

大阪大学ヒューマン・メタバース疾患研究拠点
Premium Research Institute for Human Metaverse Medicine (PRIME)



Taking on an unending challenge:
“conquering all diseases”
by metaverse-based medical research

Why have advances in medicine not eliminated all diseases?

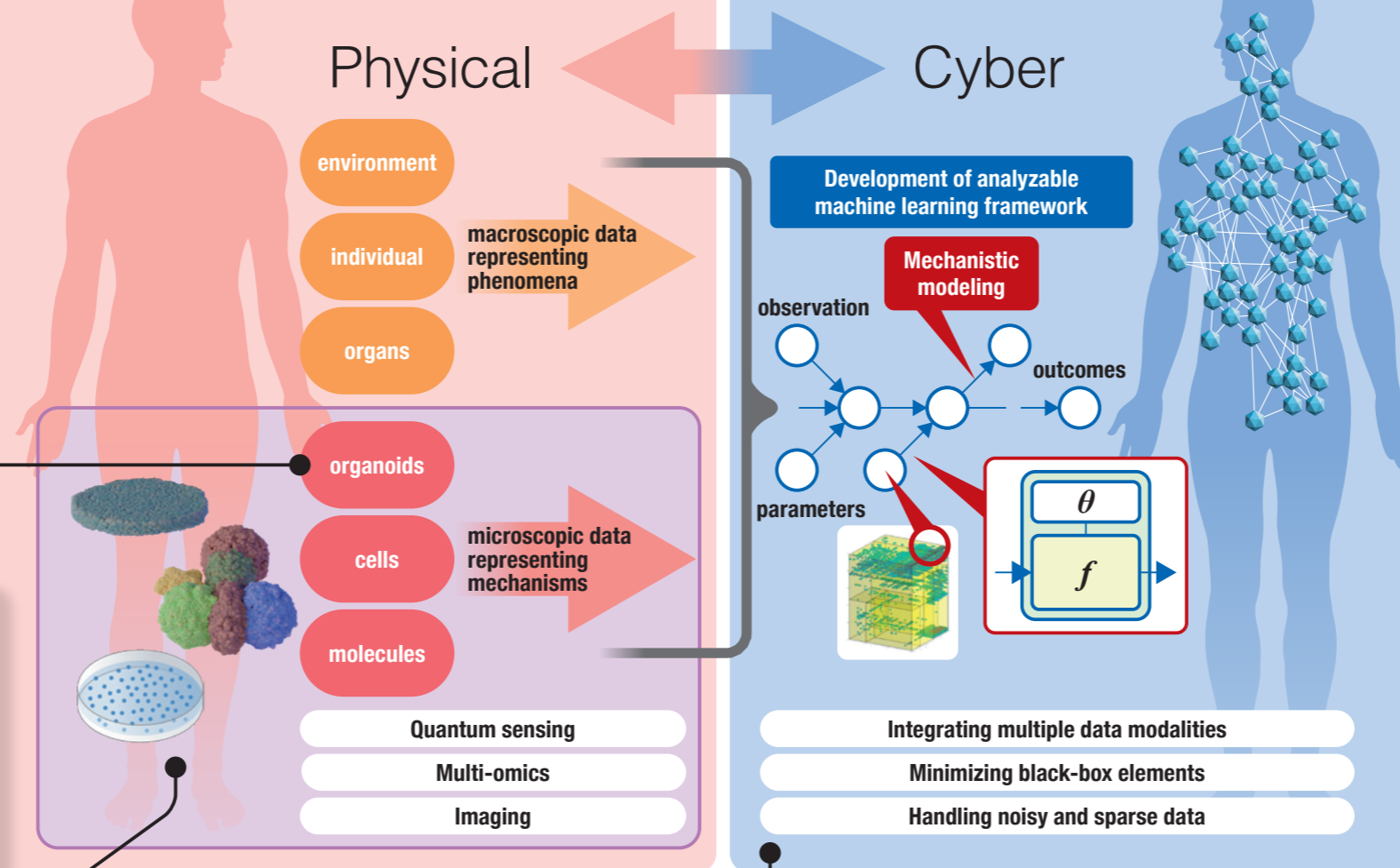
Fully understanding the causes of a disease is fundamentally difficult

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

However with resulting large advances in average lifespans, this has led to the explosive growth in age-related diseases: diabetes, dementia, and cardiac failure.

Because many of these diseases are caused by complex and long term interactions between genetic and environmental factors over time, it is extremely difficult to gain a comprehensive understanding of their pathogenic mechanisms using animal models, a novel approach is needed to advance and promote medical research further.

Research spanning the real world and cyber spaces will give us a new insight into the causes and onset mechanisms of diseases.



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 make it possible to induce the onset of a disease much more quickly 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 the 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

Measurements obtained from organoids are integrated with clinical and statistical data, with the full use of information and mathematical sciences, to model the onset mechanism of diseases. Tracing mutual relationships between data sets will enable identification of the causes of diseases.

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

Human metaverse that serves as an information space will be created to share and utilize human biodigital twins. For the future, researchers and medical professionals will utilize this informational space to perform activities like clinical trials, drug design personalized diagnosis, and medical treatment.



Center Director
Kohji Nishida

Professor,
Graduate School of Medicine
Osaka University

Message from the center leader

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 life—from its gestation, through reproduction till aging—to understand the processes of disease development in the human organisms in its comprehensive and unbroken developmental cause, to achieve the creation of a new scientific field: “Human Metaverse Medicine”. Through medical research using this metaverse, we will work to develop individualized prevention and treatment methods to conquer all diseases.

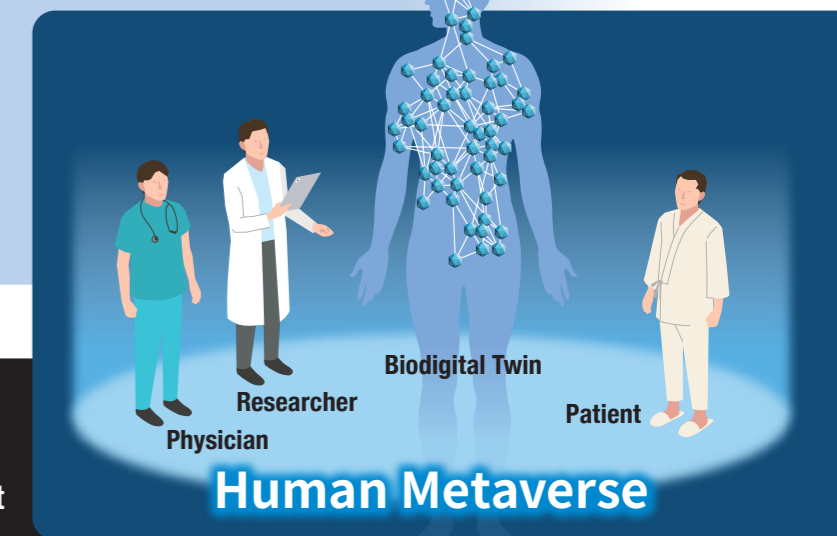
The immediate research targets include diseases that develop with age such as hepatic disorders, obesity, dementia, degeneration of the retina and optic nerve, cardiac failure, and osteoarthritis.

Researchers from a wide range of discipline cooperate in this center to integrate “human organoid-based biomedical science” and “information and mathematical sciences” for the first time. We also discuss this new type of research’s ethical, legal, and social issues.

Biodigital Twin

What is a biodigital twin:

Replica of biological phenomena and pathological processes in human organs in cyberspace

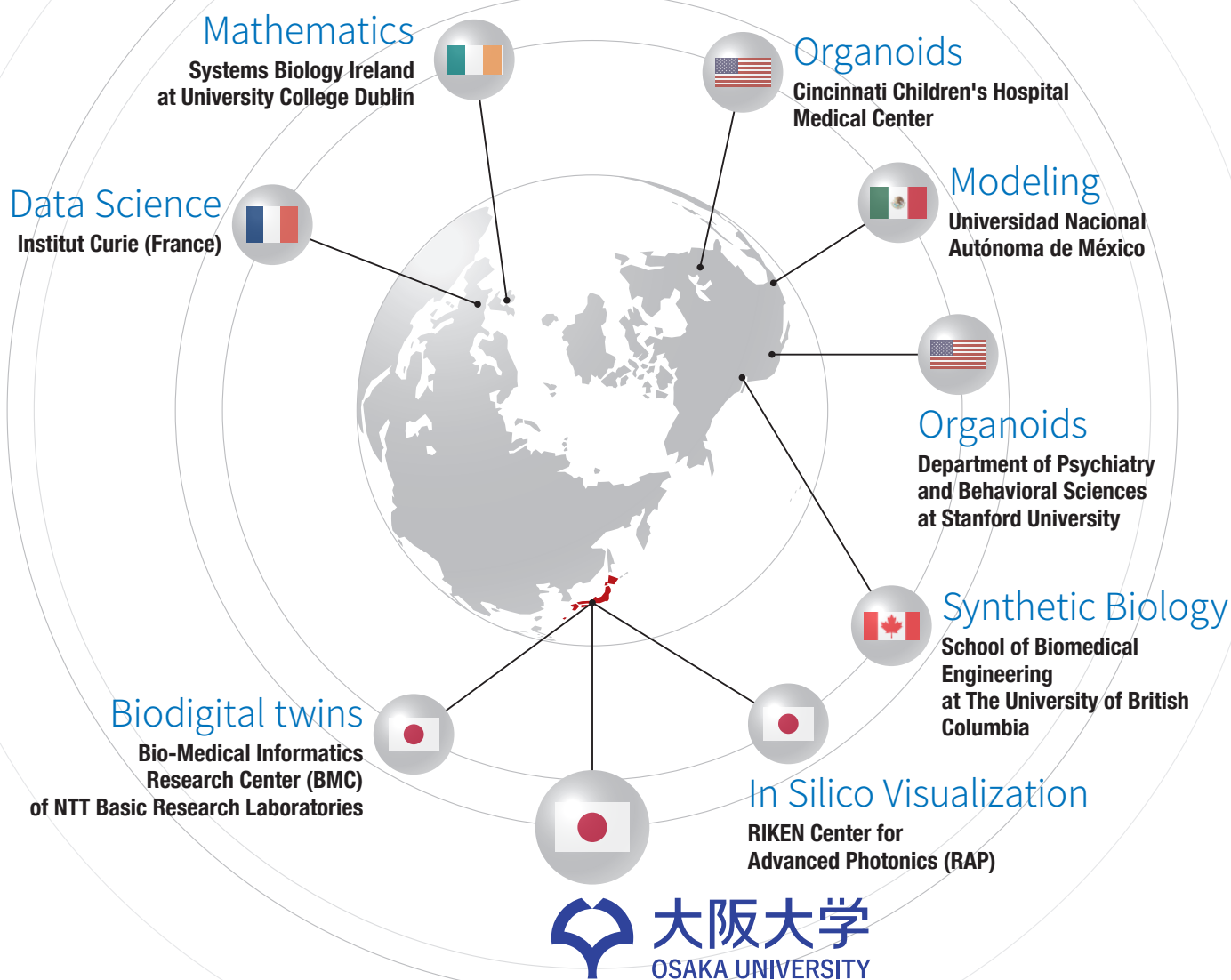


Human Metaverse

Cooperative framework

We pursue research in closely knit cooperation with research institutes and universities in and out of Japan.

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. We explore research in Human Metaverse Medicine, internationally in cooperation 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

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