Japan Agency for Medical Research and Development (AMED)

AMED R&D related to combating the novel coronavirus

August 11, 2020

Japan Agency for Medical Research and Development

Outline of the Japan Agency for Medical Research and Development (AMED)

1. Objectives

Based on the Plan for Promotion of Medical Research and Development created by the government's Headquarters for Healthcare Policy, AMED engages in research and development in the field of medicine, establishing and maintaining an environment for this R&D, and providing funding, in order to promote integrated medical R&D from basic research to practical applications, to smoothly achieve application of outcomes, and to achieve comprehensive and effective establishment / maintenance of an environment for medical R&D.

2. Established: April 1, 2015

President Mishima (since April 2020)

3. Organization

(1) Directors

- President: Yoshinao Mishima
- Executive Director: Katsufumi Jo
- Auditor (part-time): Shingo Majima, Kimiko Murofushi

(2) Number of staff (as of April 1, 2020)

Number of full-time staff :387

4. Budget (FY 2020)

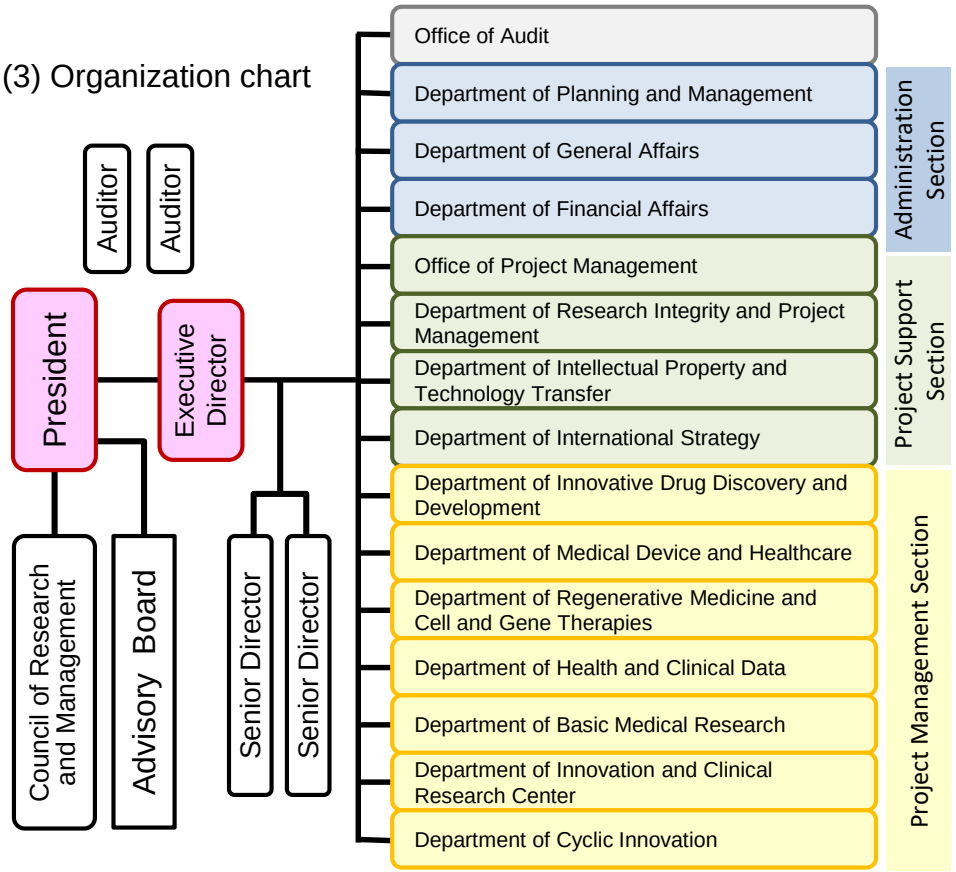
Subsidies for AMED: 127.2 billion yen
Adjustment fund:17.5 billion yen*

*Part of SIT promotion funds are allocated.

5. Address

20-24F Yomiuri Shimbun Bldg. 1-7-1 Otemachi, Chiyoda-ku, Tokyo

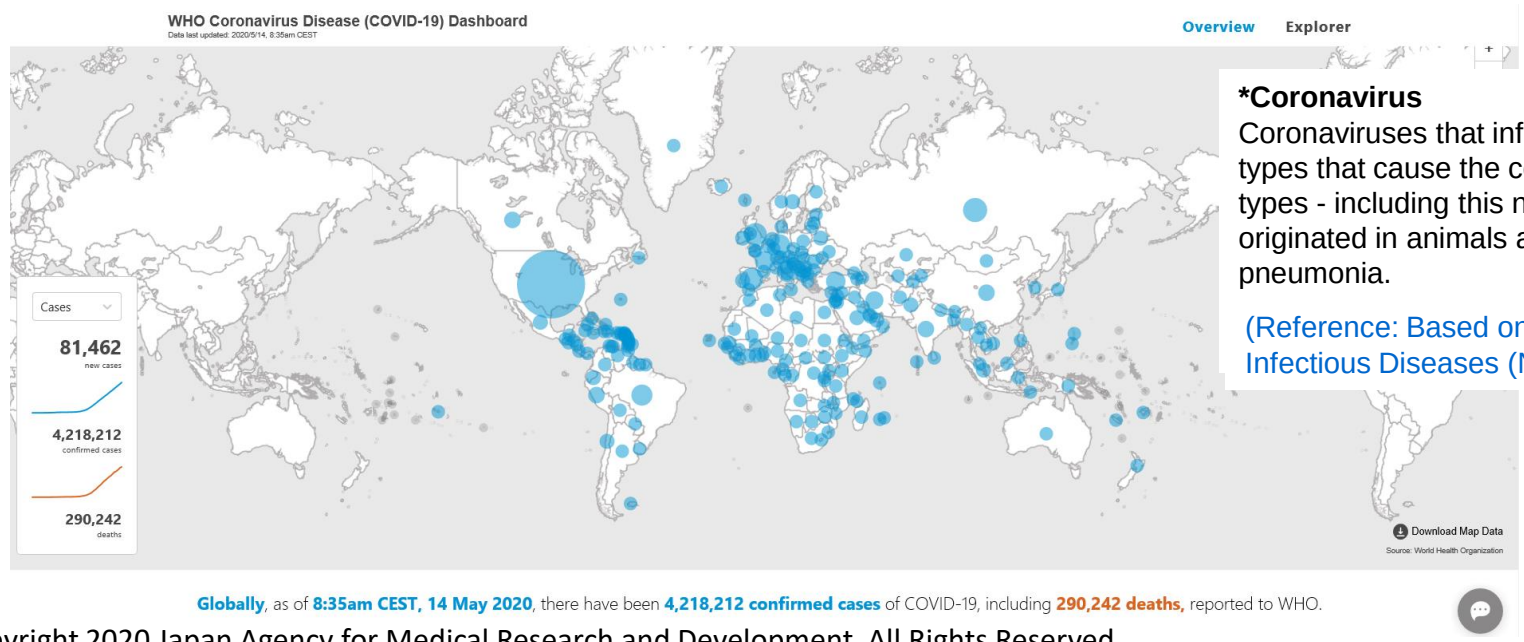
(3) Organization chart



Domestic and international trends regarding the novel coronavirus (COVID-19) 1/3

●Global background:

- Over the past 20 years, there have been three outbreaks involving coronaviruses*.
- The first was caused by the **severe acute respiratory syndrome coronavirus (SARS-CoV)** in 2002, which infected more than 8,000 people and caused more than 800 deaths.
  (Reference: Graham and Baric, 2010)
- The second was caused by the **Middle East respiratory syndrome coronavirus (MERS-CoV)** in 2012, which had a low infection rate but a high mortality rate, with 2,429 infections and a mortality rate of 34.4% as of 2019.
  (Reference: WHO website: https://www.who.int/emergencies/mers-cov/en/)
- The third outbreak has been caused by **SARS-CoV-2**, which is deemed to have emerged in Wuhan, China in December 2019 and is the cause of the COVID-19 severe respiratory illness.
  (Reference: Gorbalenya et al., 2020)
- The World Health Organization (WHO) announced on March 31, 2020 that COVID-19 “can be characterized as a pandemic”.
- As of May 14, 2020, 4.21 million people have been infected worldwide, and more than 290,000 have died.
  (Reference: WHO website: https://covid19.who.int/)



***Coronavirus**
Coronaviruses that infect humans include four types that cause the common cold, and three types - including this novel coronavirus - that originated in animals and cause severe pneumonia.

(Reference: Based on the National Institute of Infectious Diseases (NIID) website)

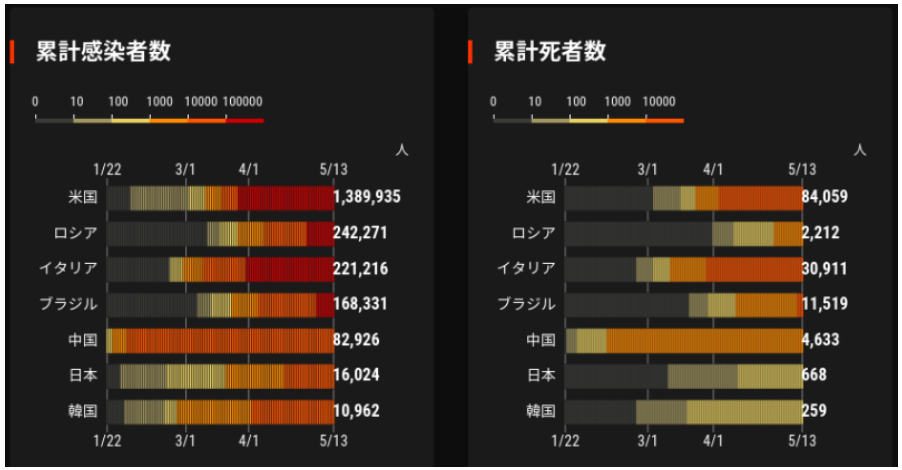
Domestic and international trends regarding the novel coronavirus (COVID-19) 2/3

●Main events in Japan:

○ Jan 15	Returnees from Wuhan, China tested positive
○ Jan 21	A ministerial task force for novel coronavirus measures was established
○ Jan 28	Person-to-person infection was reported in Nara Prefecture
○ Jan 29 - Feb 17	Japanese nationals were repatriated from Wuhan by government charter flights
○ Jan 30	The first meeting of the Novel Coronavirus Response Headquarters was held
○ Mar 13	Amendment of the Act on Special Measures for Pandemic Influenza and New Infectious Disease Preparedness and Response
○ April 7	Declaration of a state of emergency in 7 prefectures, April 16: Expanded to all prefectures
○ May 4	The state of emergency was extended until May 31 (including 13 prefectures subject to special precautions)
○ May 14	The state of emergency was rescinded for 39 prefectures excluding Hokkaido, Saitama, Chiba, Tokyo, Kanagawa, Kyoto, Osaka, and Hyogo

As of May 14, there were a total of 16,079 infected people and 687 deaths in Japan

(Reference: WHO website: https://covid19.who.int/)



(Reference: Global coronavirus infections according to a Nihon Keizai Shimbun chart)

Domestic and international trends regarding the novel coronavirus (COVID-19) 3/3

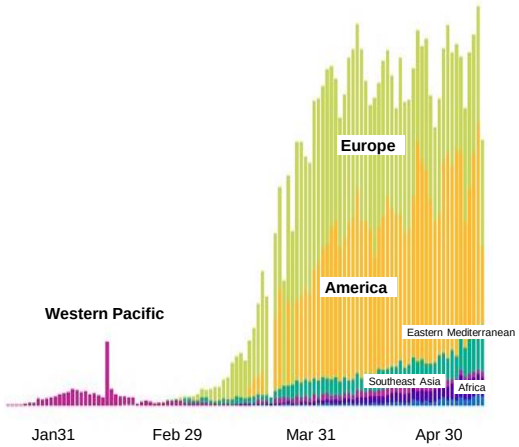
●Trends in the numbers of people infected worldwide:

- ○ Since March 2020, numbers of infected people have **increased sharply in Europe and the U.S.**
- ○ According to the genomic epidemiology of the novel coronavirus, **the virus that has been circulating domestically and internationally since March is the same as that which spread across Europe.**

●Infections in Japan:

- ○ Patients are hospitalized for two to three weeks on average. Although more than half the patients in Japan have been discharged, **there are still many critically ill patients who need ventilators and ECMO.**

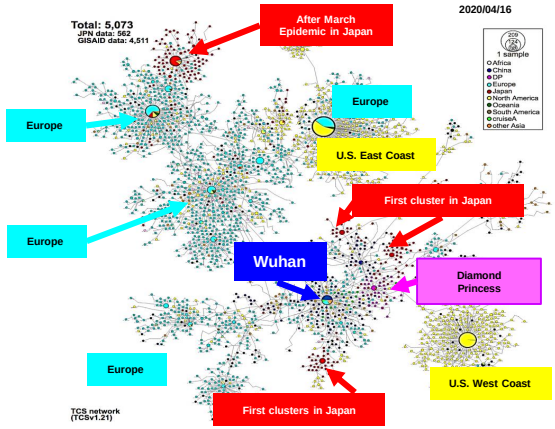
Trend in the number of people infected worldwide (WHO data)
(Regional names are WHO classifications)



(Source: WHO website: https://covid19.who.int/)

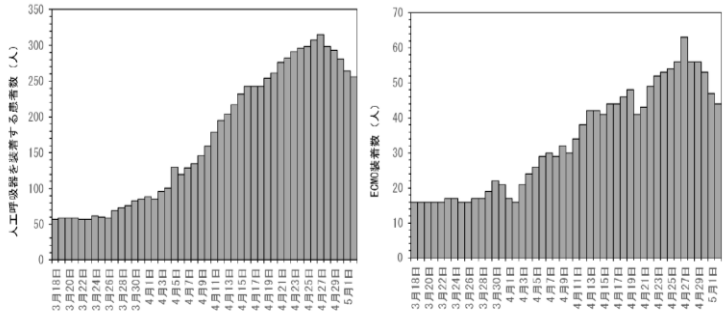
Genomic molecular epidemiology of the coronavirus

The Japanese epidemic, which has been increasing since March, was exacerbated by returnees from Europe



(Source: NIID material)

Trend in the number of confirmed patients requiring a ventilator nationwide (left) Trend in the number of patients on ECMO nationwide (right)



※ 日本集中治療医学会の日本 COVID-19 対策 ECMOnet による集計

(Source: MHLW materials)

AMED's activities related to COVID-19 1/2

●AMED's initiatives in medical R&D

- ○ On January 31, 2020, AMED signed a joint statement committing to rapidly and widely share research results and data related to the novel coronavirus. The joint statement signatories, including research supporting institutions such as AMED and the NIH, are implementing their own sharing policies while also calling for researchers to share their data.
- ○ AMED participated in a teleconference hosted by the U.S. and a G7 scientific leaders' meeting on the novel coronavirus.
- ○ AMED regularly obtains the latest information on COVID-19 research and understanding on the ground from its Washington DC and London Offices, and shares that information in a timely manner with the Headquarters for Healthcare Policy, MEXT, MHLW, METI, the Ministry of Internal Affairs and Communications, and the Japan Patent Office.
- ○ AMED started support for the development of existing and new drugs, as well as a vaccine for the novel coronavirus (detailed on the next page).

The key points of the joint statement promising to rapidly and widely share research findings and data on the novel coronavirus

We call on researchers to rapidly and widely share their research outcomes and data relating to COVID-19, and to ensure the following:

- Research findings relevant to the outbreak are made immediately and freely accessible in academic publications
- Research findings are made available via preprint servers before journal publication, or via platforms that make papers openly accessible before peer review, with clear statements regarding the availability of underlying data
- Researchers share interim and final research data relating to the outbreak, together with protocols and standards used to collect the data, as rapidly and widely as possible - including with public health and research communities and the WHO
- It is made clear to authors that data or preprints shared ahead of submission will not pre-empt its publication in these journals

Framework for international collaboration to combat the novel coronavirus

Regular US-hosted teleconference on the novel coronavirus

Main participants

Science and technology advisors from about 20 countries including Japan, US, UK, France, and Korea

From Japan, CSTI Executive Member Ueyama attended (AMED also participated).

Outline

Held about once a week since the beginning of March, at the invitation of Dr. Droegemeier, Director of the White House Office of Science and Technology Policy. Participants jointly issued a letter to academic publishers urging them to promptly publish articles and data in WHO databases, etc., and exchange opinions on testing methods and the development status of therapeutic drugs.

○ **G7 Science Leaders Meeting (April 30, 2020)**

Main participants

Japan: Naokazu Takemoto (Minister of State for Science and Technology Policy)
Takahiro Ueyama (CSTI Executive Member), Yoshinao Mishima (AMED President)

U.S.: Kelvin Droegemeier (Director, White House Office of Science and Technology Policy)

EU: Mariya Gabriel (Commissioner-designate for Innovation and Youth)

Outline

Participants exchanged opinions on science and technology relating to COVID-19 and confirmed the importance of international collaboration.

AMED's activities related to COVID-19 2/2

●Collaboration with related organizations

○ Research support organizations and publishers of academic journals around the world jointly singed a statement committing that research data and findings will be shared, and that efforts will be made to ensure that this will not disadvantage researchers' publication records (February 3, 2020)
https://www.amed.go.jp/news/topics/20200203.html

○ It was confirmed that the following three initiatives to combat COVID-19 will be undertaken on a Japan-wide basis through mutual cooperation and by strengthening collaboration among industry, academia and government, including the Japan Pharmaceutical Manufacturers Association and Japanese pharmaceutical companies. (March 27, 2020)

(1) Provision of low molecular weight compounds (drug repositioning)
(2) Vaccine development using a BSL-3 facilities
(3) Research and development of neutralizing antibody drugs
https://www.amed.go.jp/news/other/20200327.html

○ A web page on AMED support for R&D on the novel coronavirus disease (summary) will be created, where information on calls for research proposals and research findings can be accessed easily, and all information will be updated as necessary. (March 17, 2020)
https://www.amed.go.jp/news/other/covid-19.html

AMED R&D related to control for the novel coronavirus 1/3

●AMED expenses of 109.3 billion yen out of total government support of 144.4 billion yen

*Figures are rounded up, so totals may therefore differ

○ **1st round (February 13, 2020) Total of 460 million yen (FY2019 budget surplus)** <government as a whole: 2.03 billion yen>

The government has put together a list of measures that should be taken immediately, with the highest priority being to protect the lives and health of the people. AMED aims to develop simple diagnostic kits similar to an influenza test, antiviral drugs, recombinant protein vaccines, etc., and to assist structure-based discovery of efficacious repurposed drugs.

R&D details

(1) Development of diagnostic methods and equipment (basic research and development of a rapid diagnostic kit, development of serum antibody detection kits and systems)

(2) Development of therapeutic methods (selection of therapeutic drug candidates using in silico analysis, development of antiviral drugs)

(3) Vaccine development (development of recombinant protein and mRNA vaccines)

○ **2nd round (March 10, 2020) Total of 2.81 billion yen (FY2019 adjustment fund, reserve fund)**

<government as a whole: 3.11 billion yen>

In addition to accelerating the research and development started in the 1st round, we aim to carry out clinical research to utilize an existing drug, Favipiravir (Avigan) for COVID-19, to speed up development of rapid testing equipment, and to establish an R&D platform that can immediately respond to emerging epidemics.

R&D details

(1) Development of infrastructure that supports research (development of analysis infrastructure for pathogens and infectious clinical specimens, and enhancement of drug discovery infrastructure in the field of infectious diseases)

(2) Clarification of molecular epidemiology and pathology (genomic analysis of infectious diseases, immune repertoire analysis, and integrated data sharing)

(3) Development of methods of treatment (Favipiravir clinical research)

(4) Development of diagnostic methods and testing equipments (development of rapid diagnostic equipment)

(5) Development of infrastructure to support research (development of new technology infrastructure related to R&D for emerging infectious diseases)

AMED R&D related to control for the novel coronavirus 2/3

○ **3rd round (March 17, 2020) Total of 3.25 billion yen (FY2020 reserve fund)** <government as a whole: 3.25 billion yen>
Given that the development of therapeutic drugs, vaccines, medical devices, etc. is an urgent need, we aim to further accelerate and expand R&D concerning COVID-19 through top-down funding.

R&D details

(1) Development of methods of treatment (additional sites for Avigan clinical research, observational studies of Alvesco and Avigan, etc.)
(2) Development of infrastructure to support research (installation of cryo-EM at BSL-3)
(3) Development of treatment methods (development of new drugs for COVID-19)
(4) Clarification of molecular epidemiology and pathology (collection and analysis of samples - blood samples, etc. from Japan and overseas)

○ **4th round (April 30, 2020) Total of 46.9 billion yen (FY2020 supplementary budget)**
<government as a whole: 75.1 billion yen>
In order to overcome COVID-19 and put the hard-hit Japanese economy back on a growth trajectory, we aim to add measures to accelerate the development of devices and systems in addition to the development of therapeutic methods and vaccines for COVID-19.

R&D details

(1) Vaccine (support for preparation of vaccine candidates, animal studies, development of related technologies such as adjuvants, non-clinical trials and clinical trials, and development of supply technologies)
(2) Development of diagnostic methods and testing equipment (development of medical equipment in response to various needs at each stage of diagnosis, provision of medical services, treatment, etc.)
(3) Development of infrastructure that supports research (strengthening compound library and compound screening functions, building clinical study and clinical trial networks in Asia, etc.)
(4) Creation of pharmaceuticals, medical equipment, etc. using government funding

○ **5th round (March 17, 2020) Total of 55.9 billion yen (FY2020 second supplementary budget)**
<government as a whole: 60.9 billion yen>
While the end of this once-in-100-year crisis is not yet in sight, we aim to accelerate the development of treatment methods and vaccines for infectious diseases in order to prevent the spread of infection, and at the same time to fully restore socio-economic activities.

AMED R&D related to control for the novel coronavirus 3/3

●Contents

1. Molecular epidemiology and pathology

- Supporting research to track viral propagation pathways, infection mechanisms, and aggravation mechanisms.
- As there are two strains circulating – one from Wuhan and one from Europe – strain identification will aid analysis of transmission pathways and prevalence, and possibly also vaccine development.

2. Development of diagnostic methods and testing equipment

- Supporting the development and commercialization of inspection technology and equipment with high accuracy, high sensitivity, and high processing capacity for early detection of COVID-19.
- Validation of a PCR detection device able to rapidly detect viruses. Commercialization and insurance coverage from March.
- Development of a testing kit to detect antigens quickly and easily. Manufacturing and marketing approval in May.
- Development of a rapid diagnostic method enabling visual diagnosis, without the need for detection equipment, from samples (such as saliva) within 25 minutes.

3. Development of treatment methods

- Supporting repositioning of existing drugs or development of new drugs for treating patients. Also, supporting development of medical devices to relieve symptoms.
- Through in silico screening (using computer/numerical analysis to identify candidate compounds), identification of 118 hit compounds from about 8,000 compounds in existing drug databases.
- Discovery that an existing drug (Nafamostat) blocks viral entry in the early stages of infection.
- Support for clinical research on existing drugs (Avigan, Alvesco). Support for research and development to improve the performance and safety of ventilators and cardiopulmonary bypass (ECMO).

4. Vaccine development

- Supporting the development of vaccine candidates and technological development for stable domestic supply to prevent the future spread of infection.

5. Infrastructure to support coronavirus research

- Supporting basic research, development of equipment, production of model animals, and establishment of evaluation systems to support the clarification of pathology, treatment, and development of vaccines.

6. International cooperation, industrial support, etc.

- Promoting R&D to develop innovative medicines and medical devices, including measures against the novel coronavirus, through collaboration among industry, academia and government.

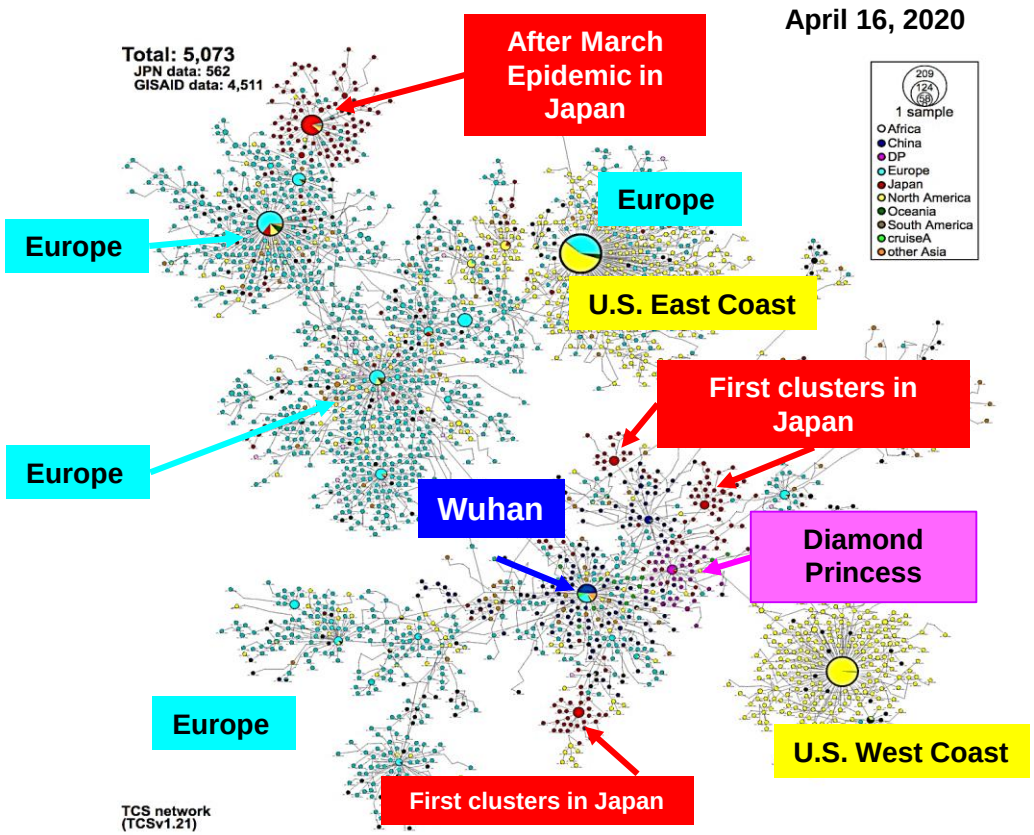
1. Molecular epidemiology and pathology

○ In this field, it is possible to accelerate R&D with real-time genomic analysis by establishing a worldwide virus genome data sharing framework (GISAID) (*1).

○ Viruses are constantly mutating while growing in human and other cells, and tracking their types may aid analysis of their infection pathways and transmission, and the development of vaccines (*2).

○ How did the virus spread, how did it mutate, and how did the infection spread? To answer these questions, it is necessary to **clarify the molecular epidemiology and pathology** of the virus by collecting and analyzing samples (such as blood samples) from Japan and overseas.

●Genomic epidemiology of the novel coronavirus



(*1) Global Initiative on Sharing All Influenza Data
(*2) Reference: Phylogenetic network analysis of SARS-CoV-2 genomes PNAS first published April 8, 2020

A comparison of the genomes of SARS-CoV-2 isolates in Japan (562) with all GISAID-available genomes (4,511):

1. From the Diamond Princess cruise ship
   (1) Virus from Wuhan
   (2) No epidemic in Japan

2. First clusters in Japan (Hokkaido, etc.)
   (1) Virus from Wuhan
   (2) Measures against clusters: Effective

3. Increasing spread in Japan since March
   (1) From people returning from Europe
   (2) Clusters in various regions

Pathogen Genomics Center, National Institute of Infectious Diseases
JP19fk0108104, JP20fk0108103
https://gph.niid.go.jp/covid19/haplotype_networks

2. Development of diagnostic methods and testing equipment

○ In the early stages of the spread of infection**, a PCR test kit was developed that can detect the novel coronavirus in about 15 minutes excluding pretreatment time**, and some testing is covered by insurance.
○ The Japanese Association for Infectious Diseases conducted a preliminary study to evaluate the performance of four types of test kits that are commercially available overseas, concluding that they do not recommended using them for novel coronavirus testing, and that although they may be used for epidemiological studies, further detailed examination is necessary*.
○ Rapid implementation of research and development contributing to infectious disease countermeasures, and development of technologies for conducting rapid, large-scale studies.

*Reference: Preliminary study on the performance of four test kits based on the detection of novel coronavirus antibodies (April 23, 2020, Japanese Association for Infectious Diseases)

●Progress and achievements

- Kyorin Pharmaceutical demonstrated the performance of GeneSoC, a PCR tester that rapidly detects viruses, commercialized it, and obtained insurance coverage (approved March 18) (2nd round: Reserve fund).

- Fujirebio has developed a test kit that detects antigens quickly and easily, and it was approved for manufacture and sale on May 13. (1st round: Budget surplus)

- Yokohama City University developed a serum antibody diagnostic technology and high-throughput and automation technologies in collaboration with Tosoh (1st round: Budget surplus, 4th round: 2020 supplementary budget).

- Call for proposals for the development of equipment relevant to control of infectious diseases, using 2020 supplementary budget.
(See the note on page 12)

High-speed PCR tester (Kyorin)

Novel coronavirus antibody detection kit (Yokohama City University)

3-1. Development of treatment methods (therapeutic drugs)

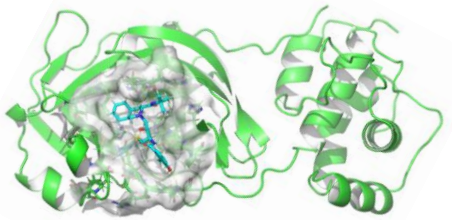
○ Since it takes time to develop a new drug or vaccine, it is a top priority to find existing drugs that are effective against the novel coronavirus, with proven basic safety profiles.
○ In order to **expand the application of existing approved drugs to the novel coronavirus** (drug repositioning), **we conducted in silico screening of existing drugs** and linked the results to an evaluation system using actual viruses.
○ In addition, since February this year, **wet lab research** was carried out at the National Institute of Infectious Diseases with the support of AMED.
○ Support for **clinical studies on existing drugs** (Avigan, Alvesco).
○ In the future, **support for the development of new therapeutic drugs** with the practical application of new antiviral drugs in mind (currently applications are being reviewed).

●Progress and achievements

1. In silico screening* (AMED/BINDS project, from February this year)
   → **118** hit compounds identified from approximately **8,000** compounds in the existing drug database

*Narrowing down candidate compounds by computational analysis

2. Screening in a wet lab (from February this year, 1st round: Use of the FY2019 budget surplus)
   → (Result) A synergistic antiviral activity was found with a combination of Nelfinavir and Cepharanthine.



Main protease composite structure of Nelfinavir and the novel coronavirus:The findings of BINDS

3. Clinical research on existing drugs (Avigan and Alvesco) (from March this year, 2nd round: 2019 top-down reserve fund)
   → Avigan specific clinical study_Target number of cases 106, Avigan and Alvesco observational study

4. Call for drug discovery research proposals (scheduled to start on June 15) (3rd round, 2020 top-down reserve fund)
   → Accelerate commercialization by setting new projects including industry-sponsored projects

(Reference) Status of overseas clinical trials:
A new antiviral drug, Remdesivir, and existing approved drugs, Kaletra, camostat, etc. are being tested.

3-2. Development of treatment methods (devices)

○ Due to the worldwide spread of COVID-19, it is challenging to secure enough ventilators for the treatment of pneumonia. There may be a shortage of ventilators in Japan*.
○ Undertake R&D **to improve performance and safety, and to ensure the availability of ventilators and extracorporeal membrane oxygenation (ECMO)** machines for critically ill patients.

*Estimate based on: a survey of the number of ventilators by the Japanese Society of Respiratory Care Medicine and the Japan Association for Clinical Engineers, announced on March 6, 2020; the estimate released by the MHLW on March 6 for the peak number of outpatients; and population statistics by prefecture from the Ministry of Internal Affairs and Communications.

●Progress and achievements

- Nipro and others have developed and commercialized the world's smallest and lightest high-performance next-generation cardiopulmonary assist system (ECMO).

- ECMO can only be used for about 6 hours continuously, so the National Cerebral and Cardiovascular Center, MERA and others will develop technology to extend the possible duration of its continuous use (4th round: 2020 supplementary budget).

Portable ECMO drive (Nipro)

Note: Call for resarch proposals as part of the Program " Develop Countermeasure Technologies against Viral and Other Infections" using the FY2020 supplementary budget. There was a total of 113 applications, including proposals focusing on treatments, tests, protection of medical staff, prevention of infection in hospitals, remote monitoring technology, IT, and application development. Research is expected to start in June.

4. Vaccine development

○ Vaccines with various molecular mechanisms are being developed internationally (according to the World Health Organization (WHO), there are 110 novel coronavirus vaccine candidates in development around the world*).
○ Domestic production is necessary to ensure a stable supply of vaccines for the Japanese population.
○ AMED has been supporting research on the development of various vaccines since February 2020.

*Source: DRAFT landscape of COVID-19 candidate vaccines –11 May 2020 (WHO)

●Progress and achievements

Research Program on Emerging and Re-emerging Infectious Diseases (460 million yen)

*1st round:FY2019 budget surplus (implemented since February 2020)

- Professor Hasegawa, National Institute of Infectious Diseases: Study on development of vaccines using recombinant protein as antigen
- Professor Kawaoka, Institute of Medical Science, The University of Tokyo: Research on the development of vaccines and related technical foundations that apply mRNA technology

Currently, animal models are being developed

Program on Development of Vaccines for COVID-19 (10 billion)

*4th round: 2020 supplementary budget.

○ Industry-sponsored projects and university-initiated projects will be supported with the goal of rapid development and practical application.
○ Support for a wide range of development stages: basic research, non-clinical trials, etc., as well as technical assistance for the supply of vaccines.
→ The call for proposals closed at the end of April, and applications are currently under review.
→ **Start of funding in late May (planned)**

● Reference

Overseas vaccine development (prominent examples)

Company (country)	Status of development	Type of vaccine
Moderna (US)	Phase I clinical trial	mRNA vaccine
Inovio Pharmaceuticals (US)	Phase I clinical trial	DNA vaccine
BioNTech/Pfizer (Germany/US)	Phase I clinical trial	mRNA vaccine
GeoVax (US)	Non-clinical testing	Recombinant vaccinia vaccine

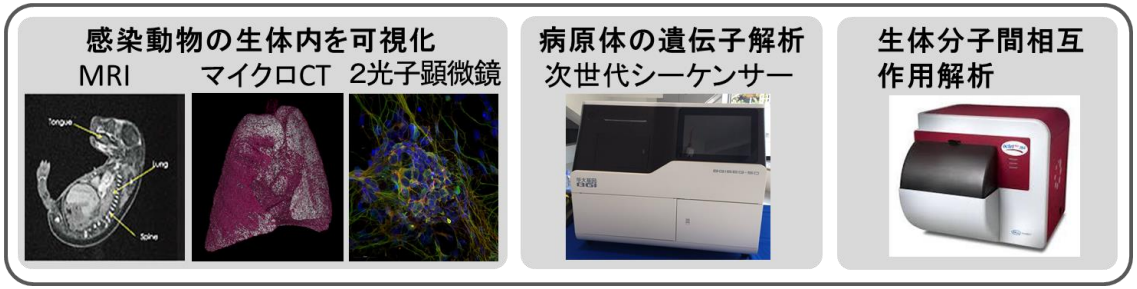
5. Infrastructure development to support coronavirus research

○ Accelerate COVID-19 R&D and establish **an R&D platform that can respond immediately** to new infectious disease epidemics.
○ Furthermore, in order to **accelerate the search for target molecules that may contribute to the treatment of infectious diseases and the subsequent R&D of therapeutic drugs**, provide a cryogenic electron microscope in one of the world's few BSL-3 facilities (rarely seen around the world).

●Establishment of specific research platform (examples)

1. A vaccine and treatment development platform, relevant to infectious diseases and directly linked to clinical practice (2nd round: FY2019 reserve fund)

→ Within-BSL-3 facilities and their associated facilities, establish a platform directly connecting to the clinical frontline in order to analyze and characterize emerging infectious diseases, establish diagnostic methods, develop vaccines, and develop therapeutic methods.



Cryogenic electron microscope

2. Cryogenic electron microscope facilities to support pathogen analysis
   - Institute for Frontier Life and Medical Sciences, Kyoto University (BSL-2 facility, 2nd round: FY2019 reserve fund)
   - Hokkaido University Research Center for Zoonosis Control (BSL-3 facility, 3rd round: FY 2020 reserve fund)

→ Install a 300 keV high-end cryogenic electron microscope at the BSL-3 facility at Hokkaido University, and enhance and expand the search for target molecules in discovery of anti-infective drugs by enabling more detailed structural analysis of viral proteins.

3. A non-human primate experimental infection platform (2nd round: FY2019 reserve fund)

→ Establish an experimental infection platform using non-human primates for analysis of COVID-19 pathogenicity and understanging its behaviour in other contexts. (National Institutes of Biomedical Innovation, Health and Nutrition, Research Institute for Microbial Diseases, Osaka University (BSL-3 facility))

6. International cooperation, industrial support, etc.

○ **Promotion of rapid research outcomes**, **using patient samples and clinical information obtained at overseas research centers in Asia and Africa**, that will **contribute towards new preventive, diagnostic and therapeutic advances, and towards countermeasures against future epidemics in Japan**.
(Strengthening and accelerating research on countermeasures against the novel coronavirus infection)

●Program overview

- Promotion of joint research using local samples and information obtained in infectious disease endemic areas in Asia and Africa (10 countries), based on a relationship of trust with universities, research institutes and hospitals in those locations and with researchers working there.
- Support for research on the novel coronavirus, leveraging overseas research centers, in order to generate rapid outcomes that will contribute to new preventive, diagnostic and therapeutic advances, and to future infectious disease countermeasures in Japan (using FY2020 reserve fund and primary supplementary budget).

●Progress and achievements in countermeasures against novel coronavirus infection

- Support for research demonstrating that nafamostat (a drug for treating acute pancreatitis) blocks viral entry during early stages of infection. (FY2019 initial budget, University of Tokyo).

●Overview of overseas research centers

(year of establishment)

Hokkaido University/Zambia Research Center (2007)	Collaboration with the University of Zambia School of Veterinary Medicine. Epidemiology of zoonosis, research on drug-resistant tuberculosis.
Tohoku University/Philippines Research Center (2008)	Collaboration with the Philippines Research Institute for Tropical Medicine. Features a cohort study of infant pneumonia and diarrhea.
Niigata University/Myanmar Research Center (2015)	Collaboration with the National Health Laboratory of Myanmar. Epidemiology of influenza and respiratory viruses.
University of Tokyo/China Research Center (2005)	Collaboration with the Chinese Academy of Sciences and Chinese Academy of Agricultural Sciences. Research on preventive therapeutics and diagnostics for new influenzas, and viral infection control.
Tokyo Medical and Dental University/Ghana Research Center (2008)	Collaboration with the Noguchi Memorial Institute for Medical Research, University of Ghana. Molecular epidemiology of dengue fever and chikungunya.
Osaka University/Thailand Research Center (2005)	Collaboration with the National Institute of Health of Thailand and Mahidol University. Research on mosquito-borne diseases and drug-resistant bacteria.
Osaka City University/Democratic Republic of Congo (2020)	Collaboration with the National Institute of Biomedical Research. Feasibility study on establishing the research center this year.
Kobe University/Indonesia Research Center (2007)	Collaboration with the Airlangga University Institute of Tropical Disease. Research on bird flu and dengue fever
Okayama University/India Research Center (2007)	Collaboration with the National Institute of Cholera and Enteric Diseases. Research on new Cholera strains and transmission mechanisms.
Nagasaki University/Vietnam Research Center (2005)	Collaboration with the National Institute of Hygiene and Epidemiology. Research on dengue fever, bird flu, pediatric respiratory tract infections. Succeeded in the first isolation of the novel coronavirus in Vietnam in 2020.