



Tsukuba Digital-Bio
International Center

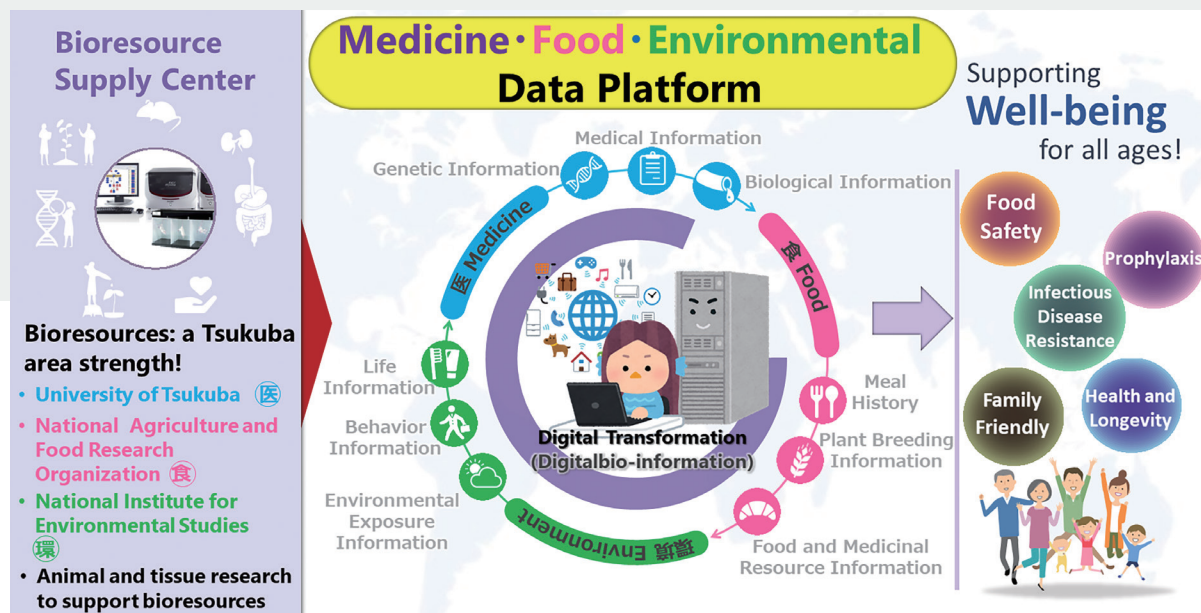
VISION

Japan is an advanced country with a declining population, low birthrate, aging society, and social issues such as increasing lifestyle-related diseases and increasing demand for medicines. Under these circumstances, creating a society where people can spend 100 years of their lives happy and in good health is an extremely important initiative that will determine the future of Japan and the world.

This center emphasizes the importance of well-being (physical, mental, and social) for all generations of citizens, and aims to create the science, technology, and industrial forms necessary to achieve this goal by mobilizing the collective wisdom accumulated in Tsukuba. In particular, by creating basic technologies that support the well-being of the people in the areas of medicine, food, and the environment (as well as affiliated industries) we hope to eliminate issues that

could significantly weaken our social structure, such as a declining birthrate, aging population, and anxiety about emerging infectious diseases or natural disasters. This will allow us to create a society in which all generations of people exist in a state of comprehensive well-being.

The vision of the future society envisioned by this center is “a digital bioeconomy” society that supports the well-being of its citizens based on a quantitative understanding of multimodal information that affects people’s health, such as genome, diet, and social environment, through the application of digital biotechnology. Based on an innovative industry-academia-government co-creation system and digital bio-first human resources created in the process of realizing this future society, we aim to make Tsukuba Science City an international bio-community hub.



From the voice of the Tsukuba area to the vision of the Center

The Tsukuba area, as part of the Tsukuba International Strategic Special Zone, aims to become Tsukuba Science City and the University of Tsukuba has taken the lead in establishing the Tsukuba Life Science Promotion Council (TLSK), a biotechnology consortium that includes universities, local governments, research institutions, and more than 60 companies. In the field of digital science, we have also established the Tsukuba Smart City Council, which aims to become a demonstration base for Society 5.0. In formulating the vision for this center, we solicited opinions from companies and institutions in a wide range of fields. For example, a local government commented that “to promote the development of pharmaceuticals

and other products, it is important to have a system that promotes the more effective use of human biological samples” and “to develop technologies that make full use of digital bio-data through the fusion of digital and biological technologies.” We also received diverse opinions from citizens, such as “I want to know how we can prevent ourselves from getting sick and how we can take action with evidence on a daily basis” and “I want a society where children can live in good health.” We have assembled the wishes, hopes, and dreams of our citizens and institutions into the expression “Well-being for all generations of citizens,” which accurately describes our vision for the center.

MESSAGE

Greetings from the Project Leader

Dramatic advances in information technology have led to the emergence of an ultra-smart society (Society 5.0) that is based on the concept of “digital” and highly integrated cyber and physical spaces. In the field of biotechnology, research and development using artificial intelligence (AI) is also advancing, and the digital bioeconomy, which would create new industries through the fusion of AI and biotechnology, is gaining momentum worldwide. Against this backdrop, Japan must resolve the world’s most pressing problems of declining population and an aging society as a strategic opportunity to create a digital bioeconomy through co-creation among industry, academia, and government so that people at all stages of life can live in a state of well-being (physical, mental, and social). We believe that the creation of this collaborative digital bioeconomy is important for building the human and social infrastructure necessary for sustainable growth. Based on the concept of “digital bio,” this project aims to create a “foundation for industry and technological innovation” in accordance with SDG Goal 9 “Industry, Innovation and Infrastructure”, and to deliver SDG Goal 3 “Good Health and Well-being.”

The Tsukuba area, as the planned center of this international hub, is a research and academic city originally built to promote science and technology, enhance higher education, and spread research areas away from Tokyo. With a collection of agencies, the University of Tsukuba, national research institutes, and pharmaceutical and food companies, Tsukuba City has continued to develop as a “city that utilizes science and technology for the benefit of its citizens.” It has succeeded in establishing one of the world’s largest bioresource authorities and formed a center of excellence for international life science and artificial intelligence research, which has primed the soil for the creation of digital biotechnology. Based on the unique history and environment of Tsukuba, we have set our vision as “the realization of a society that supports the well-being of all generations of citizens through interdisciplinary research using bioresources and digital technology, with Tsukuba at the core.” We aim to create a society in which every citizen can lead a healthy and happy life that gives them the freedom to realize their personal and career dreams.

Project Leader



Hiroyuki Nishiyama

Professor,
Faculty of Medicine,
University of Tsukuba

Deputy Project Leader



Tetsuya Sakurai

Professor,
Faculty of Engineering,
Information and Systems
University of Tsukuba

ORGANIZATION

Besides governance functions, management and research promotion divisions will be established within the project, and leaders will be assigned to properly manage and promote the organization, R&D, social implementation, and internationalization of the Center. In addition, the Center will be equipped with existing industry-academia collaborative center-forming programs cross-promoted in collaboration with other universities and research institutions, such as the Center of Innovation (COI) and Program on Open Innovation Platform with Enterprise, Research Institute and Academia (OPERA), as well as a comprehensive system with research institutions, companies, local governments, and a new core central management system. Based on this core management system and the creation of technology and system innovation scenarios for fostering new key industries, we will collaborate with related organizations and operate efficiently.

CHALLENGES

In order to realize our vision for the Center, the following three targets have been set and nine research and development projects have been established to achieve them.

Target
1

Realization of a bioresource supply service for Society 5.0

Target
2

Development of digital bio-application technologies for social implementation

Target
3

Realization of an integrated product development platform to promote strategic market development

1

Development of a Next-Generation Medical System by Constructing a Future-Integrated Medical Information Network



Hiroyuki Nishiyama

Professor,
Faculty of Medicine,
University of Tsukuba

2

Establishing A Research Hub for Environmental Health/Medicine of Future Generations Utilising Digital Bio-Information and Artificial Intelligence



Shoji F. Nakayama

Deputy Director, Japan Environment and Children's Study Programme Office
Head, Exposure Dynamics Research Section
Health and Environmental Risk Division
National Institute for Environmental Studies

3

Construction of A Bioindustry Platform Using Biological Resources and Genome Editing Technology



Satoru Takahashi

Professor,
Faculty of Medicine,
University of Tsukuba

4

Rapid Breeding of Functional Agricultural Products Using AI for the Realization of Well-Being



Mari Maeda-Yamamoto

Executive Scientist,
National Agriculture and Food Research Organization (NARO)

5

Development and Functional Evaluation of Innovative Food and Drug Resources



Hiroko Isoda

Professor, Faculty of Life and Environmental Sciences,
University of Tsukuba

6

Innovative Food and Drug Resource Engineering Technology to Support a Society of Well-Being



Kazuhiko Sato

Director, Interdisciplinary Research Center for Catalytic Chemistry
The National Institute of Advanced Industrial Science and Technology

7

Formation of a Social Implementation Base with An Evidence Generation Platform Using a Future-Integrated Medical Information Network Based on A Large-Scale Cohort



Tomohiro Okura

Professor,
Faculty of Health and Sport Sciences,
University of Tsukuba

8

Establishment of a Next-Generation Lipid Research Center for a Well-Being Society Based on the Understanding Regulation of Lipid Biology



Hitoshi Shimano

Professor,
Faculty of Medicine,
University of Tsukuba

9

Development of Infection Control Technology Using Future Integrated Medical Information Network and Robot Technology



Atsushi Kawaguchi

Professor,
Faculty of Medicine,
University of Tsukuba

PARTICIPATING ORGANIZATIONS

Representative Organization

University of Tsukuba

Related Campus Organizations

- Tsukuba Human-Tissue Biobank Center
- Tsukuba Preventive Medicine Research Center
- Center for Innovative Medicine and Engineering
- Tsukuba Clinical Research & Development Organization (T-CReDO)
- Transborder Medical Research Center
- Laboratory Animal Resource Center
- Research and Development Center for Precision Medicine
- Center for Artificial Intelligence Research
- R&D Center for Tailor-Made QOL
- International Institute for Integrative Sleep Medicine
- Life Science Center for Survival Dynamics
- Alliance for Research on the Mediterranean and North Africa
- Tsukuba Global Innovation Promotion Agency (TGI)
- Headquarters for International Industry-University Collaboration
- Open Innovation Strategy Organization
- Research Administration/Management Office
- Department of Research Promotion
- Office of Conflict of Interest and Security Export Control
- Open Facility Network Office
- Office of Development

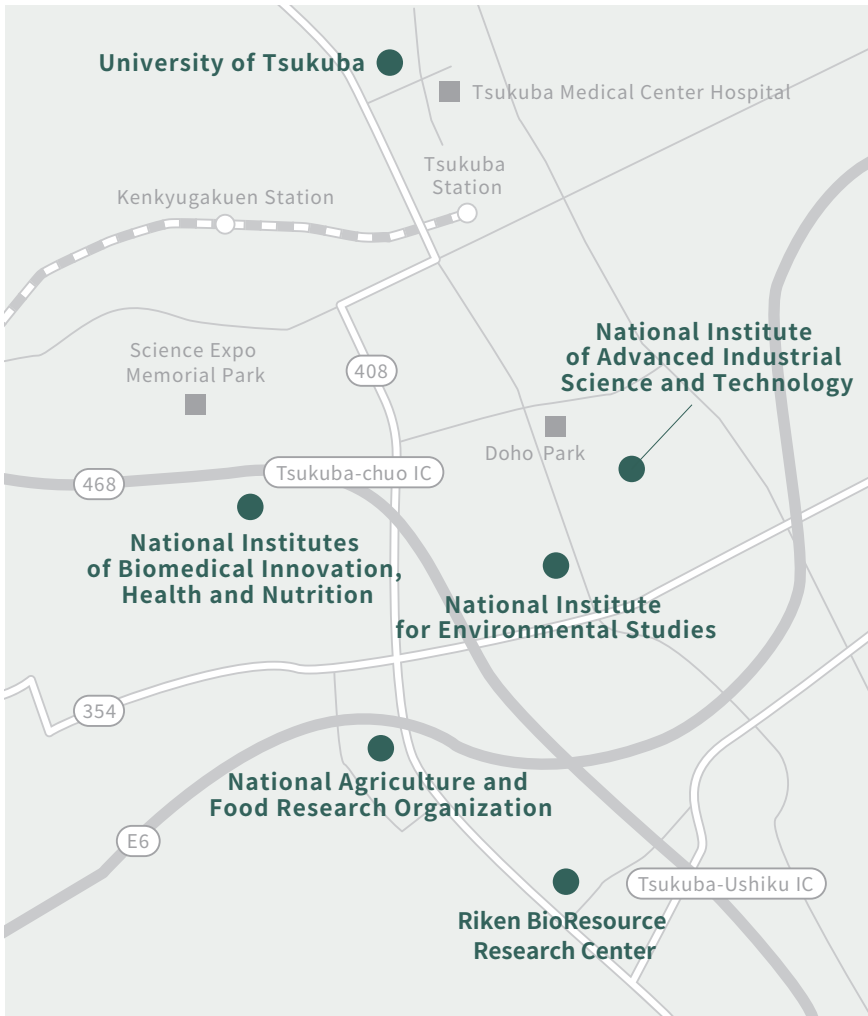
Participating Organizations

National Research and Development Corporation

- National Institutes of Biomedical Innovation, Health and Nutrition
- National Institute for Environmental Studies
- National Institute of Advanced Industrial Science and Technology
- Tohoku University
- National Agriculture and Food Research Organization
- Institute of Physical and Chemical Research
- National Center for Child Health and Development

Company

- ADEKA Corporation
- Atlas Olive Oils
- MathDesign Co.,Ltd
- Ajinomoto AGF, Inc
- ab sciex
- S&B FOODS INC.
- Ogawa & Co., Ltd.
- Sumika Chemical Analysis Service, Ltd.
- TANITA corporation
- TEIJIN LIMITED
- Tokyo Electric Power Company Holdings, Inc.
- Nichirei Foods Inc.
- Roche Diagnostics K.K.
- The Nisshin Oillio Group, Ltd.
- Oishi kenko Inc.
- Abbott Diagnostics Medical Co., Ltd.
- SANWA KAGAKU KENKYUSHO CO., LTD.
- Ricoh Technologies Company, Ltd.
- NTT DATA Corporation
- Denka Company Limited
- LG Japan Lab Inc.
- Accenture Japan Ltd
- WELCIA YAKKYOKU CO.,LTD.
- Integrity Healthcare Co., Ltd.
- NIPPON CORPORATION
- NIPPO CO.,LTD.
- Zeon Corporation
- CHARLES RIVER LABORATORIES JAPAN, INC.
- NEWCOM Inc.
- Nutrition Act Co., Ltd.
- MITANI SANGYO Co.,Ltd.
- Mitsubishi Corporation Life Sciences Limited
- Mitsubishi Space Software Co.,Ltd.
- MORINAGA MILK INDUSTRY CO.,LTD.
- Robotic Biology Institute Inc.
- Taisho Pharmaceutical Co., Ltd.
- Mitsubishi Chemical Corporation
- Cocokara fine Healthcare Inc.
- JMDC Inc.
- Habitus Care Inc.
- MARUZEN CO., LTD.
- DAIICHI SANKYO HEALTHCARE CO., LTD.
- Human Metabolome Technologies, Inc.
- DIC Corporation
- Algal Bio Co.,Ltd
- Bridgestone Corporation
- EP Trading Co., Ltd.
- Chiyoda Corporation



▲ Map of Tsukuba Digital-Bio International Center Area



Website

<https://tsukubadigitalbio.jp/en/>

Contact digitalbioeco@md.tsukuba.ac.jp



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