Artificial intelligence (AI) technologies promote patient-friendly, high-quality medical care!

A database consisting of a large amount of data (big data) from the medical care–based Internet of Things (IoT) will be established. Its objectives include ensuring high-quality medical care in the “super-aging” society, suppressing national medical spending, enhancing the international competitiveness of the medical care industry of Japan, and reducing the workloads of medical care professionals. Furthermore, AI technologies will be used to create new platforms that will assist in the diagnosis, training, and communication of inter-medical care professionals as well as in improving their interactions with patients and their family members.

Program Director

Dr. NAKAMURA Yusuke

Director
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Profile

NAKAMURA Yusuke, Ph.D., is currently the Director of the Cancer Precision Medicine Center, Japanese Foundation for Cancer Research, and Professor Emeritus at The University of Tokyo and Professor Emeritus at The University of Chicago. Since graduating from the Osaka University Faculty of Medicine in 1977, Dr. NAKAMURA has been one of the pioneers of genetic medicine, discovering a number of genetic disease markers useful for identifying pathogenic mechanisms and treatment. His previous positions include the following: (i) Professor, Laboratory of Molecular Medicine, Institute of Medical Science, The University of Tokyo; (ii) Professor and Director, Human Genome Center, Institute of Medical Science, The University of Tokyo; (iii) Director, RIKEN Center for Genome Medicine; (iv) Director, National Cancer Center Research Institute, Tokyo, Japan; and (v) Special Advisor to the Cabinet Secretary General, Office of Medical Innovation, Cabinet Secretariat, the Government of Japan; (vi) Professor, Department of Medicine, Section of Hematology/Oncology, the University of Chicago; and (vii) Deputy Director, Center for Personalized Therapeutics, the University of Chicago. Dr. NAKAMURA has been the Director of the Cancer Prevention Medicine Center since July 2018. He has published over 1,540 papers in peer-reviewed international journals, which have been cited over 195,000 times. He awarded in the Clarivate Analytics Citation Laureates 2020.
Past Milestones and Anticipated Outcomes

This program will develop a comprehensive package of advanced medical care services that are optimized by AI technologies and big data analytics. This program will help spread high-quality medicine that offers minimally invasive and personalized treatment options based on the genetic, physical, and lifestyle characteristics of individual patients.

The advantages of this high-quality medicine include prolonging healthy lifespans, suppressing the increasing health care expenditures by identifying ineffective therapies and therapeutics, and strengthening the workforce. At the same time, the technologies to be developed in this Project will be useful in terms of reducing the workloads of medical care professionals, including doctors, nurses, and caregivers, and will lead to major changes for maintaining safe and secure medical care even as the super-aging society advances.

Moreover, the new technologies that will support the AI hospital system will increase the international competitiveness of the medical, pharmaceutical, and health care industries of Japan.

Goals of the overall project

- Development of a high-security database system and extraction of useful medical information. Revitalization of the industries of pharmaceutical products, medical equipment, and medical information.
- AI hospital system will be introduced to at least 10 medical institutions. The operation of a safe, high-precision model hospital system that is stress-free for patients will be commenced.
- An AI-assisted imaging, pathological telemedicine system, and automated coloscopy will be implemented.
- Development of a high-security database system and extraction of useful medical information. Revitalization of the industries of pharmaceutical products, medical equipment, and medical information.
- An AI-assisted diagnostic system that can identify disease trends and patterns for disease prevention and control.
- Standardized remote sample transport procedure for cancer diagnosis by blood-based liquid biopsy.
- By using AI, improved accuracies of voice input of nursing record and automated documentation of voice input of doctors’ commands in emergency medical care (recognition rate about 95%).
- Confirmed usefulness of an AI robot as a guide during PET examinations, which reduces radiation exposure to medical workers (by 63%) and improves patient satisfaction (83%) with healing effect, etc.
- Demonstrated usefulness of tablet PC during preop or pre-exam explanations to patients; the doctors’ workload was reduced by 98%, 3,000 hours of annual task shifts were achieved, and gained 100% patient understanding.
- Built a data linkage platform for COVID-19 (approximately 1,700 cases) and launched the database operation (May 2021).
- Started a consultation assistance system for COVID-19 using artificial intelligence avatars (it supports not only Japanese but also English and Chinese); the access count reached about 100,000 nationwide (as of June 2021).

Past Milestones

- Demonstrated by applying data secret sharing and secret calculating to various evaluations (including multicenter analysis of clinical and management indicators, treatment results, etc., survival curve analysis for each treatment, verification of distributed storage during disasters in hospital systems, etc.)
- Developed a glossary of medical terms consisting of about 420,000 words such as disease names, symptoms, medicines, tests, and patient expressions. Introduced international coding based on the WHO’s IDC to support standardization and multilingualism.
- In order to be used as a diagnostic assistance (disease candidate prediction) system, constructed a dictionary with associations between terms using information from the disease biobank (BioBank, Japan).
- To build the common basic technologies for the industry, established “Healthcare AI Platform Collaborative Innovation Partnership” approved by the Minister of Health, Labour and Welfare and the Ministry of Economy, Trade and Industry in April 2021, accelerated the development of service provision platform and AI development platform toward social implementation. To promote proliferation of the AI hospital system, the Japan Medical Association established the Japan Medical Association Promotion Center for AI Hospital & Clinic.
- Introduced an automated wheelchair system for the transportation of elderly patients and those requiring nursing care in hospitals and have achieved a high level of satisfaction (more than 2,000 patients, patient satisfaction 81%).
- Digitalized pathological diagnostic images and constructed a system that displays patient summaries, AI prediction models, and simple nomograms using the AI-equipped integrated cancer database combined with electronic medical records.
- Standardized remote sample transport procedure for cancer diagnosis by blood-based liquid biopsy.
- By using AI, improved accuracies of voice input of nursing record and automated documentation of voice input of doctors’ commands in emergency medical care (recognition rate about 95%).
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AI supports that effectively assist physician-patient interaction and communication applied by the big data information.