Old Age,
School of Medicine,
Juntendo University

Leader's institution

Juntendo University

R&D institutions

Osaka University, Kyushu University, Kyoto University, Keio University, Japanese Foundation for Cancer Research, Kobe University, Juntendo University, Tokyo Medical and Dental University, University of Tokyo, Tokushima University, Nagoya University, Fujita Health University, RIKEN, Ryukyu university, National Institute of Biomedical Innovation, Kochi University

Outline of the project

In Japan, more than half of the population suffers from cancer, and one in several people dies of cancer. Even if an excellent drug is developed, the situation continues that we cannot know whether it is effective for ourselves until we use it. Among them, refractory cancer poses the most serious threat, largely due to the fact that the cause of refractory cancer is largely unknown and early diagnosis methods have not been established.

To date, basic cancer research has been conducted using animal models and established cancer cell lines due to various technical and social constraints. However, with the advent of various innovative technologies such as genome analysis technology from minute samples and patient organoid technology, new cancer research is expanding utilizing patient biometric data obtained from cancer patient clinical samples.

In this project, we will promote efforts to further deepen and solidify these technologies. Specifically, it is the development of technologies and research bases for collecting and accumulating clinical specimens and data including early stage cancers, technologies and research bases for identifying key factors for prediction and prevention and technology and research infrastructure to identify the role of the given factors in the pathogenesis process.

By conducting these efforts in an integrated manner, we will develop and maintain several basic technology groups necessary for the prediction and prevention of intractable cancers. At the same time, we will promote the development of new diagnostic markers and therapeutic targets that enable the prediction and prevention of intractable cancers.

We develop innovative technologies for prevention, diagnosis, and treatment to turn intractable cancers into curable cancers by year 2030. We aim to create a society in which everyone can get precision medicine of cancer at any moment by year 2050.

Milestone by year 2030

We develop innovative technologies for prevention, diagnosis, and treatment to turn intractable cancers into curable cancers.

Milestone by year 2025

We develop biomarkers and therapeutic target molecules for early detection of intractable cancers.

Project structure

Development of technologies for collecting patient biospecimens and data for the realization of optimal medicine (My Medicine):

Using clinical specimens of intractable cancers, based on ELSI, we will develop new mechanisms and new technologies for acquiring and accumulating various biological data, including individual genomic information and genomic abnormalities in cancer tissues.

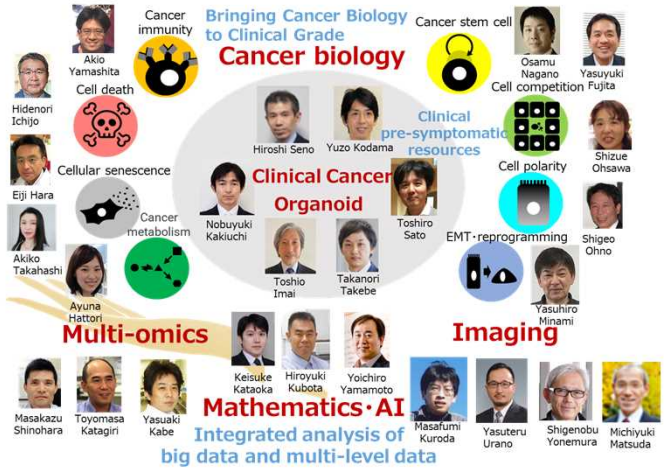
Technology development for integrated analysis and verification of patient biometric data:

We will promote the development of integrated mathematical and AI methods to uncover molecules (and networks) involved in pathogenesis, using various levels of biological big data including genomes, patient organoids, animal models necessary for experimental verification and new omics and imaging technology.

Technology development for the creation of innovative diagnostic and treatment concepts based on understanding of the onset process of cancer:

We will proceed with the development of biological experimental systems and techniques to identify specific roles of the identified "candidates" in the pathogenesis process at the level of cell biology.

Research system for comprehensive understanding of the presymptomatic cancer network



Japan Science and Technology Agency