PRESS RELEASE

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Right patient, right dose, right time

NUS Medicine study uses AI to modify drug doses for personalised cancer treatment

Singapore, 24 April 2025 — While artificial intelligence (AI) has shown promising potential, much of its use has remained theoretical or retrospective. Turning its potential into real-world healthcare outcomes, researchers at the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine) have successfully utilised an AI platform to make precise recommendations for dose adjustments in 10 patients at the National University Cancer Institute, Singapore (NCIS) in Singapore.

Led by Professor Dean Ho, Director of the Institute for Digital Medicine (WisDM), NUS Medicine, the team tracked the cancer biomarkers, CEA and CA125, of 10 patients in Singapore who were diagnosed with advanced solid tumours, to create personalised 'digital twins' for each patient.

By analysing the changes in biomarkers in response to different drug doses, precise recommendations were made to adjust each patient's treatment plan. Over the period from the first dosing in August 2020 to the last dosing in September 2022, clinicians accepted 97.2 per cent of the recommended doses, with some patients receiving optimal doses that were approximately 20 per cent lower on average. The research trial marks a potential shift towards personalised oncology, where drug doses are dynamically adjusted for each patient during treatment, potentially reducing costs, rather than adhering to a standard, one-size-fits-all treatment regimen.

This approach to patient care is enabled by the CURATE.AI platform—developed by Prof Ho and team—an optimisation platform which harnesses a patient's clinical data, such as drug type, drug dose and cancer biomarkers, to generate an individualised digital profile to determine a customised optimal dose during chemotherapy treatment.

Prof Ho said, "Our team is among the few in precision medicine that have taken AI-driven treatment into real-world clinical settings. The results from our study represent a meaningful milestone in healthcare—demonstrating prospective, real-time optimisation of treatment based on an individual's own data. Currently, the collection of data is still mainly population driven—specifically, many patients' data is collected, but they are largely snapshots. However, patients evolve over time, yet their treatment is guided based on population data that does not

capture how each patient's status changes during the course of therapy. By leveraging AI to adjust drug doses based on biomarkers and patient data, we have unlocked a new frontier in personalised medicine." Prof Ho is also Head of the Department of Biomedical Engineering at the College of Design and Engineering (CDE) at NUS, and Director of the NUS N.1 Institute for Health.

The clinical lead of the study, Associate Professor Raghav Sundar, who was from the Department of Medicine, NUS Medicine, and the NUS N.1 Institute for Health at the time of the research, said, "These are important first steps that we have made in personalising chemotherapy drug dosing for our cancer patients. This is something that many of us as clinicians have hoped to have for our patients, but has been extremely challenging to translate from idea to implementation. The data from this research trial forms the basis for the next steps in the field of precision drug dosing in oncology." Assoc Prof Raghav was also a Senior Consultant in the Department of Haematology-Oncology, NCIS at the time of the research. He is currently an Associate Professor of Internal Medicine (Medical Oncology & Hematology) at the Yale School of Medicine.

As the field of AI-powered personalised medicine continues to advance, this work sets the stage for transforming clinical care by integrating data-driven approaches that are not only more precise but also adapted to each patient's treatment needs. Published in _Nature Partner Journals (NPJ) Precision Oncology_, the study is poised to expand into larger, randomised controlled trials with further refinements in design to validate the effectiveness of the CURATE.AI platform against traditional treatment regimens. The potential applications of the platform extend beyond oncology—it is already being adapted for use in other therapeutic areas, including immunotherapy, hypertension, and healthspan medicine within the longevity space.u

Nigel Foo, co-author of the study, and PhD candidate from Prof Ho's research team at WisDM, NUS Medicine, and the NUS N.1 Institute for Health, added, "It's not always about how much data is collected; in the context of therapy, it's about how the data is collected. By pairing drug dose changes with how cancer markers change, we can better understand how different drugs interact over time. Our method of using digital twins to guide individualised patient care is a key advance, especially as the field has traditionally focused on the retrospective use of data for diagnosis or prediction." He is also from the Department of Biomedical Engineering at NUS CDE.

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About National University of Singapore (NUS)

The National University of Singapore (NUS) is Singapore's flagship university, which offers a global approach to education, research and entrepreneurship, with a focus on Asian perspectives and expertise. We have 16 colleges, faculties and schools across three campuses in Singapore, with more than 40,000 students from 100 countries enriching our vibrant and diverse campus community. We have also established more than 20 NUS Overseas Colleges entrepreneurial hubs around the world.

Our multidisciplinary and real-world approach to education, research and entrepreneurship enables us to work closely with industry, governments and academia to address crucial and complex issues relevant to Asia and the world. Researchers in our faculties, research centres of excellence, corporate labs and more than 30 university-level research institutes focus on themes that include energy; environmental and urban sustainability; treatment and prevention of diseases; active ageing; advanced materials; risk management and resilience of financial systems; Asian studies; and Smart Nation capabilities such as artificial intelligence, data science, operations research and cybersecurity.

For more information on NUS, please visit http://www.nus.edu.sg/

About the NUS Yong Loo Lin School of Medicine (NUS Medicine)

The NUS Yong Loo Lin School of Medicine is Singapore's first and largest medical school. Our enduring mission centres on nurturing highly competent, values-driven and inspired healthcare professionals to transform the practice of medicine and improve health around the world.

Through a dynamic and future-oriented five-year curriculum that is inter-disciplinary and inter-professional in nature, our students undergo a holistic learning experience that exposes them to multiple facets of healthcare and prepares them to become visionary leaders and compassionate doctors and nurses of tomorrow. Since the School's founding in 1905, more than 12,000 graduates have passed through our doors.

In our pursuit of health for all, our strategic research programmes focus on innovative, cutting-edge biomedical research with collaborators around the world to deliver high impact solutions to benefit human lives.

The School is the oldest institution of higher learning in the National University of Singapore and a founding institutional member of the National University Health System. It is one of the leading medical schools in Asia and ranks among the best in the world (Times Higher Education World University Rankings 2025 by subject and the Quacquarelli Symonds (QS) World University Rankings by subject 2024).

For more information about NUS Medicine, please visit https://medicine.nus.edu.sg/

About the National University Cancer Institute, Singapore

The National University Cancer Institute, Singapore (NCIS) is an academic, national specialist centre for cancer under the National University Health System (NUHS), and is the only public cancer centre in Singapore that treats both paediatric and adult cancers in one facility.

As one of two national cancer centres in Singapore, NCIS (pronounced as "n-sis") offers a broad spectrum of cancer care and management from screening, diagnosis and treatment to

rehabilitation and survivorship, as well as palliative and long-term care. NCIS' strength lies in the multi-disciplinary approach taken by our clinician scientists and clinician-investigators to develop a comprehensive and personalised plan for each cancer patient.

NCIS provides the full suite of specialised oncology and haematology services at the NUH Medical Centre at Kent Ridge, Singapore, including those by the NCIS Chemotherapy Centre, NCIS Radiotherapy Centre and NCIS Cellular Therapy Centre.

NCIS also offers cancer services at other hospitals in Singapore:
• NCIS Cancer & Blood Clinic @ Ng Teng Fong General Hospital
• NCIS Radiotherapy Centre @ Tan Tock Seng Hospital
• NCIS Radiotherapy Clinic @ Khoo Teck Puat Hospital

To bring cancer care even closer to our patients, our NCIS on the Go programme delivers a range of cancer services at clinics within the community for their convenience. For more information, please visit www.ncis.com.sg.

About the National Medical Research Council (NMRC)

The NMRC was established in 1994 to oversee research funding from the Ministry of Health and support the development and advancement of biomedical research in Singapore, particularly in the public healthcare clusters and medical schools. NMRC engages in research strategy and planning, provides funding to support competitive research grants and core research enablers, and is responsible for the development of clinician scientists through awards and fellowships. The council's work is supported by the NMRC Office which is part of MOH Holdings Pte Ltd. Through its management of the various funding initiatives, NMRC promotes healthcare research in Singapore, for better health and economic outcomes.

About the National Research Foundation

The National Research Foundation, Singapore (NRF), set up on 1 January 2006, is a department within the Prime Minister's Office. The NRF sets the national direction for research and development (R&D) by developing policies, plans and strategies for research, innovation and enterprise. It also funds strategic initiatives and builds up R&D capabilities by nurturing research talent. Learn more about the NRF at www.nrf.gov.sg