



PRESS RELEASE

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NUS researchers develop new imaging approach to diagnose advanced form of non-alcoholic fatty liver disease

To improve the accuracy and sensitivity of diagnosing non-alcoholic steatohepatitis (NASH), the advanced form of liver disease, researchers developed the enzyme-sensitive nanoprobe, a device which emit signals that are more readily detected by Magnetic resonance imaging (MRI) techniques.

Singapore, 10 March 2023 — Non-alcoholic fatty liver disease is the most common chronic liver disease in the world. In its advanced form, Non-alcoholic steatohepatitis (NASH), is curable when diagnosed and treated in its early stages. However, when left untreated, it could progress to the irreversible stage of liver cirrhosis and cancer, making early diagnosis imperative.

However, to date, the only approach to definitively diagnose NASH is through a liver biopsy, which is often painful and invasive to patients. This renders an urgent need to develop better diagnostic approaches for NASH.

To tackle this issue, Assistant Professor Wang Jiong-Wei from the Department of Surgery and Nanomedicine Translational Research Programme at the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine), in collaboration with Professor Liu Bin from Chemical and Biomolecular Engineering at the College of Design and Engineering, National University of Singapore, led a team to develop an enzyme-sensitive nanoprobe to improve the accuracy and sensitivity of diagnosing NASH using an MRI technique. This study is published in [ACS Nano](#).

This device is used in the detection of NASH by targeting specific biomarkers in the liver—oxidative enzyme myeloperoxidase (MPO), which are biological molecules in the body that signal disease. In the liver of a NASH patient, high amounts of MPO are present. MPO is a key peroxidase released from the innate immune system to catalyze the formation of reactive oxidative species at the inflamed site of tissue.

The nanoprobe contains an enzyme substrate that would bind to the MPO in the liver, present in high amounts due to NASH. It will then emit a signal that can be readily detected by MR imaging techniques, providing more sensitive MRI data for the diagnosis of NASH.

Researchers are currently conducting follow-up studies to validate the effectiveness of the nanoprobe. This diagnostic tool can be combined with new drugs to monitor the treatment responses of NASH patients.

“This discovery emphasises the importance of Nanomedicine as a platform with two pillars – diagnosis and therapy. It is only with detailed and accurate diagnosis that effective treatment can follow,” said Professor Wang, co-lead author of the study.

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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 our NUS Overseas Colleges programme in more than 15 cities 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.

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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 2023 by subject and the Quacquarelli Symonds (QS) World University Rankings by subject 2022).

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