

# INSTITUTE OF TROPICAL MEDICINE NAGASAKI UNIVERSITY

Solving the World Health Problem through Scientific Discovery and its Application



JULY



2024

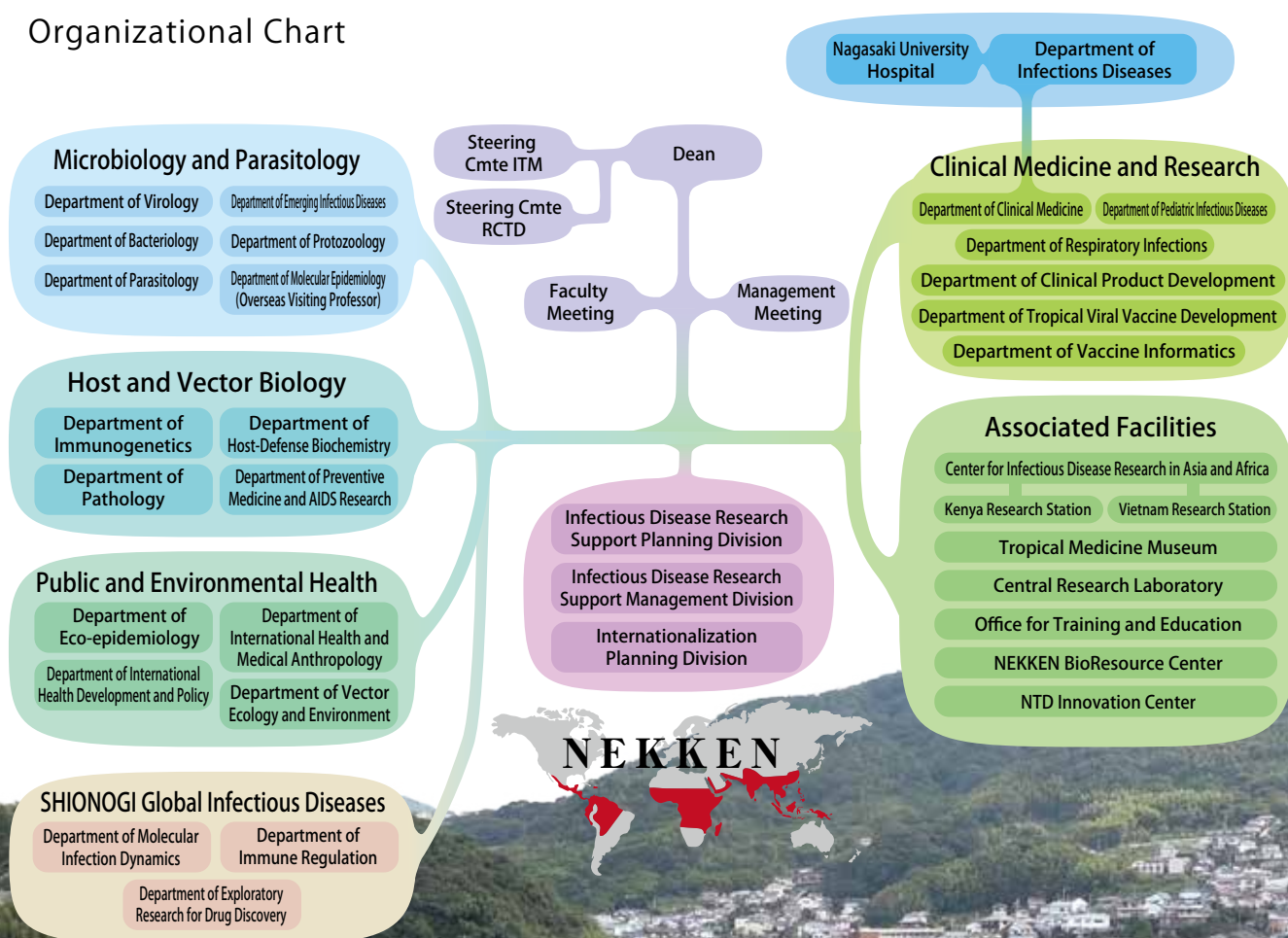
## Mission Statement

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 (23 research departments), two affiliated facilities, and a hospital department, with 76 faculty members (including fixed-term and concurrent post employees), 121 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. To overcome these issues, the institute has set the following comprehensive goals.

1. Spear-head research in tropical medicine and global health
2. International contribution through disease control and health promotion in the tropics
3. Cultivation of researchers and specialists in the above fields

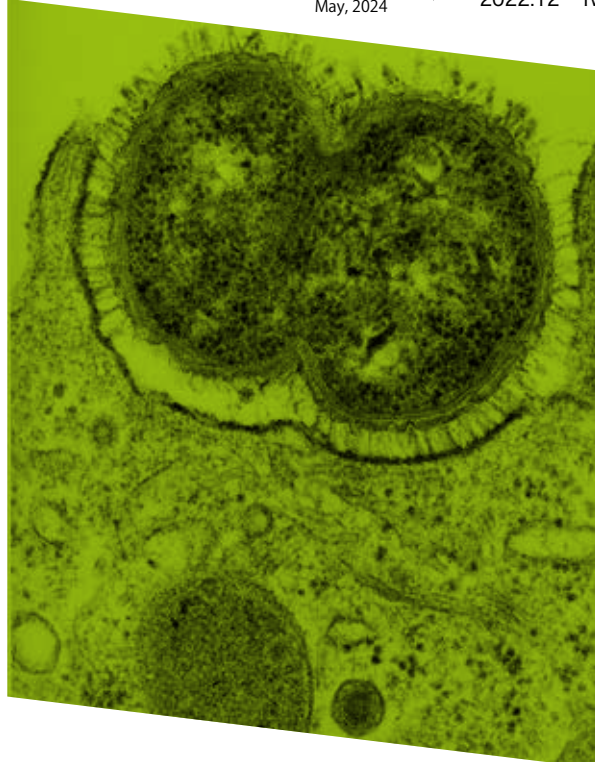
This pamphlet is intended to introduce the organization and activities of the institute. The diseases studied at the Institute include a wide range of tropical infectious diseases such as malaria, schistosomiasis, dengue fever, yellow fever, and infectious diarrhea; emerging infectious diseases such 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, 2024

## History

- 1942.3 East Asia Institute of Endemics as Nagasaki Medical College affiliate
- 1946.4 Institute of Endemics, N.M.C
- 1949.5 Institute of Endemics, Nagasaki University, under postwar scheme
- 1967.6 Institute of Tropical Medicine, N.U.
- 1967.6 Added the Ward Tropical Internal Medicine, to University Hospital
- 1978.4 Diploma course, Kensyu-katei
- 1983.4 JICA Researcher Group-Course
- 1989.5 Certified as Joint Usage Research Center
- 1993.11 WHO Collaboration Center
- 1995.4 Certified as Center of Excellence, COE
- 1997.4 Tropical Infection Research Center
- 2003.4 COE program 21st Century Global Strategy against Tropical & Emerging Infection
- 2006.4 Tropical Medicine Master's Course
- 2008.4 Museum and Asia / Africa Facilities
- 2008.6 COE program Comprehensive Global Strategy against Tropical & Emerging Infection
- 2009.6 Certified as Tropical-medicine Joint Usage / Research Center
- 2011.4 Two vaccine - related departments
- 2012.4 Global Leader Course for Tropical & Emerging Infection Intervention
- 2017.11 75th anniversary ceremony
- 2019.4 Shionogi Global Infectious Diseases Division
- 2022.12 Two vaccine - related departments



# 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.

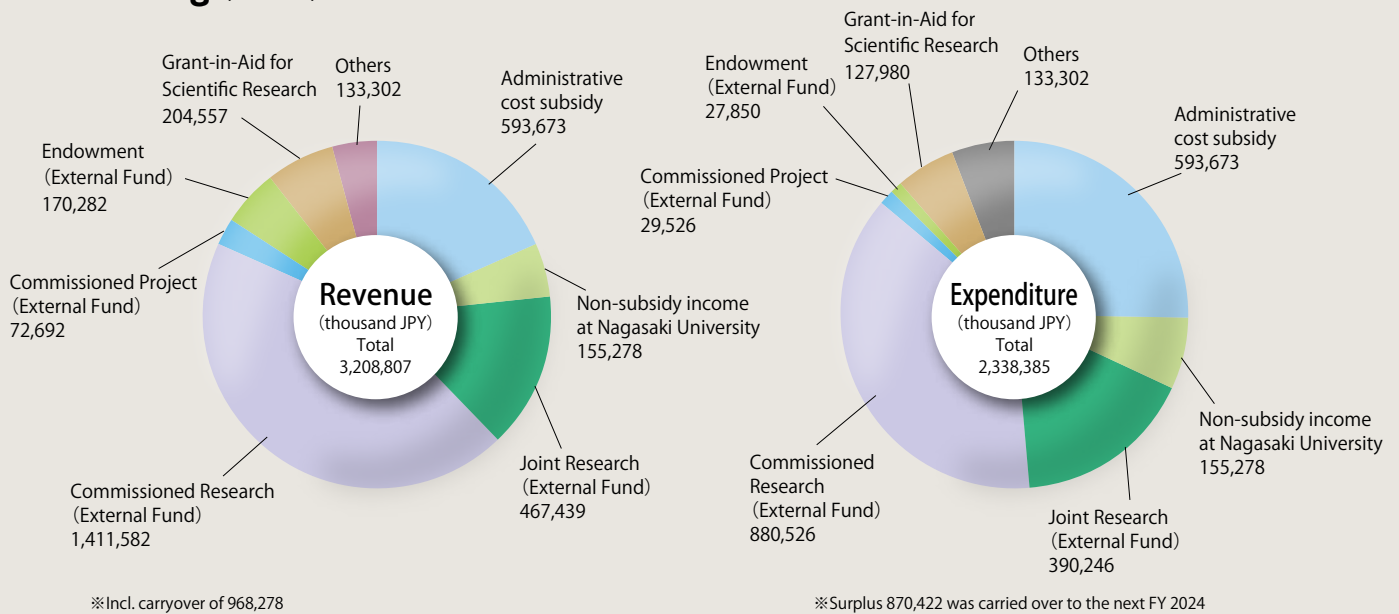
A specific administrative office has been allocated to the Institute to support the activities mentioned above.

### The Institute of Tropical Medicine

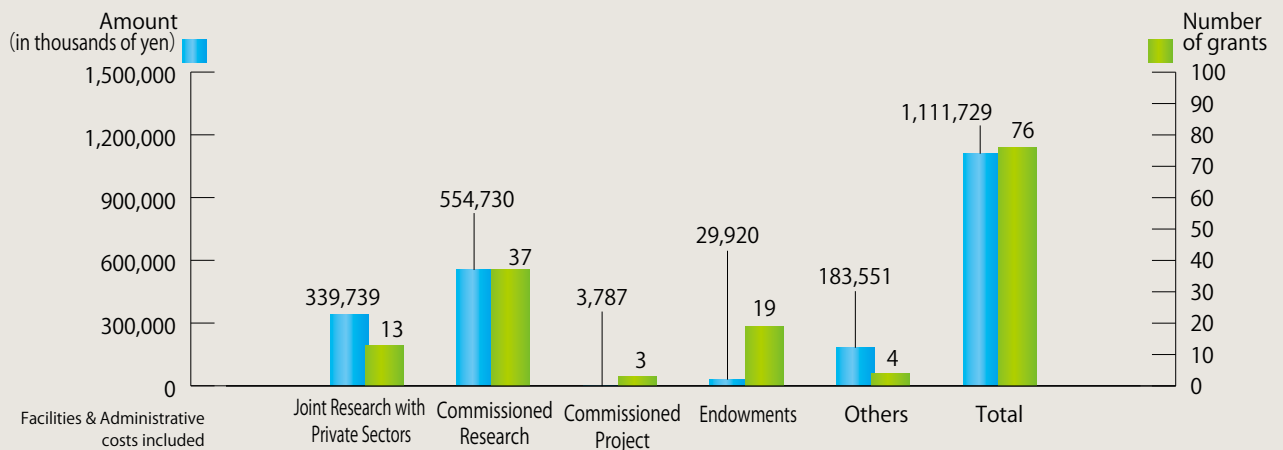


**Steering Committee for the Joint Usage / Research Center on Tropical Disease** (Committee Member outside the university)  
Manabu Ato (National Institute of Infectious Diseases) ,  
Shinichiro Kawazu (Obihiro University of Agriculture and Veterinary Medicine) , Yasushi Kawaguchi (The University of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

## Accounting (FY2023)



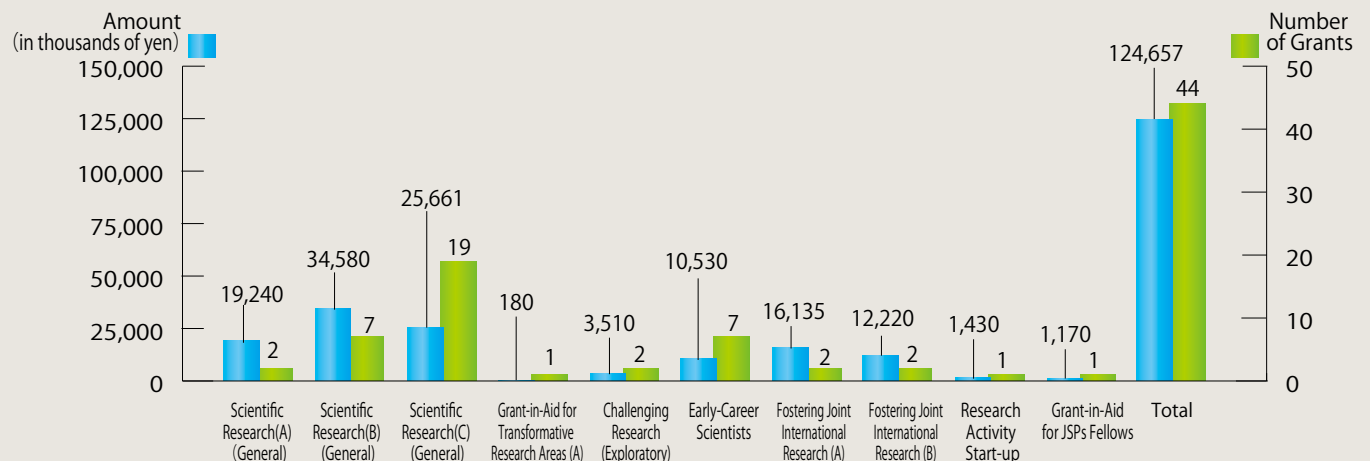
## External Fund (FY2023)



## Number of Staff (as of May 1, 2024)

Professor	Associate Professor	Senior Assistant Professor	Assistant Professor	Sub total	Others	Total
16	11	0	34	61	121	182

## Grants-in-aid for Scientific Research (KAKENHI) (MEXT) (FY2023)





## Microbiology and Parasitology Department of Virology



Professor  
Kouichi Morita  
Associate Professor  
Yuki Takamatsu  
Assistant Professor  
Takeshi Nabeshima  
Assistant Professor  
Hu Shang Fan

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.

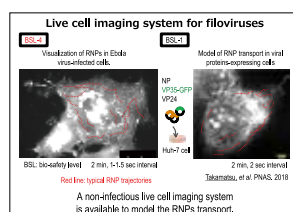
### ●Intracellular Dynamics Analysis for Highly Pathogenic Viruses

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. Nabeshima et al. *J Med Virol* 2023; 95(11): e29255.
2. Nguyen et al. *Viruses* 2023; 15(10): 2065.
3. Hu et al. *PNAS Nexus* 2023; 2(4): pgad 120.
4. Takamatsu et al. *J Virol* 2022; 96(17): e0108322.
5. Fujita-Fujiharu et al. *Nat Commun* 2022; 13(1): 1191.

## Microbiology and Parasitology Department of Bacteriology

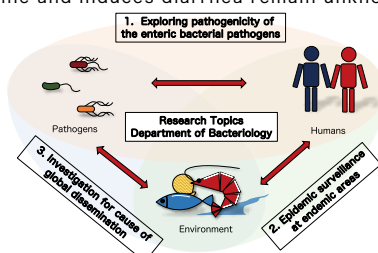


Professor  
Toshio Kodama  
Associate Professor  
Hirota Hiyoshi  
Assistant Professor  
Tandhavanant Sarunporn

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. Anggramukti et al. *PLoS Pathog* 2024; 20: e1012094.
2. Prithvisagar et al. *Microb Pathog* 2023; 178: 106069.
3. Zhang et al. *mBio* 2022; e0273322.
4. Liou et al. *Cell Host Microbe* 2022; 30(6): 836-847.
5. Hiyoshi et al. *Cell Host Microbe* 2022; 30(2): 163-170.

# 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  
Yasumasa Komoda  
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 SARS-CoV-2.

## 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.

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

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 mosquitoes) 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

## 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.



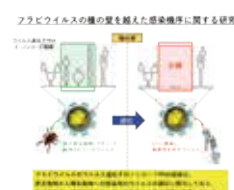
1. Urata et al. *J Virol* 2023; 97(3): e0001523.
2. Yoshikawa et al. *J Biol Chem* 2023; 299(6): 104819.
3. Abe et al. *Microorganisms* 2023; 11(8): 2046.
4. Kawasaki et al. *Sci Rep* 2023; 13(1): 13105.
5. Amano et al. *Viruses* 2023; 15(10): 2086.

EBV, a ubiquitous human  $\gamma$ -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. Sasaki et al. *Biochem Biophys Res* 2024; 38: 101712.
2. Nanbo, *Microorganisms* 2024; 12(4): 806.
3. Wannigama et al. *Lancet Infect Dis* 2024; S1473-3099(24)00155-5.
4. Wannigama et al. *Lancet Infect Dis* 2023; S1473-3099(23)00620-5.
5. Dochi et al. *Int J Cancer* 2023; 154(5): 895.

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. Hirano et al. *Antiviral Res* 2022; 200: 105276.
2. Takahashi et al. *Ticks Tick Borne Dis* 2022; 13: 101900.
3. Kodama et al. *Nat Commun* 2022; 12: 5539.
4. Maezono et al. *Sci Rep* 2022; 11: 9213.
5. Haviernik et al. *Antiviral Res* 2021; 185: 104968.



## Microbiology and Parasitology Department of Protozoology



Professor  
Osamu Kaneko  
Assistant Professor  
Taeko Naruse  
Assistant Professor  
Shinya Miyazaki  
Assistant Professor  
Yukiko Miyazaki

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

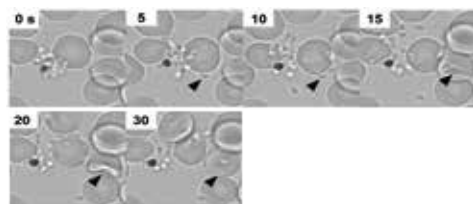


Fig.1 Gliding motility of *Plasmodium* merozoites. *P. falciparum*, the deadliest malaria parasite species (arrow), was released from an infected RBC (0 s), then adhered to the RBC in a gliding motion (5 and 10 s), deformed the cell (15 s) and invaded the cell (30 s). A longtime mystery of whether malaria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

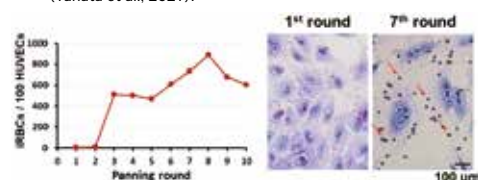


Fig.2 Cytoadherence of *P. knowlesi* -infected RBCs. *P. knowlesi* -infected RBCs with increased cytoadhesion activity (arrows) were selected by repeated panning against human umbilical vein endothelial cells (HUVECs), and the responsible ligand, SICA-HUVEC, was identified (Chuang et al., 2022).

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 expand a platform for basic and clinical malaria research, we are investigating the molecular evolution and drug resistance of *P. falciparum* in endemic countries, malaria vaccine development, development of diagnostic and control methods for zoonotic malaria, and mosquito and liver stages of human infectious malaria parasites.

1. Christensen et al. *Antimicrob Agents Chemother* 2024; 68(5): e0028024.
2. Poofery et al. *Sci Rep* 2023; 13: 20258.
3. Ward et al. *J Infect Dis* 2023; 227(10): 1121-1126.
4. Otsuki et al. *Biomolecules* 2023; 13(3): 458.
5. Nguyen et al. *Sci Rep* 2023; 13: 145.

## Microbiology and Parasitology Department of Parasitology



Professor  
Shinjiro Hamano  
Assistant Professor  
Risa Nakamura  
Assistant Professor  
Atcharaphan Wanlop  
Assistant Professor  
Ayako Hyuga

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 new 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). 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. Dey et al. *Nat Commun* 2023; 14(1): 7028.
2. Alshaweesh et al. *Microbiol Spectr* 2022; 10(5): e0112622.
3. Tanaka et al. *Parasitol Int* 2021; 83: 102346.
4. Talaam et al. *Antimicrob Agents Chemother* 2021; e0041821.
5. Zhang et al. *Nat Commun* 2020; 11(1): 3461.



## 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 (cruz-trypanosomes and malaria) and viruses (dengue fever and COVID-19) 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; 3) Ahmadu Bello University, Nigeria; and 4) University of Kinshasa, Democratic Republic of Congo. In addition, joint research is being conducted with the London School of Public Health and Tropical Medicine, the Global Health Institute of Barcelona,



the University of Toyama, Tokyo Medical and Dental University, Tokyo Institute of Technology, 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

- Immunogenetic analysis of malaria in endemic areas in Kenya (SATREPS, KEMRI, SHINE Program)
- Nanoparticle nucleic acid vaccines (SCARDA)
- Development of new antiprotozoan drugs derived from Chinese herbal medicine or natural products (University of Toyama, Nagasaki University)
- 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 (GHIT, JICA Grassroot Partnership Program)
- Single cell analysis of T-cell fractions from dengue fever patients (Grant-in-Aid for Scientific Research)

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 Rodriguez et al. *Lancet Reg Health West Pac* 2022; 31: 100574.

## Host and Vector Biology

### Department of Infection Biochemistry



Professor  
Daniel Ken Inaoka  
Professor  
Kiyoshi Kita  
Assistant Professor  
Takaya Sakura

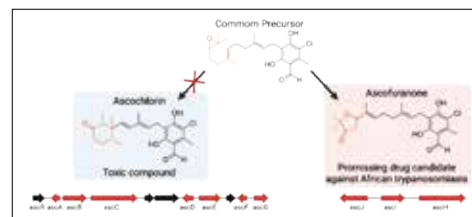
The aim of our department is to contribute to global health and welfare through basic research. The primary focus of our research is on energy metabolism, which is essential for the survival, growth, and reproduction of living organisms. From the perspective of biological adaptation, we study the molecular 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 mitochondria from human 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 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 Neglected Tropical Diseases (NTDs), with special focus 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.

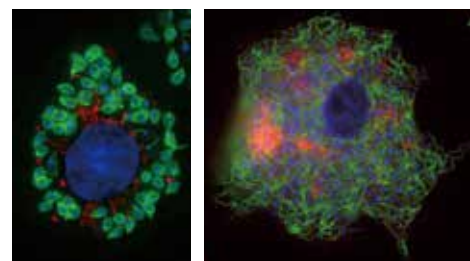
In addition to the trypanosomatid parasites as one of our research target organisms, we are also studying other pathogens and model organisms. This includes parasites like *Eimeria tenella* and *Theileria* spp., worms like *Anisakis* spp., *Haemonchus contortus*, and *Fasciola* spp., and bacteria such 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. Matsumoto et al. *Trials* 2024; 25: 165.
2. Kato et al. *Front. Mol. Biosci* 2023; 10: DOI: 10.3389/fmolb.2023.1288470.
3. Wasonga et al. *Int. J. Environ. Res. Public Health* 2023; 20: 6781.
4. Kagaya et al. *Trials* 2023; 24: 354.
5. Osborne et al. *Sci Rep* 2023; 13(1): 11416.

## 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.'

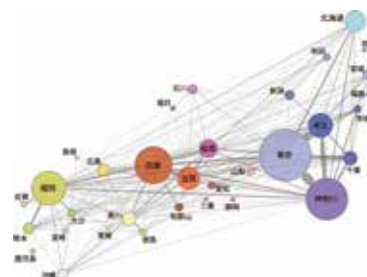
Specifically, efforts are made towards constructing theories of sexually transmitted infections (STIs) using mathematical models and collecting data on sexual behavior through web surveys to elucidate the persistence of STIs. Additionally, we advance research on the social dilemmas underlying the use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



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

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.



Network visualizing the mobility of male clients in the sex industry

1. Yamanouchi et al. *Parasitology Research* 2024; 123: 163.
2. Inomata et al. *Scientific Reports* 2024; 14: 4701.
3. Kambale et al. *Parasitology International* 2024; 100: 102866.
4. Arima et al. *BMC Public Health* 2023; 12: 2471.
5. Dhakal et al. *Pathogens* 2023; 12(8): 1045.



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

1. Tin Zar et al. *Int. J. Environ. Res. Public Health* 2023; 20(19): 6660.
2. Ogino et al. *Southeast Asian J. Trop. Med. Public Health* 2023; 54(3): 146-166.
3. Suzuki et al. *Methods and Protocols* 2023; 6(1): 12.
4. Yoshino et al. *BMC Public Health* 2022; 22(1): 1732.
5. Dizon et al. *PLoS Negl Trop Dis* 2022; 16(1): e0009948.

## 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. Adjei-Gyamfi et al. *J Health Popul Nutr* 2023; 42 (1): 87.
2. Aiga et al. *Bulletin World Health Organ* 2024; 102 (3): 151-151A.
3. Balogun et al. *Public Health* 2023; 223: 94-101.
4. Aoki et al. *J Glob Health* 2023; 13: 04073.
5. Elsheikh et al. *J Glob Health* 2023; 13: 03040.



## Public and Environmental Health Department of Vector Ecology and Environment



Professor  
Noboru Minakawa  
Assistant Professor  
Toshihiko Sunahara  
Assistant Professor  
Kyoko Futami

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.

Currently, we are analyzing the population genetic structures of *Aedes aegypti* in Africa. This study has already revealed that the genetic structures of mosquito populations in dengue fever endemic areas are distinct. We are also working on the genetic structure of the



*Aedes albopictus* population that was introduced in Republic of Mozambique and the Democratic Republic of the Congo in the recent years. This study will reveal their origins and introduction pathways.

For reducing malaria risk, we are evaluating the effectiveness of new insecticides and tools in Kenya and Malawi. We are also developing malaria prediction models and dengue prediction models using deep learning methods.

1. Vulu et al. *Parasit Vectors* 2024; 17(1): 35.
2. Pillay et al. *Sci Rep* 2023; 13(1): 23091.
3. Kawada et al. *PloS One* 2023; 18(5): e0285883.
4. Martineau et al. *Front Public Health* 2022; 10:962377.
5. Minakawa et al. *Parasitology* 2022; 149(7): 1-39.

## Clinical Medicine and Research Department of Clinical Medicine



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

This is the only clinical department in NEKKEN that conducts clinical practices in Nagasaki University Hospital. We conduct a wide range of multi-disciplinary studies that bridging 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



Bed-side clinical training course in San Lazaro Hospital

epidemiology research on respiratory infections such as influenza, RSV and COVID-19 in Japan and the Philippines.

### ●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 pathogenesis caused by the GILT enzyme and endogenous retroviruses. Additionally, a study on snake bite has started in the Philippines.

1. Saito et al. *Clin Infect Dis* 2021; 72: 61-68.
2. Mukadi et al. *PLoS Negl Trop Dis* 2021; 15: e0009670.
3. Domai et al. *Lancet Reg Health West Pac* 2021; 19: 100334.
4. Yanagisawa et al. *PLoS ONE* 2020; 15: e0242438.
5. Han et al. *Sci Rep* 2023; 13:5393.

## Clinical Medicine and Research

### Department of Respiratory Infections



Professor  
Konosuke Morimoto  
Associate Professor  
Bhim Gopal Dhoubhadel

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

- 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, we performed outbreak investigation in nursing care facilities. We also investigate the effectiveness of the COVID-19 vaccines on onset of disease, hospitalization, and severe illness by COVID-19 in Japan.
- In Nepal, two projects on diagnostic method of pediatric pneumonia and on pneumococcal carriage among children have been conducted.

1. Maeda et al. *Expert Rev Vaccines* 2024; 23: 213-225.
2. Dhoubhadel et al. *p Med Health* 2024; 52(1): 14.
3. Maeda et al. *Expert Rev Vaccines* 2023; 22: 288-298.
4. Wakabayashi et al. *BMC Pulm Med* 2023; 23(1): 351.
5. Yamashita et al. *Front Immunol* 2023; 14: 1222428.

## 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

#### 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. Otomaru et al. *Sci Rep* 2023; 13(1): 15757.
2. Shah et al. *Microbiol Spectr* 2023; 1: e0414022.
3. Toizumi et al. *Vaccine* 2022; 40(36): 5366-5375.
4. Qian et al. *PLoS Med* 2022; 19(5): e1004016.
5. Li et al. *Lancet* 2022; S0140-6736(22)00478-0.

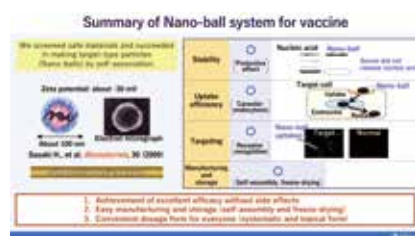
## Clinical Medicine and Research

### 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. Ko et al. *Pharmaceutics* 2024; 16(4): 522.
2. Nakamae et al. *Front Immunol* 2023; 14: 1116299.
3. Muro et al. *Biol Pharm Bull* 2023; 46(2): 237-244.
4. Kurosaki et al. *Pharmaceutics* 2021; 13(11): 1983.
5. Kurosaki et al. *Drug Deliv* 2021; 28(1): 1585-1593.

## Clinical Medicine and Research

### Department of Tropical Viral Vaccine Development



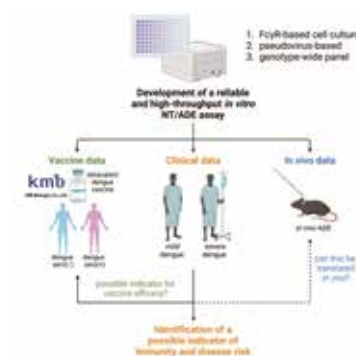
Professor  
Kouichi Morita  
Professor  
Corazon Cerilla Buerano  
Assistant Professor  
Jean Claude Palma Balingit  
Assistant Professor  
Muhareva Raekiansyah  
Assistant Professor  
Nguyen Thi Thanh Ngan

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 are on the following:

- development of new live dengue vaccines, characterization of candidate dengue vaccines and elucidation of immune responses to and antibody-dependent enhancement (ADE) of vaccines in human trials.
- development of a pseudovirus-based DENV panel system for quantitatively evaluating the neutralizing and ADE responses across diverse DENV genotypes.
- development of a high-throughput in vitro assay for reliable detection of ADE antibodies using immortalized human cell lines.
- investigation of the mechanism of ADE infection in newly developed mouse model.

- investigation of the role of ADE in long-term epidemics, outbreaks, and outcomes of dengue infection in dengue-endemic areas in the Philippines, Indonesia, Vietnam and Myanmar.
- sero-molecular epidemiological studies on arboviruses (DENV, Japanese encephalitis virus, Zika virus, Chikungunya virus) in various countries in Asia (Myanmar, Southern Vietnam, Nepal, Sri Lanka, and Malaysia) that are important for vaccine development and evaluation of the impact of future vaccination programs.
- development of drugs/ compounds against arboviruses and study to understand the mechanisms by which these antivirals inhibit viral infection or replication.



1. Buerano and Morita *Lancet Infect Dis* 2024; doi:10.1016/S1473-3099(24)00181-6.
2. Balingit et al. *Int J Infect Dis* 2024; 139: 59-68.
3. Ngwe Tun et al. *Vaccines (Basel)* 2023; 11(12): 1857.
4. Ngwe Tun et al. *Am J Trop Med Hyg* 2023; 109(4): 917-925.
5. Ngwe Tun et al. *J Infect Public Health* 2023; 16(9): 1435-1442.



Clinical Medicine and  
Research

## Department of Vaccine Informatics



Professor  
Trevor Clancy  
Associate Professor  
Sebastian Kapell  
Assistant Professor  
Anja Mösch

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) based on the "Government Strategy to Strengthen Vaccine Development and Production to Enable Rapid Approval," has launched a project to establish world-leading R&D centers for vaccine development in Japan. Nagasaki University applied to be one of these centers with three main focuses: "Response to tropical infectious diseases," "Vaccine development against advanced BSL-4 pathogens," and "Vaccine development using artificial intelligence (AI)." The university was selected as one of the vaccine R&D centers. The development of infectious disease vaccines using AI is a new initiative for the university, established in collaboration with NEC Oncoimmunity AS (NOI), a Norwegian company owned by NEC with headquarters in Tokyo. Professor Trevor Clancy, Chief Science Officer at NOI, has joined this collaboration together with

Associate Professor Sebastian Kapell, Senior Bioinformatician at NOI, to develop a new center of research on the topic of vaccine informatics. The aim of the center is to integrate cutting-edge AI and computational biology into the vaccine development programs at Nagasaki University. This work is further supported by the cross-appointment of Assistant Professor Anja Mösch, a research scientist from the NEC European Laboratories (NLE), making this a joint international undertaking across academic institutions and the biotechnology industry. The goal is not only to develop a vaccine research center for combating infectious diseases in Japan but also to establish a truly international center that can attract human resources from around the world, contributing to the 100-day mission of vaccine development.

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 AIDS 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> )



SHIONOGI Global  
Infectious Diseases  
Department of Molecular  
Infection Dynamics

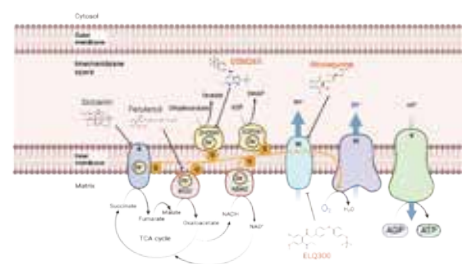


Professor  
Daniel Ken Inaoka  
Assistant Professor  
Takaya Sakura

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. Miyazaki et al. *Commun Biol* 2023; 6(1): 713.
2. Hidayati et al. *Int J Parasitol Drugs Drug Resist* 2023; 21: 40-50.
3. Komatsuya et al. *Pharmaceuticals (Basel)* 2022; 15(7): 903.
4. Waluyo et al. *Parasitol Int* 2021; 85: 102432.
5. Acharjee et al. *Int J Mol Sci* 2021; 22(15): 7830.

SHIONOGI Global  
Infectious Diseases  
Department of  
Immune Regulation



Associate Professor  
Shusaku Mizukami  
Assistant Professor  
Jiun-Yu Jian

#### Mizukami Group

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

The life cycle of *Plasmodium* parasites which causes malaria can be divided into liver-(pre-erythrocytic) stage and erythrocytic-stage in human body. And, parasites show significant morphological change 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. So, further development of malaria vaccine is required.

Cellular immunity, mediated by T lymphocytes, is considered having crucial roles on the defense against liver-stage malaria. However, most of the previous vaccine development studies have aimed to induce humoral immunity, mediated by antibodies, and there have not been many studies focusing on cellular immunity.

Our vaccine development has focused on tissue-resident memory T cells ( $T_{RM}$ ) in liver. Unlike circulating memory T cells,  $T_{RM}$  reside in specific tissues or organs. We have confirmed the importance of  $T_{RM}$  in the protective immunity against liver-stage malaria. Additionally, we have successfully induced sufficient numbers of  $T_{RM}$  and observed protection in our mouse malaria model using mRNA-containing lipid nanoparticles (mRNA-LNP). Based on these findings, our malaria vaccine development is on-going.

1. Nakamae et al. *Front Immunol* 2023; 14: 1116299.
2. Tayama et al. *Trop Med Health* 2023; 51(1): 12.
3. Mizuta et al. *Chem Med Chem* 2023; 18(7): e202200586.
4. Kawaguchi et al. *J Pharm Sci* 2023; 112(5): 1401-1410.
5. Kamiya et al. *Pharmaceutics* 2022; 14(11): 2357.

#### 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. Macalinao et al. *EMBO Mol Med* 2023; 15 (12): 10.15252/emmm.202317713.
2. Ganley et al. *Nature Immunol* 2023; 24 (9): 1487-1498.
3. Macalinao et al. *Lancet Reg Health West Pac* 2023; 10.1016/j.lanwpc.2023.100792.
4. Ntita et al. *Int Immunol* 2022; 34: 21-33.
5. Enders et al. *Curr Res Immunol* 2021; 2: 79-92.

## SHIONOGI Global Infectious Diseases

### Department of Exploratory Research for Drug Discovery



Visiting Associate Professor  
**Ken-ichi Matsumura**  
(Specialist, Head of Medicinal Chemistry 3 Group, SHIONOGI & CO., LTD.)

Malaria is one of the three largest infectious diseases in the world, which aligns with HIV and tuberculosis. More than 200 million people are infected with malaria and more than 600,000 people died annually. Although Mosquirix (RTS, S/AS01) and R21/MM were recommended by WHO as anti-malaria vaccines in 2022 and 2023, there are still some issues such as insufficient efficacy so on. In addition, resistant malaria to existing therapeutic drugs have been reported. In this situation, the development of new drugs is urgently needed.

In this department, a Shionogi's researcher is in charge of a principal investigator, and conduct small molecule drug discovery together with Department of Molecular Infection Dynamics. We will take on the role of research hubs that connect research assets of Nagasaki University such as know-how and global network for malaria research and SAR (structure-activity relationship) engine for small molecule drug discovery of SHIONOGI. By taking advantage of strengths of each department, the drug discovery research will be promoted to create a therapeutic or a prophylaxis/chemoprevention drug with strong antimalarial activity and high safety. We are also collaborating with domestic and overseas research organizations including MMV (Medicines for Malaria Venture), promoting further optimization of the lead scaffolds and phenotypic screening hits that we have created so far.

Research activities are as follows:

- Structure-Activity Relationship (SAR) study for lead compounds based on existing drugs

- Identification of hit compounds from compound libraries and Hit to Lead SAR approach based on screening-based drug discovery
- Optimization of drug metabolism, safety, and physical parameters of candidate compounds within Shionogi
- Strengthening external collaboration for SAR study, clinical development and identifying new targets
- Conducting target discovery and basic research for antimalarial drugs



1. Tamura et al. *Bioorg Med Chem Lett* 2022; 68: 128769.
2. Kato et al. *Bioorg Med Chem Lett* 2022; 59: 128567.
3. Kato et al. *J Med Chem* 2023; 66: 11428.
4. Tamura et al. *Bioorg Med Chem Lett* 2023; 79: 129059.

## 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  
**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 field. In FY2022, the station's laboratory was significantly upgraded with newly installed research equipment. Since FY2022, the Station has been supporting the JICA technical cooperation project aimed at strengthening the research capacity of KEMRI.

#### 1. Research activities:

Major research projects have been conducted based on the station, including the 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 SATREPS project "Integrated Research and Development for the Control and Elimination of Schistosomiasis" (PI: Prof. Shinjiro Hamano) will be 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. In addition, joint research with companies (NEC, Eiken Chemical, etc.) and research funded by Grants-in-Aid for Scientific Research (KAKENHI) are also actively carried out.

#### 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 adopted in FY 2020 and supports student exchange between four educational institutions in Kenya and Nagasaki University.

#### 3. Social contribution activities:

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

1. Suzuki et al. *Methods Protoc* 2023; 6: 12.
2. Mizuta et al. *J Med Chem* 2022; 65: 369-385.
3. Larson et al. *Trop Med Health* 2022; 50: 31.
4. Wandera et al. *Trop Med Int Health* 2022; 27: 669-677.
5. Koda et al. *International Conference of the Biometrics Special Interest Group (BIOSIG)* 2022; 1-6.



Associated Facility  
Center for Infectious Disease Research in Asia and Africa

## Vietnam Research Station



Chief Representative, Professor  
Futoshi Hasebe  
Associate Professor  
Haruka Abe

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. The Vietnam Research Station in the National Institute of Hygiene and Epidemiology (NIHE) in Hanoi is currently manned by 3 staffs from NU, and the Nha Trang sub-station by 2 permanent staff, in addition to which 20 researchers from NU and a further 64 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, three joint research projects related to drug-resistant bacteria, mosquito vector, COVID-19, HIV 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



Photo-1. Group photo of Vietnam base members @NIHE (May 2023)

Tuberculosis.

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 from NU and other universities. "Study on Emerging and Re-emerging Infectious Diseases in Vietnam Nagasaki University - NIHE Joint Symposium" was held on November 21, 2020 at the Ryojun Hall, Nagasaki University (Photo 1). A workshop "Infectious disease research during the COVID-19 pandemic in Vietnam" was held at the Global Health Joint Conference 2023 at the Hongo Campus of the University of Tokyo on November 26th. (Photo-2).



Photo-2. Fiscal 2021 Foreign Minister's Commendation Award and Group Awards Presentation Ceremony @Embassy of Japan in Vietnam (December 2022)

1. Nguyen et al. *Int J Infect Dis* 2024; 139: 109-117.
2. Nabeshima et al. *J Med Virol* 2023; 95(11): e29255.
3. Nguyen et al. *Viruses* 2023; 15(10): 2065.
4. Iguchi et al. *PLoS Negl Trop Dis* 2023; 17(4): e0011259.
5. Kuninobu et al. *Trop Med Health* 2023; 51(1): 5.

## Associated Facility Museum of Tropical Medicine



Professor  
Wataru Iijima  
Technical Staff  
Kazuo Araki

The predecessor of the Museum of Tropical Medicine was the "Tropical Medicine Reference Room", established in 1974. It was later reorganized into the "Resource and Information Center for Tropical Diseases" (1997) and the "Research Center for Tropical Infectious Diseases" (2001) and became the "Museum of Tropical Medicine" in April 2008, where it remains today.

The exhibition room was originally located on the 1st floor of the Institute of Tropical Medicine (current Administration office). It was moved to the former JAERI Building No. 2 with the "A-bomb Medical Museum" in April 2014. Together with the "Modern Medical Materials Exhibition Room" in the Medical Library, and the "150th Anniversary Museum" in Ryojyun Kaikan, it has become museums that utilizes the tradition and characteristics of Nagasaki University, which was founded as a medical school. The new museum was designed and expanded to welcome many visitors by taking advantage of the traditions and characteristics of Nagasaki University. The relocation increased the exhibition area by 1.5 times.



The museum preserves and exhibits various pathogens (parasites, bacteria, and viruses), specimens of vector insects and dangerous animals, visual materials, documents, and other valuable materials related to the history of medicine, as well as panels describing tropical diseases and other infectious diseases. A special section has been created where visitors can classify mosquitoes and separate male from female, with the aim of increasing interest and understanding of tropical infectious diseases among many people. The museum also provides explanations in English and Chinese using tablets.

The Institute of Tropical Medicine manages the "Summer School on Tropical Medicine and Emerging Viral Infectious Diseases" during the summer vacation for junior and senior high school students, in order to communicate the research activities of the Institute of Tropical Medicine to the society and to provide an opportunity to focus on infectious diseases, medicine and public health in the world.

The IT (Information Technology) environment will be improved by upgrading servers and network equipment, and efforts will be made to maintain a high level of security at the Institute of Tropical Medicine. In addition, the Museum of Tropical Medicine is responsible for the maintenance of the IT environment, including the loan of IT equipment to meet the diverse needs of the Institute's researchers and other users.

## 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, 2024, Fumika Mi-ichi, 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/super-resolution microscope (Elyra.PS.1 + LSM 780, ZEISS), Laser scanning confocal/fluorescence microscope (AXR, NIKON), Laser scanning confocal/fluorescence microscope (A1R, NIKON, 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, 2024, Fumika Mi-ichi, Miako Sakaguchi and Akemi Ura)

are in charge of maintaining these research facilities.

### ○Electron Microscope Unit

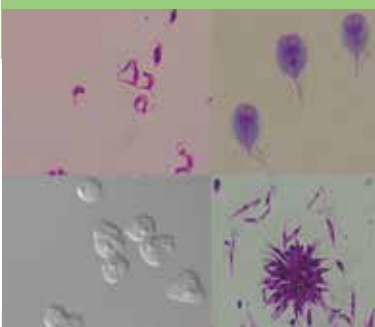
Electron Microscope Unit supports ultrastructural characterization of microbial pathogens and the structural change of the pathogen-infected cells. This unit offers high quality imaging services by state-of-art techniques such as conventional and immuno-electron microscopy, and also provides sample preparation 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, 2024, 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. *Parasitol Int* 2024; 99: 102844.
2. Mi-ichi et al. *mSphere* 2023; 8(5): e0017423.
3. Mi-ichi et al. *mSphere* 2022; 7(4): e0029922.
4. Mi-ichi et al. *Microbiol Spectrum* 2021; 9(1): e0051121.
5. Mi-ichi et al. *mSphere* 2021; 6(2): e00174-21.

## 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 2015 to take charge of National BioResource Project (NBRP) mission in Institute of Tropical Medicine (NEKKEN). NBRP constructs the framework for systematic collection, preservation, and distribution of bio-resources with a focus on those that required strategic development by the National Government. 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 2002 when it was initiated by the Ministry of Education, Culture, Sports, Science and Technology (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.

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 900 strains of pathogenic protozoa are preserved, and 379 strains are available to supply. Last year 43 protozoan strains were provided to researchers. The highly infective strain of *Leishmania donovani* (MHOM/NP/03/D10) has been used in many research papers. 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/nbr/>  
E-mail: [protozoa@tm.nagasaki-u.ac.jp](mailto:protozoa@tm.nagasaki-u.ac.jp)

Associated Facility  
Neglected Tropical Diseases  
Innovation Center  
(NTDi Center)



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

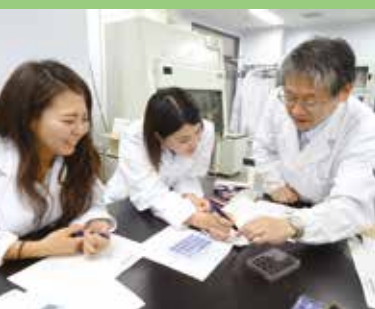


the G7 Nagasaki Health Ministers' Meeting co-hosted with the GHIT Fund, Uniting to Combat NTDs. (Supported by: Ministry of Foreign Affairs of Japan, Ministry of Health, Labour and Welfare, JICA, DNDi Japan, Japan Pharmaceutical Manufacturers Association (JPMA), SDGs Promise Japan (SPJ), Nikkei FT Infectious Disease Conference, Asahi Shimbun).

※ JAGntd 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

The main role of our office is to run a short course in tropical medicine, the Training Course of 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 46th course in 2023, a total of 636 participants from all over Japan have

completed the course and 34 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, pathology, 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 2023



**The University Hospital**  
**Department of Infectious Diseases**

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

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. It was originally established in 1967 and has since been locally known as "NEKKEN-NAIKA".

Currently, the department runs an outpatient clinic and provides inpatient care in the general internal medicine ward with 16 beds and TB ward with 6 beds, closely collaborating with the Department of General Medicine. We are primarily responsible for treating patients with complicated infectious diseases such as sepsis, unknown febrile illness, HIV/AIDS, tuberculosis, 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.



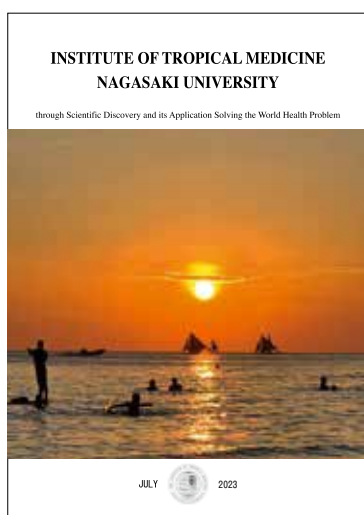
## Publications

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.)



1



2

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

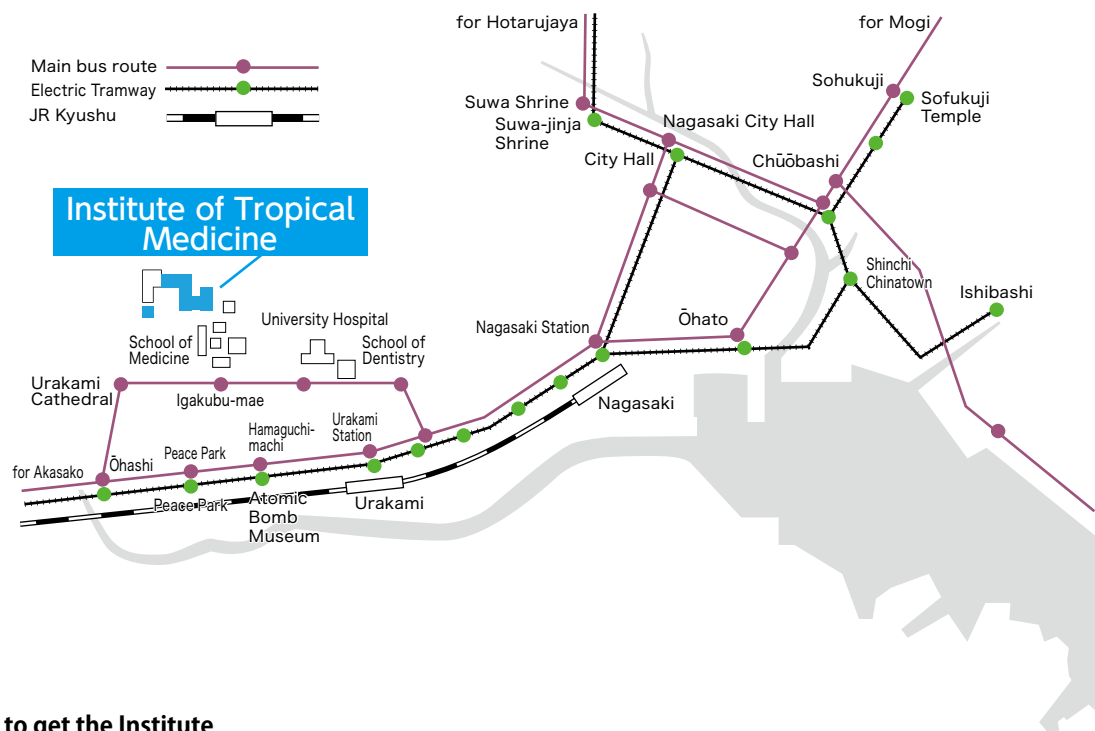
3. Report of Research activities and achievements as the Joint Usage / Research Center on Tropical Disease (PDF files are available at our web page.)



3







### 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" / via "Showa-machi • Sumiyoshi")) → "Hamaguchi-machi" → about 10-minute walk



Nagasaki University

# Institute of Tropical Medicine

Location 1-12-4 Sakamoto Nagasaki 852-8523

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

