COMMISSION ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT (CSTD)

Geneva, Switzerland

Contribution by

Japan

to the CSTD call for information sharing on initiatives against COVID-19

May 19, 2020

Research and Development Progammes related to COVID-19 by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan

I. Development of medicine and rapid genetic testing system

- Medicine

  The Institute of Medical Science of The University of Tokyo identified an existing drug, Nafamostat (brand name: Fusan), which was developed in Japan as treatments for pancreatitis and some other diseases, as expected to prevent novel coronavirus infection (COVID-19) at its early stage. This research resulted in launching clinical trials for treating COVID-19.

- Rapid genetic testing system
  - ✓ Loop-Mediated Isothermal Amplification (LAMP):

    Nagasaki University and Canon Medical Systems jointly developed a rapid genetic testing system based on the technique using LAMP method, which can detect the COVID-19 in 40 minutes. This system has already been used for administrative inspections and covered by insurance.
  - ✓ Smart Amplification Process (SmartAmp):

    The rapid genetic testing technique based on the SmartAmp method can provide a major time-saving compared to PCR. The effectiveness of this method has been validated through the joint research of the Kanagawa Prefectural Institute of Public Health and RIKEN. As a result, this system has already been used for administrative inspections and covered by insurance. Work is ongoing to further reduce the amount of time required.

II. Utilize Supercomputers for research on COVID-19

The supercomputer Fugaku, which is currently being installed in Kobe, Japan under a RIKEN-led project, will be put to use to help combat the COVID-19 pandemic to the maximum extent possible, by giving priority to research selected by MEXT. Currently, five projects are being conducted by the scientists from RIKEN and other research institutions. Other computing resources in other universities and national research institutes are also encouraged to be used for this purpose as priority.

III. New funding schemes for strengthening the nexus between Humanities/Social Sciences and Natural Sciences

The following schemes aim at developing and implementing public health policy proposals based on scientific evidences by utilising knowledge of Humanities and Social Sciences, such as law, ethics, sociopsychology and behavioral economics or integrating this knowledge with information science which analyze citizen/consumer's behavior in the current social circumstances caused by COVID-19.

- ✓ Research Institute of Science and Technology for Society (RISTEX) of Japan Science and Technology Agency (JST) opened FY2020 call for "Responsible Innovation with Conscience and Agility (RInCA)" program, which have a special quota for research relevant to COVID-19.
- ✓ JST also launched a call for "JST-Mirai Program" under the theme of "Making full use of AI and simulation technologies across different fields for a human-centered society."

IV. Opportunities for non-medical international collaborative research related to the prevention and mitigation of effects of the COVID-19 pandemic

JST has been implementing a funding mechanism for international collaborative research on the theme of COVID-19 and current pandemic as part of its J-RAPID program. In this mechanism, funding is envisaged for researchers in Japan who are currently in collaboration with or anticipate collaboration with researchers abroad who are funded or to be funded by eligible foreign funding agencies including through the RAPID program of the National Science Foundation (NSF) of the United States. This mechanism not only supports research directly applicable to mitigating the ongoing COVID-19 outbreak, but also welcomes non-medical research related to the prevention and mitigation of effects of the COVID-19 pandemic.

June 5, 2020

Research activities to prevent the spread of COVID-19 by the National Institute of Advainced Industrial Science and Technology (AIST), Japan

For AIST, it is our mission to overcome this global crisis and to continue striving to bring society back to normal as soon as possible, under the slogan, “in Society, for Society.” Moreover, we believe it is also important to support people’s daily lives in this “new normal.” To achieve these missions, AIST will continue to conduct cutting-edge R&D, collaborate with other research institutions, and disseminate information useful for “staying at home,” in order to prevent the spread of infection.

[Research activities for tackling COVID-19]

AIST is performing the following research activities to prevent the spread of COVID-19. We will post updates whenever new activities are being conducted.

- **Free access to AI Bridging Cloud Infrastructure (ABCI) for COVID-19 research**

As part of measures to prevent the spread of COVID-19 infections, AIST will provide free access to its AI Bridging Cloud Infrastructure (ABCI), the world's top-level, large-scale, open AI computing infrastructure, for the “treatment,” “prevention,” “drug discovery,” and “analysis and predictions” related to the spread of infections. Since mid-April, the high-performance computing infrastructure (HPCI) office has opened its doors to COVID-19 research in need of supercomputer resources. The service is available to those who apply and are approved.

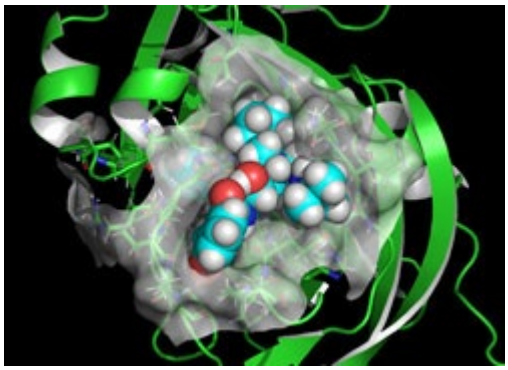
More information: https://abci.ai/

- **International comparison of COVID-19 RNA measurement capabilities**

Standardization of detection methods is required in order to improve the reliability of PCR kits and testing protocols for confirming COVID-19 infections. For this purpose, AIST and national metrology institutes of Europe, the United States, and Asia are currently planning an international comparison study of measurement capabilities for COVID-19 RNA. Participation in the comparison study makes it possible to guarantee international comparability and reliability of measurement capabilities of PCR tests in Japan, as well as to develop standard reagents and reliable detection methods for testing.

- **Repositioning approved drugs as candidates of COVID-19 therapeutic agents**

Since the safety of approved drugs for other treatments has been confirmed, these drugs can be repositioned and smoothly introduced to clinical trials for COVID-19. In collaboration with the National Institute of Infectious Diseases, AIST contributed to the discovery of two drugs: nelfinavir, an anti-AIDS virus (HIV) drug, and cepharanthin, a leukopenia drug by using *in silico* screening for narrowing down the candidates of COVID-19 therapeutic agents and simulation for understanding molecular mechanisms. Computer analyses indicated that jointly administering the two drugs, each with different working mechanisms, could efficiently eliminate the novel coronavirus.



- **Development and social implementation of a rapid PCR diagnostic device**

AIST has developed a novel PCR technology (micro-channel PCR chip) for a rapid and compact PCR detection device. This novel technology is used in “GeneSoC®,” a small ultra-high-speed gene quantification device that can identify bacteria and viruses in only 5 to 15 minutes. We will continue our efforts to develop a multiplex PCR testing reagent to enable simultaneous detection of multiple genes in one reaction solution, which will not only minimize the possibility of false negatives caused by mutations, but also improve test efficiency. We will also promote the development of a high-speed DNA sequencing system that will reliably track any mutations.

- **Development of a reliable and rapid diagnostic technology for COVID-19**

For emerging infectious diseases such as COVID-19, the development and improvement of rapid diagnostic technology is a top priority in preventing the spread of infection and enabling early diagnosis and treatment. To this end, AIST is aiming toward the development of a reliable rapid PCR diagnostic system, and the social implementation of a simple and rapid antibody test using ELISA. This research project has been selected as an urgent task which calls for immediate action under the FY 2020 supplementary budget “Development of technologies for infectious diseases including viruses.”

For up-to-date information, please visit https://www.aist.go.jp/aist_e/covid-19/index.html.