## Bio2Q as a Global Research Institution

Bio2Q brings together world-leading researchers in microbiome studies, organoid technology, metabolite analysis, neural circuit analysis, and quantum computing. It collaborates internationally with global leaders in immunology, microbiology, neuroscience, information science, biochemistry, metabolism, stem cell biology, and structural analysis.

Keio University is the first private university in Japan to be selected for the World Premier International Research Center Initiative (WPI) program, led by the Ministry of Education, Culture, Sports, Science and Technology (MEXT). WPI aims to create "globally visible research centers" with exceptional research environments and exceptionally high research standards, attracting top researchers from around the globe.

## Message to Young Readers

This research center introduction was composed based on the remarks of Oltea Sampetrean, Administrative Director of Bio2Q.

Research is the finest means, the greatest opportunity, to formulate hypotheses and verify them. In this process, you can encounter new questions and unexpected discoveries. The study of the human body and the microbiome is filled with excitement as it involves continuous learning and discovery about the microorganisms that coexist within our bodies.

I hope that even as you grow older, you never forget to ask 'why?' and continue to nurture your curiosity.

Oltea Sampetrean

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WPI Research Center
Keio University

Bio2Q Human Biology Microbiome Quantum Research Center


# Bio2Q: Center Introduction

Keio University Human Biology-Microbiome-Quantum Research Center (Bio2Q)

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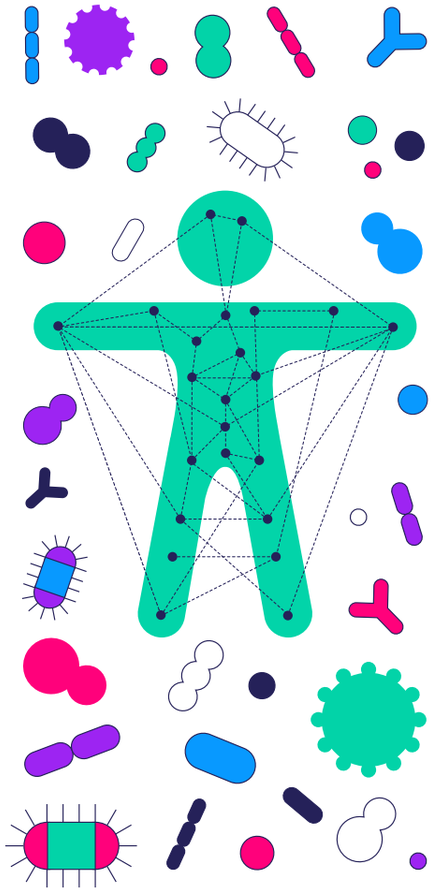
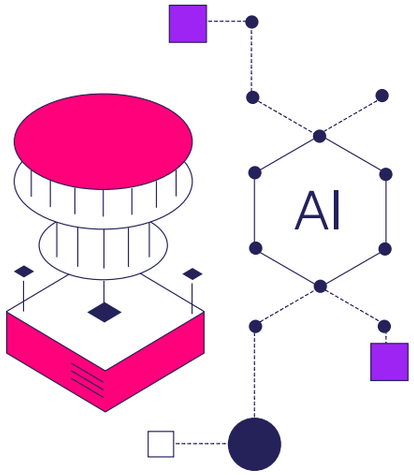


## What is Bio2Q?

Bio2Q is a world-class research center located at Keio University. It conducts research on the connections and interactions between the microbiome* present in the human body and various organs and tissues. By bringing together diverse knowledge and expertise, it is creating a new interdisciplinary research field aimed at unraveling the mechanisms that maintain health in the human body.

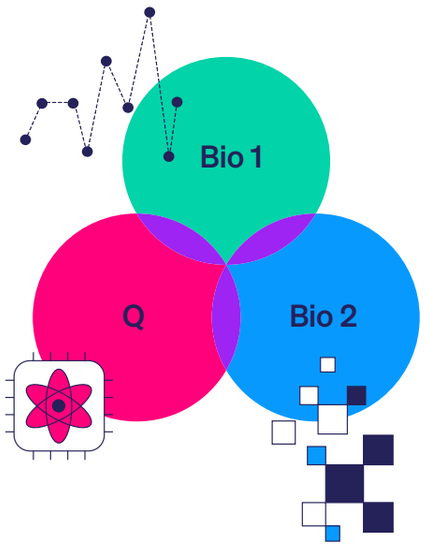



## Utilizing AI and Quantum Computing for Analysis

The interactions between the microbiome and organ networks are incredibly complex, and the data involved is extensive. Traditional computing capabilities sometimes struggle to keep up with the analysis required. Therefore, at Bio2Q, we are developing methods that combine AI and quantum computing technologies for analysis. This approach holds significant potential in uncharted territories where global standards have yet to be established.

## Research on the Microbiome and the Human Body

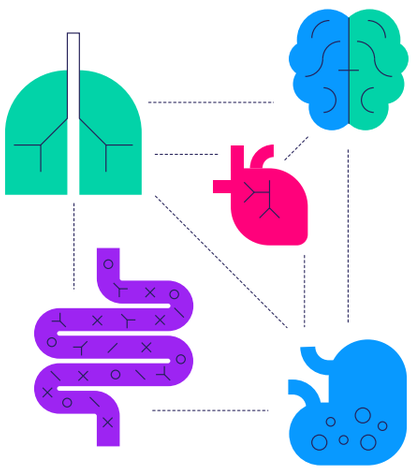
There are trillions of microorganisms present on every surface of our bodies, such as the skin and the intestinal tract. The coexistence of humans and microorganisms is a highly important research theme when considering our health, bodily functions, and disease prevention. The collection of microorganisms known as the microbiome engages in complex interactions with the body. At Bio2Q, we are researching these interactions taking place between the body and the microbiome.




## Exploring the Secrets of Health Beyond Boundaries

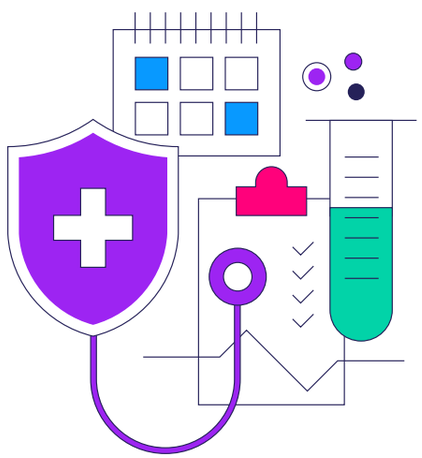
Bio2Q consists of three research core units: Multidimensional Data Analysis Core (Bio-1), Homeodynamics Mechanistic Analysis Core (Bio-2), and Quantum Computing Core (Q). These units engage in interdisciplinary research that transcends boundaries. Data is shared within the facility, allowing one research team to provide feedback on the findings of another and for specialized techniques developed by one team to be collaboratively utilized by various research teams.

Moreover, Bio2Q provides a platform for free discussions across research teams and cores, similar to the interconnectedness of organs that maintain health. Through these networks of people, researchers, and data/technologies/samples, we are exploring the secrets of health.



## Research on Multi-Organ Coordination

To maintain our health, it has become evident that not only should each organ fulfill its respective roles, but also the interplay between organs is crucial. The body, with its many organs and microbiome, forms a network like a cycle, enabling it to adapt rapidly to environmental changes. Conversely, when such networks break down, they can become the root causes of various diseases. At Bio2Q, we study the connections and functions between multiple organs, probing into the mechanisms that sustain health and the causes of diseases.



## Our Goal

Bio2Q's goal is to uncover the essential factors that will allow us to live healthier, longer lives. For example, making it possible to detect what previously required burdensome tests through non-invasive and easy examinations. Enabling the prediction and prevention of future diseases based on data. Developing novel treatments that didn't exist before and curing previously incurable diseases. Through such achievements, Bio2Q aims to make a significant impact on society.

* Microbiome refers to the community of microorganisms (such as bacteria, viruses, and fungi) that inhabit a particular environment, in this case, the human body.