

Premium Research Institute for Human Metaverse Medicine (PRIME)



Taking on an Unending Challenge:
“Conquering All Diseases”
by Metaverse-based Medial Research



Why advancements in medicine have not eliminated all diseases?

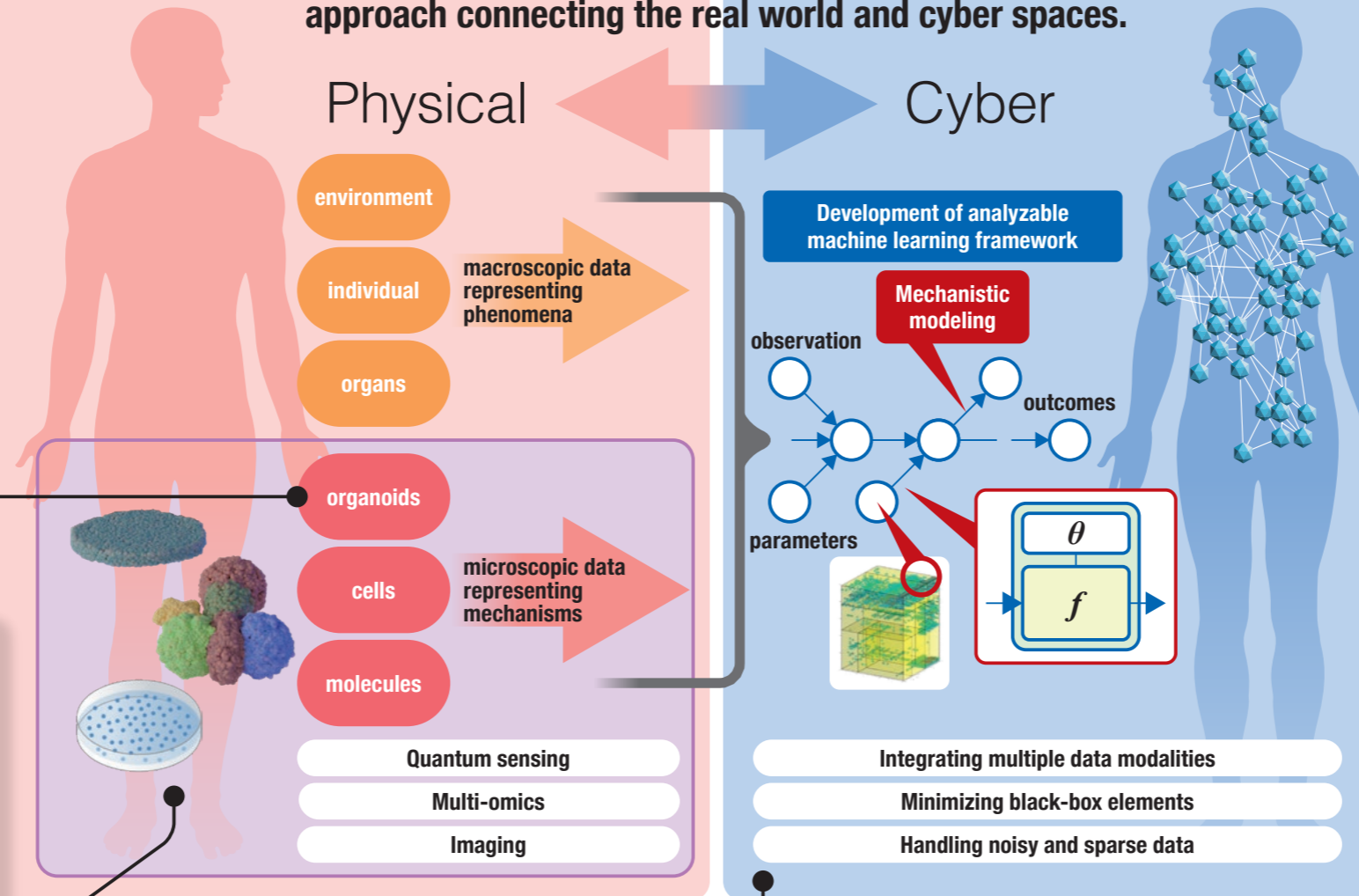
Elucidating the causes of diseases are inherently difficult

Conventional medicine has successfully found causes for diseases that have a clear causal dependence on single genetic or environmental factors.

Although conventional medical developments have improved average lifespans, we witness explosive growth in age-related diseases such as diabetes, dementia, and cardiac failure.

Many of these diseases are caused by complex and long-term interactions between genetic and environmental factors over time. As such, it is extremely difficult to comprehensively understand pathogenic mechanisms using medical research primarily based on animal models. This necessitates the establishment of a novel approach to further push forward advancement in medical research.

Understanding causes and onset mechanisms of diseases via the dynamic research approach connecting the real world and cyber spaces.



Feature 1 Use of human organoids

Organoids (miniature organs) will be created from iPS cells of individuals with various health conditions. Experiments using these organoids can induce the onset of targeted disease in a significantly shorter time than in vivo (real-life conditions).

Feature 2 Replicate diseases with organoids and measure them with advanced technology

Stimuli will be given to organoids to replicate the onset of targeted disease, and the changes caused will be measured. The measured data spans a wide temporal range (from millisecond to months) and extensive spatial dimensions (from the molecular to the cell and organ level).

Feature 3 Creation and development of biodigital twins

While taking full use of information and mathematical sciences, measurements obtained from organoids are integrated with clinical and statistical data to construct the model for the onset mechanism of diseases. Tracing the networks formed by interrelated data sets will enable identification of the causes of diseases.

Feature 4 Storing biodigital twins in the human metaverse promoting research and remedy development

In order to share and utilize human biodigital twins, an information space embodying the human metaverse will be constructed. Researchers and medical professionals can utilize this informational space in future to perform research activities such as clinical trials, drug design personalized diagnosis, and medical treatment.



Center Director
Kohji Nishida

Professor,
Graduate School of Medicine
Osaka University

Message from the Center Director

We are creating a new scientific field “Human Metaverse Medicine” that will help to conquer all the diseases.

We focus on chronological sequence of our lives—from gestation, through reproduction till aging—to understand the casual processes of disease development in the human organisms in a comprehensive and unbroken developmental manner, thereby creating the new scientific field: “Human Metaverse Medicine”. Through medical research using human metaverse, we will develop individualized prevention and treatment methods that conquer all diseases.

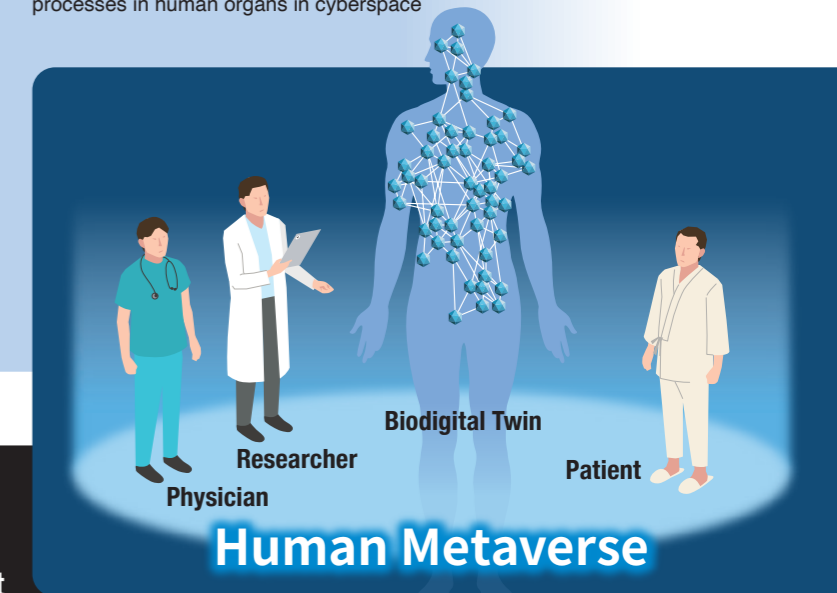
Our immediate research targets at diseases that develop with age such as hepatic disorders, obesity, dementia, degeneration of the retina and optic nerve, cardiac failure, and osteoarthritis.

By gathering outstanding researchers from a wide range of disciplines in this center, we integrate “human organoid-based biomedical science” and “information and mathematical sciences” for the first time in the medical world. Furthermore, our groundbreaking project incorporates research on ethical, legal, and social issues of technology.

Biodigital Twin

What is a biodigital twin:

A replica of biological phenomena and pathological processes in human organs in cyberspace



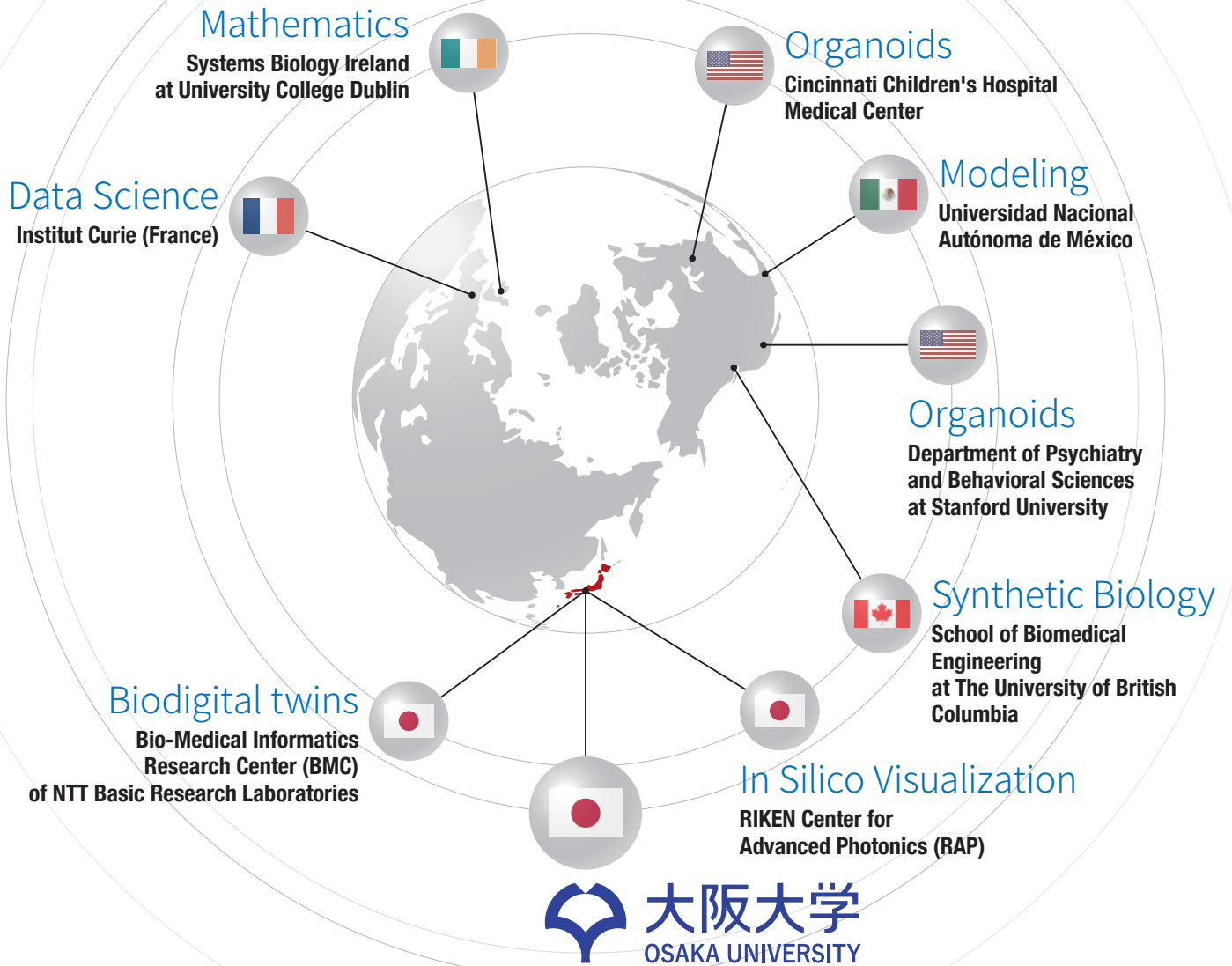
Human Metaverse



Global Research Network

We pursue the research by closely collaborating with research institutes and universities all over the world.

PRIME satellites will be set up at The University of British Columbia, Universidad Nacional Autónoma de México, RIKEN Center for Advanced Photonics (RAP) and Bio-Medical Informatics Research Center (BMC) of NTT Basic Research Laboratories. Moreover, we develop our research in Human Metaverse Medicine by collaborating with four overseas research institutes - the Cincinnati Children's Hospital Medical Center, Stanford University, Systems Biology Ireland at University College Dublin (Ireland), and Institut Curie (France).



Contact us

Premium Research Institute for Human Metaverse Medicine (PRIME)

URL

<https://prime.osaka-u.ac.jp/>