

NUS team taps digital medicine to make treatments more precise

Drugs not only work differently on different people, but they could also have different effects on the same person at different times of their lives.

Professor Dean Ho heads biomedical engineering at the National University of Singapore and is director of the Institute for Digital Medicine at the Yong Loo Lin School of Medicine. He and his team are developing ways to take the guesswork out of medication, and to optimise drug doses and combinations for each person.

For instance, said Prof Ho, it is common for doctors to give cancer patients a two-drug combination as the standard dose. Though adequate, the treatment would be even more effective if there was a way to "modulate the dose a little bit to study the interplay of the two within the patient".

In a clinical trial that he is conducting on his algorithm, called Optim.AI, a small piece of a tumour is used to find the best dose for a particular patient. It is tested against up to a dozen drugs, providing about 900 different combinations to find which works best.

His team then recommends the dose to the doctor, who will decide what to give the patient.

Sometimes, the optimum dose for a patient might be lower than the standard dose, and it could change as treatment progresses. In Singapore, a lower dose could result in significant savings for the patient, who also benefits from the lower toxicity.

Prof Ho, who moved to Singapore from the United States in 2018, is known for his work in the use of artificial intelligence in precision and personalised medicine,

among other things. In 2023, he was invited by the US Food and Drug Administration to speak on defining and optimising drug dosages using AI.

His work at NUS and the University of California, Los Angeles, where he started on it, has led to a spin-off company called KYAN Technologies.

In March 2025, KYAN and Mayo Clinic Laboratories (MCL), a subsidiary of Mayo Clinic and a global leader in diagnostics, especially those related to cancers, formed a collaboration to test Optim.AI.

MCL's president and chief executive, Dr William Morice, said: "This collaboration with KYAN Technologies provides another avenue for physicians to have access to the most robust and reliable diagnostic options available, empowering them to make informed



Professor Dean Ho and his National University of Singapore team are developing ways to take the guesswork out of medication, and to optimise drug doses and combinations for each individual. PHOTO: NUS

decisions for better health outcomes and deliver customised treatment plans for their patients."

Digital medicine is important not only for cancer.

Said Prof Ho: "Digital medicine is our ability to leverage tools that we have, whether it's through wearables or through making better sense of our biomarkers and how

they change over time, so we are able to better manage care, to better dose medicines, exercise, and even train our brains."

He is a strong proponent of wearable technology, which tracks people's exercise, sleep, stress levels and other patterns. He said people are more likely to make changes if they are aware of what is happen-

ing in their own bodies.

His trials have also included cognitive training carried out on about 300 to 400 people: "We developed this multitasking game, and we've helped healthy people sharpen their brain performance even more."

Another area Prof Ho plans to pursue is diabetes prevention, to give people tools "to pre-emptively and behaviourally change, to strengthen insulin sensitivity, not lose it over time".

The American is an ardent supporter of Singapore, and he said he is never leaving because "if you want to move your treatments from bench to bedside, from idea to implementation, Singapore is the place to be in".

"It's not the technology alone. You need leadership at a university that really supports what you do. You need accessible stakeholders, policymakers, regulators, reimbursement people, implementation scientists. Singapore, in my opinion, is the only place in the world where you can have that access at a timescale that lets you help people quickly and safely."

Salma Khalik