

PRESS RELEASE

New “master switch” linked to aggressive breast cancer, with drug shown to slow tumour growth

Singapore, 18 August 2026 – Researchers at the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine) have identified a ‘master switch’ responsible for driving tumour growth in an aggressive form of breast cancer. Blocking the switch with a targeted drug was also found to reduce cancer cell growth and reduce its spread.

One of the deadliest forms of breast cancer, Triple-negative breast cancer (TNBC) accounts for approximately 15 to 20 per cent of breast cancers and is associated with a high risk of early recurrence, metastasis and poor survival¹. As TNBC is highly aggressive and lacks effective targeted therapies, a small population of cancer stem cells often resist treatment and fuels tumour regrowth in patients—leading to rapid metastasis and recurrence. Investigating the mechanisms that allow these cancer cells to survive, spread and resist therapy, the research team homed in on regulators of a key pathway driving TNBC known as Wnt signalling.

The research team identified a previously unknown master regulator, DP103, which creates a self-reinforcing cycle that keeps cancer cells growing, spreading and resisting treatment while maintaining the population of cancer stem cells responsible for disease recurrence. Following the discovery, the team further evaluated if an investigational targeted drug, RX-5902 (Supinoxin), could turn off this ‘master switch’ and block its effects in driving TNBC.

Published in [Cell Death and Disease](#), the study combined advanced molecular biology with state-of-the-art laboratory models, analysing patient-derived datasets, human breast cancer cells, and three-dimensional tumour models that better mimic how cancers grow in the body. The findings were then validated in laboratory models and human tumour organoids to determine whether blocking this pathway could slow cancer progression. Analysing 21 samples, the team found that the drug reduced cancer stem cell viability by 40 to 60 per cent. Tumour growth in the laboratory-grown tumour models also fell by about 50 per cent. In laboratory models, the treatment reduced tumour size by around 90 per cent while largely sparing healthy cells. It also extended survival, with 50 per cent of treated models reaching 70 days and beyond, compared to none in the untreated group.

¹ <https://www.nature.com/articles/nrclinonc.2016.66>; <https://jamanetwork.com/journals/jama/article-abstract/2721183>

Research Assistant Professor Alan Prem Kumar from the NUS Centre for Cancer Research (N2CR) and Department of Pharmacology, NUS Medicine, who is Principal Investigator of the study, said, “Patients with triple-negative breast cancer are facing an aggressive form of breast cancer with limited treatment options. Our findings suggest that DP103 could potentially serve as a diagnostic biomarker to identify the patients most likely to benefit from RX-5902 treatment, paving the way for a more precise, personalised approach to treating triple-negative breast cancer. Instead of treating all patients the same, future clinical trials could focus on those whose tumours have high levels of DP103, where the therapy is expected to have the greatest impact.”

Dr Cai Wanpei, the first author of the study, who was a PhD student at the N2CR and Department of Pharmacology, NUS Medicine, during the time of the study, added, “The RX-5902 drug is a first-in-class oral targeted therapy designed to block a key cancer-promoting pathway known as Wnt/ β -catenin. By preventing β -catenin from entering the cell nucleus, the drug switches off genes that drive cancer growth, spread and survival. This slows tumour progression and triggers apoptosis—the natural death of cancer cells.”

The research team involved collaborators from the NUS Cancer Science Institute of Singapore, Duke-NUS Medical School, Nanyang Technological University, National Cancer Centre Singapore, Singapore General Hospital, Agency for Science, Technology and Research, Rexahn Pharmaceuticals Inc, University of Edinburgh, University of Southampton, National Taiwan University and Curtin University.

Associate Professor Celestial T. Yap, a clinician-scientist from the N2CR and Department of Physiology, NUS Medicine, who is a co-author of the study, said, “Triple-negative breast cancer remains particularly difficult to treat because standard options such as surgery, chemotherapy, and immunotherapy do not work equally well for all patients, and resistance and recurrence are common. What makes this finding exciting is that DP103 may represent a new biological vulnerability in the disease, linking tumour growth, stemness, and treatment resistance. This discovery offers new insights that could support more precise patient selection and open the door to better targeted strategies for durable disease control and improved clinical outcomes.”

As abnormal Wnt signalling is a driving factor behind several other cancers, the impact of the research could extend beyond breast cancer and open new avenues for treating multiple aggressive cancers. The research team’s next steps include validating DP103 as a predictive biomarker in larger patient cohorts while further developing DP103-targeted therapies for clinical testing. They will also investigate combination treatments with existing therapies to further improve treatment outcomes.

This research is supported by the Singapore Ministry of Health through the National Medical Research Council (NMRC) Office, MOH Holdings Pte Ltd under the NMRC Clinician Scientist-Individual Research Grant (NMRC/CIRG/1396/2014), and the National Research Foundation, Singapore (NRF) under the Open Fund-Large Collaborative Grant (MOH-000206). The research is also supported by NRF (NRF-NRFF2012-054), Singapore Ministry of Education Academic Research Fund (MOE2014-T3-1-006), Singapore Ministry of Education Academic Research Fund (MOE-T2EP30120-0016), Singapore Ministry of Education Academic

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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.

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

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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 2026 by subject and the Quacquarelli Symonds (QS) World University Rankings by subject 2026).

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

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About the National Research Foundation (NRF)

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