

SCOPE

LATEST NEWS & EVENTS @ NMRC

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NMRC National Medical
Research Council
Singapore

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Saves Lives

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Award Winning Research

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With Biceps



Featured

NATIONAL MEDICAL EXCELLENCE AWARDS 2019

5 September 2019



NMEA awardees with Guest-of-Honour, Minister for Health, Mr Gan Kim Yong and MOH Senior Management.

Let me congratulate all our recipients this year. The awards not only recognise their outstanding achievements, but also spur healthcare professionals towards the common vision of excellence in healthcare for the benefit of our citizens.

Guest-of-Honour,
Mr Gan Kim Yong,
Minister for Health

The National Medical Excellence Awards (NMEA) 2019 was co-organised by the Ministry of Health and the SingHealth Duke-NUS Academic Medical Centre. The event, which was held at Capella Hotel on the 5th of September 2019, recognises outstanding clinicians and healthcare professionals who have made meaningful contributions to the advancement of healthcare in Singapore.

Graced by Guest-of-Honour, Minister for Health, Mr Gan Kim Yong, guests were first treated to "Swirl", a lively and colourful performance by the talented ladies of the Singapore Chinese Dance Theatre. Mr Gan kicked off the night's programme with an opening speech where he lauded the awardees for their achievements and contributions to the healthcare sector.

Next, dinner was served accompanied by instrumental renditions of classic and popular music by J'adore, an all-lady string quartet, followed by a formal award giving ceremony, presented by Mr Gan Kim Yong.

The National Outstanding Clinician Award 2019 went to Professor Aymeric Lim Yu Tang for his achievements in the advancement of hand and reconstructive microsurgery. Another notable award, the National Outstanding Clinician Educator Award, was awarded to Professor Tan Boon Yeow for his dedication and visionary contributions in Family Medicine. All in all, the 9 awardees across five categories were lauded with congratulatory support and well wishes from the audience.

National Medical Excellence Awards Recipients

National Outstanding Clinician Award

Professor Aymeric Lim Yu Tang

Associate Professor Chua Yeow Leng

National Outstanding Clinician Scientist Award

Adjunct Professor Goh Boon Cher

National Outstanding Clinician Mentor Award

Professor London Lucien Ooi Peng Jin

National Outstanding Clinician Educator Award

Associate Professor Tan Boon Yeow

National Clinical Excellence Team Award

Singapore Integrated Diabetic Retinopathy Programme (SiDRP)

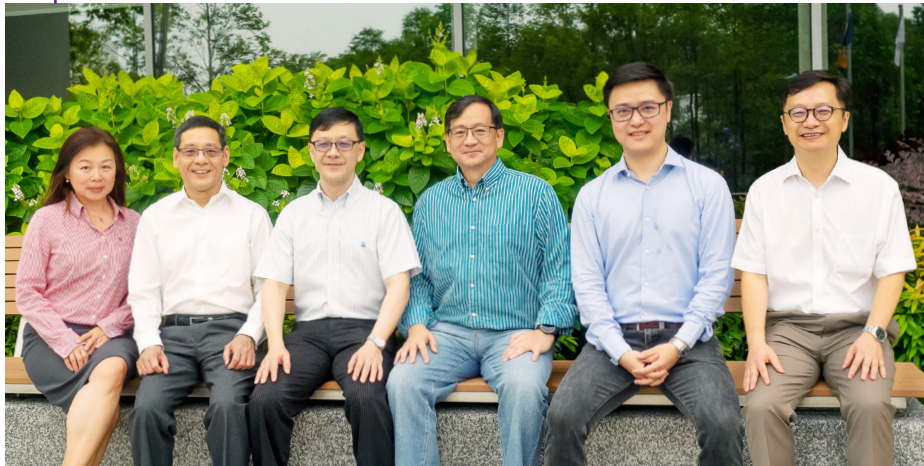
- Assistant Professor Gavin Tan Siew Wei
- Clinical Associate Professor Wong Hon Tym
- Associate Professor Colin Tan Siang Hui
- Ms Haslina Binte Hamzah



UNDER THE MICROSCOPE

EARLY DETECTION SAVES LIVES

**Bedside and Bench (B&B) Grant:
Development of a Novel, Non-invasive Serum
MicroRNA Test for Early Detection of Gastric Cancer**



(Left to right) Dr Sidney Yee, Prof Yeoh Khay-Guan, Prof Lam Kong-Peng, Prof Too Heng-Phon, Dr Zhou Lihan and Prof Jimmy So.

Gastric cancer is the fifth most common cancer and third leading cause of cancer deaths worldwide, with a five-year survival rate averaging at a low 30% globally, often due to late detection of the cancer. What if there was a way to detect the cancer earlier, potentially lowering the mortality rate?

Looking to develop an accurate, affordable and actionable solution for the early detection of gastric cancer, a dedicated team of Clinician Scientists came together and developed a gastric cancer serum microRNA (miRNA) assay, making the early detection of gastric cancer possible.

miRNAs regulate gene expression and can affect cancer genesis and progression. The development of a non-invasive screening test for gastric cancer spanned nine years, resulting in the development of GASTROClear, a world's first miRNA assay.

Post-completion of the prospective clinical validation study under the B&B grant, GASTROClear received regulatory clearance as a Class C medical device by Health Science Authority of Singapore (HSA) in May 2019. Upon approval, post-market studies have been planned to evaluate miRNA blood test implementation at primary care and tertiary care settings, with an initial cohort of 200 patients.

With the capabilities and experience gained through the development of the gastric cancer miRNA test, Clinician Scientists are now developing novel miRNA biomarkers for other disease application in both oncology and non-oncology fields.



Research Milestones

Phase 1 (2010-2011)

BTI research team developed a miRNA qPCR technology platform capable of accurately and robustly detecting miRNA from small amount of clinical specimen including blood and FFPE tissues

Phase 2 (2012-2014)

- BTI collaborated with Singapore Gastric Cancer Consortium (SGCC) to test the hypothesis that circulating miRNAs could serve as novel biomarker for detecting gastric cancer
- 75 miRNAs associated with gastric cancer were identified

Phase 3 (2015-2018)

- B&B grant was awarded in 2015, with the primary goal of conducting a large-scale clinical validation to evaluate the performance of identified miRNA biomarkers in over 5000 high risk individuals
- Local biotech company, MIRXES, was established to develop and manufacture quality and regulatory compliant miRNA in vitro diagnostic (IVD) assays

Project Details

Status/Progress:

Completed

Project Investigators:

Prof Jimmy Bok-Yan So (Clinical Co-PI) and Prof Lam Kong Peng (Basic Science Co-PI)

Host Institution:

National University Health System and Bioprocessing Technology Institute, A*STAR

(Class C IVD, HSA Registration No.: DE0503083)



GASTROClearTM, a serum miRNA gastric cancer biomarker assay.



Challenges Faced

Development of New Technologies

Due to the size of miRNAs — the smallest genetic material sized at a hundredth of a typical protein coding gene — the technology developed had to be sensitive enough to detect the miniscule genetic materials

miRNA Biology

The biology was largely unknown when the project began, with few scientific literatures available for reference

Recruitment and Management of Patients

The large scale of the clinical study required much dedication and coordination by the clinical team in SGCC over the course of three years

Development of the Assay

Without existing quality and regulatory standards for evaluating a novel miRNA assay, the teams had to develop parameters and standards in consultation with regulatory agencies and diagnostic industry experts



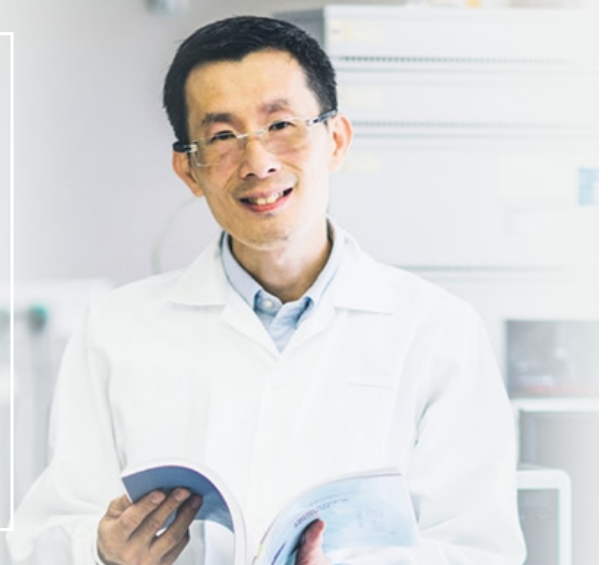
BEHIND THE SCIENCE

THE FIGHT AGAINST CANCER — AWARD WINNING RESEARCH

**Cancer Pharmacology and Drug Development with
Adjunct Professor Goh Boon Cher, recipient of the
NMEA 2019 National Outstanding Clinician Scientist Award**

"I have had the opportunity to work with many talented and creative scientists who are passionate about their research, and have outstanding productivity. I regard this as a team award, which I have received on their behalf, for their hard work and dedication."

Adj Prof Goh Boon Cher,
Deputy Director (Research) & Senior Consultant,
Department of Haematology-Oncology,
National University Cancer Institute, Singapore



Early in his career as an oncologist, Prof Goh would watch helplessly as patients suffered the side effects of chemotherapy and those who did not respond to treatment succumbed to cancer. Spurred by his feelings of helplessness and the despair of patients' loved ones, he developed a passion for cancer pharmacology and drug development.

Believing that the key to selecting the most effective drug and dosage for patients stems from an understanding of the science behind the treatments, Prof Goh began further research when he noticed a link between the differences in drug effects between people of different ancestries. He hopes that, through his work and the work of others in the same field, they will be able to make an impact on the prognosis of cancer.

On receiving the National Outstanding Clinician Scientist Award, Prof Goh credited the hard work of various research teams and collaborators, along with the guidance of his mentors. He is especially thankful to Professor John Wong Eu Li, Chief Executive of NUHS, and Professor Mark Ratain from the University of Chicago, for seeing potential in him and encouraging his work. He is also grateful to his loving and supportive wife Dr Marie Stella Platon Cruz, herself a busy physician, and family for understanding the time spent on his work.

What Makes Work Rewarding

"In the novel Phase 1 trials that we conduct, many patients who would have died from their cancers have had their lives prolonged as a result of participation in these trials, and this has been a source of encouragement and joy to me. I have received many words of encouragement from the patients, and their relatives to keep up this effort."

- Adj Prof Goh Boon Cher

Notable breakthroughs and discoveries:

- The enzymatic breakdown of a commonly used chemotherapy drug, docetaxel, is more toxic in East Asians due to a variable functional activity of the enzyme
- Compared to Indian and Caucasian patients, Chinese patients are more sensitive to warfarin, a blood thinning agent, due to genetic variation of the target protein and Vitamin K epoxide reductase
- A formula was derived, based on Singaporean patients, to predict the correct dose of warfarin needed for each individual
- Development of novel drugs that target tumour blood supply and altered tumour metabolism
- Through strategies based on activation of the immune system, treatments for nasopharyngeal cancer, the most common head and neck cancer in Singapore, is currently in the midst of development



Prof Goh with his supportive family at the NMEA 2019 awards ceremony.



FROM LAB TO LIFE

STAYING STRONG WITH BICEPS

Innovation to Develop (I2D) Project — Bio Ionic Currents
Electromagnetic Pulsing Systems (BICEPS) for Human Muscles



QuantumTX invites you to join us and Sit, Click, and Get Fit! (Left to right) Team members Janice Yue, Fann Lee, A/Prof Alfredo Obregon, Dr Juerg Froelich, Jingze Li and Ivan Goh.

Muscle, our largest tissue mass, plays a major homeostatic role over whole body maintenance and repair. The growth of muscle depends on physical activity, and inactivity will undoubtedly cause muscle loss. An ageing population in Singapore also means more individuals will face the challenge of natural deconditioning that comes with age.

In order to lessen the physiological consequences of muscle loss for those who find it difficult or are unable to exercise, a team of Clinicians at National University Health System (NUHS) has developed BICEPS, a device which delivers pulsed electromagnetic fields (PEMF) to reduce muscle degradation. QuantumTX, a spin-off company from the Department of Surgery, Yong Loo Lin School of Medicine, National University of Singapore was launched for the commercialisation of BICEPS, through funding from investors and government agencies including National Health Innovation Centre (NHIC).

The device is tuned to target mitochondria (the key players in adaptive responses modulating systemic metabolism and tissue regeneration) as muscle is the body's greatest source of mitochondria. As a result, BICEPS recapitulates many of the regenerative, energetic and metabolic responses that physical activity provides. This lessens the impact of muscle loss for the elderly and for individuals recovering from acute accidents or surgery.

Insights from NHIC

What were the reasons behind the decision to fund this project?

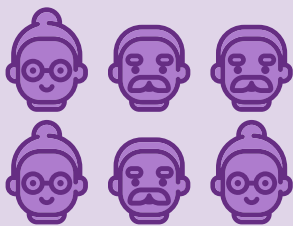
The BICEPS device is exemplary of NHIC's mission of supporting the translation of new innovations that lead to improvements in healthcare. Prior to BICEPS, other existing PEMF devices required hours of daily application for any results, while BICEPS requires as little as 10 minutes of exposure per week to elicit effects.

Insights from Quantum TX

Are there plans for future implementations of BICEPS?

The overall goal is to bring the benefits of the magnetic mitochondria activating platform to various groups in the community, specifically those who are unable to exercise. QuantumTX is currently partnering various elderly fitness programmes, community centres and senior activity centres to improve care of elderly in the community, as well as collaborating with hospitals to introduce BICEPS to aid in patient recovery. Through this, the team is working towards a wider adoption of BICEPS into the daily lifestyles of the elderly in Singapore.

BICEPS and the Elderly



Elderly past the age of **60** tend to face increasing rates of deconditioning

Recommended amount of weekly exercise for the elderly:



150 minutes
of aerobic exercise



2 resistance sessions



Effects of BICEPS are evident with just **10 minutes** of exposure per week