

# USING AI TO MAKE HEALTHCARE MORE HUMAN

The Japanese Government is driving **THE DEVELOPMENT OF AI-BASED INNOVATIONS** that aim to ease the healthcare burden and enable professionals to deliver better quality face-to-face care.

**Japan is at the forefront in many areas of medical care,** including state-of-the-art technologies and treatments. Yet its healthcare system is under stress. With a rapidly ageing population and a shrinking workforce, the ratio of patients to carers and specialists is on the rise, making it ever harder to provide quality care. In response, the Japanese government has funded a major national initiative to develop data-driven artificial intelligence (AI) and internet of things (IoT) technologies that will increase the efficiency and quality of healthcare delivery, and power the hospitals of the future.

**Helping healthcare workers spend more time with patients** “Doctors and nurses simply don’t have the time to focus on patients as much as they’d like to,” explains Program Director Yusuke Nakamura. “Although we have advanced medical technologies, our hospital IT systems are lagging behind. Nurses spend up to one third of their time updating patients’ records — time that could be better spent with patients. Meanwhile, there has been an explosion in the diversity of tests and diagnostics, which

take time to review and leave doctors little time to actually speak to patients with eye-contact. We believe AI can solve these challenges and free up our healthcare professionals to concentrate on human-to-human care.”

Now in its third year, the Cross-ministerial Strategic Innovation Promotion Program (SIP) for the Development of the Innovative AI Hospital System has 12 industry, academic and clinical partners, including five hospitals. The SIP, run out of the national Cabinet Office, aims to develop a suite of AI-driven tools that promise to revolutionize medical care in Japan.

**“IT’S ANOTHER TECHNOLOGY THAT JUST WOULDN’T BE POSSIBLE WITHOUT AI.”**

“Advanced, personalized medicine relies on lots of data. It’s simply beyond our human capacity to review and interpret so much data, and the potential for mistakes is high,” says Nakamura. “In Japan, we also have very few specialists for a large number of imaging

and pathological tests that are conducted. So it’s critically important to use AI to help interpret all these data.”

The idea is that AI will do all the straightforward diagnostics of imaging and pathology tests, allowing human specialists to concentrate on the difficult cases.

“With a unified system and data-sharing among hospitals, this type of AI system can help provide consistently accurate diagnoses across our entire healthcare system by allowing specialists to review test results from anywhere in Japan,” says Nakamura.

Automated record-keeping is also a major component of Nakamura’s vision for a comprehensive AI-supported hospital system.

“If we can automatically record a patient consultation, the doctor or nurse can be freed up to spend more quality time with patients and have a reduced workload,” says Nakamura. “Our clinical speech-recognition system is approaching 95% accuracy for nurse records and we’re anticipating reaching the same accuracy in doctor consultations in the next couple of years. This will be a huge benefit of a future AI hospital.”

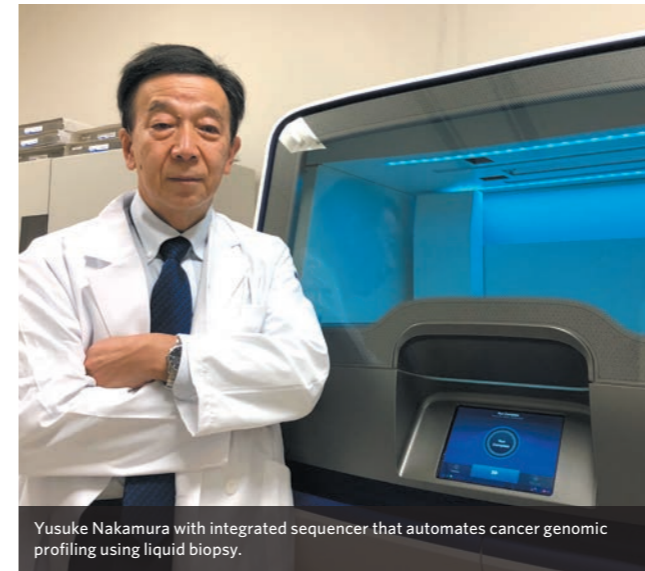
The hospital of the future will also be populated by a range of AI assistance robots to fill specific roles, such as assisting patients with positron emission tomography (PET) scans to reduce occupational radiation exposure among radiology technicians, helping keep children still during computed tomography (CT) scans, and providing emergency room triage.

“We didn’t envisage the coronavirus pandemic when we conceived this programme, but many AI technologies could be very helpful for providing contactless care in situations like the one we’re facing now,” says Nakamura.

#### Mining data for insights

AI can also be used to mine the enormous amount of patient data being generated every day across Japan to give new insights into disease.

“One of our partners, the Cancer Institute Hospital, treats 9,000 patients a year,” says Nakamura. “By using AI to interrogate that dataset, we can improve treatment by identifying risk factors, selecting more appropriate drugs and treatments, and developing personalized



Yusuke Nakamura with integrated sequencer that automates cancer genomic profiling using liquid biopsy.



A transporter that brings drugs to hospitalized patients, saving nurses time.



An AI robot with two young patients.

(Top right) © Keio University Hospital; (Bottom) © Hitachi, Ltd.

precision medicine based on a large library of previous cases.”

A particularly promising application of AI is in ‘liquid biopsies’, which offer a minimally invasive way to analyse cancer at the molecular level as a powerful alternative to conventional invasive tissue sampling.

“With liquid biopsies, AI can analyse the genes and molecules being shed

into the blood by cancers,” says Nakamura. “It’s really promising because we can see how cancer responds to treatments in a couple of weeks instead of months. That will allow us to test more treatments and rapidly confirm efficacy, which will result in better outcomes for patients. It’s another technology that just wouldn’t be possible without AI.”

Combined with networked IoT wearable devices for patient monitoring, the hospital of the future will be able to provide an unprecedented level of comprehensive healthcare while reducing the burden on healthcare workers.

“We’re developing a rich open AI platform for hospitals that will transform Japan’s hospital system,” says Nakamura. “This will give

patients access to a higher level of healthcare, and, perhaps counterintuitively, AI will help our clinicians and nurses provide more human, empathic care.” ■

**SIP** Cross-ministerial Strategic Innovation Promotion Program

**Innovative AI Hospital System**

**Innovative AI Hospital System**  
www.nibiohn.go.jp/en/sip/greeting/