Japan Agency for Medical Research and Development

Overseas Centers in Japan Program for Infectious Diseases Research and Infrastructure

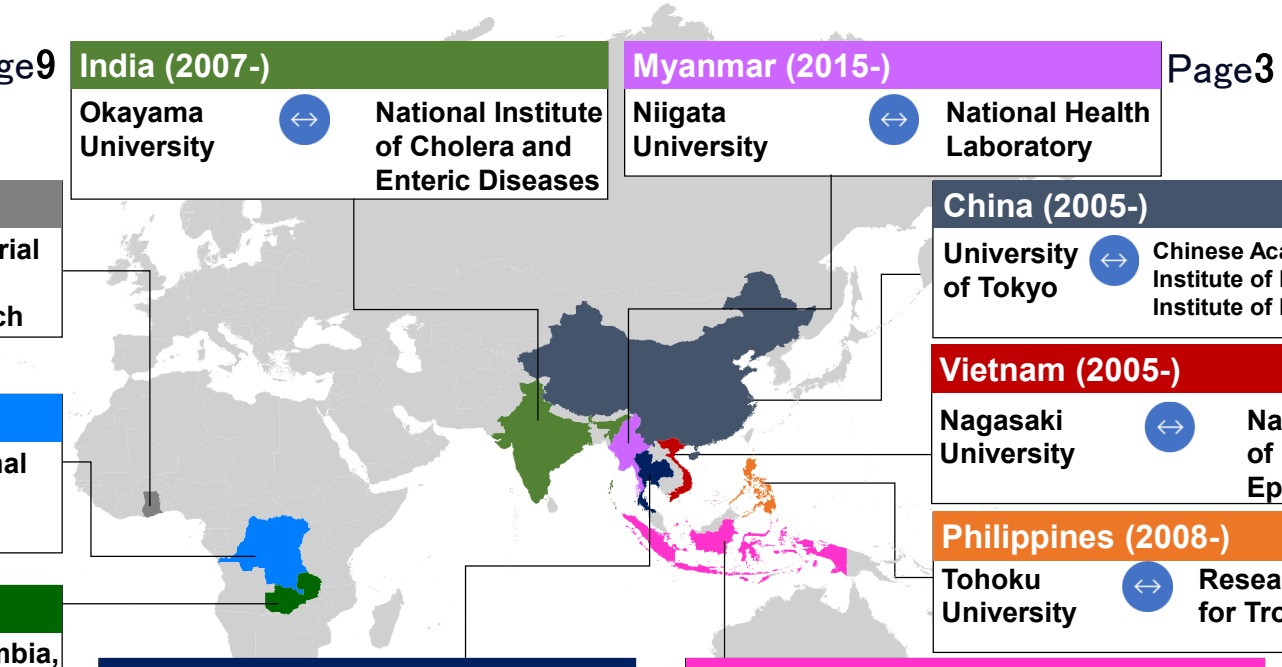
Division of Basic Medical Research
Department of Basic Medical Research

Japan Agency for Medical Research and Development (AMED)

As of August 2023

CONTENTS

Overseas Centers in Japan Program for Infectious Diseases Research and Infrastructure



Hokudai Center for Zoonosis Control in Zambia: HUCZCZ

For the establishment of “preemptive measures against zoonoses”, we attempt to identify natural host animals carrying potential pathogens, to elucidate the transmission routes and factors involved in the spread and pathogenesis of infections in Africa and to develop preventive, diagnostic, and therapeutic methods for zoonoses.

Basic information

★Location of the research center

Principal Investigator/Head
Hokkaido University
Distinguished Professor
Hirofumi Sawa

Counterpart/Oversea Center
School of Veterinary Medicine,
University of Zambia

Targeted infectious diseases

- COVID-19
- Viral Diseases (Arboviral diseases, Viral hemorrhagic fever, Viral respiratory diseases, Viral GI tract diseases, Rabies and so on)
- Bacterial Diseases (Tuberculosis, Drug-resistant Enterobacteriaceae infection, Anthrax, Staphylococcus aureus infection, Relapsing fever, Rickettsiosis, Campylobacterium infection and so on)
- Protozoan diseases (Trypanosomiasis, Cryptosporidiosis, Toxoplasmosis, Leishmaniasis, malaria and so on)

Other collaborating institutions

Collaborating institutions in Zambia
- University Teaching Hospital
- Zambia National Public Health Institute
- Zambian Government Agencies
- JICA Zambia Office
- Embassy of Japan in Zambia

Collaborating institute in Japan
- National Institute of Infectious Diseases
- Doshisha University
- The University of Tokyo

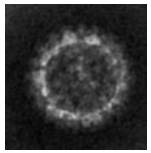
Main research projects and achievements

Comprehensive analysis of zoonotic pathogens in Zambia

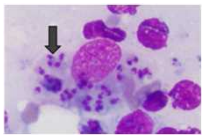
【Background】In today's globalized society, opportunities for human-wildlife contact are increasing, and outbreaks and epidemics of zoonotic diseases are spreading. In order to prevent future outbreaks of possible zoonoses, it is extremely important to conduct “preemptive research" to comprehensively understand the pathogens carried by animals and arthropods.

【Research】Using the HUCZCZ, we attempt to detect pathogens from human, wildlife, livestock and arthropod samples.

【Significance & Prospects】The development of diagnostic, preventive and therapeutic methods for infectious diseases based on pathogen information will promote “preemptive measures against infectious diseases.



Electron micrograph of a rotavirus causing diarrhea isolated from an animal (J Virol 2023)



Leishmania detected in the first case in Zambia (Emerg Infect Dis 2022)

Biologging study of bats in Zambia

【Background】Our research has revealed that bats in Zambia harbor an extremely diverse pathogens. However, information on the behavior of bats is limited worldwide, and the transmission mode of bat-borne diseases is still unknown.
【Research】We will simultaneously analyze the pathogens and their host bats’ behavior to comprehensively clarify the spreading pattern and geological distribution of the pathogens.
【Significance & Prospects】The study will reveal how the pathogens are maintained in the wild and will be transmitted into human society. These findings will contribute to the preemptive countermeasure for bat-borne diseases.

Bat with data logger attached to its back

Visualization of bat flight paths

【Response to COVID-19】

We have introduced real-time PCR and whole genome analysis methods for COVID-19 developed in Japan. In addition, in-house RT-LAMP method was also verified on clinical samples.

Tohoku-RITM Collaborating Research Center on Emerging and Re-emerging Infectious Diseases

In order to establish sustainable infection control programs from the perspective of public health, research in pathogen diagnosis and epidemiological analysis have been conducted jointly with researchers at the Research Institute for Tropical Medicine (RITM) and provincial hospitals in the Philippines as well as research institutes in Japan.

Basic information

Principal Investigator

Dr. Hitoshi Oshitani
Professor
Tohoku University

Head

Dr. Emiko Nakagawa
Assistant Professor
Tohoku University

Counterpart

Research Institute for Tropical Medicine (RITM)

★ Location of the research center

Targeted infectious diseases

- Respiratory infectious diseases
- Gastrointestinal infectious diseases

(Mainly viral diseases in children)

Other collaborating institutions

Medical institutions in the Philippines

- Provincial hospital: 2
- Rural Health Unit: 1

Research institutes in Japan

- National Institute for Infectious Diseases
- Sendai Medical Center
- Yamagata Prefectural Institute of Public Health

Main research projects and achievements

Research on childhood respiratory infectious diseases

【Background】
Respiratory syncytial virus (RSV) is significantly attributed to severe respiratory illness in infants under 6 months of age. Understanding RSV transmission patterns at the community level is important to protect infants from infection.

【Overview】
Conducting a cohort study on respiratory viruses in Biliran Island, Philippines, and elucidating the virus introduction and persistence in the community by molecular epidemiological analysis and mathematical modeling.

【Significance/Prospect】
The research can provide background epidemiological data and insights contributing to the establishment of future measures against viral respiratory diseases, such as vaccine strategies.

Research on infection and transmission of diarrheal virus

【Background】
Asymptomatic and repeated infections of norovirus and sapovirus in children occur frequently at the community level. Many of those viruses are excreted in feces and household transmission could be common in resource-limited settings.

【Overview】
Conducting a cohort study in Tarlac, Philippines, collecting clinical information and samples from mothers and children regularly, including when they are asymptomatic.

【Significance/Prospect】
To clarify the actual state of mother-to-child transmission and the overall picture of enteric viruses, that are spreading within the region.

Contribution to the research for infectious diseases in the Philippines

In January 2020, we provided RITM with reagents and advice on test analysis in the direction to build a testing platform for COVID-19 in the Philippines.
In June 2022, in order to establish rapid diagnosis and testing methods for Mpox in the Philippines, we provided reagents and technical guidance for detection to RITM based on advice from the National Institute of Infectious Diseases.

Infectious Diseases Research Center of Niigata University in Myanmar

The project aims to clarify the actual situation of various virus-origin infectious disease in Myanmar through comparative analysis with neighbouring countries, host-side factors, and pathogen analysis for influenza, respiratory syncytial virus, SARS-CoV-2, norovirus, rotavirus, entero D68 and D71.

Basic information

Principal Investigator

Prof. Reiko Saito,

Niigata University

Director

Prof. Hisami Watanabe,

Niigata University

Counterpart /
Locating Organization

National Health Laboratory (NHL)

★ Location of the research center

Targeted infectious diseases

- Respiratory viral infections (influenza, respiratory syncytial virus, SARS-CoV-2)
- Paediatric meningoencephalitis

Other collaborating institutions

Local research institutions
- University of Medicine 2
- University of Medicine 1
- The University of Medicine, Mandalay

Local medical institutions
- Five national hospitals
- One private hospital

Others
- Embassy of Japan in Myanmar

Main research projects and achievements

Surveillance and vaccine effectiveness of influenza and SARS-CoV-2

[Background] Myanmar has become a research blank spot of infectious diseases in South-East Asia due to political turmoil, Niigata University's activities can accelerate information sharing and monitor the transmission of emerging and re-emerging infectious disease pathogens to Japan.

[Research] Specimens will be collected mainly from hospitals in Yangon, and analyzed to determine the prevalence of influenza and SARS-CoV-2, compare it in detail with Japanese epidemic strains, analyze international transmission routes and the frequency of drug-resistant influenza viruses.

[Significance/prospects] International transmission pathway of respiratory virus infections can be elucidated, and sharing of the Myanmar strains to the National Institute of Infectious Diseases in Japan can make a significant contribution to influenza vaccine selection in Japan.

Estimated pathways of transmission of influenza A/H3N2 in 2021

Meningoencephalitis in children

[Background] Meningoencephalitis in children in Myanmar has an extremely poor prognosis with a fatality rate of 10%, but the causative pathogen has rarely been investigated.

[Research] To investigate the causative agent of meningoencephalitis, viruses and bacteria are identified from samples (spinal fluid, blood, faucal, and nasopharyngeal samples) from patients with meningoencephalitis at the National Children's Hospital in Yangon, and genetic analysis of detected viruses is carried out.

[Significance/prospects] Japanese encephalitis, dengue virus, enterovirus A71 and D68 are thought to be causative viruses of severe meningoencephalitis. By clarifying the clinical picture as well as the genetic analysis of the viruses, it will be possible to compare them with the causative agents of meningoencephalitis in other countries, and to investigate their causes and consider countermeasures.

Online meeting with Yangon Children Hospital

Support to the Myanmar Government

At the request of the Myanmar Government during the 2017 influenza A/H1N1pdm09 epidemic, we supported genetic analysis of patient specimens in collaboration with the National Institute of Infectious Diseases in Japan. In addition, given the shortage of rapid test kits in the area, donations were received from Japanese companies and provided to the area.

Minister of Health attends Project Debriefing January 2020

(Minister of Health on the right, President of Niigata University on the left)

Research Center for Asian Infectious Diseases

We promote basic research that contributes to the prevention, diagnosis, and treatment of infectious diseases caused by SARS-CoV-2, influenza viruses, dengue viruses, HIV and drug-resistant bacteria through collaborations with leading research institutions in China.

Basic information

Director and Professor
Yasushi Kawaguchi
The University of Tokyo

Counterpart/Institution
Institute of Microbiology
Chinese Academy of Sciences

Counterpart/Institution
Harbin Veterinary Research Institute, Chinese Academy of Agricultural Sciences

★ Location of the research center

Targeted infectious diseases

- Influenza
- COVID-19
- Flavivirus infection (Dengue fever etc.)
- AIDS
- Infection with antimicrobial resistance bacteria
- Other infectious diseases

Other collaborating institutions

Local Research Institutes
- Peking University
- Fudan University
- Sun Yat-sen University

Local Medical Institutions
- One hospital

Others
- China CDC
- Embassy

Main research projects and achievements

Basic Research for the Development of Therapeutics for COVID-19

[Background] Since COVID-19 has a complex pathogenesis, the analysis of the infection mechanism is important for the development of therapeutic agents. It is also necessary to consider the attenuation of the efficacy of therapeutic agents due to the emergence of mutant viruses.

[Results] We have established animal experimental systems in hamsters and cats to develop therapeutic agents by analyzing the infection mechanism. In addition, we found that some existing therapeutic agents lost their efficacy against mutant viruses.

[Perspective] The development of effective therapeutics for mutant viruses will also contribute to the treatment of new coronaviruses that may emerge in the future.

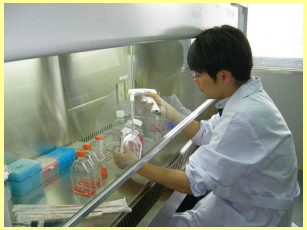
Epidemiological Analysis of Antimicrobial Resistant Bacteria (AMR) in China

[Background] Due to the active economic interactions, there is a possibility that imported cases may trigger the spread of AMR in Japan. In order to predict future outbreaks in Japan, it is necessary to understand the epidemic situation in China.

[Results] We exchanged epidemiological information on AMR in China with the China Antimicrobial Resistance Surveillance System (CARSS). The results showed that the carbapenem resistance rates of *Klebisella pneumoniae* and *Acinetobacter* spp. were much higher in China than in Japan, especially in metropolitan areas.

[Perspective] It is necessary to monitor the outbreak of carbapenem resistant pneumoniae in Japan in the future. The exchange of epidemiological information with China will contribute to the prevention and control of outbreaks of AMR in both countries.

In addition to infectious disease research by our resident researchers at the Beijing Research Site, we train infectious disease researchers and provide a platform for collaborative research with research institutions in China and abroad.



Ghana-TMDU Research Collaboration Center in Noguchi Memorial Institute for Medical Research

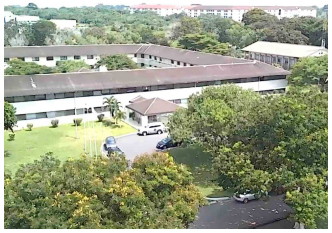
We are conducting research on mosquito-borne infectious diseases such as dengue fever and malaria, diarrhea caused by rotavirus, drug-resistant bacteria, Buruli ulcer, and novel coronavirus infection. Based on the knowledge obtained, we are contributing to infectious disease control in Ghana.

Basic information

Project Leader

Tokyo Medical and Dental University

Prof. Toshihiko Suzuki



Counterpart/Institute

Noguchi Memorial Institute for Medical Research
University of Ghana

★ Location of the research center

Targeted infectious diseases

- Mosquito-borne diseases (dengue fever, malaria, yellow fever)
- Viral diarrhea
- Drug-resistant bacteria
- Buruli ulcer
- COVID-19
- Schistosomiasis

Other collaborating institutions

Local research institutions

- Centre for Plant Medicine Research

Local medical institutions

- Hospitals

Others

- Embassy of Japan in Ghana
- JICA Ghana office

Main research projects and achievements

Study of Buruli ulcer

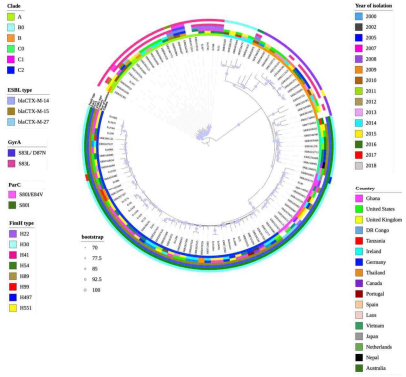
Isolation/identification of the causative bacteria from the water environments of the endemic area and genome analysis are going on.

We conducted year-round surveys and detected the genes of causative bacteria from environmental water samples, and showed the possibility of their continued existence in the environment. These findings provide useful information for public health measures against Buruli ulcer.

Study of drug-resistant bacteria

Investigating drug-resistance in strains isolated from patients and the environment and conducting genomic analysis of drug-resistance.

We isolated and identified the first case of drug-resistant strain (producing carbapenemase) in West Africa. This has provided valuable information for the prevalence and surveillance of drug-resistant bacteria in West Africa.



Thailand-Osaka University Research Center

Our research focuses on diarrheal diseases and mosquito-borne infections, aiming to establish efficient methods for the rapid detection of underlying microorganisms, developing preventive measures, and gaining insights into the epidemiology and genetic variation of epidemic strains.

Basic information

★ Location of the research center

Representative

Osaka University
Prof. Tetsuya Iida

Counterpart/ base

National Institute of Health, Department of Medical Sciences, Ministry of Public Health

Secondary base

Mahidol University

Targeted infectious diseases

- Mosquito-borne viral infections (Dengue fever, Zika fever, Japanese encephalitis, Chikungunya fever)
- COVID-19 infection
- Bacterial diarrhea
- Viral diarrhea
- Drug-resistant bacteria

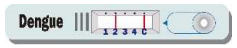
Other collaborating institutions

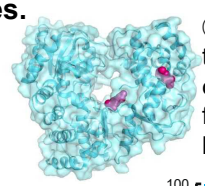
- Department of Disease Control
- Hospitals in Thailand
- Provincial Public Health Offices
- Regional Medical Sciences Centers
- Others

Main research projects and achievements

Development of diagnostic tools and therapeutic drugs for mosquito-borne diseases.

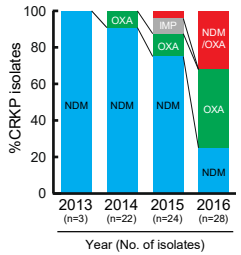
① Rapid kits for determining the serotypes of Dengue and Chikungunya viruses





② Development of a therapeutic drug candidate for dengue fever by a structural biology approach

③ Development of a DNA dipstick tool for detecting carbapenem-resistant *Enterobacteriaceae* (CRE) has supported surveillance and rapid epidemiological studies on multi-drug resistant CRE strains found in Bangkok, Thailand.



Surveillance, genomics, and pathogenicity research on diarrheal bacteria and viruses.

①

Resident cohort briefing

①Cohort study: Monitoring enteric pathogens among a diverse group of individuals.

②

③

②・③Field study: Investigated cholera cases and sources of contamination at cholera outbreak sites in border areas.

Diarrhea outbreak investigation: Identify the cause and source of outbreaks that have occurred in Thailand.

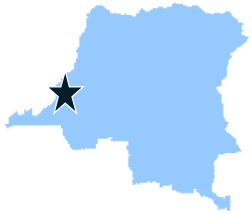
In collaboration with the Department of Disease Control and the Thai NIH, we continuously monitor the occurrences of gastrointestinal illness across the country of Thailand. Our approach involves utilizing advanced genetic detection tools and culture methods to predict the causative pathogens. Recently, we have identified unique strains of *Vibrio* and norovirus. Additionally, we have identified outbreaks caused by rare pathogens.

Osaka Metropolitan University (OMU), Democratic Republic of the Congo

As a center for translational research for the control and suppression of emerging and reemerging infectious diseases, the center conducts international collaborative research on malaria, novel coronavirus infections, Neglected Tropical Diseases (NTDs), and other diseases.

Basic information

★ Location of the research center



Principal Investigator	Manager	Counterpart/ Base Institution
OMU, Professor Yasutoshi KIDO	OMU, Lecturer Natsuko KAKU	Institut National de Recherche Biomédicale (INRB)

Targeted infectious diseases

- Malaria
- Novel Coronavirus Infections (COVID-19)
- AMR
- NTDs
- Cancer-causing pathogens(H. pylori, HBV)
- Mpox

Other collaborating institutions

Local Institutes
- Université de Mbujimayi
- Université de Kinshasa

Local hospitals
- 6 General Hospitals

Others
- JICA
- Ambassade du Japon en République Démocratique du Congo
- USAID

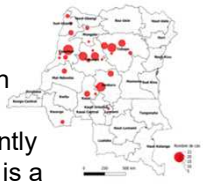
Main research projects and achievements

- Malaria research

The mortality rate of malaria in children under 5 years of age is high, but there are individual differences in the severity of the disease at the time of illness, suggesting the existence of host factors leading to severe malaria.
We conducted a seroepidemiological study focusing on severe malaria and found several biomarkers related to the severity of the disease. If the factors leading to severe disease severity can be clarified, this will lead to the elucidation of the mechanisms involved and the establishment of infection control measures based on the stratification of high-risk populations.

- Mpox research

Since human infection was first confirmed in 1970, endemic transmission has continued in the country. In addition to the decline in population immunity due to a decrease in the number of smallpox vaccinees, there are concerns about further spread of the disease due to a worldwide increase in human-to-human transmission after 2022.
We are conducting domestic surveillance of patients with Mpox and tracking changes in prevalence and mortality over time. The main genotype is Clade I, which has a higher mortality rate than the genotype that is currently widespread. The understanding of its trends is a key to infection control.



- Social Implementation of COVID-19 Research Results

Developed a Point of Care Testing (POCT) COVID-19 serological test that can be performed in limited medical resource settings, and clarified the usefulness of serodiagnosis for those infected with false-negative PCR tests. Immunogenicity evaluations were also conducted in the field where various SARS-CoV-2 vaccines are being administered.
Differences in natural infection/vaccine immune response between Japan and Africa were clarified.

Kobe University Indonesian Research Center

Conducting research on novel pathogen discovery, dengue fever, antimicrobial resistant infections, viral diarrhea and COVID-19 etc., the center also seeks to develop research in collaboration with the National Institute of Infectious Diseases, the Drug Discovery Support Network, and other participating institutions.

Basic information

Representative and director of the center

Kobe University Professor Yasuko Mori

Counterpart

Institute of Tropical Disease Universitas Airlangga

★ **Location of the research center**

Targeted infectious diseases

- Zoonotic viral infections
- Viral diarrhea
- Dengue fever
- Antimicrobial-resistant infections
- Febrile illness of unknown cause (infectious disease)
- COVID-19

Other collaborating institutions

Local Research Institution

- Institute of Tropical Disease, Universitas Airlangga

Local Medical Facilities

- Universitas Airlangga Teaching Hospital
- Dr. Soetomo General Academic Hospital

Main research projects and achievements

Viral Diarrhea Research (Norovirus)

[Background] The role of asymptomatic infected persons as a source of infection is supposed to be important in the norovirus transmission. However, the detailed mechanism is unknown.
[Results] We corrected and analyzed the stool specimens (total number 262) from four members of one family [father (29 yo), mother (29 yo), a daughter (5 yo), and a son (2 yo)]. There were five intrafamilial infections during 1.5 years. In each episode, the 2-year-old son was the first to be infected and was the source of intrafamilial transmission. The genotype of the norovirus was different each time, suggesting that the asymptomatic son was infected with norovirus outside and transmit the virus to his family as a source of infection.
[Significance and Perspectives]
The asymptomatic norovirus carrier spread the infection to the family members and caused diarrhea. It is important to determine the host factors and viral factors that predispose an individual to become a carrier of the norovirus and spread the virus to the family members.

Survey on Drug-Resistant Bacteria in Indonesia Using the One Health Approach

[Background] Antimicrobial-resistant bacteria (AMR) and antibacterial agents circulate in humans, livestock, and the environment, and a comprehensive approach (one health approach) is important.
[Research results] In Indonesia, the consumption of poultry is high and antimicrobial agents are abused, so we conducted a molecular epidemiological survey of AMR in pregnant women, poultry, and rivers. The results showed that about half of the pregnant women who gave birth in a hospital were carriers of ESBL-producing *Enterobacteriaceae*. Poultry were also found to have decreased susceptibility to routinely used antimicrobial agents. In addition, various drug resistance genes, including carbapenem resistance genes, were detected in rivers near the hospital.
[Significance/Prospects] From 2023, we are participating in the " Tricycle Project: Human, livestock, and environment " supervised by WHO, to deepen the molecular epidemiological surveys using the One Health Approach. The findings obtaining in this project will be useful in preventing the spread of AMR after COVID-19.

Infectious disease control in Indonesia

The Institute of Tropical Diseases at Airlangga University has set up an RT-PCR testing system for SARS-CoV-2 and has been testing samples from East Java since February 2020. The laboratory was responsible for most of the testing until mid-May 2020, and has shared approximately 20% of the testing since then for a population of approximately 40 million in East Java Province. The total number of tests from March 2020 to March 2021 was about 40,000, with about 20,000 positive cases, for an overall positivity rate of 50%. Viral genome analysis was performed from the positive cases, and a phylogenetic tree was created and disseminated.

Collaborative Research Center of Okayama University for Infectious Diseases in India

Studies on the clarification of infectious routes of diarrheal diseases, the prevention and control of diarrhea caused by microorganisms, and the environmental factors that affect the occurrence, survival and spread of *Vibrio cholerae,* the causative agent of cholera

Basic information

Principal investigator
Okayama University
Professor
Shin-ichi Miyoshi

Field manager
Okayama University
Associate Professor
Kei Kitahara

★ Location of the research center

Counterpart

National Institute of Cholera and Enteric Disease (NICED)

Targeted infectious diseases

- Bacterial diarrhea
- Cholera and vibrio infections
- Pathogenic *E. coli* infection
- Viral diarrhea
- Rotavirus infection
- Drug-resistant bacterial infections
- *Salmonella* infection (Typhoid)

Other collaborating institutions

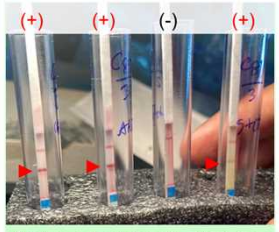
Research institutions (India)
- NICED
- Brainware University

Medical institutions (India)
- West Bengal State ID Hospital
- Dr. B. C. Roy Hospital

Other
- Indian Council of Medical Research (ICMR)

Main research projects and achievements

Transmission routes of diarrheal diseases and the roles of asymptomatic carriers



Antigen test for *V. cholerae.*

The infectious diarrhea is common in India. The metagenomic analysis of the stool samples from healthy individuals has suggested that the presence of asymptomatic carriers. At the present, we are conducting the metagenomic analysis using fecal samples from patients and their families, and isolation of pathogenic microorganisms such as *Vibrio cholerae from* the samples.
It is expected that the study will provide useful information for development of new strategy to control infectious diarrhea.

Resuscitation to the vegetative cells of *Vibrio cholerae* in the viable but non-culture state


Pumped domestic use water

Previous studies revealed that the cells of *V. cholerae* in the viable but non-culture state were recovered to the vegetative cells by treatment with proteases. At the present, we are studying the impact of proteases on the detection of vegetative *V. cholerae* cells from sewage and domestic use water surrounding the patients.
In the future, we will examine whether *V. cholerae* is also recovered after being exposed to proteases in the intestine to clarify the mechanism to be asymptomatic carriers.

Training of young researchers at the center

On November 14-15, 2022, at NICED, we carried out the training on the next-generation sequencing data analysis for microbial genome. From NICED, four young researchers/postdocs and six graduate students participated.

Nagasaki University Vietnam Research Station

Nagasaki University Vietnam Research Station conducts research that contributes to effective control of infectious diseases, mainly on Dengue fever, Diarrheal infections, Influenza, Drug-resistant bacteria, Pediatric severe respiratory infections, Zoonotic diseases (bat-derived infections), and COVID-19, in collaboration with the National Center for Global Health and Medicine.

Basic information

★ Location of the research center

Principal Investigator

Nagasaki University
Professor
KANEKO Osamu

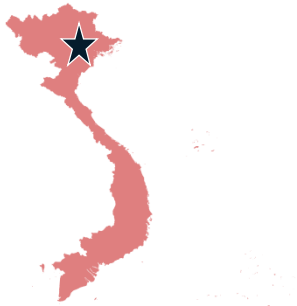
Center Representative

Nagasaki University
Professor
HASEBE Futoshi

Vietnamese Counterparts

National Institute of Hygiene and Epidemiology(NIHE)

Bach Mai Hospital



Targeted infectious diseases

- Mosquito-borne infectious diseases
- Vector mosquito Research
- Respiratory infection
- Diarrheal infections
- Zoonotic diseases
- Drug-resistant bacteria
- AIDS
- Tuberculosis
- COVID-19

Other collaborating institutions

Local Research Institutes

- Institut Pasteur in Ho Chi Minh City
- Institut Pasteur in Nha Trang
- Tay Nguyen Institute of Hygiene and Epidemiology（TIHE）

Local medical institutions

- 5 Hospital

Others

- Khanh Hoa Health Service Department, Nha Trang

Main research projects and achievements

Pediatric Respiratory Infections Study with the Nha Trang Resident Cohort

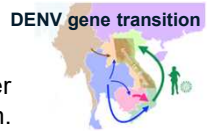
【background】
Pediatric acute respiratory infection (ARI), pneumonia is one of the leading causes of death in children under 5 years of age.

【Research Content】
A cohort study[1] of 350,000 residents in 76,000 households, including approximately 25,000 children under 5 years of age, determined pneumonia hospitalization rates and severity factors for RS virus, influenza, and human metapneumovirus, SARS CoV2 as causes of pediatric ARI.

【Significance and Prospects】
We will identify pathogenic genotypes associated with severity of disease by analyzing the whole genome of the above viruses.

1. Studies that track changes in the health status of a specific group (=cohort) to examine the association between disease factors and disease onset.

Research on the prevalence of mosquito-borne infectious diseases



【background】
Mosquito-borne infectious diseases such as dengue fever and Zika fever are serious infectious diseases in Vietnam. In Japan, dengue fever is reported every year as an imported infectious disease. In 2014, there were 162 cases of domestic dengue infectionin Tokyo, and there are concerns that the epidemic will continue to occur in Japan.

【Research Content】
In cooperation with a local research institute, patient samples were collected over a long period of time and analyzed in detail, including viral genes. The origin of the current dominant viral strains in Hanoi, Northern Vietnam, was clarified.

【Significance and Prospects】
We will analyze patient samples from the south, and clarify the epidemic situation throughout Vietnam and find out the factors affecting the spread of infection.

Development of rapid antibody diagnostic kit for COVID-19

As a response to new coronavirus infection, we jointly developed with NIHE a new antibody diagnostic system using N-protein as antigen. As a social implementation, this diagnostic kit has contributed to the establishment of a domestic testing system and the prevention of the spread of infection in Vietnam, and we were awarded the 2021 Minister of Foreign Affairs Award for these achievements.