

### National Institutes of **Biomedical Innovation, Health and Nutrition**

# https://www.nibn.go.jp/

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## **Check Our SNS**





The official YouTube channel



The official X (formerly Twitter) Instagram account account



NIBN

 Tsukuba Division, Research Center for Medicinal Plant Resources

HOKKAIDO

National Institute of Health and Nutrition

- National Institute of Biomedical Innovation • National Institute of Health and Nutrition
- Sennan Bioresource Research Section, National Institute of Biomedical Innovation

National Institutes of Biomedical Innovation, Health and Nutrition







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CONCEPT

BOOK



01

# **NIBN's Wish**

To Be a Beacon in the Darkness

#### Logo Renewal in April 2025!

## The Meaning Behind the Logo

The new NIBN logo is based on the concept of "a beacon of candle". It symbolizes our commitment to research that serves as a beacon of hope, even in the smallest way, to change lives. The ten circles beside the flame represent our mission to provide optimal medical and nutritional solutions tailored to each individual. This logo not only signifies the integration of pharmaceuticals, health, and nutrition but also embodies our role in bringing hope to those battling illness. Our research is driven by the belief that even the smallest light can shine brightly in someone's life.



#### Change in English Abbreviation

As a research institute dedicated to "realizing and supporting health", NIBN is committed to conducting research that serves as a beacon of hope for those fighting illness, rather than research for its own sake. The previous English abbreviation, NIBIOHN, was often noted by international audiences as difficult to read and remember. To enhance global recognition, we have changed our English abbreviation to NIBN and will continue to share our research achievements worldwide.

#### NIBN's Philosophy

## Create, Challenge, Achieve

## ~ Striving for a Healthy and Long-lived Society ~

We contribute to society through a broad range of research activities, including drug discovery based on biomedical and health sciences, studies on nutrition, dietary habits, and physical activity, as well as biological resource research. By strengthening collaboration between industry, government, and academia, we integrate cutting-edge technologies and knowledge to achieve national health and well-being.

#### Mission

- Pursuing innovation: We create new knowledge and technology through cutting-edge drug discovery research
- Promoting health: We challenge ourselves to improve the nation's future well-being through research on nutrition, dietary habits, and physical activity.
- Supporting patients and families: We drive research and development to fulfill the wishes of patients battling various diseases, including rare conditions.

#### Greetings



President : Yusuke Nakamura

## By collaborating not only with industry, government, and academia but also with patients, we aim to accelerate research that contributes to society.

The National Institutes of Biomedical Innovation, Health and Nutrition (NIBN) was established in 2015 through the merger of the National Institute of Biomedical Innovation and the National Institute of Health and Nutrition. The former has been dedicated to "transforming uncurable diseases into curable ones", while the latter has focused on "realizing a society where people live long with healthy conditions".

In 2025, the post-war baby boomer generation has reached the advanced age group, raising the importance of living a long life with the healthy condition. Amid this, our second 7-years med- to longterm plan started in 2022, tackling various challenges in anticipation of the "era of 100-year lifespans". Beyond promoting health maintenance and enhancement through diet and exercise, the future demands optimal, personalized medical guidance and treatment options tailored to each individual. By further advancing drug discovery, nutrition science, and Al-driven analytical technologies, we aim to maximize societal benefits. Additionally, through comprehensive collaboration

with two Osaka Prefectural Hospitals, Osaka International Cancer Institute, and Osaka Women's and Children's Hospital, we are working closely with patients and medical institutions to transform currently

#### History

The National Institutes of Biomedical Innovation, Health and Nutrition was established on April 1, 2015, through the merger of the National Institute of Biomedical Innovation and the National Institute of Health and Nutrition. This integration was part of "the Basic Policy on Reform of Independent Administrative Agencies", approved by the Cabinet in 2013, aiming to advance comprehensive research by merging expertise in pharmaceuticals and food sciences.

National insti	tute of Health Sciences	National Institute of Infectious Diseases		
Pharmaceuticals and Medical Devices Agency				
2005 Part of each organization merged National Institute of Biomedical Innovation				

National Institute of Biomedical Innovation

Originally based on the Osaka branch of the National Institute of Health Sciences, this institute integrated parts of the National Institute of Infectious Diseases and the Pharmaceuticals and Medical Devices Agency. Its purpose is to develop a foundation for research and development in pharmaceuticals and biological resources to improve public health



National Institutes of Biomedical Innovation, Health and Nutrition

untreatable diseases into treatable ones. Our research activities now fully leverage generative AI to alleviate the burden on healthcare providers while facilitating real-time clinical data collection

As a national research institute encompassing the three key domains of biomedical innovation, health, and nutrition, we are committed to addressing challenging areas such as intractable and rare diseases, where private enterprises may struggle to engage. One of our core missions is to develop new technologies that can bridge the fields of medicine, health, and nutrition, making full use of the synergy created by the merger of the two institutes. In the interdisciplinary domain, we are exploring new possibilities, including research on nutrition, gut microbiota, and immune-related functions.

Moving forward, we will continue our dedicated efforts in developing foundational technologies for innovative drug discovery, conducting research on food, nutrition, and exercise, and advancing fundamental studies based on free-thinking approaches. Through these initiatives, we aspire to contribute to extending healthy lifespans and would greatly appreciate your continued support and cooperation

1920 Institute of Nutrition (established within the Ministry of Interior 1938 Jurisdiction transferred to the Ministry of Health and Welfare following its establishment 2001 Transformed into an independent administrative institution National Institute of Health and Nutrition

#### National Institute of Health and Nutrition

Founded in 1920 as a Nutrition Research Institute, it became part of the Ministry of Health, and Welfare and later transitioned into an independent trative agency in 2001. The institute conducts research on public health, nutrition, and national health improvement.

Organizational



02

# **NIBN's Strengths**

# Integrating Biomedical Science and Health Science

We are committed to bridging biomedical science, which focuses on treating diseases, and health science, which promotes longevity and well-being. Our daily research covers drug discovery, nutrition, exercise, and biological resources, aiming to contribute to public health from innovative drug development to personalized nutritional and health guidance.





National Institute of Biomedical Innovation focuses include developing therapies for rare diseases and infectious diseases using antibodies, nucleic acid-based drugs, and regenerative medicine. By leveraging bioinformatics and Al, aim to bring cutting-edge medical solutions to the world.

we explore drug targets, assess safety and efficacy, and build rare disease databases. Through collaboration with the Japan Agency for Medical Research and Development (AMED), we

## Japan's Pharmaceutical Industry Facing an Era of Major Transformation and Challenges

As Japan's trade deficit in pharmaceuticals continues to grow each year, the country's pharmaceutical industry is required to address the following challenges

- · Shortage of drug discovery seeds · Low success rates in clinical proof-of-concept trials Paradigm shift towards biopharmaceuticals Risk of financial strain due to high-cost drugs
  Risk of supply chain collapse
  - Need for integration and organization of big data and IT workforce development Weaknesses in pandemic infectious disease countermeasures due to country-specific risks
- Initiatives Required to Address These Challenges
- ng big data to efficiently ide ing AI and conduct clinical trials with p





### Advanced research on nutrition, physical activity and intestinal bacteria for a healthy and long-lived society

The National Institute of Health and Nutrition is promoting research on the effects of diet and physical activity on health in order to realize a healthy and long-lived society with consideration for reducing environmental impact. Partnering with National Institute of Biomedical Innovation, we utilize AI to develop the "Healthy Human Microbiome Information





### Bringing innovation to drug development through bioresource research

Our research centers, including Center for Drug Discovery Resources Research, Research Center for Medicinal Plant Resources, and Tsukuba Primate Research Center, engage in research and development of biological resources. These



Platform" focusing on gut microbiota and circadian rhythms. Our efforts include new prevention and mitigation strategies for lifestyle-related diseases and frailty. Additionally, we assess health impacts of functional foods and dietary ingredients, contributing to evidence-based dietary guidelines and national health policies.

include human tissues, cell lines, disease model animals medicinal plants, and experimental primates. Through genetic data integration and quality enhancement, we aim to advance research on drug discovery for intractable diseases



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# **NIBN's Challenges**

# Translating Research Outcomes into Societal Benefits Through Diverse Partnerships

We are expanding collaborations to realize a healthier society. Through partnerships with medical institutions, municipalities, and businesses, we support clinical research, urban development, and product innovation. Our collaborative efforts also extend internationally.

### Promote open innovation with the region at the core. Convergence of research infrastructures will also develop fusion areas.

In March 2023, National Institute of Health and Nutrition relocated to "Northern Osaka Health and Biomedical Innovation Town" (Kento), situated across Suita and Settsu cities. This move enhances open innovation with neighboring institutions, including the National Cerebral and Cardiovascular Center and Suita Municipal Hospital. Strengthening cooperation with the National Institute of Biomedical Innovation in Saito, we aim to advance integrated research themes

Through these initiatives, we foster collaborations between researchers and industries in Osaka and Kansai area, promoting evidence-based policies and accumulating valuable research data



National Institute of Biomedical Innovation International Culture Park (Saito: Ibaraki City, Osaka Prefecture)



National Institute of Health and Nutrition Northern Osaka Health and Biomedical Innovation Town (Kento: Suita and Settsu Cities, Osaka Prefecture)

# NIBN's Expanding International Network

In September 2024, NIBN signed a Memorandum of Understanding (MOU) with Institut Pasteur du Japon development. This partnership enhances research on biological resources and health sciences, facilitating global expansion of research findings and fostering opportunities

Additionally, in June 2024, a delegation led by Dr. Wen-Chang Chang from Taipei Medical University (TMU) visited





Collaboration with Medical

Institutions



**Osaka International Cancer** Institute

Providing and developing advanced cancer treatment, while also promoting support for cancer survivors

> · Sharing research outcomes and clinical information Collaboration between NIBN and Each Center • Exchange of opinions in regular meetings · Conducting joint research

## Collaboration with Local

Communities UO



Collaboration

with

Industries

**Development of a Web Application** for Supporting Nutritional Balance and Sustainability-Conscious Food Choices

everyone can live healthily.

We are developing a web application to support healthy eating habits, aiming to increase the utilization of products that consider both health and environmental aspects

**Research on Personalized** T Physical Activity Levels Based on Life Course and Lifestyle

By creating energy expenditure and physical activity profiles using doubly labeled water, we enable personalized recommendations for physical activity levels.

## Toward the Realization of a Naturally Healthy Diet

#### Innovation in Food Environments Based on Scientific Evidence

We are building a platform in collaboration with food companies to support a healthy diet for the Japanese population. Our initiatives focus on developing products that consider nutritional balance and sustainability and examining effective information dissemination methods based on scientific evidence.

#### Feedback

Establishment and Utilization of a Processed Food and Recipe Database

Database

We have created a database of nutritional information for processed foods and recipes, and will enhance it with data from various organizations, publish it on the NIBN website. and conduct data analysis.







### Bringing Together Knowledge Across Fields for a Healthier Society

#### Creating Value through the Integration of Medicine and Nutrition

We are strengthening research partnerships with advanced medical institutions, integrating clinical research insights and patient data to develop nutrition and health guidance that enhances post-treatment quality of life.



#### Osaka Women's and Children's Hospital

Providing advanced perinatal and pediatric medical care, actively engaging in research and maternal-child health initiatives



#### National Cerebral and **Cardiovascular Center**

A research and development hub for the prevention and treatment of cardiovascular diseases, offering advanced medical care.

#### Promoting Healthy and Sustainable Urban Development

We promote sustainable urban development that supports healthy lifestyles. Through collaboration with local governments and citizens, we establish systems linking diet and physical activity, aiming to create an environment where

Research for the Development of a Japanese Nutritional Profiling System

We are conducting validation studies on the Japanese nutritional profiling system developed in FY 2024 to facilitate its utilization



Research Evaluating Food-Related Companies' Health Initiatives Using International Standards

We assess corporate efforts to promote healthier products, aiming to create a food environment where healthy choices come naturally

Effective Collaboration System with Companies and Local Communities

We promote information sharing among participating companies and municipalities. supporting the optimization of the nutritional balance of processed foods and meals.



#### Social Implementation

Creating a Food Environment that Encourages Healthy Eating

We explore effective ways to provide and sell nutritionconscious products to both health-conscious and non-health-conscious consumers.



Predicting and Validating Effects Through Simulation

We predict the impact of promoting and practicing healthy eating through simulations, evaluating health, medical, and economic benefits.



# **Center for Intractable Diseases and** ImmunoGenomics (CiDIG)

#### A professional's commitment to research

Since my student days, I have consistently focused on human immunology research. Before joining the National Institutes of Biomedical Innovation, Health and Nutrition, I had the opportunity to hone my expertise at leading infectious disease research institutions in Japan, France and the United States, working at the forefront of translational research. However, I have always aspired to contribute to drug and vaccine development originating from Japan. Receiving an invitation from this institute, a leading center for translational research, solidified my decision to return to Japan and take on this challenge.

Director Takuya Yamamoto



### Exploring approaches to intractable diseases, cancer and infectious diseases by elucidating the hidden connections between genomic and immune information

With advancements in computer science, life sciences have undergone a paradigm shift toward research and development utilizing big data. However, the practical implementation of these benefits for patients remains a work in progress. To bridge this gap, omics analysis-which systematically structures and analyzes diverse human phenotypic dataplays a crucial role. Since human phenotypes vary widely, it is essential to capture biological samples as temporally and spatially interconnected data at high resolution and analyze them with advanced expertise.

To maximize the potential of valuable biological samples for patient benefit, we must ensure the collection and structured organization of high-quality biospecimens linked to clinical data. Additionally, the entire process-from data generation through experimental analysis to high-level data interpretation-must be conducted with scientific rigor. Against this backdrop, our center was established in April 2023 to advance research and development that integrates clinical information with genomic and immune data, ultimately driving the diagnosis, prevention, and treatment of rare diseases, cancer, and infectious diseases.



Utilizing platforms for highdimensional immunological analysis seamlessly connecting clinical and non-clinical data

The Center is dedicated to realizing precision medicine through immunological approaches. By understanding individual immune characteristics and identifying disease- and population-specific challenges, we have established a comprehensive, high-resolution platform to analyze differences in immune systems and their responses to antigens across individuals.

This platform enables us to elucidate disease-specific immune responses and develop novel biomarkers and immunotherapies. Specifically, we conduct research on immunotherapies for pancreatic cancer and chronic persistent infections, as well as preclinical and clinical trials for vaccines targeting acute infectious diseases such as influenza and COVID-19





Figure 2:Metaphorical illustration of higher-dimensional immunological analysis

#### Developing cancer immunotherapies based on genomic information

We focused on developing personalized immunotherapy based on the patients' cancer genome. We have established a system for efficiently predicting cancer-specific neoantigens from genome information. Using this system, we are conducting clinical research to develop personalized neoantigen-targeted cancer vaccines as well as novel T-cell therapies. In pancreatic cancer, we have identified abnormal KRAS gene activation at early stages and are actively investigating immune evasion mechanisms. Although KRAS has long been considered "undruggable", the recent emergence of KRAS inhibitors has opened new possibilities. We aim to develop more effective treatments by combining these inhibitors with immunotherapy.

### Collaborating with experts from research on intractable diseases, cancer and infectious diseases to social implementation

Realizing innovation through big data utilization and solving real-world health challenges requires a series of highly specialized processes, including: 1. proper collection, management, and structuring of relevant biological samples and clinical information 2. well-designed preclinical and clinical trials, and 3.

#### Center for Intractable Diseases and ImmunoGenomics (CiDIG)

#### Laboratory of Precision Immunology

We aim to achieve personalized and stratified medicine using immunological To realize precision medicine for individual patients, we conduct multi-omics analyses, including genomic and immunogenomic approaches, to explore approaches to overcome refractory diseases, including cancer and chronic infectious diseases. By advancing the accurate understanding of individual pathogenesis and biomarkers of diseases. We also aim to develop novel donor immune status changes through high-parameter flow cytometry data immunotherapies based on patients' genomic information and multi-layered immune omics analysis, we conduct disease-specific surrogate marker exploration and develop vaccines and immunotherapies.

#### Laboratory of Rare Disease Information and Resource Library

We manage the "National Database of Designated Intractable Diseases of We leverage molecular pathology platforms and biological analyses of early carcinogenesis Japan", which has accumulated over 4.5 million registrations, supporting and tumor progression to investigate the fundamental mechanisms of cancer development using human clinical specimens. Our ultimate objectives are to establish surveillance research through utilization of comprehensive patient clinical information. We also strategies and ultra-early diagnostic methods for high-risk populations, identify novel analyze target genes/pathways for rare and intractable disease drug discovery. develop databases, and operate a biobank in collaboration with patient registries. therapeutic targets, and translate our findings into effective cancer prevention.

#### **Reverse Translational Research Project**

We conduct reverse translational research by transforming various clinical guestions into basic research themes for resolution. This includes elucidating the pathology of rare diseases and applying machine learning to analyze rare disease data, utilizing research findings to address clinical challenges.

Figure 1:Development of higher-dimensional immunological analysis platform

#### What are intractable diseases? Why should we find a cure?

Intractable diseases refer to conditions that are difficult to cure or lack established treatments. Many designated intractable diseases are classified as rare diseases, making research and development particularly challenging and necessitating government support

At our institute, we are committed to enhancing research resources for rare diseases, utilizing omics analysis to study disease mechanisms, and developing new treatments and drugs. As of April 2024, Ministry of Health, Labour and Welfare has designated 341 diseases as intractable diseases. affecting approximately one million patients. With patient consent, we manage a patient database based on clinical survey forms. Additionally, we provide researchers with resources and information through the Rare Disease Bank and the clinical trial database "DDrare", promoting drug repositioning research.

high-quality and high-volume omics data analysis. At the Center, teams with deep expertise collaborate organically to tackle rare diseases, cancer, and infectious diseases. Through timely translation of research findings into clinical applications, we contribute broadly to public health and longevity.

#### Laboratory of Immunogenomics

#### Laboratory of Molecular Diagnostics and Therapeutics

# **Microbial Research Center** for Health and Medicine



Why I Became a Researcher and My Future Goals Originally, I had wanted to work for a trading company, but became a researcher after I found myself fascinated by new discovery through scientific research. Currently, I am working diligently to expand my research to create a new and healthier society.

#### Director Jun Kunisawa



A Near-Future Vision for a Healthy Society from the Perspective of Gut Environment: Individualized and Stratified Dietary Guidance, **Development of New Drugs and Functional Foods** 

#### Integrating the medical and health sciences

When you hear the term "intestinal bacteria", you might imagine its relationship to bowel movements, but have you ever heard that intestinal bacteria may be involved in immune responses, allergies, or obesity?

The merger of the National Institute of Biomedical Innovation with the National Institute of Health and Nutrition has created a framework where we can study both medical science (after illness occurs) and health science (before illness occurs), and our project, focused on gut health, aims to maximize the benefits of this integration.

Components consumed through food are absorbed in the gut and become part of the body, so the content and quantity of food can influence various health conditions, such as obesity and brain function. Moreover, as many immune cells exist in the gut, intestinal bacteria also influence immune-related diseases like allergies and rheumatoid arthritis. Recently, the role of gut bacteria has been gaining attention.

The outcomes of this research on gut health will promote precision nutrition, personalized and stratified dietary guidance, drug discovery targeting gut health, and the development of functional foods, expanding the possibilities of the healthcare industry.



### Informatics analysis of human big data set and elucidation of mechanisms by animal models

In collaboration with institutions across Japan, we collect human data, and these data are analyzed to identify correlations using the latest information science. Hypotheses generated from this analysis are tested and mechanisms are clarified through basic research using animal models, with the results being fed back into human studies. This iterative process aims to enhance our research focused on health promotion and the prevention and improvement of diseases from the perspective of gut health (see Figure 1).

Research on humans and practical applications in society

We gather information on lifestyle habits (such as diet) and health (such as health checkup data) from residents across various regions, along with blood. stool, and saliva samples. We measure parameters such as gut microbiota, oral microbiota, metabolites derived from diet, and immune system markers. By the end of fiscal year 2024, we are in the process of building a microbiome database with data from over 12,000 individuals, making it the largest in the world

Seven years ago, we conducted a study on the types of gut bacteria in the residents of Shunan City, Yamaguchi Prefecture. The results showed that the proportion of bacteria favoring protein and fat was higher compared to the national average, and there was a lower intake of dietary fiber. By analyzing these characteristics and providing data-driven guidance for improvement of dietaries, we observed changes in gut microbiota, including an increase in butyrate-producing bacteria, which are associated with health benefits.

Moreover, increasing the diversity of gut bacteria has been shown to lower the risk of various diseases. Our research also demonstrated that consuming barley, a good source of dietary fiber, increases the diversity of gut microbiota. This research on gut health is now being translated into practical applications.

Exploring the relationship between food and biological functions Dietary fiber is fermented by multiple gut bacteria into short-chain fatty acids, which are used as energy for the gut, as well as to regulate immune function, contributing to a body that is less prone to fat accumulation.

In a cohort study in Yamanashi Prefecture, we are examining the health effects of barley, which is rich in dietary fiber. In collaboration with our "Artificial Intelligence Center for Health and Biomedical Research", we have developed a machine learning model to predict the health benefits of barley and flaxseed oil. By expanding on this, we expect to create a society where individuals can receive personalized dietary recommendations. We have also utilized an integrated analysis platform called "MANTA" (Microbiota And pheNotype correlaTion Analysis) that makes it easy to identify factors correlated with specific health conditions, and it has successfully identified useful bacteria and metabolites that show disease prevention and improvement effects.

Discovery of useful gut bacteria that may alleviate obesity and diabetes, and elucidation of their mechanism of action

Using "MANTA", we identified a beneficial gut bacterium, Blautia wexlerae (hereinafter referred to as "Blautia"), which may help prevent and improve obesity and diabetes. This bacterium produces compounds like ornithine and S-adenosylmethionine, which have anti-inflammatory effects and inhibit fat accumulation. By producing short-chain fatty acids like acetate and indigestible starches like amylopectin, it works synergistically with other gut bacteria to improve gut health, potentially preventing and improving obesity and diabetes. This discovery is expected to lead to drug development targeting Blautia and the creation of functional foods, contributing to the realization of a healthy society. We are especially focused on developing a testing system that allows for fast, affordable, and easy identification of specific bacteria, such as Blautia.

 Relationship between cooking oil consumption and allergy or inflammation Through research on cooking oil commonly consumed in daily life, we are

Collaboration with academic institutions



#### Microbial Research Center for Health and Medicine

#### Laboratory of Vaccine Materials

Focusing on the immune system of mucosal tissues, we conduct research to Focusing on the gut environment formed by symbiotic microorganisms, such develop vaccines, immunotherapies, and healthcare products that prevent and as intestinal bacteria, and dietary components, we study their relationship with improve infectious diseases, allergies, inflammatory diseases, and lifestylehealth and disease through human research and animal models. We apply our related diseases. Examples include vaccines and diagnostic systems for findings to drug discovery and healthcare product development. bacterial food poisoning and adjuvants utilizing gut microbiota components.

#### Laboratory of Gut Microbiome for Health

We clarify the role of human gut microbiota in the relationship between lifestyle habits, lifestyle-related diseases, and frailty, aiming to establish scientific evidence for extending healthy life expectancy, incorporating perspectives on metabolism and chrono-nutrition.

exploring effective substances produced after oil intake that help suppress allergies and inflammation. Animal model studies have shown that after consuming flaxseed oil, specific enzymes in various tissues produce compounds such as "17,18-EpETE" and "12-HEPE", which suppress allergies and inflammation in the gut, respiratory system, and skin through unique mechanisms

We have also discovered that microorganisms found in gut microbiota and fermented foods can produce substances like "aKetoA" and "trans-10cis-15-octadecadienoic acid" from oils, which help suppress allergies and inflammation. For example, aKetoA has been shown to suppress inflammatory responses in macrophages, thereby reducing allergic skin reactions and diabetes. These findings hold promise for the development of new drugs and functional foods.



Next-generation Sequencer (MiSeq) for intestinal microbiota analysis

#### Laboratory of Gut Environmental System

#### Laboratory of Microbial Informatics

We elucidate the pathogenic mechanisms of infectious diseases while conducting research to develop vaccines and pharmaceuticals contributing to infection control. Additionally, by clarifying the relationship between the microbiome and health/disease, we aim to develop pharmaceuticals and healthcare products

# Center for Drug Design Research (CDDR)

#### Wishes as a Center Director

Our center is dedicated to the mission of the National Institutes of Biomedical Innovation, Health and Nutrition: "Transforming Incurable Diseases into Curable Ones". To achieve this goal, we are engaged in the development of fundamental technologies for innovative drug discovery, with a particular focus on methodologies and techniques for designing novel modalities such as antibody, nucleic acid, and peptide therapeutics. With a united effort, our center remains committed to overcoming diseases.

Director Toyomasa Katagiri



## The Challenge to Conguer Diseases: Integrating Cutting-Edge Technology to Boost Innovative Drug Discovery

#### What is CDDR ?

The Center for Drug Design Research (CDDR) was established in 2015 to strengthen the technological support of the "Drug Discovery Support Network", a research support program that bridges fundamental academic research outcomes from universities and research institutions to practical applications. CDDR aims to develop foundational technologies for an advanced drug discovery platform that addresses challenges faced by the Japanese pharmaceutical industry.

Currently, CDDR not only utilizes established technologies and expertise but also serves as a key technical support hub for the "Drug Discovery Support Network Project", an all-Japan initiative that connects various research efforts to pharmaceutical development. Furthermore, CDDR promotes research and development in drug design, focusing on drug target discovery, candidate compound screening, in silico drug discovery, and optimization technologies, with the goal of creating biopharmaceuticals, vaccines, and other new modality drugs. In particular, in FY 2024, CDDR established a world-class multiphoton excitation microscopy-based drug discovery imaging platform to advance the development of diagnostic and therapeutic methods. Through these activities, we aim to contribute to drug discovery for disease treatment

CDDR consists of six projects, categorized into the following three areas:

1. Projects for Drug Target Discovery and Functional Analysis (Proteomics for Drug Discovery, Drug Target Proteomics, and Biofunctional Molecular Medicine)

- 2. Projects for Drug Development
- (Antibody Design and XNA Screening and Design) 3. Projects for Drug Efficacy Evaluation

(Drug Discovery Imaging and Advanced Biopharmaceuticals). By integrating the highly competitive technologies of each project, we aim to establish a drug discovery platform that addresses unmet medical needs



Inside the Research Center

#### Training the Next Generation of Researchers and Strengthening External Collaborations

CDDR aims to enhance the level of drug discovery research while strengthening collaborations with universities, research institutions, and industry to improve research efficiency and success rates. The development of highly skilled research personnel is essential for fostering

productive collaborations. To achieve this, we actively engage in personnel exchanges and joint research with graduate schools at institutions such as Kyoto University, University of Osaka, Kobe University, Nagoya City University, Asahikawa Medical University, and Tokushima University.

### Platform Launched as a Global Hub for Bioimaging Drug Discovery Research

Bioimaging is an advanced technology that uses multiphoton excitation microscopy to visualize structures and functions in living organisms at high resolution for a deeper understanding of biological phenomena. Multiphoton excitation microscopy uses near-infrared light to achieve high penetration into deep tissue, allowing non-invasive acquisition of three-dimensional images. This technology provides more realistic and reliable data than in vitro experiments because cell dynamics and intercellular interactions can be observed in real time under natural physiological conditions. In addition, side effects and systemic effects can be evaluated over time, making it an innovative tool in drug discovery research.

In FY2025, we will launch the Next Generation Intravital Imagingbased Drug Discovery Platform, a contract analysis service utilizing the world's highest resolution multiphoton excitation microscope. This platform provides a pharmaceutical-regulatory



World's first successful bioimaging in bone

#### Laboratory of Proteomics for Drug Discovery

We develop sensitive and scalable proteome analysis platform for clinical specimens to identify novel biomarkers and therapeutic targets useful for disease diagnosis and treatment.

#### Laboratory of Drug Discovery Imaging

Focusing on the dynamic network of immune cells, we aim to uncover the fundamental principles maintaining organ and tissue integrity and develop innovative drugs to regulate these mechanisms.

#### Laboratory of Advanced Biopharmaceuticals

We develop basic technologies for the creation of new biopharmaceutical modalities using protein engineering, antibody engineering and organic synthetic chemistry. Our focus is on the development of engineered antibodies with enhanced functions compared to conventional antibody drugs.

compliant data management and guality assurance system and ensures confidentiality of research through contract research agreements with pharmaceutical and healthcare-related companies. Furthermore, we will promote research and development of imaging quantitative analysis and drug probe technology, and develop the platform as an international research center. We will also focus on technical guidance and human resource development to contribute to the training of new experts and the dissemination of technology.

In addition, the bioimaging technology is expected to be applied to cancer screening because it enables in-situ evaluation of malignancy and metastatic invasiveness of cancer cells without the need for biopsy. This technology provides rapid and quantitative diagnosis while reducing patient burden, and is expected to further develop in the medical field





Chromatographic system

#### Center for Drug Design Research

#### Laboratory of XNA Screening and Design

We work on synthesizing artificial nucleic acids (xeno nucleic acids: XNA), designing sequences, screening target-specific nucleic acid molecules and optimizing them for different applications to create nucleic acid drugs.

#### Laboratory of Antibody Design

We focus on designing next-generation antibody-based pharmaceuticals to maximize therapeutic efficacy. By exploring the binding modes (epitope) of various antibody-based drugs across molecular boundaries, we aim to develop clinically applicable, innovative, and high-performance antibody therapeutics.

#### Laboratory of Biofunctional Molecular Medicine

Through comprehensive cancer omics analysis, we identify "cancer-related genes" and clarify their in vivo functions, aiming to uncover the molecular mechanisms underlying development, progression, and treatment resistance. Furthermore, we are studying the development of therapeutic strategies by functional regulation of these genes in vivo.

# **Artificial Intelligence Center for Health** and Biomedical Research



#### From Cells and Animals to Computers

As a student, I conducted research on the functionality of food components through cell cultures and animal studies. I was fascinated by the phenomenon whereby a single compound could exhibit multiple physiological activities. My efforts to understand this complexity by comprehensively measuring and analyzing biomolecules have led me to my current research.

Director Yayoi Natsume

Approaching Invisible Life Phenomena Through Data : The Future of Drug Development Woven with AI

#### The Establishment of Artificial Intelligence Center for Health and Biomedical Research

The Artificial Intelligence Center for Health and Biomedical Research was established on April 1, 2019, within the National Institutes of Biomedical Innovation. Health and Nutrition (NIBN). Its mission is to integrate Al-related activities and expand research capabilities in the fields of drug discovery and health sciences. Al has seen rapid advances and integration across various fields, including biology and chemistry. These disciplines, with their long histories, have witnessed technological innovations that have enabled the acquisition of diverse data. Additionally, as theoretical foundations continue to be established, large-scale simulations based on vast computational outputs have become possible. This evolution has led to the fusion of biology, chemistry, and information science, giving rise to fields like bioinformatics and chemoinformatics. These disciplines, which have developed alongside computers, are now entering a new phase with the advancements in machine learning and natural language processing. At our center we strive to fulfill the aspirations of those who seek effective treatments and long, healthy lives by harnessing cuttingedge AI technologies to drive research in the areas of drug discovery and human longevity



Figure 1 : Data-Driven Drug Target Discovery



#### Visualizing the Invisible: Understanding the World Through Computational Data

Drug development involves multiple processes, each presenting unique challenges-ranging from the depletion of viable drug targets and rising medical costs due to biopharmaceuticals to high attrition rates in clinical trials. The development of pharmaceuticals relies on the collective expertise of biology, chemistry, and various other scientific fields. A major wave of Al integration and digital transformation is now sweeping through this landscape. One of our key research initiatives at the center is datadriven drug target discovery. The term "data-driven" signifies making decisions based on data. Traditionally, researchers identify biologically significant molecules associated with a disease and, through analysis, determine the most effective drug targets. In contrast, data-driven drug target discovery involves collecting disease-related data and utilizing Al technologies to propose drug targets. By identifying potential drug targets directly from patient data, we hope to reduce the risk of new drug

stage.



## Advancing Drug Discovery with AI and Human Collaboration

Al adoption in academic research is no longer a novelty. However, at our center, we focus on applying the most suitable AI technologies to specific challenges in drug development and healthy longevity. By utilizing AI in practical and meaningful ways, we aim to bridge fundamental discoveries with real-world applications. We are building a research framework that connects knowledge extracted from patient data with the physical entities at the core of drug development. Our mission is to demonstrate the new possibilities of Al-driven drug discovery.

Moreover, by collaborating closely with other research institutions that collect



and manage extensive biological and chemical datasets, we play a vital role in deepening insights and strengthening partnerships. Through these collaborations, we achieve a scale and precision of analysis that would be impossible through independent research alone, creating new value and opportunities.

#### Laboratory of Bioinformatics

To support data-driven drug target discovery, we conduct research on analyzing various disease-related data (such as clinical and omics data) and developing novel analytical methods using cutting-edge technologies, including machine learning

### Our Vision for the Future of the Artificial Intelligence Center for Health and Biomedical Research

Our goal is to leverage AI technologies to solve challenges in drug development and healthy life extension - discovering innovative solutions that were previously unattainable. However, our vision extends beyond simply applying existing AI technologies

At the Center, we aim to contribute to the advancement of AI itself - developing truly groundbreaking AI innovations that will drive the future of drug discovery and health sciences



#### Artificial Intelligence Center for Health and Biomedical Research

#### Laboratory of In Silico Design

To rapidly identify and create drug targets and pharmaceutical compounds, we develop structure-based drug discovery technologies using molecular simulation and informatics. Through this technology, we aim to understand complex molecular recognition processes within the human body and create novel therapeutic agents and drug design methods

# **Center for Drug Discovery Resources Research**



## Supporting Drug Discovery Research by Providing High-Quality Biological Resources

#### Establishment and provision of drug discovery resources for immediate response in emergencies

Since its inception in 1985, the Center has been collecting and registering various biological resources, including cultured cell lines, to support basic research in Japan, particularly in drug discovery. To date, we have established a system to provide over 1,900 types of cell lines and continue to add more than 40 new biological resources annually to meet the needs of researchers. Researchers can easily request resources via the "JCRB Cell Bank" website, and requested cell lines are delivered within a week to ensure swift initiation of research. This initiative has grown into a program providing approximately 6,000 cell lines annually, contributing significantly to research advancement.

Our well-structured supply system enabled a rapid response to the COVID-19 pandemic. As early as February 2020, in collaboration with the National Institute of Infectious Diseases, we became the first in the world to provide a useful cell line (JCRB1819: VeroE6/ TMPRSS2) for isolating and propagating the SARS-CoV-2 virus. This contribution greatly facilitated the development of vaccines and therapeutics

Figure 1: Changes in the number of newly catalogued cultured cell resources

FY	Number of cell lines collected	Number of cell lines catalogued
2015	79	70
2016	43	93
2017	73	56
2018	106	40
2019	47	42
2020	88	40
2021	66	44
2022	65	46
2023	52	62
Total	619	493

Figure 2: The number of distributions to researchers



#### Commitment to high-quality and reliable resources

Advancements in cell characterization and quality testing technologies are occurring. While the global standard for cell banks mandates the absence of microbial contamination and misidentification in human-derived cells, our center goes beyond these minimum requirements by implementing additional quality assessments and characterizations. Our goal is to provide safe and reliable biological resources for researchers.

One of our key initiatives includes a proprietary virus screening technology capable of detecting 20 different DNA and RNA viruses. This method addresses virus infections in cells, an aspect often overlooked by researchers. Additionally, we offer specialized cell collections, such as bioluminescent

#### Development of new drug discovery resources through advanced technologies

Drug discovery resources evolve with changing research needs. Initially, cancer cell lines were categorized based on their organ of origin. Today, researchers demand detailed profiling of oncogene mutations, verification of target molecule expression, and quantitative expression data, reflecting a significant increase in complexity and



precision. Our center Ampoule sealing actively develops new



needs. External liquid

Figure 4: Facilities for preparation/storage of biological resources



biological resources to meet these emerging Traditional cell banks predominantly store cancer cell lines cultured on flat surfaces in containers, which



may not be possible to accurately mimic the three-dimensional nature of tumors in the human body. The selective expansion of highly proliferative and easily manageable cancer cells in culture has been a maior imitation. While these cell lines have been

Figure 5: Identification of abnormal chromosomes via a chromosomal analysis

### Center for Drug Discovery Resources Research

#### Laboratory of Drug Discovery Resources Research

We operate the JCRB Cell Bank, which has the largest number of registered We are developing efficient differentiation methods to induce stem cell lines in Japan, and the Human Tissue Bank, which provides surgical cells into target cells from the perspectives of developmental biology residual tissues to domestic researchers. By offering high-quality biological and molecular biology. Using the functional cells obtained, we are resources, we support the foundation of drug discovery research both establishing screening systems and other foundational technologies for domestically and internationally. Additionally, we are engaged in the drug discovery. development of essential cell tools for drug discovery research.

#### Laboratory of Functional Organoid for Drug Discovery

We aim to accelerate drug discovery research by developing novel evaluation To promote the development of model cell evaluation systems, such as functional systems to assess the efficacy and toxicity of pharmaceuticals using maintenance cells and disease model cells necessary for drug discovery research, as hepatocytes and intestinal epithelial cells derived from human iPS cells. well as freezing technologies for biological resources, we facilitate collaboration both within and outside the institute, aiming for efficient resource and technology development.

#### Laboratory Animal Resource Bank (LARB)

We develop disease model small animals that are essential for research on intractable diseases and therapeutic development while also operating an experimental animal research resource bank. By developing, analyzing, collecting, preserving, and supplying spontaneous and genetically modified model animals, we support and promote disease and drug discovery research

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cancer cells incorporating firefly luciferase genes for in vivo imaging in mouse transplantation models. Another important collection involves cells derived from patients with highly tumorigenic genetic disorders, such as xeroderma pigmentosum, with comprehensive characterization data provided to researchers



Figure 3: Visualization of bioluminescent cancer cells transplanted into mice

widely utilized as standardized research tools due to their reproducibility, they do not fully support drug development. There is a growing demand for more physiologically relevant research models



Figure 6: Organoids prepared from the ntestinal tract

To address this, our center operates a "Human Tissue Bank" initiative, where, with appropriate patient consent, we provide researchers with previously discarded cancer tissues and adjacent normal tissues. This effort has successfully established human intestinal models, and our blood-brain barrier model, developed using endothelial cells, holds promise for central nervous system drug development.

Furthermore, leveraging our expertise in cell bank, we are actively researching and developing freezing technologies for preserving threedimensional cell aggregates while maintaining their original functionality. This includes the development of cell cryoprotectants and freezing devices that ensure optimal preservation of these valuable resources for future research applications.



Figure 7:Neurite outgrowth of iPS cell differentiation-induced neurons after thawing

#### Laboratory of Cell Model for Drug Discovery

#### aboratory of Drug Discovery Resources Research Collaboration Promotion Office

# **Research Center for Medicinal Plant Resources**

#### The Fascination of Plant Research

Unlike animals, plants do not exhibit obvious changes before our eyes, but sometimes, unexpected transformations occur without notice. The joy of discovering a new and unprecedented change is truly exceptional.

Japan

10.3%

82.7%

Others

7.0%

hare o

Director Kayo Yoshimatsu

## Importance of Domestic Cultivation and Conservation of Resources for the Stable Supply of Crude Drugs

Under the Convention on Biological Diversity, medicinal plants are classified as "genetic resources". Due to this convention and other international treaties such as the Washington Convention, obtaining plant seeds and seedlings from abroad is extremely difficult. As of 2020, the share of crude drugs produced in

Japan was only about 10%, compared to approximately 80% from China (See the figure on the right). The promotion of domestic cultivation of raw medicinal plants faces three main challenges

(1) Securing Seeds and Seedlings - The supply system for seeds and seedlings remains underdeveloped. (2) Training of Cultivators and Instructors - The rapid aging of skilled farmers poses a significant challenge. (3) Improving Production Efficiency and Sustainability - The technical infrastructure, including mechanization and appropriate pesticide use, is insufficient.

In addition to (1) to (3) above, there are other challenges in maintaining and managing medicinal plants These include the large number of herbal medicines used in Japan, the diversity in origin, growing environment life style, and growth period, and the fact that even within a single plant species, the constituents contained often differ depending on the origin and environment. In addition, the maintenance and manage plants requires multiple locations and methods (e.g., conservation cultivation in fields and gree preservation, and culture preservation) in order to disperse hazards. Under these circumstances, the challenge is how to achieve stable cultivation and supply of medicinal plants in one's own country.

## Maximizing the Potential of Medicinal **Plants to Benefit People's Health** in the Future

#### Enabling the broad use of medicinal plants in Japan

Medicinal plants have been used in pharmaceuticals since ancient times. They are also indispensable for the research and development of pharmaceuticals, including Western medicines. The Center cultivates and preserves more than 4,000 strains of medicinal plants according to vegetation at three locations in Japan (subarctic, temperate, and near subtropics) (Figure 1). We regard medicinal plants as important assets and believe that it is our responsibility to make them available when needed and to pass them on to future generations. We are conducting various research to achieve this. In addition, we supply seeds and seedlings to research institutes in Japan and provide instructions on their cultivation techniques

Hokkaido Division	— · · <b>` `</b>	
Location:		100
44°22'N, 142°28'E		and the second s
Altitude 98 m		
Temperature:		
Average 7.3°C		
Highest 35.6°C	1910	
Lowest -28.3°C	and the second second	
Site area:	191	
83,253 m²		
Tanegashima Division	Tsukuba Divi	ision
30°32′N, 130°27′E	Cultivation Labora	tory
Altitude 88 m	Breeding and Phys Modisinal Plant Sa	Slology Laboratory
lemperature:	Losotion: Tor	areening Project
Average 19.3°C	26°01 / N Δv	erane 16 1ºC
Hignest 32.7°C	1/0 °0/ ′E Li/	nhest 37 1 °C
Lowest U.5 °C		wort -7 5°C
	Altitude 20 m LO	1.3 U
	Site	died.

#### **Research Center for Medicinal Plant Resources** Introduction of Research Divisions, Laboratories, and a Project

#### Hokkaido Division

Focusing on medicinal plants that thrive in cold regions, we have planted over 1,000 strains in our We conduct research on the maintenance, preservation, and quality improvement of medicinal plant resources, as well as their application to production, using plant medicinal plants garden, arboretum, useful plants garden for the Ainu people, and research fields. Additionally, we conduct research and development on breeding medicinal plant cultivars suitable biotechnology. By utilizing plant tissue culture techniques, we cultivate and maintain for pharmaceutical raw materials, optimizing cultivation conditions, and implementing measures various plant species as genetically identical "clones" under sterile conditions. against weeds, pests, and diseases while disseminating these technologies to production areas

#### Tsukuba Division - Cultivation Laboratory

We conduct research on the cultivation and guality evaluation of medicinal plants. Additionally, Since Tanegashima Island is a habitat for many plant species at their southern or northern limits, as well as rare species, we conserve and propagate medicinal plant species. In the as part of international academic cooperation, we engage in low-temperature preservation of respect of medicinal plants that are difficult to obtain from abroad, we aim to establish a valuable plant seeds and carry out seed exchange programs with botanical gardens abroad. Preserved seeds undergo periodic germination tests, and those with decreased germination sustainable production system by improving efficiency across all processes, from seed rates are regenerated to ensure the continuous conservation of genetic resources propagation to crude drug production, using locally acclimatized plant strains.

#### Medicinal Plant Screening Project

We store and manage over 10,000 plant extracts, primarily derived from plants growing in Japan, as Dimethyl sulfoxide (DMSO) solutions at -20°C. These extracts are provided to companies and research institutions in various fields, including pharmaceuticals, cosmetics, health foods, and agrochemicals, with the aim of facilitating their application and commercialization, From FY 2024, we have also started providing Kampo prescription extracts.

### Preserving Northern Plants and Breeding of Superior Medicinal Plant Cultivars Using an Expansive Field

We have been working on breeding medicinal plant cultivars suitable for the production of pharmaceuticals. So far, we have bred and registered a total of seven medicinal plant cultivars such as coixseed, peony, glycyrrhiza, and

perilla (Figure 2). A medicinal cultivar of coixseed known as 'Kitanohato', which can be cultivated even in cold regions. has been successfully produced in Hokkaido. It is widely used not only for pharmaceuticals, but also for guasi-drug lotions and edibles. A medicinal cultivar of peony called 'Benishizuka' is



Medicinal Plants Cultivation and Quality Cultivar registered Evaluation Part 14 in 2007 Published September 25 2024

Prefecture, and 'Yumesaika' in Akita Prefecture

actually produced in Okayama

Figure 2: The latest issue of the Guidelines for the Cultivation of Medicinal Plants (left) and medicinal plants bred and registered at the Center (right)

#### **Research on Germination Conditions of Medicinal Plants**

In recent years, the genetic resources of wild plants have been rapidly declining. To address this issue, we have been storing seeds under low-temperature conditions. Since optimal storage conditions vary by seed type, we preserve

them in tin cans or styrofoam bottles at 10°C -1°C and -20 °C, continuously studying the best storage methods. Regular germination tests are conducted, and if germination rates decline. seeds are regenerated to maintain genetic resources. We have also continued seed exchange programs with botanical gardens worldwide for over 70 years (Figure 3).



Figure 3:Seed storage (top left, bottom left) germination test (top right), Index Seminum (seed list) sent to overseas botanical gardens (bottom right)

#### Medicinal Plant Screening Project

It is estimated that there are 270,000 species of plants growing worldwide. However, the use of natural resources from overseas is becoming increasingly difficult due to the Convention on Biological Diversity and other regulations. Our plant extracts and Kampo prescription extracts are expected to lead to new developments in underused domestic plant resources, crude drugs, and Kampo medicines.

#### Tsukuba Division - Breeding and Physiology Laboratory

#### Tanegashima Division

### Plant Biotechnology Contributing to Stable Supply of Medicinal Plant Resources

To ensure the safe, secure and stable supply of important medicinal plant resources, we utilize plant biotechnology for their preservation. Plant tissue culture is a key biotechnology technique that employs the plant's ability to regenerate a complete plant from any part, a property known as totipotency. Using this technology, we cultivate and maintain

various medicinal plants as genetically identical "clones". These cloned plants serve as a vital source of high-quality seedlings for medicinal plants expected to be cultivated domestically (Figure 4).



Figure 4: Plant tissue culture maintained under LED light (left) and planting work in a clear bench (right)

## Preserving Tropical, Subtropical and Temperate Medicinal Plants and Leading Commercial Production of those Difficult to Obtain

Rauvolfia serpentina (Rauvolfia) is a medicinal plant used in Ayurveda and known for its blood pressurelowering effects. However, due to resource depletion in India, it has been listed under CITES Annex II, making international procurement difficult Our center has been preserving and cultivating Rauvolfia since the 1950s, with the aim of ensuring a stable supply of its pharmaceutical formulations for hypertension treatment.



Rauvolfia serpentir Medicinal part: roots Indications: hypotensive, sedative

Figure 5: Rauvolfia serpentina in flowering season (top) and its roots used as herbal medicine (bottom



Figure 6 : Collection of wild plants (left), extraction equipment (middle), biological activity evaluation using plant extract library (right)

# Tsukuba Primate Research Center



#### Day-to-day Research activities

Research using Nonhuman Primates (NHP) covers many areas, from basic research to practical applications in medicine, with the ultimate goal being disease control. In this way, medical science research using NHP aims to control diseases from basic research and shed light on the final phase of disease overcome. To reach this future goal, we are developing the drug discovery technology platforms, establishing the research on the creation of animal models for human diseases using NHP, and furthermore, the development of vaccines with the best possible effects on global public health.

Director Yasuhiro Yasutomi

## Issues with Primate Imports Caused by the COVID-19 Pandemic

Sunna Marriel

Due to the COVID-19 pandemic, the import of laboratory primates from China was suspended, making their procurement extremely difficult. As a result, contract testing has become challenging, and drug development has faced significant delays. As of the 2023 fiscal year, primates are primarily being imported from Vietnam and Cambodia. However, from 2012 to 2023, the nport prices of laboratory primates have risen sharply, increasing approximately tenfold compared to 2013 (see Figure 1) rt costs and regulatory restrictions, the demand for domestic production of laboratory primates is o re, the key challenge now is how to establish a stable domestic system for breeding and supplying these essential an



## Supplying Quality Nonhuman Primates for Medical Research and Using them to Conduct Independent Medical Research

NHP for medical experiments are essential for drug discovery

A variety of evidence is needed, from drug development and research to the provision of those drugs to society. Among these, experiments for confirming efficacy in animals before clarifying it in humans are an indispensable part of that process. Testing in NHP, which are closely related to humans, is particularly crucial to drug discovery. As the export of laboratory NHP from other countries has ground to a halt since the pandemic, NHP for medical experiments are becoming increasingly important to drug discovery in Japan.

### Breeding SPF monkeys with an unparalleled in the world pedigree to secure a population of elderly monkeys

Our center is the only medical research primate center in Japan, dedicated to enhancing the quality of cynomolgus macaques as research resources while establishing a system for their maintenance and supply. Additionally, we promote biomedical research using primates, spanning from the individual to the genetic level.

In our center, we breed Specific Pathogen-Free (SPF) monkeys and provide animals with clear backgrounds, including lineage, medical history, and test results. The proportion of SPF monkeys in our breeding facilities was 14.0% in FY 2007, but by the end of FY 2023, it had reached nearly the upper limit of 91.1% (Figure 3).

Furthermore, in the context of an accelerating aging society, aged individuals housed under completely controlled conditions in germ-free environments are an essential research resource. The aged primates at our center are unparalleled in the world in both quality and quantity on a global scale.

	Category	2018	2019	2020	2021	2022	2023
Number of monkeys produced		214	210	222	211	189	210
Number of monkeys supplied	Normal monkeys	143	196	163	154	206	170
	Special monkeys	15	4	10	10	2	0
	Total	158	200	173	164	208	170

Figure 2:Number of Cynomolgus Monkeys Produced and Supplied Each Year



The percentage of SPF animals in the breeding building was 14.0% in EX 2007 but reached 91, 1% by the end of February 2023

Figure 3: Chronological Changes in the Numbers and Percentages of High-Quality SPF Cynomolgus Monkeys Produced

# Animal Biosafety Level (ABSL)-3









(1)

### Providing experimental animals and technological support to help streamline drug discovery

We do more than simply supply monkeys to academia and other institutions. We thoroughly review submitted experimental protocols, and only those that are fairly evaluated and approved by our review committee are conducted and completed within our center. In other words, we provide not only monkeys but also a full range of resources, including hard resources such as CT scanners and dissection rooms, as well as soft resources such as experimental expertise and highly skilled researchers. This comprehensive support enables faster and more cost-effective drug development.

#### Combating intractable diseases, rare diseases and infectious diseases with no established therapy!

We primarily focus on researching intractable diseases for which no established treatments exist, as well as diseases that public institutions are responsible for addressing. Using primate models that allow us to investigate disease onset at the genetic level, we have been able to track and analyze the pathophysiology of rare disease models such as macular degeneration and dilated cardiomyopathy from the pre-symptomatic stage. In 2024, we initiated whole-genome analysis of cynomolgus macaques. This unique approach, conducted using strictly controlled and clean primate populations, has earned high international recognition.

One of our recent achievements is the establishment of a COVID-19 evaluation system, where we successfully developed and reported an effective treatment for the Omicron variant using primate models. In 2024, within 100 days of the WHO's declaration of a Public Health Emergency of International Concern (PHEIC), we were the only institution in Japan to create and evaluate an Mpox model. This has helped establish a system for the rapid development of vaccines against emerging infectious diseases.

Additionally, we have advanced research on HTLV-1, becoming the first in the world to successfully develop an HTLV-1 infection model in primates. This research aims to uncover the mechanisms of mother-to-child transmission through breast milk, which is essential for developing treatments and vaccines.

Furthermore, we have developed a vaccine technology incorporating an adjuvant antigen into an attenuated AIDS virus, which has demonstrated high efficacy in primate-based evaluations. Human clinical trials are planned within the next few years, raising hopes for the realization of an HIV cure.

# Infectious Disease Experimental Facility to Support Advanced Basic Research:

# **Center for Nutrition Epidemiology** and Policy Research

#### Why I Started This Research

I studied food science at university, and as I delved deeper into the field, I became increasingly interested in the relationship between "food and health", which led me to pursue a medical degree. Along the way, I encountered the field of "epidemiology" and began my journey as an epidemiologist.

Director Mieko Nakamura

By investigating and analyzing the "nutrition" and "diet" of the Japanese people, we aim to show society how to create lifelong health through "food".

#### Exploring the "Scientific Evidence" for Nutrition for a Healthy Tomorrow

At our center, we primarily conduct nutrition research using epidemiological methods to clarify the relationship between nutrition, diet, and health, as well as to contribute to the development and evaluation of nutrition policies. Among our activities, the compilation and analysis of the "National Health and Nutrition Survey" (a nationwide survey conducted annually by the Ministry of Health, Labour and Welfare) forms the foundation for all of our research. The results of this survey are used to establish guidelines on what nutrients Japanese people should consume in what quantities for a healthy life, and as scientific evidence for policy recommendations. For example, the findings are used to monitor the progress of the goals set in the "Health Japan 21 (the third term)" health promotion policy by the government.

Additionally, we conduct research to improve the accuracy of survey methods for the ongoing implementation of the National Health and Nutrition Survey and research on factors related to the diet and eating behaviors of the Japanese people. We also conduct reviews and related studies necessary for the compilation of dietary standards such as the

"Dietary Reference Intakes for Japanese", which are used in hospitals, etc., with the goal of enhancing dietary guidelines.

In a cross-disciplinary project on "Promoting the Improvement of Food Environments through Industry-Academia-Government Collaboration", we focus on databases and simulation research. Collaborating with companies, we are working on building and utilizing food product and recipe databases. Furthermore, in health economics research assessing the impact of policies that promote sustainable and healthy diets on health, society, and the economy, we are creating an environment where individuals, businesses, and local governments can effectively use simulation models and scientific evidence for decision-making. By utilizing public statistical data such as the National Health and Nutrition Survey and collaborating with organizations like WHO, we contribute to global epidemiological data creation, thereby supporting the dissemination of information to society. We are also involved in the "Health Japan 21 Analysis and Assessment Project", commissioned by the Ministry of Health, Labour and Welfare (see Figure 1).





Figure 1: Health Japan 21 Analysis and Assessment Project

#### Life Course Approach Looking Ahead to the "100-Year Life" Era

When considering the "100-Year Life" era, it is not just about extending average life expectancy, but focusing on extending healthy life expectancy, ensuring independence throughout one's lifetime. Since nutritional priorities vary at each life stage, for adults, "life course approach" (appropriate interventions based on the life course), such as reducing the risk of lifestyle-related diseases, becomes even more important.

It is believed that healthy parents are crucial for raising healthy future generations, and just as the health of individuals during middle age affects their health in old age, human life is cyclical. From this perspective, we have initiated a cohort study focusing on pregnant women and mothers in Settsu City (see Figure 2). We expect that this research will provide scientific evidence for healthy eating habits for mothers and children.



Figure 2: Pregnancy And Nutrition cohort At KEnto (PANCAKE Study) : A longitudinal study on nutrition, diet, and other factors among pregnant women in Settsu City

#### Center for Nutritional Epidemiology and Policy Research

#### Laboratory of the National Health and Nutrition Survey

We conduct statistical aggregation and analysis for the "National Health and In collaboration with domestic and international research institutions and large-Nutrition Survey", which is conducted annually by the Ministry of Health, Labour scale cohort studies, we conduct nutritional epidemiology research to clarify the and Welfare. Additionally, we conduct research on the diet and eating behavior relationship between diet, nutrition, and non-communicable diseases, as well as among Japanese people using data from the "National Health and Nutrition research on improving food environments. We aim to translate scientific evidence Survey" to contribute to the promotion of national and local health policies, such on diet, nutrition, and health into societal benefits as "Health Japan 21 (the Third Term)"

#### Laboratory of Nutrition Guidelines

We conduct research on the scientific evidence necessary for the formulation, To support the development of effective policies, we conduct research on dissemination, and implementation of dietary and nutrition guidelines. In particular, social health and nutrition challenges through (1) epidemiological analyses on we focus on developing scientific evidence for populations requiring special the prevention of non-communicable diseases using official statistics and (2) consideration, such as infants, pregnants, and older people mathematical analyses employing approaches such as simulations and health economics

## From Scientific Evidence to Social Implementation Aiming for Social Contribution

Our center aims to create scientific evidence related to nutrition, diet, and health, which, when reflected in policy, will contribute to society. However, policies need not only to be formulated but also effectively disseminated. One way to achieve this is through the use of "nudges". For example, in the second term of Health Japan 21, the target daily vegetable intake of 350 g on average was not achieved. It remains a goal in the third term, and increasing the intake remains a challenge. As part of the Osaka Prefecture's commissioned project "Creating a Sustainable Food Environment that Naturally Promotes Health", we worked with companies and universities to implement nudges to increase vegetable intake in cafeterias. Moving forward, we will continue to focus on contributing scientific evidence back to society.

#### Laboratory of Nutritional Epidemiology

#### Laboratory of Nutrition and Social Science

# **Center for Physical Activity Research**

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Why I decided to begin my research at NIBN Through working at the hospital, I realized the importance of physical activity for patients returning home and improving their prognosis, and I became interested in research on physical activity (exercise). NIBN is the only institution in Japan that can conduct research on physical activity and reflect it in policies through guidelines, and I started working there because I thought it could greatly contribute to improving the physical activity of the people.

Director Rei Ono

# Improving the Public's Physical Activity and Exercise Habits Through Physical activity and Exercise Guide and Accurate Assessment of Physical Activity

#### To improve people's physical activity and exercise habits through physical activity and exercise guide

In Japan, the National Health and Nutrition Survey has been conducted since 1989 to assess the level of physical activity among the people of Japan. The survey uses pedometers to measure the number of steps taken by people in a day. The survey has been conducted continuously and on a large scale, and it provides important data on trends in physical activity for reference around the world. Center for Physical Activity Research has been engaged in two major efforts to help increase the number of steps measured in the National Health and Nutrition Survey

The first is to disseminate information to improve the public's physical activity and exercise habits. In order to share evidence-based information. academic papers on physical activity, exercise, physical fitness, and health from around the world have to be collected and analyzed (systematic reviews and meta-analyses). We are researching the relationship between physical activity; exercise, and physical fitness and health outcomes. Based on the evidence obtained, we have drafted physical activity and exercise guide such as Exercise and Physical Activity Reference for Health Promotion (EPAR) and the Active Guide (physical activity guidelines) to provide information to the public to improve their physical activity and exercise habits.

The second effort is to develop and validate methods of assessing the level of physical activity. Over the last few years, assessment of the level of physical activity has been based on values obtained by processing signals from an accelerometer built into each pedometer. However, a pedometer can be located in various places on or near the body, such as one worn on the waist, on the arm, or built into a smartphone. In other words, even if the number of steps taken is the same, one can never know whether or not it accurately reflects the actual number of steps taken depending on the method of measurement. Center for Physical Activity Research is verifying the validity and accuracy of the values from each model of pedometer in order to allow continuous assessment of trends in the number of steps taken according to the National Health and Nutrition Survey and to facilitate physical activity research in other fields.

Following the spread of COVID-19 beginning in 2020, lockdowns and other restrictions on activities were imposed around the world. A survey we conducted found that the objectively observed level of physical activity

was significantly lower in the metropolitan area than in rural areas due to the declaration of a state of emergency in April and May 2020 in Japan. As evidence-based policymaking is increasingly being emphasized, we hope that monitoring changes in the physical activity of the public in this manner will continue to play a role in policymaking at the national and local levels.



Treadmill

#### Identification of modifiable factors to prevent frailty, from research to implementation in society at large

The world is looking to see how Japan, a high rate of aging country, will cope with a super-aged society. As people age, their physical and mental vitality (e.g., motor and cognitive functions) declines, and their vitality can be affected by the presence of multiple chronic diseases. This can lead to impaired daily functions and greater susceptibility to mental and physical frailty. This condition is known as frailty. It is a decline in daily functions common to old age, but daily functions might be maintained and improved through early detection of frailty and appropriate interventions and support. The Center for Physical Activity Research is working with local governments to ascertain the relationship between physical activity and exercise against frailty and to implement the results not only in research but also in society at large.

#### A study on healthy longevity in Kameoka City, Kyoto Prefecture

Kameoka City has developed a program to prevent the need for nursing care in the community and is testing its effectiveness. Elderly participants who attended a weekly exercise class were compared to a group who exercised at home to determine if either had an increase in motor function or muscle mass. The results indicated that both groups saw an increase in motor function or muscle mass. At the same time, we have trained care prevention supporters and educated them about the program. In addition, research results in this field recently revealed that elderly people who walk more, who consume more protein, and who eat a higher quality diet are less likely to be frail and that elderly people with a higher or lower BMI (an indicator of one's physique) than normal are more likely to be frail. Moreover, the results also showed that people with a larger sphere of activity in daily life had a lower risk of mortality and also that leaving the house to run errands in the city did not see any change in their risk of mortality. The evidence generated by the local community is widely helping to extend healthy life expectancy in Japan.

A study on preventing frailty among the working-age population in Osaka Prefecture Center for Physical Activity Research, together with the Osaka Prefectural Government, is developing a lifestyle modification program to prevent frailty. As a survey on frailty featuring a Kihon Checklist was conducted the results revealed a certain percentage of both the elderly as well as working-age people in their 40s and 50s were frail and that respondents who were familiar with the term "frailty" were less likely to be frail than those who were unfamiliar with the term. In 2022, the program conducted frailty checks at companies during specified health exams. These checks revealed that a certain percentage of workers were frail. We aim to prevent frailty in the long term by increasing the awareness of frailty among the working-age population.

#### Longitudinal Study on Health, Nutrition, and Well-being (Settsu Study)

As society undergoes significant changes, it is crucial to implement effective health promotion measures tailored to different life course stages (generations) to protect the health of all age groups and create a more livable community

As a first step, we conducted a survey targeting residents of Settsu City 30.0 aged 18 and older, collecting approximately 14,000 responses on topics such as physical activity, diet, and social participation. For those who 20.0 provided consent, we plan to link their responses with long-term care needs certification questionnaire data, long-term care claims data, and medical 10.0 care claims data . to track disease occurrence. Based on the survey results. we aim to identify public health issues and reflect them in policymaking, 5059 years of ultimately fostering an environment where people of all generations can 30.39 yearso live comfortably. However, this survey alone is not sufficient to provide personalized lifestyle guidance. Therefore, we intend to conduct additional in-depth health assessments to further contribute to "a health promotion Figure 3 : Percentage of those who have an exercise habit by gender and age group initiative that leaves no one behind"

#### **Center for Physical Activity Research**

#### Laboratory of Physical Activity Guideline

Serving as a hub for universities and research institutions, we generate evidence Through field studies and analysis of public data, we conduct epidemiological on physical activity, sedentary behavior, and health. We also contribute to research on the relationships between physical activity, sedentary behavior. the development of guidelines on physical activity and sedentary behavior by disease prevention, healthy life expectancy, and well-being. We also identify organizing existing evidence and conducting research and support activities factors contributing to the gap between scientific evidence and real-world behavior. aimed at social implementation. aiming to bridge this gap through social implementation efforts

#### Laboratory of Well-Being

Amid population decline and changes in social structure, enhancing well-being is a crucial issue. Through field surveys and experimental research, we focus on the life course perspective to elucidate the relationship between health-especially physical fitness and exercise-and well-being, aiming to propose a more vibrant society.



Figure 2 : Prevalence of frailty evaluation by Kihon Checklist by age group



#### Laboratory of Exercise Epidemiology

# Center for Clinical Nutrition



#### Current research and vision

Our research focuses on addressing health issues such as obesity, diabetes, and fatty liver disease, as well as age-related conditions like sarcopenia and frailty. We aim to develop nutritional guidance and intervention methods based on precise nutritional assessments. By integrating analyses of gut microbiota and genetic predispositions, we seek to establish "personalized nutritional assessments". This approach enables us to provide optimal nutrition and dietary recommendations tailored to each individual's constitution and health status, contributing to disease prevention and health maintenance. Through our research, we are committed to supporting the public in leading healthy and high-quality lives.

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Director Yuic	hi Yoshida		
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## Advancing Health and Disease Prevention through Personalized Nutrition

#### Assessing Energy Expenditure for Highly Accurate Personalized Nutrition

Personalized nutrition aims to provide nutritional support tailored to an individual's constitution and lifestyle, with precise evaluation of energy requirements at its core. Energy requirements must be determined based on factors such as age, sex, physical activity level, and health conditions, as their accuracy directly affects dietary management and health maintenance. To establish estimation methods for daily energy expenditure. we utilize human calorimeter and the doubly-labeled water method, contributing to the formulation of "Estimated Energy Requirements" in the Dietary Reference Intakes for Japanese.

Additionally, our research focuses on energy metabolism and the appropriate intake of major nutrients, including protein, fat, and carbohydrate, to aid in establishing dietary reference Intakes for Japanese. We also investigate the mechanisms behind obesity and lifestyle diseases caused by excessive or insufficient nutrient intake and explore prevention strategies



Figure 1: Research using a human calorimeter to investigate individual differences in digestion, absorption, and metabolism

### Longitudinal Study on the Nutrition and Dietary Habits of Pregnant Women in Settsu City (PANCAKE Study)

In collaboration with the Center for Nutritional Epidemiology and Policy and Center for Physical Activity Research, we conduct a longitudinal study on nutrition and dietary habits. Using internationally recognized techniques such as the doubly labeled water method, we comprehensively analyze body composition and energy intake during pregnancy, which have not been fully understood in Japanese pregnant women. Based on these data, we aim to establish scientific evidence for dietary and nutritional recommendations that support maternal health and healthy fetal development.

### Research Utilizing a Large-Scale Japanese **Cohort for Personalized Nutrition**

Using large-scale cohort data from Japanese populations, we analyze lifestyle habits, health status, gut microbiota, and genetic factors to develop dietary recommendations for disease prevention and mitigation. Since food intake involves multiple nutrients that interact synergistically, we investigate how nutrition affects the onset of lifestyle diseases, frailty, and sarcopenia. We also focus on intestinal bacteria as a key factor in individual differences in dietary effects. With a database of over 10,000 individuals, we collaborate with industry partners to further our research



### Does Protein Requirement Vary Based on Physical Activity and Life Course?

Establishing the Indicator Amino Acid Oxidation (IAAO) method in Japan is a critical step toward scientifically determining protein requirements.

The IAAO method, recommended by WHO, is a highly reliable technique, but its reports on protein requirements have been limited to only two countries worldwide. Developing and applying this method in Japan has been a significant challenge. This method utilizes <sup>13</sup>C-labeled

phenylalanine to measure amino acid



Figure 3: Evaluation of Protein Requirements in Japanese Using the Indicator Amino Acid Oxidation Method

oxidation. When protein intake is insufficient, unutilized amino acids are oxidized, increasing <sup>13</sup>CO<sub>2</sub> excretion in breath, allowing for accurate determination of protein needs.

Currently, we are using this method to verify protein requirements in healthy young adults and the elderly. In the future, we will explore how physical activity levels, life course differences, and conditions like frailty and sarcopenia affect protein requirements. Our findings are expected to contribute to revisions of Japan's dietary reference intakes and the development of more effective health policies.

#### Laboratory of Nutrition Metabolism

Using methodologies such as the doubly labeled water method and human To elucidate optimal maternal and infant nutrition from pregnancy through early calorimeter method, we examine estimation methods for energy expenditure childhood, we conduct detailed research surveys on the nutritional intake, physical in daily life. Our research contributes to the development of "Estimated Energy condition, and health status of pregnant women and infants. Requirements" in the Dietary Reference Intakes for Japanese.

#### Laboratory of Behavioral Phy

We validate assessment methods for lifestyle behaviors (diet and physical activity) and conduct research to clarify their relationship with health. Human behavior is influenced by a complex interplay of genetic, physical, and psychological factors. We investigate these relationships using diverse research methodologies, including genetics, physiology, and epidemiology.

### **Research on Individual Differences in Digestion and** Absorption Rates

The "energy" values displayed for foods and meals represent the estimated energy absorbed by the body, excluding energy lost through feces, urine, and sweat

Since human digestion and absorption rates significantly impact required energy intake, we investigate individual differences in digestion and absorption and their determining factors to advance personalized nutrition. Our studies in young adults have revealed significant individual variations in digestion and absorption rates, influenced by energy loads. Future research will explore sex-based differences, body composition, aging, and diseaserelated effects

Figure 2:Building a Microbiome Information Infrastructure for Advancing Health Sciences

#### **Center for Clinical Nutrition**

#### Laboratory of Nutritional Therapy

# **Center for Food Function and Labeling**



Science of Food through Chemical Analysis and Nutrition/Functionality **Research for Safe and Healthy Eating Habits** 

#### **Our Goal**

We conduct research on the nutrition. health functions, and safety of food in order to contribute to the health and longevity of people through dietary habits. Diet plays a major role in maintaining and promoting health, and a balanced diet is the foundation of that. Additionally, it is becoming increasingly clear which foods are most appropriate for each individual and their current state. We will continue our research to make it possible for everyone to enjoy a diet that suits their preferences and is also beneficial to their health.





Inside the Experimental Room

### Contributing to the Maintenance and Enhancement of the Reliability of Nutritional Labels as Experts in Analytical Chemistry

"Foods with Health Claims" such as "Foods for Specified Health Uses with government approval. At our center, we work in collaboration (FOSHU)", "Foods with Function Claims", and "Food with Nutrient Function with the Consumer Affairs Agency to conduct actual measurements of Claims" are health-functional foods that meet the standards set by the functional ingredients and nutrient content in "health-functional foods" government and are the only types of food that can display health-related and "special use foods" available on the market verifying whether they functions. Both "FOSHU" and "Foods with Function Claims" can show meet the required standards. Our research efforts aim to ensure that the functions that help maintain or enhance health, with the former being foods people consume remain safe and continue to contribute to health approved by the government, while the latter is the responsibility of the maintenance and promotion. business to report information on safety and evidence of functionality. Additionally, processed foods are required to have mandatory nutritional "Food with Nutrient Function Claims" is that containing a certain amount labeling for energy, protein, fat, carbohydrates, and sodium (equivalent of specified nutrients and can display their function using governmentto salt), with optional labeling for dietary fiber and vitamins/minerals. defined expressions without the need for notification. All of these foods are Nutritional content must generally be displayed based on actual product measurements, so analytical institutions must always obtain accurate based on a balanced diet, and if consumed in the recommended amounts. they are expected to contribute to health. However, it is crucial that the analytical values. To promote proper nutritional labeling and improve the ingredients and nutrients are correctly included as displayed. "Food for reliability of food composition analysis methods, we conduct annual external quality control surveys and work to maintain and enhance analytical special dietary uses" is the food that can display specific uses, such as for infants, pregnant women, or individuals with swallowing difficulties, techniques

### Scientifically Clarifying the Risks of "Health Foods" and **Providing Reliable Information**

In addition to health-functional foods, there are other foods claiming to be beneficial to health, collectively referred to as "so-called health foods". In response to health issues associated with Foods with Function Claims, there is a strong demand for reliable information about the risks of "health foods". Our center operates the "Health Food Safety and Efficacy Information" website and social media platforms, providing information on health risks and alerts in a timely and easy-to-understand manner. We also gather daily information on health foods, from basic information to topics currently in the spotlight, and communicate it clearly to a broad audience, working to spread correct knowledge and prevent health issues related to the use of "health foods".

In fact, more than 30% of Japanese people habitually consume supplements and other so-called "health foods", and it is essential to consider nutrient and functional ingredient intake from supplements when evaluating the nutrition of a person's diet. Therefore, we are also working on developing dietary survey methods to estimate nutrient intake from supplements



Figure 1:A website and social media platform that provides information on so-called "health food" in an easy-to-understand manner, and an original character "Sappurin

#### **Center for Food Function and Labeling**

#### Laboratory of Food Analysis and Labeling

We verify whether foods collected under the Food Labeling Act and specially To promote the appropriate use of health foods within dietary contexts, we designated foods approved under the Health Promotion Act contain the stated conduct research on health impact assessments and scientific evidence building nutrients and ingredients through actual measurements. We also conduct for highly utilized food materials and components in health foods. Additionally, we research to improve the accuracy and effective utilization of nutritional labeling. research strategies to optimize dietary balance.

#### Laboratory of Food and Health Information

Based on scientific evidence, we continuously collect health-related information on foods and provide it to experts and the public. We conduct risk communication activities and related research to eliminate health hazards caused by so-called health foods and to promote accurate knowledge.

#### Towards Achieving a Healthier Diet







# **Center for Private-Public-Academic Collaboration Research**



### Aiming to Serve as a Hub for Private-Public-Academic **Collaboration Research**

The implementation of research findings from the National Institute of Health and Nutrition, with its long history, is becoming increasingly important in realizing Japan's vision of a "100-year life era". Against this backdrop, the first research center within the National Institute of Health and Nutrition dedicated to Pivate-Public-Academic collaboration has been established and begun its research activities.

Director Hirosato Kondo

# Bridging Private-Public-Academic Collaboration through Health and Nutrition Research

#### Contributing to Global Health as a WHO Collaborating Centre

Our center promotes collaboration with various national and international institutions, companies, and governments. As the only WHO Collaborating Centre in East Asia that commit to address significant public agendas in both nutrition and physical activity, we are building an international network to lead efforts in improving nutrition and physical activity, particularly in the Asia-Pacific region. Through this network, we support researchers in the Asia-Pacific region, enhance surveillance on nutrition and physical activity, and contribute to addressing regional health and nutrition challenges including all forms of malnutrition, such as the double burden of malnutrition (coexistence of undernutrition and overnutrition)

Through the NIHN Fellowship Program for Asian Researchers, we invite overseas researchers engaged in health and nutrition research to enhance their expertise and skills. This initiative strengthens the research capabilities of participating scientists and fosters international cooperation. Between FY2004 and FY2024, we have invited 34 researchers from 15 countries. resulting in several research outcomes through collaborative researches.

Acceptance of overseas trainee

national organizations

Collaboration

Organizing international symposia Cooperation and collaboration with

The Asia Nutrition Network Symposium on Nutrition, held biennially since 2004, addresses major health and nutrition challenges in Asia. Based on the key themes, we facilitate in-depth discussions, including keynote lectures from the technical lead of nutrition at WHO Western Pacific Regional Office and country reports from speakers across countries in the Asia-Pacific region. These discussions address issues such as the double burden of malnutrition and health disparities

Starting in FY 2024, we organize workshops to develop a training program for researchers in the Asia-Pacific region, focusing on surveillance of nutrition and physical activity

Through these initiatives, we aim to foster new research advancements and contribute to improving nutrition in the Asia-Pacific region.



Figure 2: Action Plan of the WHO Collaborating Centre on Nutrition and Physical Activity

#### Nutritional Research in Special Environments: "Evidence to Action"

Japan is a country highly prone to natural disasters. To mitigate malnutrition, health disparities, and health risks caused by disasters-including disaster-related deaths-we have initiated Japan's first government-backed research program specializing in "Disaster and Nutrition". Under the slogan "Evidence to Action", we focus on implementing evidence-based solutions for societal challenges. A cohort study of approximately 10,000 individuals affected by the Great East Japan Earthquake revealed that higher consumption of dairy products was associated with a lower risk of hypertension. Additionally, prolonged evacuation led to an increase in obesity, but a study found that men who consumed seafood more frequently had a lower risk of obesity after two years.

These research findings have been incorporated into various guidelines and policies, contributing to post-disaster support efforts. To raise awareness about household food stockpiling and enable rapid and effective food aid during disasters, we are working on the development and dissemination of disaster menus, disaster food products, and support mechanisms. To further expand these efforts globally, we are also leading the establishment of international standards (ISO standards) for disaster food. Our ultimate goal is to universalize disaster nutrition evidence. Since most health problems that deteriorate rapidly during disasters seem to

be similar as those in daily life disaster-related nutrition research can also contribute to extending healthy life expectancy in normal times. Moreover, we are collaborating with other institutions to apply this knowledge to the development of space food. which shares similarities with food consumption in extreme environments.



#### Creating a Sustainable and Naturally Healthy Food Environment

Our center strives to establish a sustainable food environment that naturally promotes health, leaving no one behind. To achieve this, we collaborate with food manufacturers, the restaurant industry, academic institutions, and various stakeholders to build scientific evidence and conduct research on social implementation

Utilizing our expertise in dietary habits and physical activity, we work with other research institutions to analyze public statistics and research data to address health and nutrition issues and reduce health disparities. Additionally, to contribute to the formulation and revision of national guidelines, we conduct research on the relationship between nutrition. diet, and health. Our findings aim to provide efficient and effective solutions to societal challenges and be translated to the social implementation.



Figure 4: Activities of Section of Research Collaboration and Partnership

#### Laboratory of International Nutrition Collaboration

With the goal of eliminating all forms of malnutrition, we collaborate with WHO We share information domestically and globally based on Japan's experiences and other international organizations, conduct joint research with research and lessons as a disaster-prone country. Our research aims to improve food and institutions in Asia-Pacific region. We promote international collaboration through nutrition issues during disasters, reduce nutritional disparities, and mitigate health the fellowship program, international symposiums, and initiatives to improve damage while providing evidence-based logistical support. nutrition and physical activity surveillance.

#### Section of Research Collaboration and Partnership

To realize a sustainable, healthy, and enjoyable diet, we collaborate with food companies through a "Private-Public-Academic Collaborative Research Project for Food Environment Improvement". Our goal is to develop a food environment model that naturally promotes health for all, not just for those with high health awareness

#### Center for Private-Public-Academic Collaboration Research

#### Laboratory of Disaster Nutrition and Information



Research Seeds and Industry-Government-Academia



# **Public Relations Activities**

Strategic Planning Industry-Government-Academia Collaboration Section

TEL (+81)72-641-9832 mail sangakukan@nibn.go.jp

Purposes of Our Public Relations (PR) Activities We conduct research daily to serve as a beacon of hope for patients battling illness, their families, and those wishing for a long, healthy life. To become a beacon of hope for many people, we actively engage in public relations, sharing our research achievements and initiatives while collaborating with various sectors.

#### Regular Study Sessions for the Press

We hold regular online study sessions for media representatives to provide clear explanations of our research and eliminate the perception that research institutions are difficult to approach. Archived sessions are available on our official YouTube channel (QR code on the back cover). Feel free to contact us if you are interested.



#### **Outreach Activities for Local Communities**

To contribute to society through our research, we actively engage in outreach activities, particularly in Osaka and Kansai area, where we are based. We participate in science classes and accept lecture requests for events. If you are interested in our activities and research, please feel free to contact us.

For PR inquiries, please contact National Institutes of Biomedical Innovation, Health, and Nutrition, Department of Strategic Planning PR Section

TEL (+81)72-641-9832 mail pr@nibn.go.jp



To Companies and Research Institutions

·Want to utilize our patents and research achievements?

Please feel free to contact

Industry-Government-Academia Collaboration Team

·Want to learn more about our research?

Interested in joint research?

Need technical consultation?

## Support Us Through Donations, Supporting a Future of Healthy Living

The National Institutes of Biomedical Innovation, Health and Nutrition (NIBN) aims to:

development of innovative pharmaceuticals and medical devices.

and physical activity for health maintenance, enhancement, and disease prevention.

To enhance research in pharmaceuticals, health, and nutrition, we seek financial support from companies

#### Types of Donations

There are two types of donations based on their purpose, and funds are used according to the designated purpose:

**Donations supporting** the overall activities of the institute

#### Tax Benefits

Donations to our institute qualify as contributions to a "Specified Public Interest Promotion Corporation", making them eligible for tax benefits.



National Institutes of Biomedical Innovation, Health, and Nutrition, Department of Strategic Planning





- 1. Conduct foundational technology research and biological resource studies to contribute to the
- 2. Improve national health through research and information dissemination related to nutrition, dietary habits,
- and individuals. We deeply appreciate your understanding and support in advancing our research activities.

### Donations designated for specific projects or research activities

#### Acknowledgment of Donors

As a token of our gratitude, we publish the names of donors who have given consent on our website.

#### **Donations by Form**

Fill out the required details in the form and submit it. Donations can be completed with simple procedures.

For inquiries, please call us. Our donation team will provide guidance.

## mail fundraising@nibn.go.jp