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$49m boost for NUS institute's research on age-related conditions

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Researchers from the Mechanobiology Institute (MBI) at the National University of Singapore will receive $49 million from the National Research Foundation to develop technologies and treatments for age-related conditions.

These conditions include infertility, chronic inflammatory diseases, muscle shrinkage and cancer.

The funding, which will be used over seven years, was announced at a press conference on Jan 22.

Mechanobiology is an emerging multidisciplinary field that encompasses the study of how cells and tissues sense and respond to mechanical signals or forces.

These forces regulate a wide range of biological activities, such as cell migration, cell proliferation and single molecule behaviour.

Led by Professor Rong Li, director of MBI, the 150 researchers will be employing state-of-the-art technologies such as high-yield molecular genomics, optical imaging and microfabrication.

Among other areas, they will be studying how cells maintain tissue health and respond to injuries and ageing.

Prof Li is also spearheading MBI's efforts to discover novel technologies to treat infertility by looking at how tissue mechanics leads to maturation of ovarian follicles.

According to her, the cells in a mammalian ovary go through a long and complex developmental process to reach fertilisation and develop into an embryo.

"Recent advances in a variety of technologies have provided new insights into how ovarian cells communicate and drive each step along the pathway to produce a mature egg," she said.

"By using innovative 3D culture systems, live imaging and force sensors, we can map the mechanobiology of these interactions. This will help us develop new approaches for enhancing fertility treatments and ovarian health during the ageing process."

She added: "Our mission is not just to make discoveries, but also to translate them into

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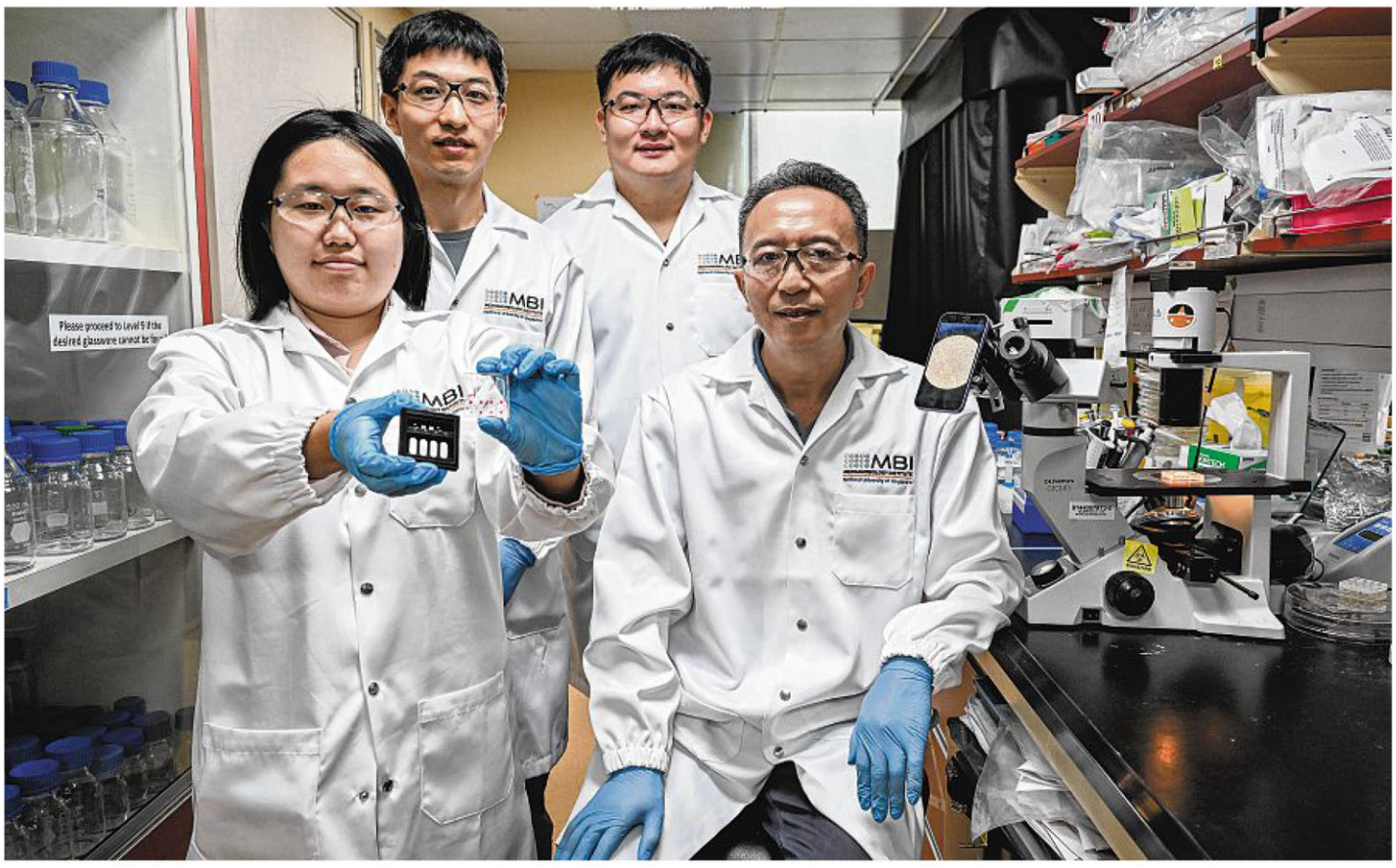
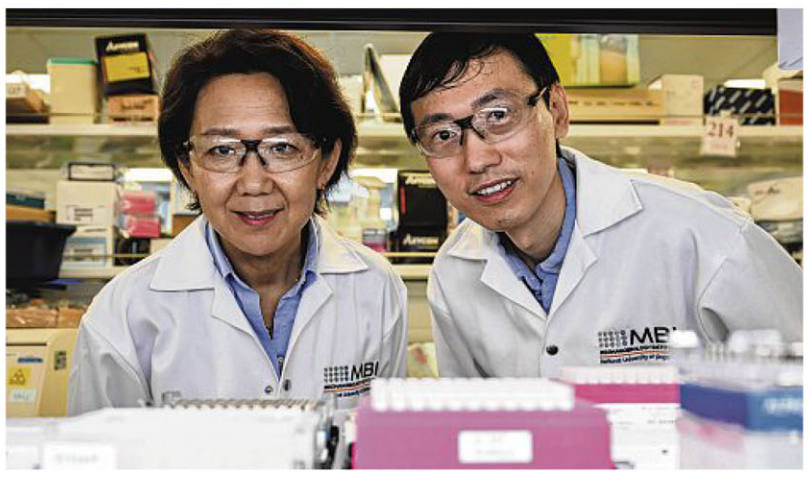


Professor Yan Jie (far right) and his team are using mechanobiology to develop sensitive, easy-to-use immuno-diagnostic platforms with the potential to diagnose cancer and ageing diseases such as Alzheimer's. The team members are (from left) Ms Jiang Yanqige, Dr Zhao Xiaodan and Dr Zhou Yu. ST PHOTOS: SHINTARO TAY

Diagnosing cancer and ageing diseases



Professor Rong Li (at left) is director of the Mechanobiology Institute at the National University of Singapore. With her is facility manager Zhu Jin.

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technologies that can benefit society, by helping to prevent, diagnose and treat human diseases."

MBI will also be collaborating with teams from National University Hospital, Nanyang Technological University, the Agency for Science, Technology and Research and overseas institutions.

In separate research at MBI, Assistant Professor Tsuyoshi Hirashima and his team are using intravital tissue imaging to peek into the dynamics of sperm and egg maturation, a study that could be translated into reversing reproductive ageing and fertility treatment.

This is especially important in Singapore, where more couples are having babies later in life and the country's total fertility rate is plunging.

The birth rate for Singapore in 2023 was 8.34 births per 1,000 people, a 0.95 per cent decline from 8.42 in 2022.

MBI also aims to apply mechanobiology in medical diagnoses and treatments, and is working with doctors and industrial partners in the development of diagnostic kits.

Another team is using mechanobiology to develop sensitive, easy-to-use immunodiagnostic platforms with the potential to diagnose cancer and ageing diseases such as Alzheimer's.

Based on this technology, the team has developed rapid test kits for Covid-19 and antibodies produced from a past infection or from recent vaccination against the virus.

Each test, using just a finger-prick blood droplet, can be completed within 30 minutes.

"This test kit can detect the nucleocapsid proteins at a concentration 100 times lower than most of the currently applied Covid-19 rapid test kits. We have been working with industrial collaborators for the commercialisation of these test kits," said Professor Yan Jie, the principal investigator.

The kits will be developed for use at home and will be as affordable as an antigen rapid test kit.

Over the next seven years, the National Research Foundation funding will also be used to support MBI's talent development. The institute aims to train 20 doctoral students in interdisciplinary science through its graduate programme.

It will also institute a new post-doctoral fellow training programme to identify and develop talented scientists to conduct both basic and translational research, which takes a broader and more collaborative approach.

"By leveraging new knowledge generated over the course of this grant, we will develop biomedical innovations and interventions aimed at improving healthy longevity in the population," Prof Li said.

"We strive to be a world leader in this area. We are already one of the leading centres in that we have published some of the more important work in this area in the last 10 to 15 years with a large number of very high-impact (peer-reviewed) publications.

"We also want to be a major hub for the international research community in mechanobiology."

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