



## PRESS RELEASE

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### **NUS researchers discover potential intergenerational impacts of physical activity and nutrition on placental methylation and fetal growth**

*Singapore, [31 August 2022]* — A healthy diet and active lifestyle may benefit pregnant mothers and their children, as shown in the intergenerational impact of maternal nutrition and lifestyle before and during pregnancy on fetal growth and offspring health. However, the underlying biological mechanisms remain unclear.

Homing in on this, a research team led by Professor Zhang Cuilin, Director of the Global Center for Asian Women's Health, and Professor with the Department of Obstetrics and Gynecology at the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine), in collaboration with investigators from the National Institutes of Health, USA, has been investigating longitudinal physical activity status and nutrition before and throughout pregnancy with placental DNA methylation and fetal growth.

"We hope to better understand both short-term and long-term health implications of diet and lifestyle on maternal and fetal health, as well as their underlying mechanisms. We aim to identify effective diet and lifestyle intervention strategies to promote the health and wellbeing of women, their children, and the entire family," Professor Zhang said.

One of Prof Zhang's latest research was to investigate maternal physical activity prior to and during pregnancy with intergenerational effects on offspring health through their impacts on placental DNA methylation. Placental DNA methylation, known as a process that regulates gene expression and cellular function in the placenta, has been critical for studying the processes related to fetal and maternal health. The placental DNA methylation pattern is crucial for regulating genes involved in the development of the placenta that affects fetal growth significantly.

With results published in the [American Journal of Clinical Nutrition](#), the team identified that recreational physical activity before and during pregnancy was significantly associated with a site of placental DNA methylation region responsible for regulating gene expression, which implied that maternal preconception and antenatal physical activity may impact the fetus' early-life cardiac, immune system, and nervous system development.

Another area of research focus led by Prof Zhang is on maternal nutrition and fetal growth. Her team of researchers recently explored the impact of different types and levels of fatty acids in early pregnancy with subsequent fetal growth throughout pregnancy. Published on the Lancet Discovery Science—[eBioMedicine](#), the team found that most plasma phospholipid poly-unsaturated fatty acids in early pregnancy, such as omega-3 fatty acids (e.g., docosahexaenoic acid (DHA) and alpha-linolenic acid (ALA)), could optimize fetal growth. The beneficial influence could last from early to late pregnancy.

Assistant Professor Queenie Li Lingjun from the Global Center for Asian Women’s Health and the Department of Obstetrics & Gynaecology at NUS Medicine said, “Findings from our longitudinal study not only provided novel insights into the differential roles of blood PUFAs in fetal development throughout pregnancy, but also determined how soon such effects kicked in and whether the effects lasted through pregnancy. By identifying some PUFAs that can be supplemented through diet, such as DHA, we might offer a potential target using PUFAs in early pregnancy to optimise fetal growth.” Assistant Professor Queenie Li Lingjun is also the first author of this study.

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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, 30 university-level research institutes, research centres of excellence and corporate labs 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 Asia's leading medical schools and ranks among the best in the world (Times Higher Education World University Rankings 2022 by subject and the Quacquarelli Symonds (QS) World University Rankings by subject 2022).

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