Japan Agency for Medical Research and Development

CONNECTING PEOPLE, CHANGING LIVES.

Japan Agency for Medical Research and Development

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2017/18 Edition

WE ARE AMED, THE JAPAN AGENCY FOR MEDICAL RESEARCH AND DEVELOPMENT.

Making life better for patients around the world today.

“Our mission is to fast-track medical research and development.”

Despite remarkable advances in medicine, new approaches to prevention, diagnostics and therapeutics are as vital now as ever before. We continually face new public-health challenges that must be met under the weight of growing public expectation.

AMED was established in the spring of 2015 in consideration of these challenges, in addition to those yet to come. Our most important role is to catalyze the process of medical innovation and overcome the barriers between sectors, connecting talented individuals in order to accelerate discovery.

In just two years, we have made significant gains in the fight against many diseases. We are relatively small and have no hospitals or institutes of our own. However, our simple structure and function is our strength. It provides us with a unique flexibility that allows us to be decisive and forward thinking. This innovative approach led to the creation of our consolidated regulations, which make funding for vital research more accessible than ever.

While our progress is encouraging, we understand the challenges we face cannot be overcome without global collaboration. To date, we have entered into Memorandum of Cooperation agreements with several of our counterparts: NIH in the U.S., MRC in the U.K. and A*STAR in Singapore. We have also established offices in these countries to further reinforce our relationships.

Indeed, this integration of collective strengths is already making a difference – particularly in the fields of rare and undiagnosed diseases, infectious diseases and cancer research, where we are successfully establishing systems for identifying complex conditions through the sharing of data and logistical know-how internationally.

Many challenges lie ahead as we work to improve health in Japan and around the world. However, through close cooperation with the global medical community, we can deliver the best medicine and change lives for the better.

Makoto Suematsu, M.D., Ph.D.
President, AMED

Who We Are

The Japan Agency for Medical Research and Development (AMED) was established in 2015 for the advancement of medical discoveries that make life better for everyone.

Based on effective partnerships and innovative collaboration, we pursue medical breakthroughs through an approach consisting of three vital components:

1. **SUPPORT**
   Funding medical studies and research facilities
2. **CONNECT**
   Linking organizations, institutions and researchers
3. **PROMOTE**
   Promoting the practical application of beneficial research outcomes

People are at the heart of everything we do. We support, connect and promote, helping researchers to make incredible discoveries and change the lives of patients around the globe.

HEADQUARTERS FOR HEALTHCARE POLICY (HHP)

Japanese government establishes top-level policy for medical research and development.

What We Do

Working beneath the Prime Minister's Cabinet and national ministries, we provide a single window for researchers and institutions seeking funding for medical research and development.

Prior to our establishment, researchers were required to request funding from several ministries, depending on the phase of their studies. Now, we provide streamlined, consistent support from initial investigations to practical application of new medicines and treatments in the real world.

We also work to connect the most qualified practitioners, medical institutions and private-sector organizations, at home and abroad, to give clinical studies the best possible chance of succeeding.

Once studies are completed, we focus our resources on promoting new medicines and treatments to ensure they get to the people who need them most.

When it comes to medical innovation, we are with you every step of the way.

JAPANESE GOVERNMENT MINISTRIES

Ministries establish mid/long-term goals based on government policy and set budgets accordingly.

- CABINET SECRETARIAT, OFFICE OF HEALTHCARE POLICY
- MINISTRY OF EDUCATION, CULTURE, SPORTS, SCIENCE AND TECHNOLOGY
- MINISTRY OF HEALTH, LABOUR AND WELFARE
- MINISTRY OF ECONOMY, TRADE AND INDUSTRY

AMED

AMED allocates funding to support researchers, providing a single point of contact from initial research to outcomes that benefit society.

RESEARCHERS AND INSTITUTES

FUNDING ALLOCATION BY AMED

In addition to funding allocation, AMED networks academia and industry in order to accelerate medical discovery.

A New Approach to Medical Research & Development

In line with government policy, we provide a single window of support and funding for research projects.

Management and Evaluation Framework

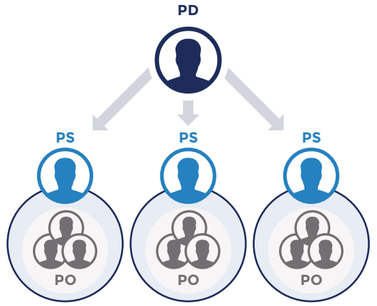
To ensure the best chance of beneficial research outcomes, we assign program directors (PD) to each of our nine key fields, and program supervisors (PS) and program officers (PO) to each program within the field.

These individuals have distinguished academic backgrounds and are handpicked for their expertise in a specific area of research. They work closely to grasp the situation and challenges in their field in order to comprehensively evaluate research proposals and provide expert program coordination. Their ultimate goal is to manage research and advise researchers to make processes run more smoothly and ensure better results.

PROGRAM MANAGEMENT FRAMEWORK

Primary roles of PDs:

- Program direction, including operation policies
- Allocation of funds
- Coordination and management of PSs



PROJECTS WITHIN THE FIELD

PD Our PDs offer expert insight into key strategic fields of research. In addition to promoting collaboration between related fields, PDs monitor entire grant programs and make expansion and acceleration recommendations to AMED.

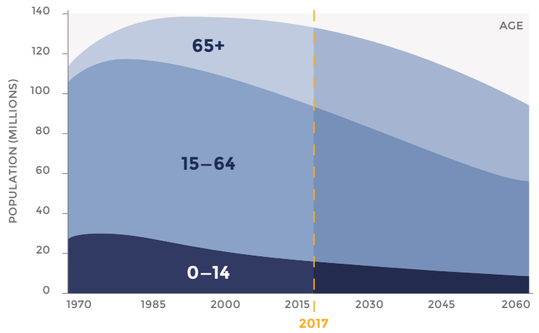
PS Our PSs possess a precise understanding of the aims and challenges related to their respective programs in order to effectively oversee operation.

PO The role of our POs is to assist PSs, taking responsibility for day-to-day program administration.

Our Challenges

Like the rest of the world, Japan continually faces new and urgent public health challenges. The emergence of infectious diseases and prevalence of chronic conditions require constant attention, but perhaps the most significant challenge is the country's aging population. Our government has defined its strategy to address this challenge, citing cutting-edge medical technology and care as vital to the creation of a society that enjoys longer, healthier lives. AMED is striving to meet this challenge head-on.

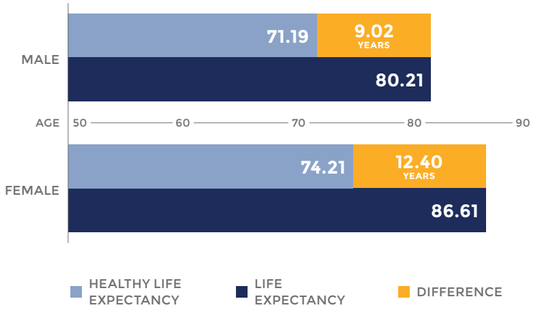
Population Structure (Japan)



NATIONAL INSTITUTE OF POPULATION AND SOCIAL SECURITY RESEARCH

Our population is aging faster than that of any other nation. The percentage of those over 65 years old increased from 7.1% in 1970 to 26.8% in 2015, and it is predicted to reach 40% by 2060. As a result of this shift, the burden on our national healthcare system is greater than ever. That's why finding effective solutions is one of our top priorities.

Life and Healthy Life Expectancy (Japan)



2013 MINISTRY OF HEALTH, LABOUR AND WELFARE DATA

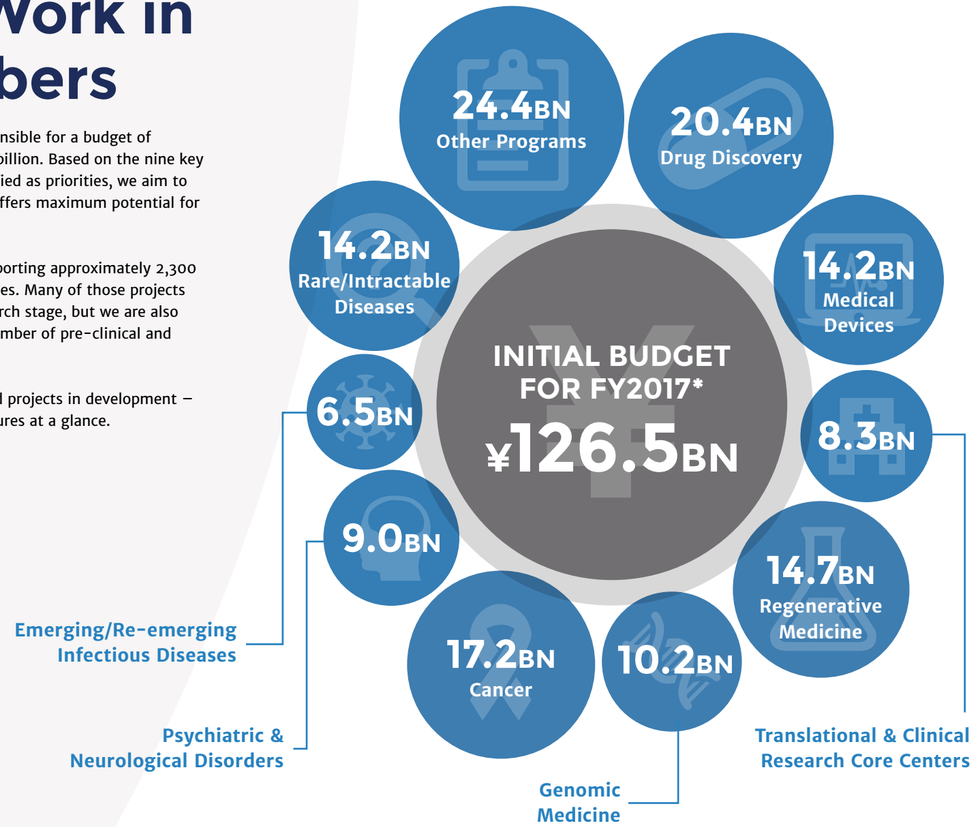
Life expectancy in Japan is among the longest in the world. However, the difference between life and healthy life expectancies stands at 9.02 years for males and 12.40 years for females. To shorten the gap, we focus on making discoveries that allow people to enjoy longer, healthier and more active lives.

Our Work in Numbers

In 2017, we are responsible for a budget of approximately ¥126 billion. Based on the nine key fields we have identified as priorities, we aim to ensure all spending offers maximum potential for beneficial outcomes.

We are currently supporting approximately 2,300 projects in 24 countries. Many of those projects are in the basic research stage, but we are also supporting a large number of pre-clinical and clinical studies.

Budget allocation and projects in development – all of AMED's key figures at a glance.



*SOME BUDGET ALLOCATIONS OVERLAP; FIGURES IN JPY, 2017/18 DATA

Countries

24

We are currently involved in projects in 24 countries around the world.

Researchers

9,000

Our global network of approximately 9,000 researchers is comprised of outstanding individuals from leading medical institutions.

2016/17 DATA

Grant Programs

We promote leading-edge medical innovation from discovery and development to clinical application. Focused on nine key fields, everything we do is guided by the Japanese government's Plan for Promotion of Medical Research and Development.

Our projects are solicited through wide-ranging calls for proposals, which are aimed at outstanding individuals working in world-class institutions. Our role as custodians of public money means we consider each proposal thoroughly in order to maximize the potential for beneficial outcomes.

Once projects are launched, we work to create the conditions necessary for discovery, establishing framework and putting together teams of distinguished researchers.

But our work does not stop there. We continue to support projects at every stage of their journey to ensure everything we do is underpinned by the highest quality and integrity.

DEPARTMENT	
Research Promotion	Division of Drug Research
	Division of Regenerative Medicine Research
	Division of Cancer Research
	Division of Neurological, Psychiatric and Brain Research
	Division of Rare/Intractable Disease Research
	Division of Infectious Disease Research
Industrial-Academic Collaboration	Division of Medical Device Research
	Division of Industrial-Academic Collaboration
International Affairs	Division of International Collaboration
Research Infrastructure	Division of Biobank
	Division of Emerging Research
Clinical Research & Trials	Division of Clinical Research and Trials
	Office of Regulatory Science and Clinical Research Support
Innovative Drug Discovery & Development	Department of Innovative Drug Discovery and Development
Cyclic Innovation	Department of Cyclic Innovation

PROJECT FOR DRUG DISCOVERY & DEVELOPMENT — 20.4BN

Promoting the development of innovative drugs and strengthening support functions for novel discovery.

PROJECT FOR MEDICAL DEVICE DEVELOPMENT — 14.2BN

Developing novel medical devices driven by clinical needs and supporting platforms for developers to contribute to the promotion of Japan's medical device industry.

PROJECT OF TRANSLATIONAL & CLINICAL RESEARCH CORE CENTERS — 8.3BN

Strengthening core center functions to achieve seamless implementation from basic research to clinical application and promoting use of innovative technology.

JAPAN REGENERATIVE MEDICINE PROJECT — 14.7BN

Promoting the development of regenerative medicine from basic research to clinical studies and creation of evaluation standards.

JAPAN GENOMIC MEDICINE PROGRAM — 10.2BN

Promoting research to realize genomic medicine and create next-generation precision medicine.

JAPAN CANCER RESEARCH PROJECT — 17.2BN

Promoting various activities from basic research to clinical studies aimed at accelerated practical application for cancer diagnosis and treatment.

PROJECT FOR PSYCHIATRIC & NEUROLOGICAL DISORDERS — 9.0BN

Promoting research and development for dementia and other psychiatric disorders.

EMERGING/ RE-EMERGING INFECTIOUS DISEASE PROJECT OF JAPAN — 6.5BN

Promoting research on emerging and re-emerging infectious diseases for effective control measures.

RARE/ INTRACTABLE DISEASE PROJECT OF JAPAN — 14.2BN

Promoting research and development to improve the treatment of rare and intractable diseases.

OTHER PROGRAMS — 24.4BN

Supporting the research, development and promotion of health and medical strategies beyond the nine key fields.

CYCLIC INNOVATION FOR CLINICAL EMPOWERMENT — 55.0BN

Promoting the establishment of infrastructure to respond to medical needs, the creation of an environment for open innovation and venture development based on industry-academia-government collaboration.

FIGURES IN JPY, 2017/18 DATA

International Collaboration

At AMED, we understand that improving quality of life for people around the world is a global effort. That's why we adopt an international approach, contributing Japanese expertise and actively engaging in research and development activities in collaboration with our counterparts around the world.

Bases of Cooperation

2016 was an exciting year for us. In June, we opened our first overseas office in Singapore. Located in the Singapore Science Park – a local research, development and technology hub – the office was set up to track medical research trends, facilitate collaboration with overseas funding agencies and institutions, and share findings throughout the Asia-Pacific region.

Then, in November, we announced our new U.S. office. Based in Washington, D.C. – the home of the U.S. government – the office will cooperate with countries throughout North and Latin America to strengthen ties. Its key roles include analyzing technical and policy information, building our network and relaying the latest news on our work.

2017 also promises to be a big year for us. It began with the establishment of our U.K. office in the heart of London. Opened in February, the office is responsible for cultivating relationships and promoting our work among our counterparts in Europe, the Middle East and Africa.

The AMED Singapore Office is located inside the Singapore Science Park – a local research, development and technology hub

Makoto Suematsu, President of AMED, and Sir John Savill, Chief Executive of MRC, signed a Memorandum of Cooperation in February 2017
Photo: Kyodo News

Partnerships for Discovery

As part of our strategic international activities, we have established formal partnerships with some the world's leading funding agencies.

In January 2016, we signed a Memorandum of Cooperation with the National Institutes of Health (NIH) in Washington, D.C. The agreement covers cooperative research projects, joint seminars, symposia and other scientific forums, and the exchange of researchers, leading to collaboration in areas such as research into rare and undiagnosed diseases.

In March 2016, we announced a Memorandum of Cooperation with the Agency for Science, Technology and Research, Singapore (A*STAR). Through the pooling of valuable resources, we hope to develop a collaborative approach to finding solutions to shared challenges. Initially, human aging has been identified as an area for joint research.

In February 2017, we signed a Memorandum of Cooperation with the U.K.'s Medical Research Council (MRC). The aim of this partnership is to leverage the strengths of both organizations in areas such as regenerative medicine, dementia, antimicrobial resistance and infectious diseases.

Global Forums

In order to strengthen relationships with overseas funding agencies and research institutions, we actively participate in a number of international forums in cooperation with global leaders such as the World Health Organization (WHO).

Through alliances such as the Global Research Collaboration for Infectious Disease Preparedness (GloPID-R), which was founded to facilitate the exchange of information on potential pandemic threats, we have identified potential collaborative research partnerships – particularly in relation to data sharing.

Likewise, our participation in forums such as the Global Alliance for Genomics and Health (GA4GH) and Global Alliance for Chronic Diseases (GACD) allows us to share our discoveries and keep abreast of the latest breakthroughs around the world.

We also fully support international efforts to combat urgent threats to global health through programs such as the Joint Programming Initiative on Antimicrobial Resistance (JPIAMR).

As part its global activities, AMED hosted the Scientific Symposium of Japan-India Research Exchange Project in February 2016

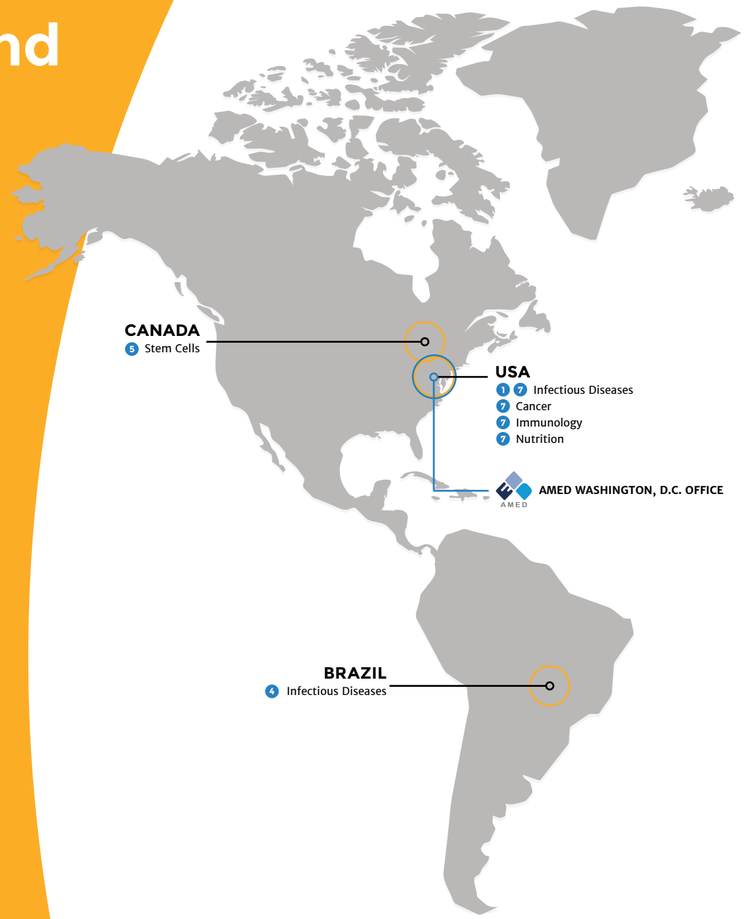
Our Work Around the World

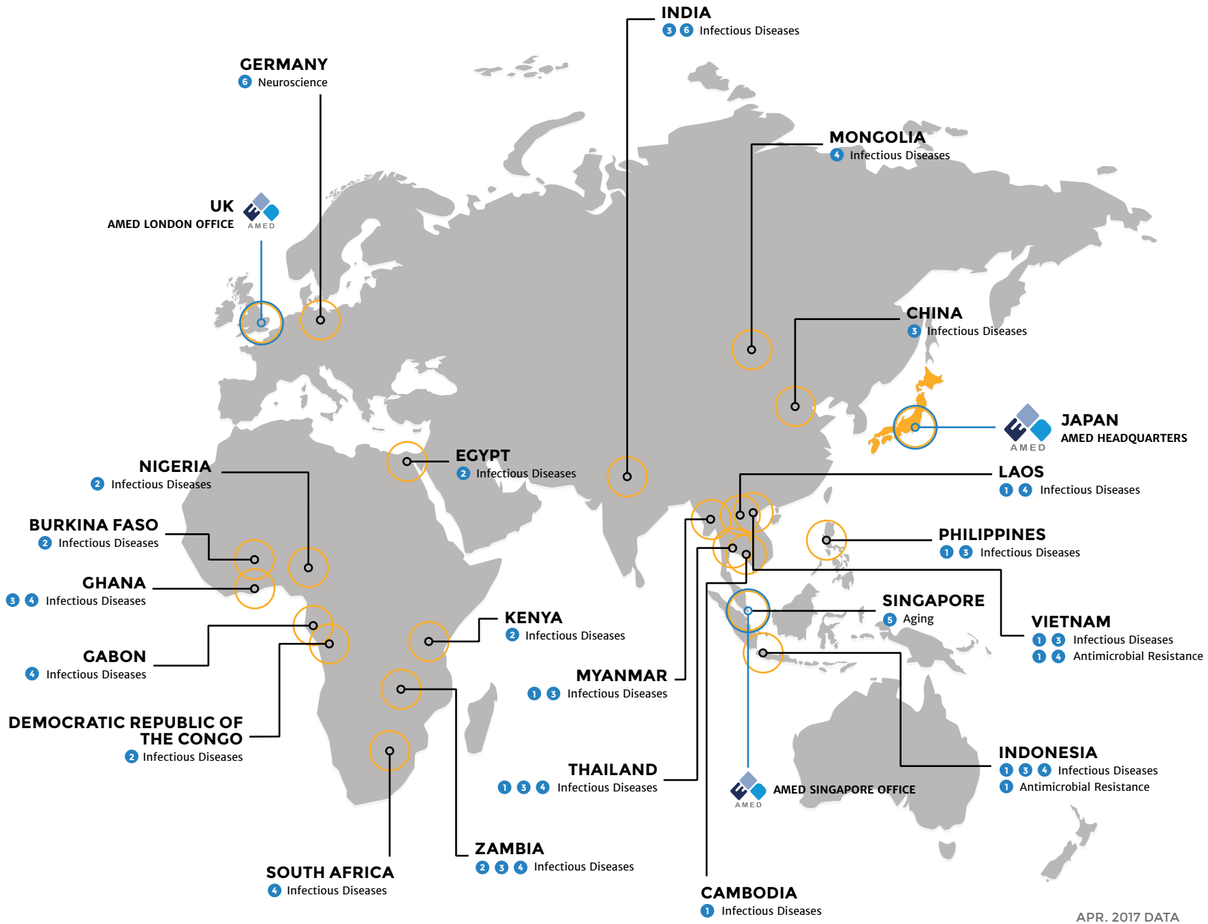
With a global network of researchers, institutions and organizations across five continents, we recognize the importance of international presence and collaboration.

AMED is currently involved in a range of international cooperative research projects, including:

1. e-ASIA JRP (e-ASIA Joint Research Program)
2. ICREP-NTDs (International Collaborative Research Program for Tackling the Neglected Tropical Diseases Challenges in African Countries)
3. J-GRID (Japan Initiative for Global Research Network on Infectious Diseases)
4. SATREPS (Science and Technology Research Partnership for Sustainable Development)
5. SICORP (Strategic International Collaborative Research Program)
6. SICP (Strategic International Research Cooperative Program)
7. U.S.–Japan Cooperative Medical Sciences Program

In addition, our overseas offices serve as hubs to support our global network.





APR. 2017 DATA

Global Successes

Medical research and development has the potential to spare millions from suffering. At AMED, we believe any outcome that makes life better is valuable – no matter how small.

The following pages contain brief snapshots of the work we are involved in to ensure safer, more effective healthcare around the world.

J-GRID: INDONESIA

A study that provided evidence of a highly pathogenic avian influenza A(H5N1) infection among live-poultry market workers, who displayed no symptoms.

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SATREPS: ZAMBIA

Research on viral zoonoses, identifying common carriers to predict the emergence of zoonotic viral infections.

18

AMED AND A*STAR JOINT RESEARCH PROJECT

Strengthening cooperation between Japan and Singapore in pursuit of the development and application of technologies in the field of human aging.

19

REGENERATIVE MEDICINE

Research and development aimed at the clinical application of regenerative medicine based on stem cell technology.

20

IRUD

Construction of a medical network and clinical databases to improve the identification and diagnosis of rare and undiagnosed diseases.

21

JAPAN GENOMIC MEDICINE PROJECT

Promoting the clinical application of genomic medicine to improve the prevention, diagnosis and treatment of a wide range of illnesses.

22

SMART CYBER OPERATING THEATER

Improving the safety and efficiency of surgical procedures through the creation of an intelligent operating room by networking medical devices.

23

MEDICAL ARTS

Considering overlooked aspects of healthcare to develop innovative technology and systems to enhance the safety, efficacy and cost-efficiency of medical treatments.

24

THE JAPAN INITIATIVE FOR GLOBAL RESEARCH NETWORK ON INFECTIOUS DISEASES (J-GRID)

Exploring the Nature of Pandemic Infectious Diseases at the Source

In response to the worldwide threat posed by potential pandemic infectious diseases, AMED is supporting Japanese universities to establish collaborative research centers in countries where risk of infection is high through its J-GRID program. This allows researchers to gain vital access to patients, animal hosts, insect vectors and public health organizations directly affected by infectious diseases.

To date, seven centers have been established in Asia in addition to two in Africa, where Japanese researchers work alongside local researchers to target influenza, dengue fever, multidrug-resistant bacteria and serious diarrhea.

One such study, conducted in collaboration with the Kobe University Graduate School of Medicine and Airlangga University in Indonesia, provided evidence of a highly pathogenic avian influenza A(H5N1) infection among live-poultry market workers, who displayed no symptoms.

AMED hopes findings such as these will provide a valuable scientific foundation for determining domestic and international measures to prevent or control pandemic outbreaks caused by viruses of avian influenza A(H5N1) origin.

As the project continues, AMED will seek to strengthen its collaborative research network in Japan and abroad, and further develop research infrastructure through the creation of a comprehensive database of its study findings.

Concept

Understand how pathogens of infectious diseases are maintained in the wider environment, how they gain access to human populations and how they are propagated in humans. In addition, study human immunological reactions. Apply findings to develop strategies for effective interventions, diagnosis systems, therapeutics and vaccines.

Progress

Seven research centers have been established in Asia in addition to two in Africa. Significant outcomes include evidence of a highly pathogenic avian influenza A(H5N1) virus infection among live-poultry market workers in Indonesia, who exhibit no symptoms.

Collaborators

Hokkaido University (Zambia); Tohoku University (The Philippines); The University of Tokyo (China); Tokyo Medical and Dental University (Ghana); Niigata University (Myanmar); Osaka University (Thailand); Kobe University Graduate School of Medicine (Indonesia); Okayama University (India); Nagasaki University (Vietnam)

SCIENCE AND TECHNOLOGY RESEARCH PARTNERSHIP FOR SUSTAINABLE DEVELOPMENT PROGRAM (SATREPS)

Surveillance of Viral Zoonoses

AMED and the Japan International Cooperation Agency (JICA) are supporting the advancement of local education, technical capacity and diagnostic techniques for viral zoonoses such as Ebola and influenza in Zambia.

The study is one of 13 that AMED is currently conducting in the field of infectious disease control as part of SATREPS.

Led by Ayato Takada, Professor, Research Center for Zoonosis Control, Hokkaido University, the study involves surveys to identify reservoirs and transmission routes of viruses, so that future issues can be controlled locally.

Midway through the five-year research period, the study has produced a number of encouraging outcomes. Perhaps the most significant is the development of a rapid diagnosis kit for identifying Ebola cases.

In addition, a number of potentially useful antibodies have been discovered, and diagnostic guidelines have been established to further raise the standard of local virology research and education.

As the study moves into the next phase, the team will continue its close cooperation with the School of Veterinary Medicine at the University of Zambia in order to reinforce and expand on current findings.

Ultimately, AMED hopes the study will contribute to the improvement of zoonosis control throughout Zambia and the rest of Africa.

Concept

Develop capacity for research and education on viral zoonoses, and identify common carriers in order to predict emergence of zoonotic viral infections and accelerate diagnosis.

Progress

Initial project goals were achieved midway through the five-year study. Outcomes include the development a rapid diagnosis kit for identifying the Ebola virus, including subtype. Moving forward, the project will reinforce and expand on current findings through more comprehensive testing.

Collaborators

School of Veterinary Medicine, the University of Zambia; Research Center for Zoonosis Control, Hokkaido University

Partnering to Tackle Human Aging

As part of the Strategic International Collaborative Research Program (SICORP), AMED and the Agency for Science, Technology and Research, Singapore (A*STAR) are collaborating to build strong research and development ties between Japan and Singapore in order to address challenges facing both countries.

Based on a Memorandum of Cooperation signed in March 2016, the two agencies agreed a joint-research program to support advancements in the field of human aging.

Like Japan, Singapore is facing sharp increases in the proportion of its population aged 65 years and over. To tackle this issue, which carries with it a number of socioeconomic implications, AMED and A*STAR will collaborate to promote research in this area, elucidating the basic mechanisms of aging while nurturing the next generation of researchers to lead the way.

The awarded projects will focus on human genes or biomarkers as indicators of healthy aging or age-related diseases. To enhance the capacity of the selected projects, AMED will provide support for researchers based in Japan, while A*STAR will provide support for researchers based in Singapore.

Through this collaboration, AMED hopes to identify key determinants of the aging process and age-related diseases in order to extend the healthy, active years of life.

In addition to cooperative research projects, the agreement also covers joint seminars, symposia and the exchange of personnel and researchers.

Concept

Strengthen research and development cooperation between Japan and Singapore. Achieve world-class results through the development and application of new and innovative technologies in the field of human aging.

Progress

Based on the Memorandum of Cooperation, AMED and A*STAR jointly invite proposals from research organizations in view of supporting up to three new projects in 2017.

Collaborators

Agency for Science, Technology and Research, Singapore (A*STAR)

Advancing Stem Cell Technology

Seeking to become a global leader in the field of stem cell technology, AMED is supporting the advancement of research and development towards the clinical application of regenerative medicine based on stem cell technology.

The project is focused on overcoming numerous barriers in order to translate the potential of the technology into practical drugs and treatments.

Key efforts include the development of induced pluripotent stem cell (iPSC) and embryonic stem cell stocks, and research into the safety and standardization of related processes. At the same time, the project is aiding the development of a comprehensive research framework in order to provide a platform for new discoveries in this field.

Support is also given to the exploration of treatment methods for dysfunctional tissues and organs, while other aspects of the project address the need for comprehensive evaluation techniques to clarify safety and efficacy of new discoveries ahead of commercialization.

Among the project's most significant outcomes is the world's first clinical application of iPSCs. The study used iPSC-derived retinal pigment epithelium cell transplantation to treat age-related macular degeneration in an elderly patient.

Moving forward, AMED aims to lead the development of a new generation of medicine based on stem cell technology in order to raise the quality of life of people around the world.

Concept

Facilitate research and development for the clinical application of regenerative medicine based on stem cell technology. Support standardization of regulations, further discussion of ethics and promote commercialization of new products.

Progress

In September 2014, the world's first clinical study of iPSCs was conducted, using iPSC-derived retinal pigment epithelium cell transplantation to treat age-related macular degeneration. The iPSCs used were reprogrammed from the patient's own cells.

A further five clinical studies are planned for 2017. However, rather than using patient-derived iPSCs, the trials will be conducted using iPSC stock provided by the Center for iPS Cell Research and Application, Kyoto University.

By utilizing stock cells in this way, it is possible to reduce the amount of time and funding required to produce the iPSCs.

AMED is working towards the practical application of iPSC-based regenerative medicine in the near future.

INITIATIVE ON RARE AND UNDIAGNOSED DISEASES (IRUD)

Systematic Identification and Diagnosis for Patients with Unidentified Conditions

Japan has a long history of tackling rare and intractable diseases (known locally as Nan-Byo). Building on this heritage, AMED's IRUD is combining expertise and technology to develop a systematic approach to supporting patients with unidentified conditions.

These efforts have led to the construction of a nationwide medical research consortium dedicated to helping these patients receive diagnoses. The network enables primary healthcare clinics to collaborate with almost 200 general hospitals and more than 30 IRUD Clinical Centers, where complex cases can be reviewed by multi-disciplinary IRUD Diagnosis Committees made up of medical specialists and clinical geneticists.

This process is supported by four IRUD Analysis Centers which administer genetic tests, including whole-exome or whole-genome sequencing. Their findings are fed back to the committees in order to support ongoing diagnosis discussions.

The clinical and genetic data gathered in each case is stored in a globally compatible patient-matching system, enabling data to be exchanged, upon consent, with domestic and overseas medical organizations in compliance with existing rules. As a result, similar cases can be compared with a broader pool of patients, increasing the chances of successful diagnoses.

Looking ahead, IRUD will continue to strengthen its nationwide network, placing emphasis on the microattribution of all IRUD collaborators – from local primary care physicians and nurses to patients, their family members and those supporting affected individuals.

In addition, working to fulfil AMED's foundational role of global harmonization through valuable forums such as the International Rare Diseases Research Consortium (IRDiRC), IRUD will seek further data-sharing opportunities and ensure patients are given the best chance of receiving a diagnosis.

Concept

Construct a comprehensive medical network and establish valuable clinical databases to improve the identification and diagnosis of rare and undiagnosed diseases.

Progress

IRUD has enabled primary healthcare clinics to collaborate with almost 200 general hospitals and more than 30 IRUD Clinical Centers, which combine with a Data Center and 4 Analysis Centers to create a national network. In addition, a globally compatible patient-matching system has been established to store and share clinical and genetic data.

Collaborators

National Center of Neurology and Psychiatry; National Center for Child Health and Development; Keio University; Yokohama City University; hundreds of related institutions and responsible individuals

JAPAN GENOMIC MEDICINE PROJECT

Establishing a Basis for Next-generation Medicine

Seeking to harness rapid advancements in the field of genomic medicine to provide patients with effective, personalized healthcare, AMED is conducting the Japan Genomic Medicine Project.

As part of the initiative, AMED is partnering with two universities in Japan to construct an integrated biobank for the storage of both biospecimens and analytical data. The Tohoku Medical Megabank Project (TMM Project) was founded with the aim of establishing an advanced medical system to foster reconstruction following the Great East Japan Earthquake.

Constructed by ToMMo and IMM, the biobank currently houses more than 2.5 million sample tubes, including plasma, blood cells, DNA and urine taken with informed consent (in Miyagi and Iwate prefectures) from healthy Japanese participants.

In addition to building a platform for research, the TMM Project also expands the knowledge base of genomics through long-term health studies and comprehensive genome and omics analyses. To date, 150,000 local residents have been recruited for studies, including 70,000 for the Tohoku Medical Megabank Project Birth and Three-Generation Cohort Study, which compares samples from the grandparents, parents and children of a single family in order to determine the factors in the development of diseases.

In 2016, 2,049 whole-genome sequencing results were shared, while plans are in place to add a further 150,000, including single nucleotide variant (SNV) frequency data, which will form the basis for further research.

Moving forward, AMED will continue to promote its data sharing policy, which increases the efficiency of research by stimulating the disclosure and sharing of related data. By breaking down such barriers, AMED hopes to conduct further research in a number of important fields.

Concept

Promote the clinical application of cutting-edge genomic medicine with the aim of improving the prevention, diagnosis and treatment of a wide range of illnesses. Build a valuable resource of biospecimens and analytical information to provide a strong foundation for research.

Progress

150,000 participants recruited for cohort studies, including 70,000 people for the Tohoku Medical Megabank Project Birth and Three-Generation Cohort Study. 2,049 whole genome sequencing results shared in 2016. Over 2.5 million tubes of biospecimens are currently stored in an integrated biobank.

Collaborators

Tohoku Medical Megabank Organization (ToMMo), Tohoku University; Iwate Tohoku Medical Megabank Organization (IMM), Iwate Medical University

SMART CYBER OPERATING THEATER

Connecting Medical Devices for Safer Surgical Care

AMED is collaborating with Tokyo Women's Medical University (TWMU), 4 other universities and 12 companies to develop the "Smart Cyber Operating Theater (SCOT)." A next-generation surgical operating room, SCOT connects medical devices and consolidates vital data to facilitate low-risk, high-precision and highly effective treatments.

SCOT uses the latest networking technology to display time-synchronized patient condition data, diagnostic images and status of surgical devices in the OPeLiNK integrated communication interface. And, by utilizing ORiN middleware to link equipment manufactured by different companies, SCOT eradicates issues caused by unsynchronized devices, prevents avoidable errors and reduces the cost of surgical treatments.

A "Basic SCOT" has been in operation at Hiroshima University Hospital since May 2016, and a fully functional version, "Standard SCOT," will be installed at Shinshu University Hospital in March 2018.

In addition, a prototype advanced model, "Hyper SCOT," was unveiled at TWMU in March 2016. It features robotic devices and navigation systems that provide key data, reduce the burden on surgeons and enable more precise surgery.

Looking ahead, the development team plans to add decision-making navigation and precision-guided surgery systems to a further enhanced version of Hyper SCOT, which is scheduled for 2019.

AMED believes that this cutting-edge technology will improve the quality of life of patients around the world.

Concept

Improve the safety and efficiency of surgical operations through the creation of an intelligent operating room, which supports surgeons by networking medical devices to display vital, time-synchronized information in a new integrated user interface.

Progress

A prototype high-performance "Hyper SCOT" was installed at TWMU in March 2016, while a "Basic SCOT" began clinical operation at Hiroshima University in May 2016. A fully functional "Standard SCOT" with OPeLiNK interface will be installed at Shinshu University Hospital in March 2018, and an advanced Hyper SCOT is planned for introduction at TWMU in 2019.

Collaborators

Tokyo Women's Medical University (TWMU), led by Yoshihiro Muragaki, professor at the Institute of Advanced Biomedical Engineering & Science; Hiroshima University; Shinshu University; Tohoku University; Tottori University; CENTRAL UNI Co., Ltd.; AIR WATER INC.; DENSO CORPORATION; NIHON KOHDEN CORPORATION; MIZUHO Corporation; PIONEER CORPORATION; Hitachi, Ltd.; Toshiba Medical Systems Corporation; SOLIZE Corporation, Air Water Safety Service Inc.; GREEN HOSPITAL SUPPLY INC.; MITSUI & CO., LTD.

MEDICAL ARTS

A Broader Approach to Innovation

Professor William Osler of Johns Hopkins Hospital once said, "Medicine is a science of uncertainty and an art of probability." He believed that healthcare included more than practical treatments alone, and he promoted ideas that were not considered medicine in the traditional sense.

Inspired by this approach, AMED established *Medical Arts* in the spring of 2016. This category includes groundbreaking technology and ICT systems that empower the development of therapeutics.

As treatments become standard practice, the quality of care patients receive should, in theory, be consistent. However, this is often not the case. Considering why such variations occur, *Medical Arts* aims to discover solutions to a number of issues that have so far eluded the medical community by utilizing cutting-edge technology.

In consideration of aspects of healthcare outside drug and device development that are often overlooked, *Medical Arts* supplements existing efforts to achieve the creation of innovative technology and systems that contribute to safer, more effective treatment. In addition, it seeks to optimize spending by making processes more cost effective.

A broader approach is needed to address societal issues, such as those related to Japan's aging population. AMED continues to develop better ways to promote the commercialization of new discoveries that contribute towards both medical innovation and cost optimization.

Concept

Consider overlooked aspects of healthcare to develop innovative technology and systems that raise the safety and efficacy of medical treatments while optimizing costs.

Progress

In its first year, *Medical Arts* invited research and development proposals in three areas: medical techniques, cancer treatment and medical devices. As a result, 25 projects were adopted. AMED continues to develop better ways to address societal issues, such as those related to Japan's aging population.

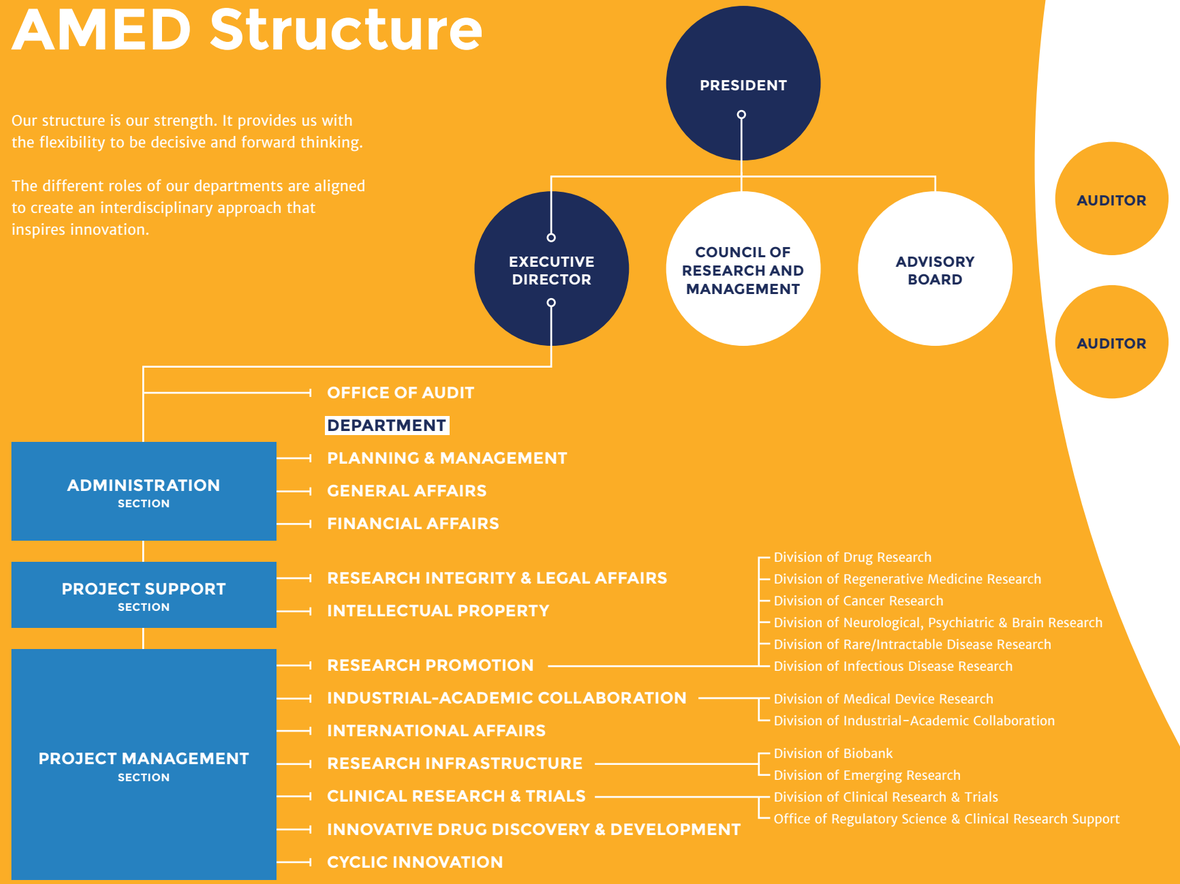
Collaborators

Medical Arts is cross functional, working closely with multiple departments responsible for AMED's grant programs.

AMED Structure

Our structure is our strength. It provides us with the flexibility to be decisive and forward thinking.

The different roles of our departments are aligned to create an interdisciplinary approach that inspires innovation.



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The location of our headquarters is marked on the cover

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