INSTITUTE OF TROPICAL MEDICINE
NAGASAKI UNIVERSITY

Solving the World Health Problem through Scientific Discovery and its Application

AUGUST 2025

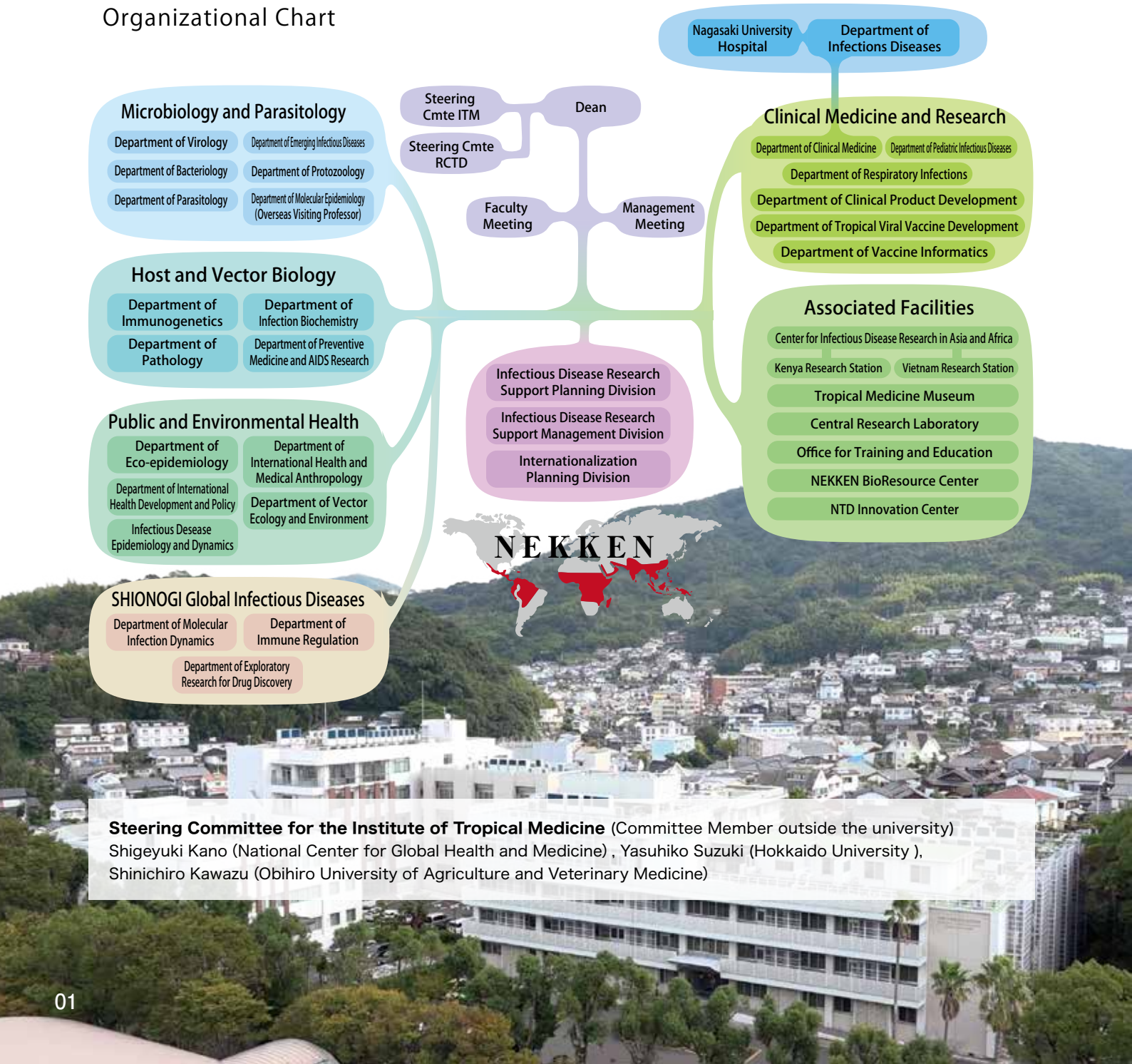
Mission Statement

The tropics, the most ecologically diverse region on Earth, presents an ongoing complexity of tropical diseases and other health problems. Given the remarkable advances in international exchange in recent years, these problems must be addressed from a global perspective.

Based on this understanding, the Institute of Tropical Medicine, Nagasaki University, aims to overcome tropical diseases, particularly infectious diseases, and their various associated health problems. In cooperation with related institutions, we strive for excellence in the following areas:

1. Spear-head research in tropical medicine and international health
2. Global contributions through disease control and health promotion in the tropics by applying the fruits of our research
3. Cultivation of researchers and specialists in the above fields

Organizational Chart



Steering Committee for the Institute of Tropical Medicine (Committee Member outside the university)
Shigeyuki Kano (National Center for Global Health and Medicine) , Yasuhiko Suzuki (Hokkaido University), Shinichiro Kawazu (Obihiro University of Agriculture and Veterinary Medicine)

Towards Overcoming Tropical Infectious Diseases

The Institute of Tropical Medicine (NEKKEN), Nagasaki University, is the only public institution in Japan dedicated to research in tropical medicine. The Institute has been accredited by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) as a "Joint Usage / Research Center on Tropical Diseases" and has contributed to the advancement and internationalization of tropical medical research in Japan as an institute open to the national as well as international research communities. The organization comprises five major divisions (21 research departments), two affiliated facilities, and a hospital department, with 89 faculty members (including fixed-term and concurrent post employees), 135 administrative staff members, and approximately 100 graduate students. Internationally, the Institute has been designated as a World Health Organization (WHO) Collaborating Center (for collecting and studying samples related to emerging and tropical viral diseases) since 1993.

In the tropics, many low-income countries have harsh natural and social environments. As a result, they are exposed to severe health problems ranging from emerging infectious diseases to lifestyle-related diseases, in addition to classical tropical diseases. With the rapid development of international exchange today, the issues of these countries have a severe impact on the high-income countries located in the temperate zone. As indicated in the Sustainable Development Goals (SDGs) of the United Nations, they are issues that must be solved from a global perspective. With the overarching goals stated on the previous page as our mission statement, our institute is dedicated to addressing these challenges.

This pamphlet is intended to introduce the organization and activities of the institute. The diseases studied at the Institute include a wide range of tropical infectious diseases such as malaria, schistosomiasis, dengue fever, yellow fever, and infectious diarrhea; emerging infectious diseases such as COVID-19 and Ebola virus disease; and zoonotic infectious diseases. The Institute conducts research in various areas, including pathogens, pathophysiology, epidemiology, clinical and vector organisms of these infectious diseases, as well as the natural and social environments that serve as the background for the spread of these infectious diseases. In addition to cooperating with Nagasaki University's graduate school education (doctoral and master's programs) and planning and implementing various educational and training courses, we also carry out social contribution activities in Japan and abroad.

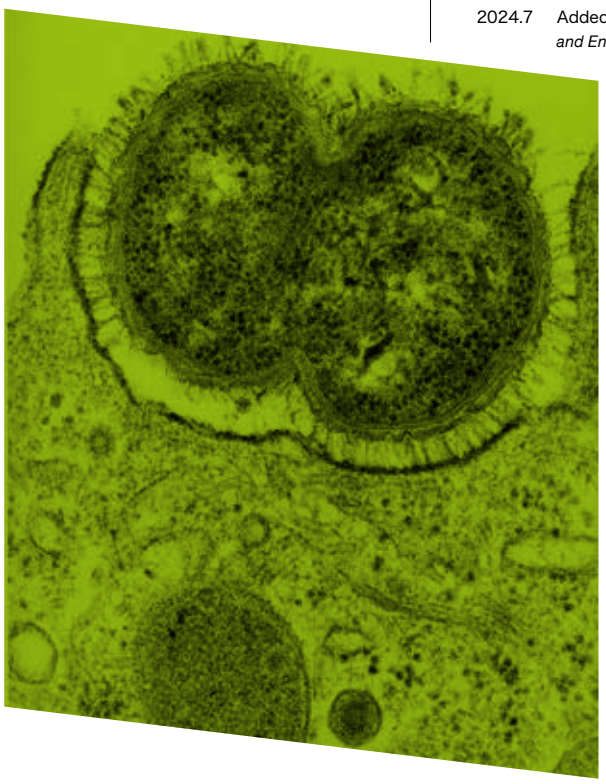
We hope that you will understand the goals of the Institute and look forward to your continued support.

Osamu Kaneko
Dean and Professor
Institute of Tropical Medicine, Nagasaki University
May, 2025

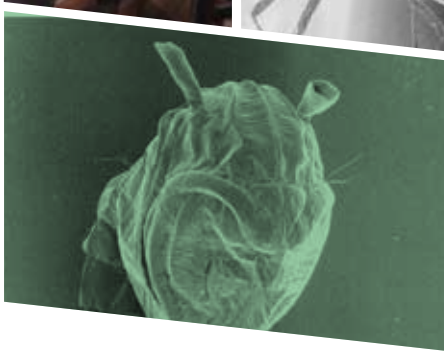
History

1942.3 Inaugurated as the *Institute of East Asia Endemics*, Nagasaki Medical College
1946.4 Renamed to the *Institute of Endemics*
1949.5 Following World War II, Nagasaki Medical College was reorganized as *Nagasaki University*
1967.6 Renamed to the *Institute of Tropical Medicine (ITM)*
1967.6 Established the *Ward of ITM Internal Medicine* within the University Hospital
1978.4 Launched the *Tropical Medicine Training Course*
1983.4 Started *the JICA Group Training: Tropical Medicine Research Course*
1989.5 Designated as a *Joint Usage Research Institute*
1993.11 Designated as a *WHO Collaborating Center*
1995.4 Selected as a *Center of Excellence (COE)* by the Ministry of Education
1997.4 Established the *Center for Tropical Infectious Diseases*
2003.4 Launched the *21st Century COE Program: Global Strategic Center for the Control of Tropical and Emerging Infectious Diseases*
2006.4 Started the *Master of Tropical Medicine (MTM)* Program
2008.4 Opened the *Asia-Africa Research Facility* and the *Tropical Medicine Museum*
2008.6 Started the *Ministry of Education Global COE Program: Global Integrated Control Strategy for Tropical and Emerging Infectious Diseases*
2009.6 Designated as a *Joint Usage/Research Center: Tropical Medicine Research Center*
2011.4 Added two departments to the *Clinical Research Unit*
2012.4 Launched the *Global Leader Program for the Control of Tropical and Emerging Infectious Diseases*
2017.11 Held the *75th Anniversary Ceremony*
2019.4 Established the *Shionogi Global Infectious Disease Division*
2022.12 Added two departments to the *Clinical Medicine and Research Unit*
2024.7 Added one department to the *Public Health and Environment Unit*









Joint Usage / Research Center on Tropical Diseases

This Institute is the one and only public sector institute supported by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) in Japan that aims to research tropical diseases and has been identified as the Joint Usage / Research Center on Tropical Diseases since June 2009.

1. The Goal of the Center

Infectious diseases are caused by the collapse of symbiosis with other living organisms, which is inevitable for humans to survive in the natural world. Although the ultimate goal of this center is to eliminate infectious diseases, it is necessary to establish reciprocal relationships with other organisms rather than eliminate them. Such establishment of reciprocal relationships requires collective knowledge, which can be achieved only by combining a broad aspect of disciplines.

Tropical infectious diseases such as malaria have been significant health problems in tropical and subtropical regions, which reflects the environment and socio-economic situation. In addition, emerging and re-emerging infectious diseases, such as newly emerging viral diseases, HIV, and tuberculosis, are also expanding globally, mainly in tropical and subtropical regions.

The Center plans and carries out collaborative research projects rooted in the endemic areas of infectious diseases with researchers from both domestic and international fields based on our global activities and research infrastructure, such as our Center for Infectious Diseases Research in Asia and Africa. Furthermore, as a resource center for information and samples that contribute to research on infectious diseases that are prevalent on a global scale, the Center will organize research meetings and provide research support services. Through the above activities, the Center aims to maintain and activate a community of researchers who create knowledge and skills that contribute to controlling infectious diseases.

2. Outline of the Center's Activities

The Center supports basic and applied collaborative research projects on tropical diseases and the seeds of such research. It also supports research meetings for exchanging information on related research and promoting collaborative research, as well as training sessions for disseminating research techniques. In addition, the Center serves as a bio-resource center to acquire, store, and deliver pathogens and their genetic information for research and education.

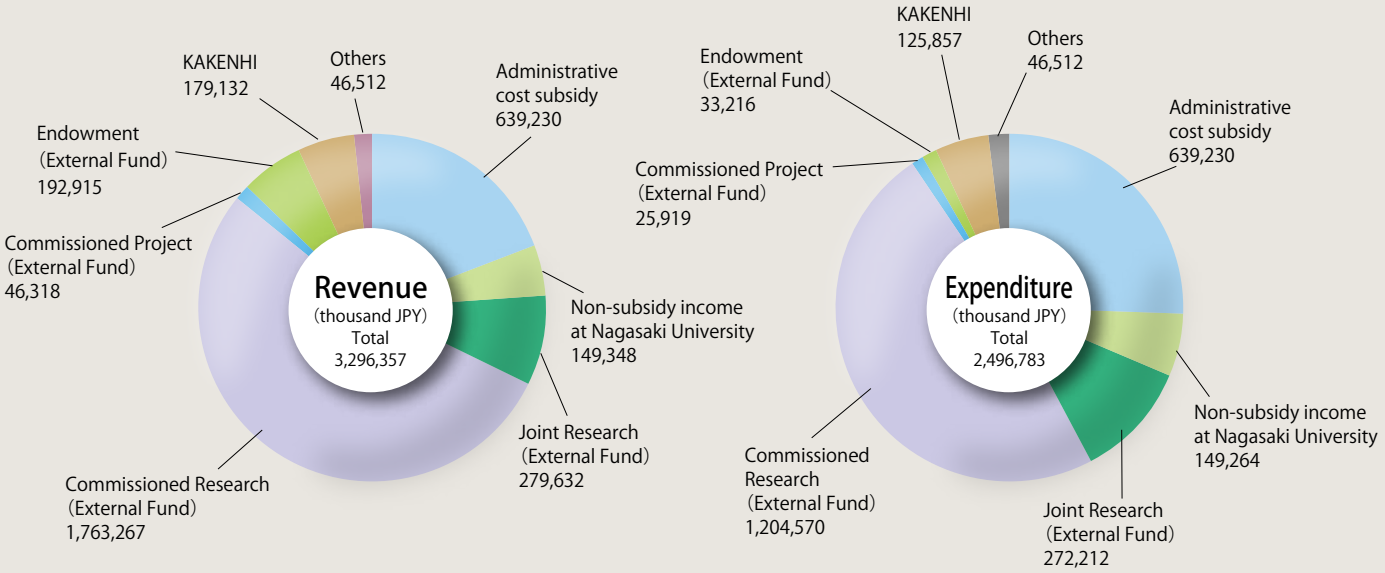
3. Operational Organization of the Center

As for the administration of this research center, the dean of the Institute of Tropical Medicine established the Steering Committee for the Center, composed of 11 members, out of whom more than half are from outside the University. The Steering Committee is responsible for adopting the applications and monitoring and evaluating the activities of accepted projects.

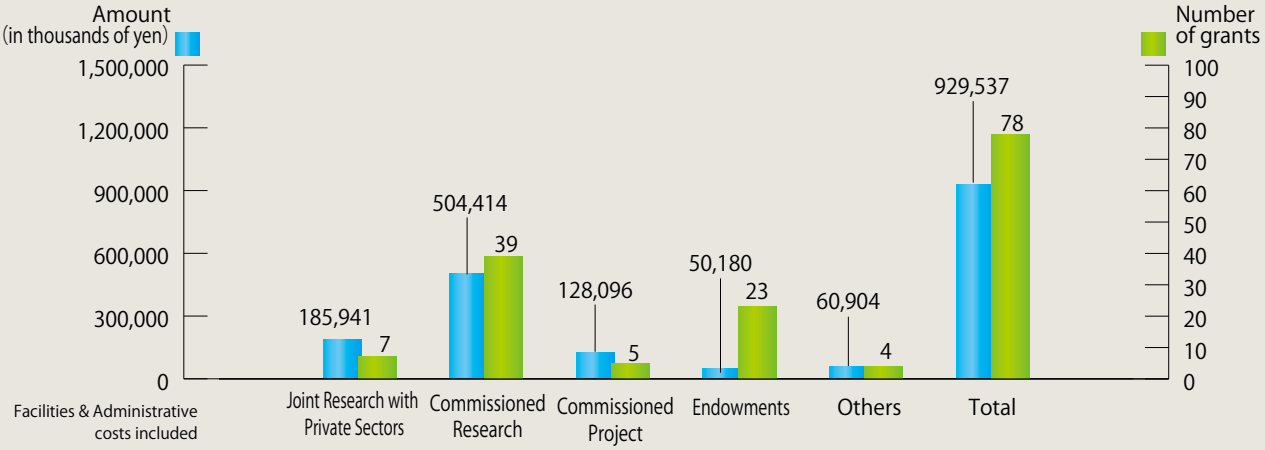
A specific administrative office has been allocated to the Institute to support the activities mentioned above.

Steering Committee for the Joint Usage / Research Center on Tropical Disease (Committee Member outside the university)
Manabu Ato (National Institute of Infectious Diseases) ,
Shinichiro Kawazu (Obihiro University of Agriculture and Veterinary Medicine) , Yasushi Kawaguchi (The University of Tokyo) , Yukiko Higa (National Institute of Infectious Diseases), Sohkichi Matsumoto (Niigata University), Reiko Saito(Niigata University), Daisuke Hayasaka (Yamaguchi University)

Budget (FY2024)



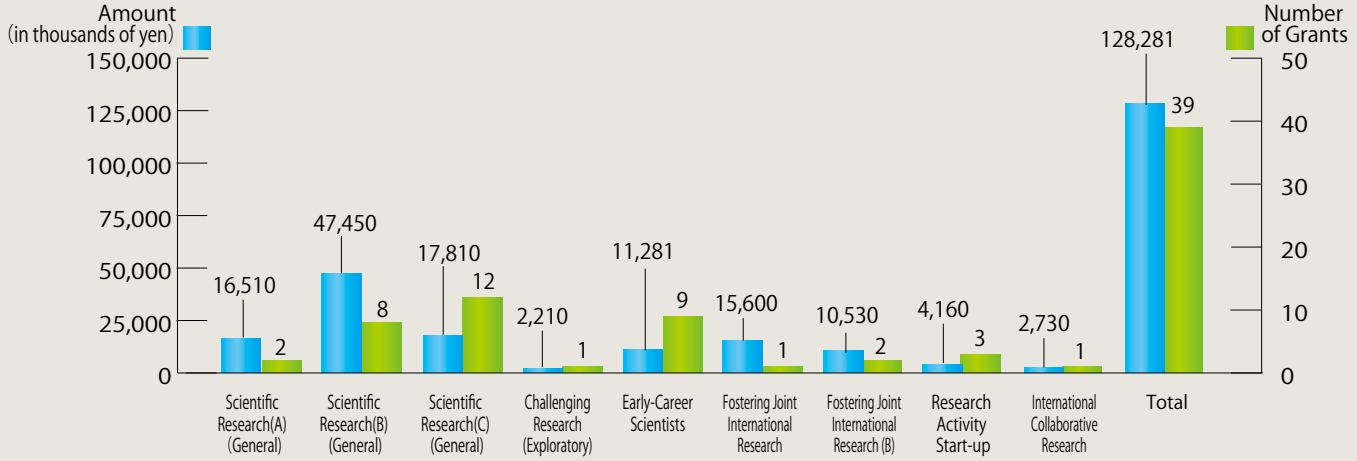
External Fund (FY2024)



Number of Staff (as of May 1 ,2025)

Professor	Associate Professor	Senior Assistant Professor	Assistant Professor	Sub total	Others	Total
16	12	0	39	67	135	202

Grants-in-aid for Scientific Research (KAKENHI) (MEXT) (FY2024)



Microbiology
and Parasitology

Department of Virology

Professor
Yuki Takamatsu
Professor
Kouichi Morita
Assistant Professor
Hu Shang Fan
Assistant Professor
Xu Qiang

Nekken-Virology conducts basic and applied research on arthropod-borne (arbo) viruses, such as Japanese encephalitis virus, dengue virus, Zika virus, chikungunya virus, severe fever with thrombocytopenia syndrome (SFTS) virus, as well as highly pathogenic viruses including filoviruses and novel coronaviruses.

●Intracellular Dynamics Analysis for Highly Pathogenic Viruses

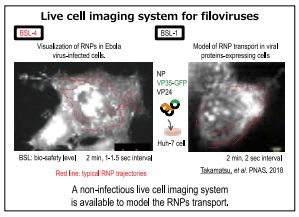
High-resolution microscopy (e.g., live-cell imaging) is used to visualize the life cycle of viruses in infected cells and elucidate the mechanisms of virus particle formation.

●Molecular Epidemiology of Arboviruses

We conduct molecular epidemiological analyses of dengue virus, Japanese encephalitis virus, chikungunya virus, novel coronaviruses, and other viruses isolated in Asia, Africa, and South America to clarify virus migration and evolution, revealing viral factors related to disease severity and expansion.

●Research on Therapeutic Drugs/Vaccine Development Using Reverse Genetics

Using reverse genetics, recombinant viruses are constructed to identify viral factors regulating viral proliferation in cells. Comparative analysis of viral pathogenicity in animals is conducted to establish the basis for the development of new therapeutic agents and vaccines.



●Development of Rapid Diagnostic Assays for Infectious Diseases

We aim to contribute to the improvement of public health in Asia, Africa, and South America through the construction of novel diagnostic methods for viral infections, such as PCR, LAMP, immunochromatography, and ELISA.

●Activities as a WHO Collaborating Center

The department is designated as a WHO Collaborating Center for Reference and Research on Tropical Viral Diseases since 1993. Currently, our department has been re-designated as a center for Tropical and Emerging Virus Diseases. The center collaborates with WHO in training WHO fellows from many developing countries and deploying experts as WHO Collaborating Centre for Reference and Research on Tropical and Emerging Viral Diseases. Since March 2020, the laboratory has been working as a WHO Reference Centre for COVID-19.

1. Halwe et al. *Virology* 2025; 607: 110503.
2. Fujita-Fujiharu, Hu et al. *Nat Commun* 2025; 16(1): 2171.
3. Xu et al. *Emerg Infect* Dis 2024; 30(11).
4. Osako et al. *Viruses* 2024; 16(6): 874.
5. Fraenkel et al. *Microorganisms* 2024; 12(6): 1092.

Microbiology
and Parasitology

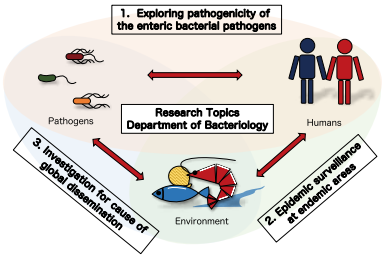
Department of Bacteriology

Professor
Toshio Kodama
Associate Professor
Hirotaka Hiyoshi
Assistant Professor
Tandhavanant Sarunporn

Our research focuses on the pathogenesis of enteric bacterial pathogens, including Vibrio parahaemolyticus, Vibrio cholerae, and Salmonella enterica spp. The emergence and spread of multidrug-resistant bacteria is currently a major problem. It is predicted that drug-resistant bacterial infections will cause approximately 10 million deaths annually by 2050. We believe that understanding the detailed mechanisms of bacterial pathogenicity provides a clue to the development of effective vaccines and the establishment of new treatment strategies without antibiotics. We will promote our study with various approaches, such as global epidemic surveillance, in vivo animal infection models, and in vitro molecular biological analyses, and make maximum efforts to produce talented researchers who can play a global stage through study and experience.

● V. parahaemolyticus Pathogenesis

We have worked on V. parahaemolyticus for decades and found that a Type III Secretion System (T3SS2) is necessary for the induction of diarrhea in patients infected with this pathogen (Hiyoshi et al., Infect Immune, 2010). We also identified and characterized effector proteins secreted from T3SS2 (Kodama et al., Cell Microbiol, 2007; Hiyoshi et al., Cell Host Microbe, 2011; Hiyoshi et al., PLoS Pathog, 2015) and revealed the regulatory mechanisms of T3SS2-related genes (Kodama et al., PLoS One, 2010; Gotoh et al., PLoS One, 2011; Tandhavanant et al., mBio, 2018). We recently demonstrated that an exotoxin, thermostable direct hemolysin (TDH), is secreted via T3SS2 in tandem with Sec machinery, facilitating distinct virulence traits (Matsuda et al., Nat Microbiol, 2019). However, the detailed mechanisms by which this pathogen colonizes the host intestine and induces diarrhea remain unknown. Therefore, we aimed to understand the comprehensive mechanism of V. parahaemolyticus infection by generating a new animal infection model, dissecting the expression mechanism of T3SS2-related genes, determining the biological activities of T3SS2 effectors, analyzing the interaction of microbiota, and other multidimensional approaches.



● Endemic Strains of Vibrio spp.

We are planning to isolate Vibrio spp., including V. parahaemolyticus and V. cholerae, from patients, seafood, and environmental samples in endemic areas to elucidate the genetic characteristics and dynamics of epidemic strains. We will also try to determine the factors that contribute to global dissemination and characterize their role in infection.

● Salmonella Pathogenesis

We are interested in and analyzed the pathogenesis of Salmonella infections (Hiyoshi et al., Cell Rep, 2018; Hiyoshi et al., Cell Host Microbe, 2022; Zhang et al., mBio, 2022). A major goal of this project is to understand how S. enterica spp. causes systemic infection in humans to develop more effective vaccines and therapies without relying on antibiotics. Type III Secretion System (T3SS) encoded on Salmonella Pathogenicity Island 2 (SPI-2) is well known as an essential virulence factor for establishing systemic infection and resisting the host innate immune defense system mediated by macrophages and neutrophils. To uncover the mechanism by which S. enterica spp. causes systemic infection using T3SS, we attempt to dissect the functions of the T3SS in systemic infection and its effector proteins using various approaches, including in vivo mouse infection models, in vitro biological assays, single-cell RNA-sequencing, epidemic surveillance, and in silico genetic comparisons among different S. enterica serovars (i.e., Typhimurium, Typhi, and Paratyphi A).

1. Morita et al. *Microb Genom* 2025; 11: 001364.
2. Xu et al. *mBio* 2025; 16: e0246924.
3. Anggramukti et al. *PLoS Pathog* 2024; 20: e1012094.
4. Prithvisagar et al. *Microb Pathog* 2023; 178: 106069.
5. Okada et al. *Microbiol Immunol* 2023; 67: 201-203.

Microbiology
and Parasitology

Department of Emerging Infectious Diseases

Professor and Head
Jiro Yasuda
Professor
Asuka Nanbo
Professor
Kentaro Yoshii
Associate Professor
Shuzo Urata
Associate Professor
Yohei Kurosaki
Associate Professor
Junko Kobayashi
Associate Professor
Yoshimi Tsuda
Assistant Professor
Yasuteru Sakurai
Assistant Professor
Rokusuke Yoshikawa
Assistant Professor
Takaaki Kinoshita
Assistant Professor
Wakako Furuyama
Assistant Professor
Minato Hirano
Assistant Professor
Misako Yajima

We are working on the basic and applied research to develop the countermeasures against emerging infectious diseases, especially viral hemorrhagic fevers and COVID-19.

Research subjects:

Analyses of replication mechanisms of highly pathogenic viruses

In infected cells, the viruses replicate using various cellular machinery and release a large number of progeny virions. Our interests are to clarify the molecular mechanisms of virus replication in host cells. We are currently analyzing the molecular interactions between viral proteins and cellular factors in infected cells. Especially, we are focusing on highly pathogenic viruses, such as Ebola virus, Marburg virus, Lassa virus and SFTS virus.

Development of novel antiviral strategies

To establish novel antiviral strategies against viral hemorrhagic fevers and COVID-19, we are identifying the cellular factors which have antiviral activity and analyzing the molecular mechanisms of their antiviral action. We are also doing high-throughput screening of organic and chemical compound libraries for antiviral drug discovery against viral hemorrhagic fevers and COVID-19.

Development of detection methods for highly pathogenic viruses

In case of outbreak of emerging infectious diseases, rapid and accurate diagnoses are essential to control infection and to prevent further transmission. We have developed novel diagnostic assays for emerging viral diseases.

Research studies on viral diseases in Gabon republic

The followings are aims of this project; 1) to investigate prevalence of known and unidentified viral diseases in Gabon through genetical and serological assays, 2) to determine characteristics including genetic information and pathogenicity of viruses which are regarded as public health concern and those newly identified in Gabon, and 3) to develop rapid diagnostic methods for viral diseases of public health concern and those newly identified.

Field studies on emerging viral diseases and zoonoses

To understand the ecology of the viruses which may cause emerging viral diseases, we are capturing wild animals including bats, primates and rodents and collecting the samples in Gabon and Thailand. We are currently identifying the viruses which may be transmitted to human and analyzing their characteristics.

Research studies on viral diseases in Brazil

At the Brazil Research station of Nagasaki University, we are investigating the prevalence of viral diseases and the identification of emerging viral diseases to understand the situation of viral disease epidemics.

1. Sapkanarak et al. *Emerg Infect Dis* 2025; 31(4): 741-750.
2. Sakurai et al. *mSphere* 2024; 9(9): e0033824.
3. Ondo et al. *Viruses* 2024; 16(5): 698.
4. Kawasaki et al. *Sci Rep* 2023; 13(1): 13105.
5. Yoshikawa et al. *J Biol Chem* 2023; 299(6): 104849.

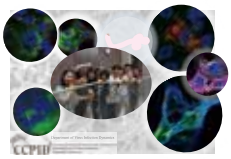
Ebola virus (EBOV) and Epstein-Barr virus (EBV) both cause major infectious diseases in humans, such as Ebola virus disease (EVD) and EBV-associated malignancies, respectively. The long-term goal of our study is to provide insights into the molecular mechanisms of their pathogenesis, which shall lead to the development of rational therapies and diagnosis for them.

1.Characterization of molecular mechanisms of EBOV entry and virus particle formation: toward the development of novel therapeutics for EVD

EBOV, a member of the family Filoviridae, is an enveloped, single-stranded, negative-sense RNA virus that causes severe hemorrhagic fever with a high mortality rate, known as EVD, in humans and nonhuman primates. Currently, only a few therapeutics has been approved for treatment and prevention of EVD. Because of the likelihood of future outbreaks and generation of mutant viruses, the development of a variety of EBOV therapeutics is urgent. Our goal is to elucidate the mechanism underlying virus entry and viral particle formation processes with a focus on host membrane traffic dynamics and viral envelope's constituent phospholipids. We are also developing the therapeutics that specifically target the entry and viral particle formation process in multiple ways, which should lead to the significant contribution for prevention of EVD in the future.

2.Characterization of molecular mechanism of development of EBV-associated epithelium tumors

EBV, a ubiquitous human γ-herpesvirus, establishes a persistent latent infection in B lymphocytes and epithelial cells in more than 90% of adults worldwide. Although this virus contributes causally to lymphomas and epithelial malignancies such as Burkitt's lymphoma, gastric carcinoma, and nasopharyngeal carcinoma, the molecular mechanism by which EBV cause these tumors remains fully elucidated. To update the understanding of the mechanisms for development of EBV-associated epithelial tumors, we are elucidating the physiological significance of exosomes, one type of extracellular vesicles, released from EBV-infected cells in tumor development. Moreover, we try to identify host and viral factors including microRNAs that are specifically and abundantly incorporated in exosomes, which shall lead to the development of potential biomarkers for EBV-associated tumors that contribute to the diagnosis of these tumors.



1. Furuyama, *Microbiol Spectr* 2024; 12(9): e0026924.
2. Sasaki et al. *Biochem Biophys Rep* 2024; 38: 101712.
3. Nanbo, *Microorganisms* 2024; 12(4): 806.
4. Dochi et al. *Cancer Sci* 2022; 113(8): 2862.

Flavivirus and Orthonairovirus include important pathogens which cause severe disease in human and animals, and many of them are transmitted by arthropod vectors in nature. We conduct research on the ecology of these viruses in hosts and environment to control infectious disease caused by these viruses.

・Research on mechanisms of virus infection and adaptation in hosts

Arthropod-borne viruses are maintained in the transmission cycle between arthropod (ticks and mosquitos) and vertebrate (mammals and birds) crossing species barrier. Although Each host has various anti-viral mechanisms, the viruses evolved to replicate in their hosts by adaptation to evade the mechanisms. We have studied the virus replication and adaptation mechanisms in terms of virus-host interactions.

・Research on virus epidemiology and development of diagnostics

High-containment biological laboratories are required to handle highly pathogenic viruses, such as tick-borne encephalitis virus, West Nile virus and Crimean-Congo hemorrhagic fever virus. It causes difficulties for the research institute to conduct research on these viruses. We have developed safe substitute such as virus-like particle system for live viruses by molecular technology and applied them to new and safe diagnostics. By using these diagnostics, we have constructed frameworks and have conducted surveys to reveal the virus epidemiology inside and outside Japan.

1. Ozeki et al. *J Gen Virol* 2022; 103: 001796.
2. Hirano et al. *Antiviral Res* 2022; 200: 105276.

Microbiology
and Parasitology

Department of Protozoology

Professor
Osamu Kaneko
Professor
Nadira Dharshani Karunaweera
Assistant Professor
Taeko Naruse
Assistant Professor
Shinya Miyazaki
Assistant Professor
Yukiko Miyazaki
Assistant Professor
Tomoyo Sakata-Kato
Assistant Professor
Huai Chuang

Malaria is responsible for a considerable burden of death and disease in large areas of the tropical and sub-tropical world. Unfortunately, those countries hardest hit by the disease are often amongst the poorest. Despite continuing efforts, the approved vaccine against the disease is not highly effective. To design and implement effective disease intervention strategies, one of the critical priorities in malaria research is strengthening our understanding of the basic biology of the parasite. We are investigating some fundamental aspects of the parasite's life cycle with a specific focus on two major virulent-related factors; the molecular mechanism behind the erythrocyte invasion and the cytoadherence of parasite-infected erythrocytes. We utilize a variety of malaria parasites, including human-infecting *Plasmodium falciparum*, the rodent malaria parasite *Plasmodium yoelii*, and *Plasmodium knowlesi*, a causative agent of zoonotic human malaria. To enhance a platform for both basic and clinical malaria research, we are studying the molecular evolution and drug resistance of *P. falciparum* in endemic regions. In parallel, we are developing vaccines, drugs, and diagnostic tools for malaria, as well as control strategies targeting zoonotic malaria and the mosquito and liver stages of human-infectious malaria parasites.

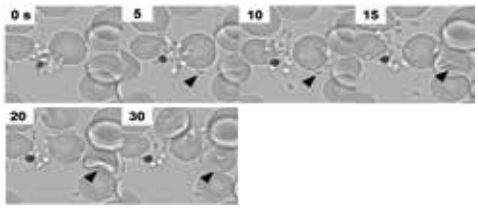


Fig.1 Gliding motility of *Plasmodium* merozoites. *P. falciparum*, the deadliest malaria parasite species (arrow), was released from an infected RBC (0 s), then adhered to the RBC in a gliding motion (5 and 10 s), deformed the cell (15 s) and invaded the cell (30 s). A longtime mystery of whether malaria merozoite glides or not was finally solved by us (Yahata et al., 2021).

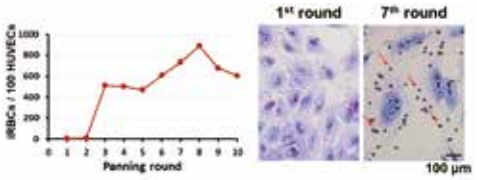


Fig.2 Cytoadherence of *P. knowlesi* -infected RBCs. *P. knowlesi* -infected RBCs with increased cytoadhesion activity (arrows) were selected by repeated panning against human umbilical vein endothelial cells (HUVECs), and the responsible ligand, SICA-HUVEC, was identified (Chuang et al., 2022).

1. Wu et al. *BMC Genomics* 2024; 25(1): 1035
2. Makau et al. *Trop Med Health* 2024; 52(1): 72
3. Christensen et al. *Antimicrob Agents Chemother* 2024; 68(5): e0028024.
4. Miyazaki & Miyazaki. *Trends Parasitol* 2024; 40(11): 1000-1015.
5. Poofery et al. *Sci Rep* 2023; 13: 20258.

Microbiology
and Parasitology

Department of Parasitology

Professor
Shinjiro Hamano
Assistant Professor
Risa Nakamura
Assistant Professor
Atcharaphan Wanlop
Assistant Professor
Yarob Ibraheem

Various parasites infect humans for long periods without killing them, giving rise to tremendous afflictions and social and economic loss. We will develop deep insight into parasitic diseases and the surrounding factors from various points of view through field and laboratory studies. Our goal is to contribute to new knowledge and provide a vibrant environment for the training of future investigators.

We have been researching parasitic diseases in Mbita and Kwale, Kenya, cooperating with the Kenya Medical Research Institute (KEMRI) and Maseno University. In 2021, we started a project on schistosomiasis with the support of the MEXT Grant-in-Aid for Scientific Research (A). In 2023, we launched a new project, "Integrated Research and Development for the Control and Elimination of Schistosomiasis", as the Science and Technology Research Partnership for Sustainable Development (SATREPS) project. We also try to develop ideal monitoring and diagnostic methods for schistosomiasis and leishmaniasis with the support of the Global Health Innovative Technology Fund (GHIT). Since 2018, we have collaborated with Leiden University and Lygature on the development of schistosomiasis monitoring tools, and starting in 2025, with Drugs & Diagnostics for Tropical Diseases, the Institute of Medical Biology, the KEMRI, and the Noguchi Memorial Institute for Medical Research in Ghana. Since 2020, we have also worked with FIND, Leiden University, and others to develop and evaluate rapid diagnostic tests for schistosomiasis. In 2022, we launched the "DEJIMA Infectious Disease Research Alliance" as a synergy center for the Japan Initiative for World-leading Vaccine Research and Development Centers (SCARDA, AMED).

We have studied host defense mechanisms against *Leishmania spp.* and *Trypanosoma cruzi* and, in the process, elucidated the function of the IL-12 cytokine family, such as IL-27/WSX-1, during the infections. Furthermore, under the support of the GHIT, we have developed live attenuated vaccines for leishmaniasis and trypanosomiasis by editing genes using the CRISPR-Cas9 system with the Ohio State University, McGill University, FDA/NIH, Gennova Biopharmaceuticals Ltd. In addition, we have developed animal models of intestinal amoebiasis and devoted ourselves to studying the molecular basis of the pathogenicity of *L. major* and *Entamoeba histolytica* and the defense mechanisms of the host to them. In the laboratory, we maintain *Schistosoma mansoni*, its intermediate host snails, *Brugia malayi*, *B. pahangi* and *Aedes aegypti*.

1. Kokubo-Tanaka et al. *PLoS Negl Trop Dis* 2025; 19(1): e0012813.
2. Ouji et al. *Parasitol Int* 2025; 106: 103020.
3. Telly et al. *NPJ Vaccines* 2024; 9(1):250.
4. Dey et al. *Nat Commun* 2023; 14(1): 7028.
5. Alshaweesh et al. *Microbiol Spectr* 2022; 10(5): e0112622.

Host and Vector Biology

Department of Immunogenetics

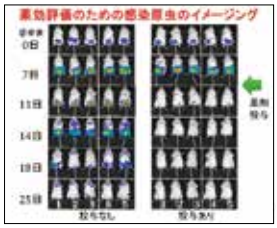
Professor
Kenji Hirayama

The Department of Immunogenetics aims to elucidate the molecular mechanisms that determine human susceptibility and resistance to tropical infectious diseases.

We are analyzing human immunity to tropical infectious diseases such as protozoa (Chagas diseases and malaria) and viruses (dengue feve) at the genetic and molecular levels. Furthermore, we aim to develop drugs, vaccines and diagnostics based on pathophysiological analysis of each infectious disease. Clinical research is conducted in collaboration with clinical groups in endemic areas overseas. Major overseas institutions include: 1) Research Institute of Tropical Medicine (RITM), Philippines; 2) Autonomous University of Gabriel Rene Moreno, Bolivia. In addition, joint research is being conducted with the London School of Public Health and Tropical Medicine, the Global Health Institute of Barcelona, Tulane university, the University of Toyama, and Osaka Metropolitan University. In addition, we are participating in drug development projects in industry-academia-government-private partnerships, with a focus on NTDs.

Ongoing research projects include the following

- Search for biomarkers for early complications of chronic Chagas disease (Grant-in-Aid for Scientific Research)
- Project for the prevention of mother-to-child transmission of Chagas disease (JICA Grassroot Partnership Program)
- Project for design of a universal rapid diagnostic test for detection of chronic Chagas disease (GHIT)
- Single cell analysis of T-cell fractions from dengue fever patients (Grant-in-Aid for Scientific Research)
- Immunogenetic analysis of malaria in endemic areas in Kenya (SATREPS)
- Nanoparticle nucleic acid vaccines (SCARDA)
- Development of new antiprotozoan drugs derived from Chinese herbal medicine or natural products (University of Toyama, Nagasaki University)



1. Kinoshita et al. *Trop Med Health* 2024; 52(1): 17.
2. Tayama et al. *Trop Med Health* 2023; 51(1): 12.
3. Mizuta et al. *ChemMedChem* 2023; 18(7): e202200586.
4. Nakamae et al. *Front Immunol* 2023; 14: 1116299.
5. Iglesias Rodríguez et al. *Lancet Reg Health West Pac* 2023; 31: 100574.

Host and Vector Biology

Department of Infection Biochemistry

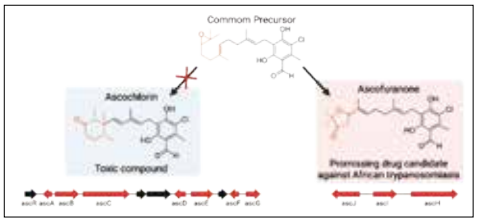
Professor
Daniel Ken INAOKA
Professor
Kiyoshi KITA
Associate Professor
Takaya SAKURA

The aim of our department is to contribute to global health and welfare through basic research. The primary focus of our research is on energy metabolism, which is essential for the survival, growth, and reproduction of living organisms. From the perspective of biological adaptation, we study the molecular mechanisms of energy transduction systems, including mitochondrial and bacterial respiratory chains, as well as drug discovery and development targeting these systems.

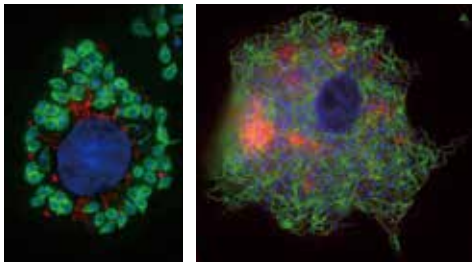
Our research focuses on human mitochondria and parasitic organisms such as nematodes (e.g., *Ascaris suum*) and protozoa (e.g., *Trypanosoma cruzi, Trypanosoma brucei, Plasmodium falciparum, Cryptosporidium* spp.). Leveraging insights from these studies, we aim to develop novel strategies, such as the use of 5-aminolevulinic acid, to combat other pathogens, including SARS-CoV-2. Additionally, we investigate Neglected Tropical Diseases (NTDs) and have identified excitatory amino acids as potential contributors to Nodding Syndrome in East Africa, with plans for future verification studies in endemic regions. Our research on Chagas disease, prevalent in Latin America and caused by *T. cruzi*, aimed to understand the parasite adaptation within the host, disease progression, and metabolic interactions between host and parasite. Since 2023, we have collaborated with Brazil Research Station to study the current situation of infectious diseases in South America and to develop new diagnostic methods and drug candidates.

In addition to the trypanosomatid parasites as one of our research target organisms, we are also studying other pathogens and model organisms. This includes parasites like *Eimeria tenella* and *Theileria* spp., worms like *Anisakis* spp., *Haemonchus contortus*, and *Fasciola* spp., and bacteria such as *Mycobacterium* spp. (tuberculosis), *Helicobacter pylori, Campylobacter jejuni*, and *Escherichia coli* to understand their central metabolism and their mechanism of adaptation to survive within host harsh environment.

Our activities are supported by research grants acquired from KAKENHI (MEXT) , AMED, GHIT and Private Companies.



Bio-synthetic pathway of asucofuranone. (Adapted from Araki et al., *PNAS*, 2019)



Human cell infected with amastigote (right) and trypomastigote (left) stages of *T. cruzi*. Nagasaki University, 2022, *Nature Portfolio.*

1. Tashibu et al. *Front Cell Infect Microbiol* 2024; 13:1302114.
2. Yoshino et al. *ACS Omega* 2023; 8(29): 25850-25860.
3. Kobayashi et al. *Proc Natl Acad Sci U S A* 2023; 120(28): e2214765120.
4. Enkai et al. *Antimicrob Agents Chemother* 2023; 67: e0142822.
5. Kabongo et al. *Front Mol Biosci* 2023; 10: 1095026.

Public and
Environmental Health

Department of Eco-epidemiology

Professor
Satoshi Kaneko
Associate Professor
Kentaro Kato
Assistant Professor
Tomonori Hoshi
Assistant Professor
Mami Hitachi
Assistant Professor
Wataru Kagaya

Our department is involved in various branches of public health research. With cutting-edge IT and biotechnology, we intend to create more accurate assessment methods in global health, improve responses to the public health needs on a local level, and open new directions in health sciences to future generations. Our activities include the following:

1) Research on Population Registration and Population Dynamics in Developing Countries

To conduct epidemiologic and regional studies in developing countries with inadequate population registration, we operate a system that registers all residents in the study area and periodically updates information on births, deaths, and migration. (Health and Demographic Surveillance System: HDSS) in Kenya. In addition, a cloud-based maternal and child registration system and a biometric system for newborn identification at health facilities is underway.

2) Research for healthy child growth in Africa

Epidemiological studies on stunting (short height compared to the norm for age in months) are being conducted in rural Kenya. In addition, we are establishing a birth cohort on child development from pregnancy to birth and beyond, obtaining information on child care and feeding activities and on the environment to elucidate the epidemiological basis for determining factors related to child growth.

3) Research to elucidate the molecular basis of parasitic diseases

We are conducting research on the molecular basis of parasitic diseases such as schistosomiasis, amoebiasis and leishmaniasis.

4) Development of mosquito vector survey tools and research on monkey malaria vectors

We are collaborating with a research team from the University of Malaysia and the UK to develop a mosquito vector survey tool using 3D printing technology and its application to the survey of monkey malaria vectors.

5) Developing new diagnostic techniques for mycetoma

To solve the problem of mycetoma caused by fungal infection, which is a public health problem in Sudan, we are working with Nagoya University and Chiba University to develop new diagnostic techniques, and with Kobe University to create a risk map based on environmental DNA measurements.

1. Hitachi et al. *Circulation* 2025; Epub ahead of print.
2. Hoshi et al. *Scientific Reports* 2025; 15(1): 4114.
3. Kokubo-Tanaka et al. *PLOS Neglected Tropical Diseases* 2025; 19(1): e0012813.
4. Ko et al. *Malaria Journal* 2025; 24(1): 42.
5. Matsumoto et al. *Trials* 2024; 25(1): 199.

Public and
Environmental Health

Department of International Health and Medical Anthropology

Associate Professor
Hiromu Ito
Assistant Professor
Hiroaki Arima

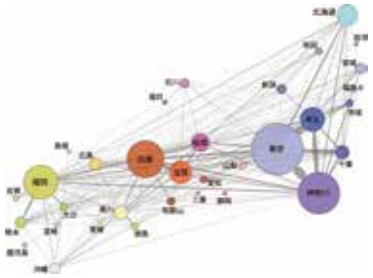
To understand human health, it is necessary to observe not only at the human and pathogens but also at the environment to which people have adapted. Furthermore, to understand the dynamics of infectious disease outbreaks, it is necessary to elucidate the ecological aspects of organisms that transmit pathogens, the interactions of human behavior, and the societal structures encompassing interpersonal connections known as social networks. This is because infectious diseases, which spread through human connections, have also adapted to society.

In this department, research is conducted to understand human health and the spread of infectious diseases based on the keywords of adaptation and evolution. By comprehensively considering the bidirectional adaptation of both human society and pathogens, we aim to understand the temporally dynamic biological phenomenon where 'pathogens adapt to society, and society also adapts to pathogens.'

Specifically, efforts are made towards constructing theories of sexually transmitted infections (STIs) using mathematical models and collecting data on sexual behavior through web surveys to elucidate the persistence of STIs. Additionally, we advance research on the social dilemmas underlying the use of antimicrobials and the emergence of antimicrobial resistance (AMR) from the perspective of game theory, which is actively studied in behavioral economics and evolutionary biology.

We also conducted studies in the Mustang district of Nepal (altitude 3560m) to elucidate the adaptation to hypoxic environments in Tibetan highlanders and their vulnerability to diseases. In recent years, we have been investigating the association between periodontal bacterial colonization in the oral cavities of pregnant women and the use of psychoactive substances (such as alcohol, tobacco, drugs, etc.) with preterm birth and low birth weight in the Republic of Rwanda. Furthermore, we are verifying how the sex ratio at birth fluctuates when pregnant women are exposed to these substances using observed values of air pollutants and volcanic ejecta along with birth data. Through these endeavors, we are exploring factors that negatively impact pregnancy and childbirth, and conducting actual condition assessments and problem proposals related to maternal and child health.

Tibetan highlanders in Mustang, where an epidemiological survey is being conducted (elevation: 3560 m).



Network visualizing the mobility of male clients in the sex industry

1. Ito et al. *Sci Rep* 2025; 15: 13113.
2. Cuaresma et al. *Sci Rep* 2025; 14: 27071.
3. Makino et al. *J Nat Hist* 2024; 58(45–48): 2099–2104.
4. Arima et al. *J Physiol Anthropol* 2024; 43: 25.
5. Ito et al. *PNAS Nexus* 2024; 3(11): 455.

Public and Environmental Health

Department of International Health Development and Policy

Professor
Yasuhiko Kamiya
Professor
Hirotsugu Aiga

Department of International Health Development and Policy (former Department of Social Environment) was re-established in 2018 by inviting three concurrent professors from the School of Tropical Medicine and Global Health (TMGH). There are now two professors that have expertise of health system strengthening (H. Aiga), child health and emergency assistance (Y. Kamiya). The department promotes policy researches in various global health fields for making critical evaluation and constructive proposal for health policy.

Implementation Science in Health and Disability

My support and study are focused on redressing health disparity in low- and middle-income countries. Notwithstanding global evidence-based aid and national policy, health disparity has been widening with know-do gap and mismatch (coexistence of excess and deficiency) in health service delivery due to organizational path dependency, lack of coordination, vertical silo of programs and aid fragmentation. Just attributing health disparity to lack of access to, and low supply of health care can mislead and delay its fundamental problems. Through Implementation Science applying to international cooperation for maternal and child health, support for disabled children and non-communicable diseases, and emergency humanitarian assistance, my assistance and research facilitate local staff and people identify bottlenecks and barrier to strengthen health systems and governance based on bottom-up problem-solving.

Training for Community Health Workers in Honduras

Health System Strengthening

In the absence of appropriately functioning systems for health service delivery, new medical technologies and drugs that are clinically effective would end up not reaching the populations in need. Key elements of health systems (e.g. health workforce, health information and health financing) particularly in the context of LMICs are one of my research topics. Needless to say, while recognizing the importance of optimization and adaptation of global standards for health systems to local settings, their critical verification and examination in view of field realities are equally important.

An experienced nurse managing a rural health center in Brundi

1. Aiga, et al. *PLoS One*. 2024; 19 (11): e0311966.

Public and Environmental Health

Department of Vector Ecology and Environment

Adjunct Professor
Noboru Minakawa
Associate Professor
Kyoko Futami
Assistant Professor
Toshihiko Sunahara

Our research interests include anything from ecology to molecular biology of medically important arthropods, particularly mosquitoes that transmit pathogens such as malaria parasites and dengue virus in Africa and Asia. We are also interested in their relationships with environmental variables and development of environmentally friendly vector control tools.

(our activities)

Currently, we are studying the population genetic structures of *Aedes aegypti* population in Africa. Our study has revealed that mosquito populations in dengue endemic areas exhibit distinct the genetic patterns. We are also studying the genetic structures of the *Aedes albopictus* populations that were recently introduced in Republic of Mozambique and the Democratic Republic of Congo. This research aims to reveal their origins and introduction pathways, and to understand the dynamics of urban *Aedes* population.

For reducing malaria risk, we are evaluating the effectiveness of new insecticides and vector control tools in Kenya and Malawi. We are also developing malaria and dengue outbreak prediction models incorporating climate and vector components.

In Kenya, we are conducting longitudinal studies on the intermediate host snails of Schistosomiasis to identify ecological factors influencing their seasonal population dynamics and infection rates.

1. Osawa et al. *Acta Tropica* 2024; 260: 107402.
2. Futami et al. *Med Entomol Zool* 2024; 75 (3):153-161.
3. Yamashita et al. *Parasit Vectors* 2024; 17 (1): 292.
4. Vulu et al. *Parasit Vectors* 2024; 17(1): 35.
5. Yan et al. *PLoS One* 2024; 19 (5): e0303137.

Public Health and Environment

Department of Infectious Disease Epidemiology and Dynamics

Professor
John Edmunds (LSHTM)
Professor
Koya Ariyoshi
Associate Professor
Kaja Abbas (LSHTM)
Assistant Professor
Laura Skrip (LSHTM)

Infectious disease epidemiology is an academic discipline aimed at protecting the health of human populations from infectious diseases by elucidating the mechanisms underlying the emergence, distribution, and spread of infectious diseases, thereby contributing to the development of evidence-based public health interventions. Our team is composed of multinational members who hold cross-appointments with institutions such as the London School of Hygiene and Tropical Medicine (LSHTM) and the National University of Singapore (NUS).

Our research primarily utilizes mathematical modeling and simulations to conduct research that contributes to the development of diverse vaccination strategies, not only for commonly circulating infectious diseases, but also to prevent the spread of emerging and rare infectious diseases. For example, we simulate clinical trial designs for novel vaccines to evaluate and establish regulatory pathways toward vaccine approval. Our current research targets include Chikungunya, Nipah virus, Mpox, Lassa fever, Ebola virus disease, Severe Fever with Thrombocytopenia Syndrome (SFTS), Human Papillomavirus (HPV), and typhoid fever. In the case of rare infectious diseases such as SFTS, we also engage in field epidemiological studies that are essential for constructing theoretical frameworks for vaccination strategies.

Our team is also actively involved in human resource development in the same field, and has newly launched two short-term courses: “Introduction to infectious disease epidemiology and modelling” and “Vaccinology: Science and Public Health”. The former provides foundational knowledge and skills related to how mathematical models are used to understand infectious disease dynamics, how they can be applied in the context of public health decision-making, what research questions they can address, and the assumptions that underlay such models. The latter course offers a comprehensive learning experience covering both scientific and public health aspects of vaccination programs. These courses are jointly organized by LSHTM, in collaboration with the Vaccine Research and Development Center and the WISE Programme in the Nagasaki University.

1. Han et al. *Influenza and Other Respiratory Viruses* 2025; 19 (3): e70089.
2. Kim et al. *Expert Review of Vaccines* 2025; 24(1).
3. Kang et al. *The Lancet Infectious Diseases* 2024: 24(5).
4. Mogasale et al. *BMJ Public Health* 2024; 2(2): e001089.
5. Qian et al. *Vaccine X* 2023; 14: 100321.

Clinical Medicine and Research

Department of Clinical Medicine

Professor
Chris Smith
Associate Professor
Yoshinao Kubo
Assistant Professor
Mai Izumida
Assistant Professor
Momoko Yamauchi

This is the only clinical department in NEKKEN that engages in clinical practices in the Department of Infectious Diseases at Nagasaki University Hospital. We conduct a wide range of multi-disciplinary studies that bridge our strengths in clinical epidemiology with laboratory-based microbiology and immunology, both within and outside Japan. Our main research interests include respiratory infectious diseases, acute undifferentiated febrile illness, tuberculosis(TB), HIV/AIDS and others as described below:

●Respiratory Infections Diseases, including Tuberculosis

We conduct TB research through international collaborations in the Philippines and West Africa, focusing on TB-specific cellular immune responses that predict disease progression. Additionally, we conduct clinical epidemiology research on respiratory infections such as influenza, RSV and COVID-19 in Japan and the Philippines.

Bed-side clinical training course in San Lazaro Hospital

●Non-malarial Febrile Illness in the Tropical Countries

We are investigating acute undifferentiated febrile illness in the Department of Infectious Diseases, Bac Mai Hospital, Hanoi, Vietnam and the National Infectious Disease Hospital (San Lazaro Hospital) in the Philippines, applying various advanced diagnostic tests in collaboration with the National Institute of Infectious Disease in Tokyo and the London School of Hygiene and Tropical Medicine.

●HIV/AIDS and others

Our collaboration with National Institute of Health, Thailand on a natural history cohort of HIV infection is on-going. We investigate the molecular mechanisms of host antivirus factors and Lassa virus cell entry using pseudotyped retroviral vector. Additionally, a study on snake bite has started in the Philippines.

1. Izumida et al. *Front Immunol* 2024; 15: 1422700.
2. Han et al. *Sci Rep* 2023; 13: 5393.
3. Dhoubhadel et al. *Thorax* 2022; 77: 1121-1130.
4. Saito et al. *PLoS Negl Trop Dis* 2022; 16: e0010414.
5. Nakamura et al. *Int.J Mol Sci* 2024; 25: 9663.

Clinical Medicine and Research

Department of Respiratory Infections

Professor
Konosuke Morimoto
Assistant Professor
Haruka Maeda

We conduct epidemiological studies of infectious diseases caused by respiratory pathogens including novel coronaviruses(COVID-19), mainly in Japan.

- We conduct a clinical epidemiological study of adult pneumococcal pneumonia in Japan. The purpose of this study is to determine the serotype distribution of pneumococcal pneumonia and epidemiological characteristics of each serotype. We aim to recommend vaccine policies of pneumococcal vaccine for older people using these data. Using the latest serotype distribution obtained from the surveillance, we are analyzing cost-effectiveness of pneumococcal vaccines in the older people in collaboration with Yokohama City University and University of Tokyo.
- A surveillance study of adult acute respiratory tract infections at seven hospitals in Japan is in progress. In this project, we aim to identify pathogens specific disease burden through comprehensive pathogen diagnosis using multiplex PCR and QoL surveys.
- With regard to COVID-19 and Influenza, we investigate the effectiveness of the COVID-19 vaccines and influenza vaccines on symptomatic disease, hospitalization, and sever illness among adult in Japan. The results of this study have been shared with the Ministry of Health, Labour and Welfare and are being used to evaluate and formulate policies for the national immunization program.

1. Maeda et al. *Hum Vaccin Immunother* 2025; 21: 2469424.
2. Morimoto et al. *Respir Investig* 2025; 63: 96-101.
3. Maeda et al. *Expert Rev Vaccines* 2024; 23: 213-255.
4. Maeda et al. *Expert Rev Vaccines* 2023; 22: 288-298.
5. Dhoubhadel et al. *Trop Med Health* 2024; 52(1): 14.

Clinical Medicine and Research

Department of Pediatric Infectious Diseases

Professor
Lay-Myint Yoshida
Associate Professor
Michiko Toizumi
Assistant Professor
Hirono Otomaru
Assistant Professor
Koehne Erik Johannes
Assistant Professor
Mohammad Shah
Assistant Professor
Yutaro Yamagata
Assistant Professor
Miyuki Tsuruoka

Clinical Epidemiological Studies on Pediatric Infectious Diseases

The Department of Pediatric Infectious Diseases conducts research on a wide range of infectious diseases with special attention on severe pediatric infectious diseases including pneumonia, diarrhea, and dengue which are the major causes of under 5 mortality. We also investigate congenital infections and its impact on child development. The Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) outbreak occurred in Wuhan, China in December 2019 which then spread globally and became pandemic in March 2020. Thus, we expanded our research activities to COVID-19. We have setup a field research laboratory and a population cohort study site in Nha Trang, Vietnam to conduct our research activities.

The current research topics,

1. Cohort studies on Pediatric Infectious Diseases in Vietnam: We receive funding from the Japan Initiative for Global Research Network on Infectious Diseases (JGRID), Japan Agency for Medical Research and Development (AMED) to conduct a large population-based cohort study on Pediatric Infectious Diseases in Nha Trang, central Vietnam since 2006.
2. Pediatric ARI surveillance: A population based hospitalized Pediatric acute respiratory infection (ARI) surveillance at Khanh Hoa General Hospital, Nha Trang, Vietnam was established to determine incidence, etiology and risk factors for pediatric ARI/pneumonia since 2007. We also investigate the emergence of new respiratory viruses and its molecular and clinical importance. In addition, we investigate the impact or potential impact of various vaccine introduction on pneumonia and dengue in a population level.
3. Birth cohort study: We have conducted a birth cohort study on 2000 new born babies in Nha Trang, Vietnam since 2009. This study is to study congenital infection and host genetic factors on physical-neurological development of the child and development of severe pediatric infectious diseases. A new birth cohort study was setup in 2017-2018 to investigate congenital infection including rubella, cytomegalo, and zika virus and the effect on the child development.
4. Pneumococcal conjugate vaccine (PCV) reduced dosing trial: We received a multimillion dollar grant from Bill and Melinda Gates Foundation to conduct a PCV reduce dosing trial in Vietnam. We believe that the study outcome will change global PCV vaccination strategy to improve the availability of PCV and other vaccines in developing countries.
5. Dengue household transmission in the community: In collaboration with London School of Hygiene and Tropical Medicine, we are conducting a dengue household transmission study in the community in Nha Trang.
6. COVID-19 related research: We are currently conducting clinical epidemiological characterization and long-term complication and immunological responses of COVID-19 in Vietnamese population. We are also investigating the vaccine response among medical, non-medical and previous COVID-19 cases in Vietnam and Japan.
7. Environmental epidemiology: We are conducting several studies on health impact of climate change and air pollution on the local and global scale.

PCV vaccination field work in Nha Trang

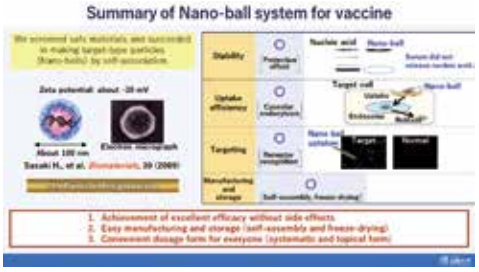
1. Yoshida et al. *N Engl J Med* 2024; 391(21): 1992-2002.
2. Toizumi et al. *Vaccines* 2024; 12(3): 225.
3. Otomaru et al. *Sci Rep* 2023; 13(1): 15757.
4. Shah et al. *Microbiol Spectr* 2023; 1: e0414022.
5. Li et al. *Lancet* 2022; S0140-6736(22): 00478-0.

Clinical Medicine and Research

Department of Clinical Product Development

Professor
Hitoshi Sasaki
Assistant Professor
Sayuri Nakamae

This department promotes the process of pharmaceutical products to clinical commercialization and researches on the systems and regulations related to the clinical development process. We have been engaged in the development of clinically usable targeted formulations mainly for gene and nucleic acid mediated medicines. And currently, we are promoting the development of novel formulations and conducting regulatory research. In particular, we have developed a novel targeted formulation for nucleic acid vaccine “nanoballs,” which is highly biocompatible, efficiently delivers pDNA and mRNA encoding antigens to antigen-presenting cells (APCs), and can strongly induce antigen specific immunity. In collaboration with Professor Kenji Hirayama and his colleagues, we have already succeeded in applying pDNA encoding antigens of malaria and schistosomiasis on nanoballs to induce specific humoral and cellular immunity against these parasites and to obtain strong growth suppression of the parasites. Now, we are constructing another nanoball formulation for local administration of mRNA vaccine and developing some mRNA vaccines against infections such as the SARS-CoV-2.



Nucleic acid is water-soluble negatively charged polymer and gene and nucleic acid mediated medicines, which have been developed in recent years, are easily degraded and hardly taken by the cell in the body. Therefore, a novel drug delivery system that can stabilize and deliver those medicines to target cells is essential. The novel targeted formulations developed in our laboratory can be widely applied to gene and nucleic acid medicines, showed extremely high safety, target efficiency, and clinical applicability, and can help many pharmaceutical companies and researchers to solve their problems.

1. Kurosaki et al. *J Drug Target* 2024; 32(7): 848-854.
2. Kurosaki et al. *Pharmaceutics* 2024; 16(5): 679.
3. Ko et al. *Pharmaceutics* 2024; 16(4): 522.
4. Nakamae et al. *Front Immunol* 2023; 14: 1116299.
5. Muro et al. *Biol Pharm Bull* 2023; 46(2): 237-244.

Clinical Medicine and Research

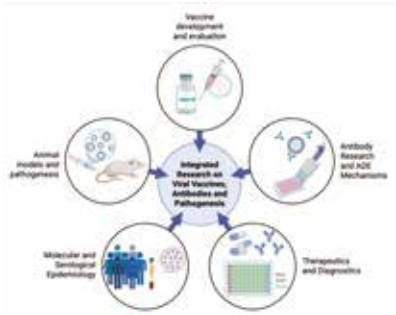
Department of Tropical Viral Vaccine Development

Professor
Kouichi Morita
Professor
Corazon Cerilla Buerano
Associate Professor
Mya Mya Ngwe Tun
Assistant Professor
Jean Claude Palma Balingit
Assistant Professor
Muhareva Raekiansyah
Assistant Professor
Nguyen Thi Thanh Ngan

In 2022, Nagasaki University was selected as one of the synergy centers to play a central role in vaccine research and development on the "Project for Establishment of a World-Leading Research and Development Center for Vaccine Development," which was initiated by the Japan Agency for Medical Research and Development (AMED). To implement the research and development plans of the project, the Institute of Tropical Medicine (NEKKEN) of Nagasaki University established the Department of Tropical Viral Vaccine Development (TVVD) in April 2023. The main objective of this (our) department is to further research on the development of medicines for tropical viral infectious diseases, with particular emphasis on the development of dengue vaccines, a priority project of AMED. In this regard, we collaborate with a private pharmaceutical company, the Kyushu-based KM Biologics, to develop a tetravalent live attenuated vaccine for dengue fever. We also have the task of promoting the development of an mRNA vaccine as part of the "100-day vaccine concept," which is one of the objectives of the AMED project.

Our research activities focus on the following key areas:

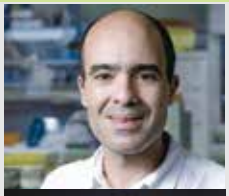
- **Development and Characterization of a Novel Live Dengue Vaccine:** We quantitatively evaluate immune responses, not only in terms of neutralizing antibodies but also antibody-dependent enhancement (ADE), using an assessment and analysis system developed in our laboratory for clinical trials involving live vaccines in humans.
- **Design and Construction of a Comprehensive Panel of 17 Single-Round Infectious Particles (SRIPs)**: These represent all dengue virus (DENV) serotypes and major genotypes. We use this panel for exhaustive neutralization and ADE assays with DENV-specific monoclonal antibodies and clinical samples. These assays are performed using a high-throughput in vitro evaluation system based on immortalized human cell lines.
- **Development of an Improved ADE Assay**: To enhance detection accuracy, we are developing an improved ADE assay using various FcγR knockout K562 cell lines. Furthermore, we conduct validation experiments in collaboration with the Department of Virology using lentivirus-transduced BHK-21 and Huh-7 cells expressing FcγRIIa and FcγRIIIa.
- **Structural Basis of ADE Mechanism**: We are collaborating with Department of Virology, NEKKEN, Nagasaki University and Uppsala University to elucidate the structural basis of ADE.
- **Vaccine Evaluation Using Mouse Models**: We evaluate vaccines against DENV, Severe Fever with Thrombocytopenia Syndrome Virus (SFTSV), and SARS-CoV-2 using mouse models.
- **Pathogenicity Studies of DENV Using a Novel Mouse Model**: We are developing and analyzing a new mouse model that replicates severe disease caused by ADE to elucidate DENV pathogenicity.
- **Long-Term Evaluation of Neutralizing Antibodies and ADE in Dengue-Endemic Regions**: We are assessing these immune responses over time in regions with ongoing dengue outbreaks, including the Philippines, Indonesia, Vietnam, and Myanmar.
- **Serological and Molecular Epidemiological Studies of Arboviruses and SARS-CoV-2 in Asia**: We conduct studies in countries such as Myanmar, Vietnam, Nepal, the Philippines, Sri Lanka, and Malaysia on DENV, Japanese encephalitis virus, Zika virus, chikungunya virus, SFTSV, and SARS-CoV-2. The data from these studies are essential for vaccine development and evaluating the impact of future vaccination programs.
- **Cross-Reactive Immunity in Flavivirus Infections in Vietnam and Myanmar**: We are studying the role of cross-reactive immunity—focusing on neutralizing and enhancing antibodies—in flavivirus infections to inform clinical management and vaccine strategies.
- **Other Ongoing Collaborative Studies**:
  - o Comparative pathogenicity studies of DENV using mouse models for vaccine development.
  - o Drug/compound development against SARS-CoV-2 and arboviruses (flaviviruses and SFTSV) by combining two complementary approaches: screening of compounds derived from natural medicinal plants and drug repurposing.
  - o Investigation on the mechanisms by which these compounds inhibit viral infection or replication.
  - o Development of point-of-care (POC) diagnostics for SFTSV.
  - o Detection of cross-reactive peptides derived from SARS-CoV-2 and its variants in serum samples collected in Vietnam before the COVID-19 pandemic, in collaboration with international research institutions.



1. Ngwe Tun et al. *J Infect Public Health* 2025; 18(5): 102709.
2. Ngwe Tun et al. *J Infect Public Health* 2024; 17(6): 1050-1056.
3. Ngwe Tun et al. *Pathogens* 2024; 13(9): 818.
4. Balingit et al. *Virus Res.* 2024; 348: 199445.
5. Thoresen et al. *J Virol* 2024; 98(5): e0023924.

Clinical Medicine and Research

Department of Vaccine Informatics



Professor
Kaidre Bendjama
Associate Professor
Sebastian Kapell
Associate Professor
Anton Kratz
Assistant Professor
Anja Mösch
Assistant Professor
Micheal Teron Pillay

The Strategic Center of Biomedical Advanced Vaccine Research and Development for Preparedness and Response (SCARDA), established under the Japan Agency for Medical Research and Development (AMED) as part of the Government Strategy to Strengthen Vaccine Development and Production to Enable Rapid Approval, has initiated a program to establish world-class R&D centers for vaccine development across Japan. Nagasaki University was selected as one of these centers, focusing on three core areas: "Response to tropical infectious diseases," "Vaccine development against advanced BSL-4 pathogens," and "Vaccine development using artificial intelligence (AI)." As part of this initiative, Nagasaki University is launching a new effort to develop infectious disease vaccines utilizing emerging AI technologies. This initiative is being undertaken in collaboration with NEC OncoImmunity AS (NOI), a Norwegian biotech company owned by NEC Corporation, headquartered in Tokyo. Through this collaboration, Nagasaki University is establishing a new research department dedicated to vaccine informatics, integrating academic expertise and industry insight. The center aims to bridge computational biology and advanced AI technologies with experimental science to accelerate vaccine development. The broader objective is not only to enhance Japan's capabilities in responding to infectious disease threats but also to build a globally recognized research department capable of attracting international researchers. This aligns with the global "100-day mission", the ambition to develop safe and effective vaccines within 100 days of identifying a new pandemic threat.

1. Clancy et al. *Comput Struct Biotechnol J* 2024; 23: 2695-2707.
2. Netskar et al. *Nat Immunol* 2024; 25: 1445-1459.

SHIONOGI Global Infectious Diseases

Alliance Coordinator

Professor
Tsuyoshi Kihara

Nagasaki University has entered into a comprehensive cooperation agreement with Shionogi & Co., Ltd. (Head Office: Osaka, Japan) in the field of infectious diseases focused on malaria on February 28, 2019. And the second stage of collaboration has started on March 4, 2024. Through this agreement, Nagasaki University and Shionogi intended to establish Shionogi Global Infectious Disease Division (SHINE) as a collaborative research division at Institute of Tropical Medicine. The aim of the establishment is to accelerate and facilitate the drug discovery research for malaria. This division will concentrate on studies to understand the life cycle of malaria parasites and the host defense mechanism, which are essential for the diagnosis and treatment of malaria. And final goals are to create an innovative novel drug and vaccine to meet Target Product Profile based on the findings from the studies.

Malaria is one of the top 3 infectious diseases worldwide along with HIV and tuberculosis, and mainly occurs in epidemics in tropical regions and subtropical regions. The efficacy of existing preventive vaccine is insufficient and also a number of parasites have been developing resistance to existing medicines. Therefore, malaria has been a serious threat to human globally.

Our division consists an Alliance Management and 3 departments, Molecular Infection Dynamics, Immune Regulation and Exploratory Research for Drug Discovery. Through the collaboration, Nagasaki University and Shionogi will become a key part of the new open innovation based on the industry-academia collaboration both domestic and overseas, and will establish a platform aiming at eradication of malaria. We will strive to contribute to the health of people around the world through ongoing provision of the best preventive and therapeutics of malaria. (Nature 618, S19 (2023)ISSN 1476-4687 (online) ISSN 0028-0836 (print) https://www.nature.com/articles/d42473-023-00092-x)

PRESS RELEASE 長崎大学 SHIONOGI

May 9, 2024

Notice of Collaboration Agreement for the Discovery and Development of Novel Malaria Drugs with Notice of Collaboration Agreement for the Discovery and Development of Novel Malaria Preventive Drugs with SHIONOGI, National Institute of Infectious Diseases, and MMV, Supported by the GHIT Fund

Nagasaki University (Administrative office: Nagasaki; President : Shigeru Kohno, M.D., Ph.D.) announced that Nagasaki University has collaborated with Nagasaki University (Administrative office: Nagasaki; President: Takeshi Nagayasu, M.D., Ph.D.), the National Institute of Infectious Diseases (Head Office: Shinjuku-ku, Tokyo; Director: Takashi Wakita), and the not-for-profit research and development organization, Medicines for Malaria Venture (MMV) to create new prevention drugs for malaria. This collaborative research (Research) has been selected for funding by the Global Health Innovative Technology Fund (GHIT Fund) and will be implemented with their support.

SHIONOGI Global Infectious Diseases

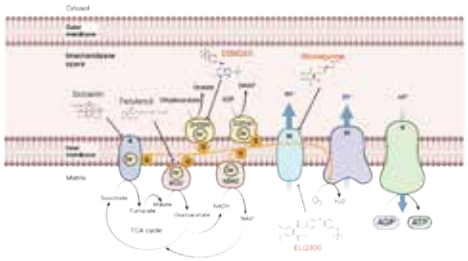
Department of Molecular Infection Dynamics

Professor
Daniel Ken Inaoka

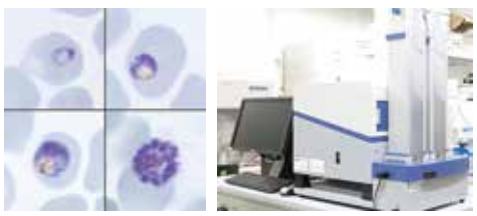
Our Department collaborates with the Department of Exploratory Research for Drug Discovery to develop new screening systems targeting malaria parasites and identify lead candidates for drug development. Using a multifaceted approach that includes biochemistry, molecular biology, and structural biology, we focus on creating new antimalarial drugs that can treat, prevent, and stop the transmission of malaria.

We aim to comprehensively understand the mitochondrial energy metabolism of malaria parasites and the mechanisms behind their parasitic behavior. By developing and implementing new evaluation systems, we search for compounds with new chemical structures and mechanisms of action in order to generate novel lead compounds for antimalarial drug development from the stand point of both basic and applied sciences.

Our research is primarily supported by Shionogi & Co., Ltd. and the Global Health Innovative Technology (GHIT) Fund.



Mitochondrial respiration from *Plasmodium falciparum* (created with BioRender.com).



Intraerythrocytic stages of *Plasmodium falciparum* (left) and PheraStar Plus Plate reader (right)

1. Plazolles et al. *PLoS Biol* 2025; 23(5): e3002938.
2. Bundutidi et al. *Commun Biol* 2025; 8(1): 187.
3. Fukumoto et al. *Commun Biol* 2025; 8(1): 142.
4. Sakura et al. *ACS Infect Dis* 2024; 10(12): 4115-4126.
5. Adolph et al. *ACS Infect Dis* 2024; 10(10): 3496-3515.

SHIONOGI Global Infectious Diseases

Department of Immune Regulation

Associate Professor
Shusaku Mizukami
Assistant Professor
Jiun-Yu Jian

Professor
Katsuyuki Yui

Mizukami Group

Our scopes are the human immune responses against malaria, and malaria vaccine development.

Plasmodium parasites cause malaria with complicated life cycle which can be divided into liver-(pre-erythrocytic) stage and erythrocytic-stage in host along with significant morphological changes at each stage.

Although many vaccine development studies for malaria have been conducted, and there are already WHO-prequalified vaccines, RTS,S/AS-01 and R21/Matrix-M. It is considered that neither their effectiveness nor their supply capacity is sufficient, and further development of malaria vaccine is required.

Our vaccine development has focused on cellular immunity, especially tissue-resident memory T cells (T_{RM}) in liver. Unlike circulating memory T cells, T_{RM} reside in specific tissues or organs. Cellular immunity, mediated by T lymphocytes, is considered to have crucial roles in the defense against liver-stage malaria. However, most of the previous vaccine development studies have aimed to induce humoral immunity, mediated by antibodies.

We have confirmed the importance of T_{RM} in the protective immunity against liver-stage malaria. Additionally, we have successfully induced enough T_{RM} and observed protection in our mouse malaria model using mRNA-containing lipid nanoparticles (mRNA-LNP). Based on these findings, our development of malaria vaccine which can activate both arms of the immune system - cellular and humoral immunity - is on-going.

1. Moriishi et al. *Clin Biochem* 2025; 135: 110865.
2. Teklemichael et al. *Trop Med Health* 2024; 52(1): 47.
3. Nakamae et al. *Front Immunol* 2023; 14: 1116299.
4. Tayama et al. *Trop Med Health* 2023; 51(1): 12.
5. Mizuta et al. *Chem Med Chem* 2023; 18(7): e202200586.

Yui Group

Individuals living in the malaria endemic regions acquire resistance to infection and disease after repeated infection over time through the development of host immune responses. Persistent infection contributes for the maintenance of immunological memory, which effectively controls re-infection. However, it remains unclear how the maintenance of immunological memory to malaria is regulated during chronic infection. We perform the following research projects aiming for the development of next generation malaria vaccine and for the control of malaria re-infection in the areas of declining transmission.

(1) Regulation of Immunological memory to malaria by IL-27

We investigate the mechanisms underlying the regulation of immunological memory to malaria using mouse models. We found that regulatory cytokine, IL-27, plays pivotal role in the regulation of immunological memory and investigate its underlying mechanisms.

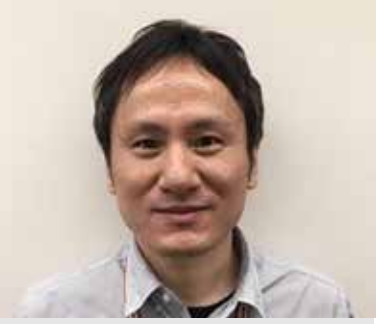
(2) The field study on the maintenance of immunological memory to malaria in areas of declining transmission

Malaria cases are declining due to the effective measures in Asian countries. However, since the risk of re-infection is maintained, it is important to evaluate the maintenance of immunological memory to malaria in these regions. In collaboration with RITM in the Philippines and LSHTM in UK, we investigate the maintenance of memory lymphocytes specific for malaria antigens in individuals living in the different levels of malaria transmission in the Philippines.

1. Ibraheem et al. *Front Immunol* 2024; 15: 1426316.
2. Tsogtsaikhan et al. *Int Immunol* 2024; 36 (12): 629-640.
3. Macalinao et al. *EMBO Mol Med* 2023; 15 (12): e17713. 10.15252.
4. Ganley et al. *Nature Immunol* 2023; 24 (9): 1487–1498.
5.Macalinao et al. *Lancet Reg Health West Pac* 2023; 37:100792.

SHIONOGI Global Infectious Diseases

Department of Exploratory Research for Drug Discovery



Visiting Associate Professor
Kenji Takaya
(Senior scientist, Laboratory for Medicinal Chemistry Research, Shionogi & Co., Ltd.)

This department is working together with Department of Molecular Infection Dynamics and aims to deliver antimalarials for treatment and prevention based on small molecule drug discovery.

Malaria is one of the three largest infectious diseases in the world, together with HIV and tuberculosis. According to the 2023 WHO report, some 263 million cases and 597,000 deaths, mostly children less than 5 years of age, were estimated. Although malaria vaccines, Mosquirix (RTS, S/AS01) and R21/MM, were recently introduced and recommended by WHO in 2021 and 2023, they still suffer from issues such as insufficient efficacy. In addition, increasing number of drug-resistant malaria to existing drugs is threatening the global health, necessitating the development of new drugs for treatment and prevention.

In this department, a SHIONOGI's researcher takes a role of principal investigator (PI), and drives small molecule drug discovery. We work as a research hub that harmonizes the malaria research assets of Nagasaki University, such as research know-how and global network, with SHIONOGI's SAR(structure-activity relationship) engine for small molecule drug discovery. By synergizing the strengths of each organizations, this department aims to deliver drugs for treatment and prevention with strong antimalarial potency and high safety. We are also collaborating with domestic and overseas research organizations, including MMV (Medicines for Malaria Venture), facilitating further optimization of the leads and screening hits we have obtained.

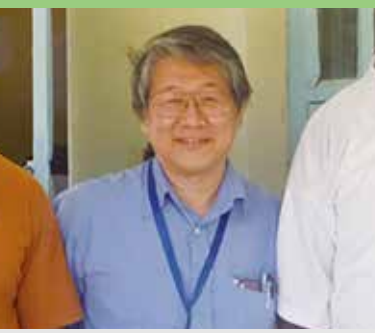
Part of the research activities in this department is financially supported by Global Health Innovative Technology Fund (GHIT Fund).

Research activities are as follows:

- Screening of compound libraries for hits and SAR studies for leads.
- Lead optimization SAR studies based on known scaffolds.
- Novel target identification studies and basic research
- Strengthening external collaboration for SAR study and clinical development.

Associated Facility
Center for Infectious Disease Research in Asia and Africa

Kenya Research Station



Professor
Shingo Inoue
(Chief Representative)
Associate Professor
Nobuo Saito
Associate Professor
Raita Tamaki
Assistant Professor
Kwallah Allan Biwott Ole
Assistant Professor
Luvai Elizabeth Ajema Chebichi
Assistant Professor
Mayu Hikone

The Kenya Research Station was established in September 2005 at the Kenya Medical Research Institute (KEMRI) in Nairobi, Kenya, with the aim of conducting research and training in tropical medicine in the 4 field stations (Kwale, Mbita, Kisian, Nairobi-Hub). In FY2022, the station's laboratory was significantly upgraded with newly installed research equipment. From FY2022 to FY2024, the Station has supported the JICA technical cooperation project aimed at strengthening the research capacity of KEMRI which focused on (1) OMICS trainings for young researchers and (2) capacity development of Research Assistant(RA), and (3) e-learning system development.

1. Research activities:

Major research projects have been conducted based on the station, including the JICA-SATREPS project (2012-2017), which aims to develop rapid diagnostic methods and establish an alert system for yellow fever and Rift Valley fever, and the JST/AMED project (2009-2019), which aims to develop multiple serological diagnostics for neglected tropical diseases (NTDs). From FY2023, the new JICA-SATREPS project "Integrated Research and Development for the Control and Elimination of Schistosomiasis" (PI: Prof. Shinjiro Hamano) has been launched for five years. From 2020 to 2023, as an Asia-Africa Science Platforms of Core-to-Core Program supported by JSPS, the station conducted research activities for the formation of IoT academic centers that contribute to the improvement and enhancement of global health.

To strengthen clinical epidemiological researches, two researchers (Drs. Saito and Hikone) has been dispatched from 2024, and research on tuberculosis and rabies has been started. In addition, the Kenya Research Station is actively conducting Using JSPS Grants-in-Aid for scientific research (KAKENHI) and AMED research grant for TB research in Kenya as a "Research Project for Promoting the Resolution of Global Health Issues," and another AMED research grant for Rabies research in Zambia as a "Basic Research on Emerging and Re-emerging Infectious Diseases Using Overseas Bases". Additionally, various research funds from private companies and foundations (Shionogi, Oyama Foundation, MSD Life Science Foundation).

2. Education and training activities:

The Station fully cooperates with the JSPS Inter-University Exchange Program "Planetary Health Africa-Japan Strategic and Collaborative Education (PHASE) Program," operated by the Graduate School of Biomedical Sciences has been conducted from FY 2020 to FY2024 and supports student exchange between four educational institutions in Kenya and Nagasaki University. Since FY 2022, Kenya Research Station is supporting advanced clinical training for sixth-year medical students at Kenyatta National Hospital.

3. Social contribution activities:

The station continues to operate the JICA Grassroots Technical Cooperation Project (Tungiasis Control Project) within Kenya.

1. Hitachi et al. *Trop med Health* 2025 ; 53 : 1-9.
2. Wandera et al. *Vaccine* 2024 ; 42 : 1-7.
3. Huang et al. *Pathogens* 2024 ; 13 : 1-12.
4. Cheruiyot et al. *Trop Med Health* 2024 ; 52 : 1-11.
5. Suzuki et al. *Trop Med Health* 2024; 52: 1-12.

Associated Facility
Center for Infectious Disease Research in Asia and Africa

Vietnam Research Station

Professor
Futoshi Hasebe
(Chief Representative)
Associate Professor
Haruka Abe
Assistant Professor
Nguyen Thi Nga

Since 2015, the Japan Initiative for Global Research Network on Infectious Disease (J-GRID) project has been taken over to the newly established Japan Agency for Medical Research and Development (AMED) and J-GRID project, a new five-year project, “Study on Emerging and Re-emerging Infectious Diseases in Vietnam.” has been started from 2020. A further two-year extension was approved, and it was decided that the program would be implemented until fiscal year 2026. The Vietnam Research Station in the National Institute of Hygiene and Epidemiology (NIHE) in Hanoi is currently manned by 4 staffs from NU, and the Nha Trang sub-station by 1 permanent staff, in addition to which 12 researchers from NU and a further 67 researchers from other research institutions participate in the activities of the Station and conduct research. The main research topics are dengue fever, infectious diarrhea, influenza, and drug-resistant bacteria, severe childhood pneumonia, zoonotic diseases (bat-derived infectious diseases) and new coronavirus infection (COVID-19) are included to study to contribute to prevention of infectious diseases collaboration with National Center for Global Health and Medicine. In addition, six joint research projects related to drug-resistant bacteria, mosquito vector, COVID-19, HIV, zoonosis and tuberculosis were conducted as research for utilizing the Vietnam Research Station collaboration with the National Institute of Infectious Diseases (NIID), Kyoto University, Kumamoto University and Research Institute of Tuberculosis.

Photo 1. Research Meeting in Quang Ninh

In 2023, as part of the general collaborative research of NEKKEN, we conducted rickettsia/leptospira research with University of Tokyo, and collaborative research with the University of Miyazaki on diarrhea-causing E. coli.

The Vietnam Research Station has been conducting educational support as an early exposure facility in the Program for Nurturing Global Leaders in Tropical and Emerging Communicable Diseases, and also utilized as an on-the-job-training facility for other researchers and students from NU and other universities and also high school students. "SCIENTIFIC CONFERENCE" was held in Quang Ninh Province, Vietnam on March 24, 2020, with 60 Vietnamese participants, 24 Japanese participants, and 5 participants online, and the research results of the 4th phase project were reported. (Photo-1).

Photo 2. Nagasaki Higashi High School Vietnam Training Program in 2024

1. Hoa-Tran et al. *Virus Evol* 2024; 10(1): veae045.
2. Fraenkel et al. *Microorganisms* 2024; 12(6): 1092.
3. Nguyen et al. *Int J Infect Dis* 2024; 139: 109-117.
4. Hasebe, *Nagasaki City Medical Association Bulletin* 2024; 58 (7): 689.
5. Nguyen et al. *Viruses* 2023; 15(10): 2065.

Associated Facility

Tropical Medicine Museum

Director and Professor
Wataru Iijima
Technical staff
Kazuo Araki

The Tropical Medicine Museum's predecessor was the 'Tropical Medicine Resource Centre', which was established in 1974. It was subsequently reorganized into the 'Resource and Information Centre for Tropical Diseases' in 1997 and the 'Research Centre for Tropical Infectious Diseases' in 2001, before becoming the Tropical Medicine Museum in April 2008, where it remains today.

Initially located on the first floor of the Institute (now offices), the exhibition room was moved to the first floor of the former JAERI Building No. 2 in April 2014, alongside the 'Exhibition Room for A-bomb Medical Materials'. Together with the 'Exhibition Room for Modern Medical Materials' in the Medical Branch of the Nagasaki University Library and the 150th Anniversary Museum in the Ryojyun Kaikan, it has become a museum that makes use of the traditions and characteristics of Nagasaki University, which began life as a medical school. The museum has gradually developed and expanded to welcome many visitors, making the most of Nagasaki University's traditions and characteristics. The relocation has increased the exhibition area by 50%.

The museum's management preserves and displays various pathogens (parasites, bacteria and viruses), specimens of vector insects and dangerous animals, visual materials, documents, and valuable materials from the history of medicine. There are also panels outlining tropical and other infectious diseases. There is also a new section where visitors can classify mosquitoes and determine their sex, with the aim of increasing interest in and understanding of tropical infectious diseases among a wide audience.

In addition, the first special exhibition, 'The Long Voyage of the Diamond Princess: Inheritance and Creation of Records and Memories', took place from February 2025 for around six months and was well received. Five years have passed since the outbreak of the pandemic, and this exhibition aimed to reconsider the significance and methods of passing on records and memories to future generations. Various special exhibitions will be held regularly in future.

Public relations and awareness-raising activities are also planned, including a 'Summer School on Tropical Medicine and Emerging Viral Infections', which will be organized and run during the summer holidays for junior and senior high school students. The aim is to communicate the research activities of the Institute of Tropical Medicine and other institutions to society, while providing an opportunity for students to focus on infectious diseases, medicine and public health worldwide.

Maintenance and management of the IT environment: The IT environment is enhanced through updating servers and network equipment, and efforts are made to maintain a high level of security at the Institute of Tropical Medicine. At the same time, the Institute's website is maintained and managed, including the updating of information. The department is also responsible for maintaining the environment, including providing a system for lending IT equipment to meet the diverse needs of researchers and others at the Institute of Tropical Medicine.

Associated Facility

Central Research Laboratory

Head and Professor
Fumika Mi-ichi
Assistant Professor
Miako Sakaguchi
Assistant Professor
Tam Kha Vo

Central Laboratory in NEKKEN maintains state-of-the-art machines and helps all the researchers in this institute facilitating their projects. This Laboratory is also approved by the Minister of Education in Japan as Joint Usage/Research Center for Tropical Medicine and is open for the researchers who proceed the collaborative project with NEKKEN.

○Molecular & Cellular Biology Unit

At the Molecular & Cellular Biology Unit in Central Laboratory in NEKKEN, the state-of-the-art research equipment is provided including 8 Capillary DNA sequencers, High-throughput sequencers Real time PCR systems, Flow cytometers, Cell sorter system, Multiplex assay systems, Chemiluminescence imaging systems, and Multimode plate readers. Additionally, as the commonly used research equipment, MilliQ system, Ultracentrifuge machines, Vacuum Concentrators, Freeze dryers, Darkroom, and Laboratory cold room are also provided. Molecular & Cellular Biology Unit members (as of April 1, 2025, Fumika Mi-ichi, Tam Kha Vo, Akemi Ura, and Ayumi Fujimatsu) are in charge of maintaining these research facilities.

○Light Microscope Unit

At Light Microscope Unit in Central Laboratory in NEKKEN, the state-of-the-art research equipment is provided including Laser scanning confocal/fluorescence microscope (AXR, NIKON), Laser scanning confocal/fluorescence microscope (A1R, NIKON), Laser scanning confocal/super-resolution microscope (Elyra.PS.1 + LSM 780, ZEISS), Imaging Flow Cytometer (Image Stream MKII, Luminex), and Virtual Slide Scanner (Nanozoomer 2.0-RS, Hamamatsu Photonics). We are also managing Nikon Infectious Disease Imaging Core laboratory established on April 2015. Light Microscope Unit members (as of April 1, 2025, Fumika Mi-ichi, Miako Sakaguchi and Akemi Ura) are in charge of maintaining these research facilities.

○Electron Microscope Unit

Electron Microscope Unit supports ultrastructural characterization of microbial pathogens and the structural change of the pathogen-infected cells. This unit offers high quality imaging services by state-of-art techniques such as conventional and immuno-electron microscopy, and also provides sample preparation for EM observation. This unit is responsible for Transmission Electron Microscope (JEOL), Ultra-Microtome (LEICA), vacuum coater (Sanyu Electron), and Hydrophilic Treatment Device (JEOL) in addition to general laboratory facilities for a wide range application of electron microscopy. Electron Microscope Unit member (as of April 1, 2025, Miako Sakaguchi) is in charge of maintaining these research facilities.

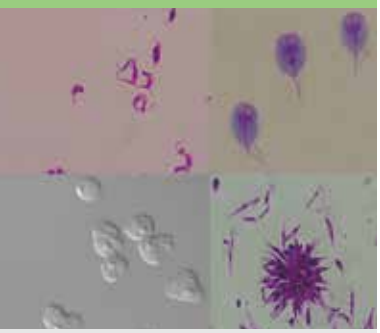
○Research Activities

We are interested in biological phenomena presented by Entamoeba histolytica, the causative parasite for amoebiasis; for example, parasitic life cycle adaptation. We employ various approaches including molecular and cellular biology, lipid biochemistry, and omics. Currently, we focus on sulfolipid metabolism, very long chain acyl ceramide metabolism, and molecular mechanism underlying cyst formation in Entamoeba. As of April 1, 2024, members are Fumika Mi-ichi, principal investigator, Tam Kha Vo, Assistant Professor, and Kyoko Nagatomo, technical staff.

1. Mi-ichi et al. *PLoS Pathogens* 2024; 20(8): e1012435.
2. Mi-ichi et al. *Parasitol Int* 2024; 99: 102844.
3. Mi-ichi et al. *mSphere* 2023; 8(5): e0017423.
4. Mi-ichi et al. *mSphere* 2022; 7(4): e0029922.
5. Mi-ichi and Sakaguchi et al. *Microbiol Spectrum* 2021;9(1): e0051121.

Associated Facility

NEKKEN Bio-Resource Center



Project Representative, Professor
Fumika Mi-ichi
Service Manager, Assistant Professor
Makoto Kazama

NEKKEN Bio-Resource Center (NEKKEN BRC) was established in FY2015 to take charge of National BioResource Project (NBRP), that constructs the framework for systematic collection, preservation, and distribution of bio-resources with a focus on those that required strategic development by the Ministry of Education, Culture, Sports, Science and Technology (MEXT). To promote life sciences, it is important for researchers to share the various bio-resources necessary for pursuing researches and developments. NEKKEN has participated to NBRP services since FY2002 when it was initiated by MEXT. We have been serving as division of protozoa in "Pathogenic Eukaryotic Microorganisms of a Core Facility Upgrading Program" under Medical Mycology Research Center, Chiba University. Furthermore, in "NBRP Technology development subprogram" between FY2023-FY2024, NEKKEN BRC developed a new cryopreservation method for Entamoeba histolytica trophozoites

NEKKEN BRC supports the research and education on pathogenic protozoa by providing following services; (1) web-based database of pathogenic protozoa maintained in Japan, including NEKKEN BRC, with their owner and strain information, (2) acceptance of pathogenic protozoa and their genetically modified organisms for deposit, (3) preservation of protozoan strains, (4) distribution of a variety of protozoan strains, and (5) distribution of their microscopic specimens for education in academic organizations. To facilitate the collection, preservation, and provision of bio-resources, NEKKEN BRC also implements the development of related technologies. Approximately 950 strains of pathogenic protozoa are preserved, and 380 strains are available to supply. Last year 43 protozoan strains were provided to researchers. Slide specimens of various protozoan species for education are also used in universities. Pathogenic protozoan resources available from NEKKEN BRC are listed in the following website.

http://www.tm.nagasaki-u.ac.jp/nbrc/
E-mail: protozoa@tm.nagasaki-u.ac.jp

Associated Facility

Neglected Tropical Diseases Innovation Center (NTDi Center)

NEKKEN NTDi Center DISCOVERY to INNOVATION

Neglected Tropical Diseases Innovation Center

Professor (Director)
Satoshi Kaneko
Professor (Deputy Director)
Tsuyoshi Kihara

The Neglected Tropical Diseases Innovation Center (NTDi Center) was established within the Institute of Tropical Medicine in 2016 to stimulate research and development in tropical medicine, including neglected tropical diseases (NTDs), utilize the research resources of the Institute, promote collaboration between industry, government, and the private sector, and build domestic and international networks. So far, the institute has supported the acquisition of sizeable external research funds and managed the Japan Alliance on Global NTDs (JAGntd) project (established in 2018), a domestic network related to NTDs. The Center has also added the function of the secretariat for the NTD Subcommittee (to be launched in 2022) of the Nikkei-FT Communicable Diseases Conference, which brings together all stakeholders in the industry, government, and academia, including administrative agencies, organizations, and academic societies related to infectious disease control from Japan and abroad. In FY2023, JAGntd, operated by the Center, held an international symposium on NTDs commemorating the G7 Nagasaki Health Ministers' Meeting co-hosted with the GHIT Fund, Uniting to Combat NTDs. (Supported by: Ministry of Foreign Affairs of Japan, Ministry of Health, Labour and Welfare, JICA, DNDi Japan, Japan Pharmaceutical Manufacturers Association (JPMA), SDGs Promise Japan (SPJ), Nikkei FT Infectious Disease Conference, Asahi Shimbun).

JAGNTD Japan Alliance on Global NTDs

※ JAGntd is a network that connects organizations, companies, and individuals involved with NTDs in Japan and abroad to promote their participation in Japan's efforts to control Neglected Tropical Diseases (NTDs) and to exchange information with each other. The secretariat is located at the Institute of Tropical Medicine, Nagasaki University.

Associated Facility

Office for Training and Education

Head and Professor
Koya Ariyoshi
Assistant Professor
Momoko Yamauchi
Assistant Professor
Akinari Moriya

The main role of our office is to run a short course in tropical medicine, the Training Course in Tropical Medicine (TTM). This course aims to support medical and co-medical personnel and others who plan to work in the tropical countries by providing opportunities to learn a broad range of skills and knowledge relevant to practicing medicine, implementing disease control programs and conducting medical research in tropical and Low- and Middle- Income Countries.

The course began in 1978 with 10 participants, and the number of participants was increased to 15 in 2000. Since, over 15 participants attended the course in each year. In 2022, an online course became available for individuals who cannot attend on-site in the Institute of Tropical Medicine (NEKKEN). As of the 48th course in 2025, a total of 660 participants from all over Japan have completed the course and 58 participants have registered the online course. The course is managed by the steering committee, which includes members from both inside and outside NEKKEN.

During the thirteen weeks (April to June), full-time staff members of NEKKEN and a substantial number of visiting professors and lecturers provide lectures, laboratory practical, and field work in the fields of virology, bacteriology, protozoology, parasitology, medical entomology, immunogenetics, epidemiology, human ecology, social medicine, clinical medicine as well as geography and culture of the tropics. Participants who successfully completed the on-site course are awarded the Diploma in Tropical Medicine, while participants who completed the online course are awarded the Certificate.

Admission ceremony in 2025

The University Hospital Department of Infectious Diseases

Professor
Konosuke Morimoto
Associate Professor
Hirotomo Yamanashi
Assistant Professor
Kensuke Takahashi
Assistant Professor
Momoko Yamauchi
Assistant Professor
Mai Izumida
Attending Physician
Eriko Ikeda
Attending Physician
Shingo Masuda
Attending Physician
Takashi Sugimoto
Attending Professor
Shogo Akabame

The clinical department of the Institute of Tropical Medicine (NEKKEN) is the only department in NEKKEN that has clinical duties in the Nagasaki University Hospital. Originally established in 1974 as a single department of NEKKEN, it has been known as “NEKKEN-NAIKA”.

Currently, the Department of Clinical Infectious Diseases in NEKKEN runs the general internal medicine beds and tuberculosis beds on the first floor of the Nagasaki University Hospital International Medical Center and has been working closely with the Department of General Medicine since 2018. The Department of Infectious Diseases was renamed the Center for International Infectious Disease Prevention and Treatment in late FY2024, and merged with the Infection Control and Education Center and the Infectious Diseases Expert Training Center into the General Division of Infectious Diseases.

We are primarily responsible for treating patients with complicated infectious diseases such as sepsis, unknown febrile illness, rickettsiosis, SFTS, and tropical infectious diseases of returned travelers. Additionally, we receive over 700 consultation cases per year, referred by almost all the other departments, suspected infectious diseases. We also operate a travel clinic for international travelers.

We take a major role in training and education undergraduate students, resident physicians and infectious diseases fellows. One of our missions is to support medical doctors who aim to work abroad as clinician volunteers or clinical researchers. We regularly organize clinical case conference in English. Staff and resident doctors are often dispatched to hospitals in the tropics of Asia and Africa, which helps us accumulate our knowledge and experience with clinical tropical medicine.

Group photo of staff members

Publications

Our official publications are as follows;

1. Bulletin of Nagasaki University Institute of Tropical Medicine (In Japanese, published yearly since 1964; PDF files are available at our web page.)

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2. INSTITUTE OF TROPICAL MEDICINE NAGASAKI UNIVERSITY (This copy, published yearly since 1977; PDF files are available at our web page.)

3. Report of Research activities and achievements as the Joint Usage / Research Center on Tropical Disease (PDF files are available at our web page.)

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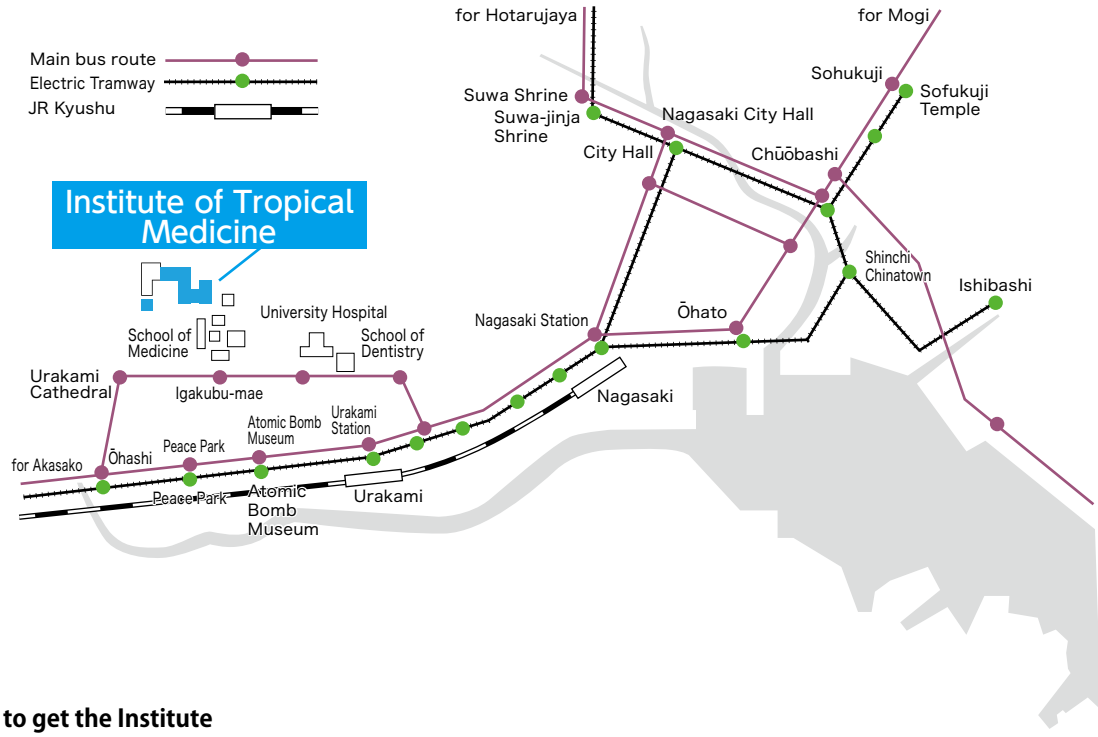

How to get the Institute

○From JR Nagasaki Station
▶Electric Tramway 〝Nagasaki Station〞 (bound for 〝Akasako〞) → 〝Atomic Bomb Museum〞 → about 10-minute walk
▶Nagasaki Bus 〝Nagasaki Station〞 (No.8 bound for 〝Shimoohashi〞 via 〝School of Medicine〞) → 〝School of Medicine〞

○From JR Urakami Station
▶Electric Tramway 〝Urakami Station〞 (bound for 〝Akasako〞) → 〝Atomic Bomb Museum〞 → about 10-minute walk

○From Nagasaki Airport
▶Kenei Bus 〝Nagasaki Airport No.4〞 Bus Stop (For 〝Nagasaki Sta〞. (via 〝Showa-machi〞))
→ 〝Atomic Bomb Museum〞 → about 10-minute walk

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URL https://www.tm.nagasaki-u.ac.jp/nekken/