PRESIDENT'S TECHNOLOGY AWARD 2021

Associate Professor Too Heng-Phon
Associate Professor, Department of Biochemistry, Yong Loo Lin School of Medicine, National University of Singapore (NUS)
Associate Professor, NUS Centre for Cancer Research, Yong Loo Lin School of Medicine, National University of Singapore (NUS)
Co-founder, Chief Scientific Advisor and Non-Executive Chairman, MiRXES

"For his groundbreaking work in developing a method for accurate, versatile detection of microRNA disease biomarkers, leading to the clinical implementation of blood tests for early detection of diseases such as cancer"

For more than 10 years, Assoc Prof Too has been developing methods and assays for the accurate detection of microRNA (miRNA) biomarkers, the smallest pieces of genetic material. In 2010, he patented and published his work on the development of a miRNA qPCR assay platform technology which was subsequently commercialised and applied to the discovery of biomarkers for the early detection of cancers and other diseases. Notably, the technology has enabled the development of the world's first molecular blood test for the early detection of gastric cancer, which received the CE mark in 2017 and regulatory approval from Singapore's Health Sciences Authority in 2019.

The test, developed in collaboration with the Agency for Science, Technology and Research (A*STAR), National University Hospital (NUH), and Tan Tock Seng Hospital (TTSH), is already changing clinical practice in hospitals and clinics in Singapore, and allowing patients with gastric cancer to be detected early, when they have the best chance of survival. Regulatory submissions for the gastric cancer test are underway in Japan and China, countries with some of the highest gastric cancer incidence worldwide.

The gastric cancer diagnostic product's development process has been documented to form the basis of the standard for the validation of microRNA (miRNA)-based diagnostics published by Enterprise Singapore in 2020. The technology platform has also been validated to have industry-leading sensitivity in data published by MSD Translational Biomarker researchers.

In addition to being a faculty member of the NUS Yong Loo Lin School of Medicine, Assoc Prof Too is a scientific co-founder of MiRXES, a leading Singapore-headquartered biotechnology company started in 2014 as a spin-off from A*STAR, which has licensed and commercialised his miRNA detection technology. Today, the company is a global leader in miRNA technology and diagnostics. Apart from the gastric cancer blood test, the technology has been used to develop assays for early detection of lung and breast cancer, with clinical validation studies done in collaboration with clinicians from Singapore and overseas published in high-impact scientific journals in the last two years.

The technology developed by Assoc Prof Too has been made available to life science researchers worldwide by MiRXES as part of the company's suite of research reagents and services. It has been applied to basic research as well as clinical miRNA biomarker discovery for over 10 cancer types and over 30 disease types. Since its beginnings in Assoc Prof Too's lab, the mission of MiRXES has been to save and improve lives by translating research discoveries from lab to the clinic, and this continues to be the thrustof his research today.

Assoc Prof Too has published over 100 papers covering a broad spectrum of scientific and engineering disciplines, including translational and basic cancer research, neurobiology, metabolic engineering, gene therapy, molecular assay development, nanoparticles, and stem cell research. He has filed 18 distinct inventions in the field of disease diagnostics, therapeutics, and biotransformation, a number of which have been licensed by the industry.