

SCOPE

LATEST NEWS & EVENTS @ NMRC

Issue 01 | June 2019

NMRC National Medical
Research Council
Singapore

P.2 A Deeper Look into
Parkinson's Disease

P.3 In the Nick of Time

P.4 Shining A Light on
Diabetic Retinopathy



Featured

AWARDS CEREMONY AND RESEARCH SYMPOSIUM 2019

3 – 4 April 2019

Event Highlights

Wednesday 3rd April

Soothing that Insatiable Itch
Dr Tey Hong Liang

How to Die Young at a Very Old Age
Prof Nir Barzilai

Thursday 4th April

**Using the NUSMart Web-Based
Grocery Store to Improve Diet
Quality Among Singaporeans**
Prof Eric Finkelstein

**Rethinking Treatment Approaches
to Schizophrenia**
Dr Jimmy Lee



Past and present NMRC chairmen with the Guest-of-Honour, Minister for Health, Mr Gan Kim Yong (third from left).

Coinciding with NMRC's 25th anniversary, the Awards Ceremony and Research Symposium 2019 celebrated NMRC's best and brightest for their achievements and contributions — over 300 luminaries attended the two-day event at One Farrer Hotel.

NMRC Chairman Prof Ranga Krishnan kicked off things with a welcome address; as did Guest-of-Honour, Minister for Health Mr Gan Kim Yong, who announced four programmes awarded a total of \$82 million in funding under the Open Fund – Large Collaborative Grant (OF-LCG). This marks the highest quantum awarded in a single grant call since the inception of the scheme in 2016.

Joining Prof Krishnan on stage were his predecessors, in a tribute to those who led NMRC to greater heights. Next, 56 researchers were honoured for their unwavering dedication to healthcare research. It included Prof Antonio Bertolotti, Prof Karl Tryggvason and Prof Toshio Suda; all presented the Singapore Translational Research (STaR) Investigator Award. The award winners were also celebrated with a photo wall that lauded their achievements.

Plenary speakers shared expert knowledge in their fields, beginning with Prof Nir Barzilai's research on how genetics might affect human lifespans. His humorous speech was a hit with the audience, and other plenary speakers followed suit with stimulating presentations. The event was also a golden opportunity to highlight NMRC's achievements in its 25-year journey, via a timeline wall at the reception area.



Highlights of NMRC's journey over the past 25 years (click to enlarge)

“Scientific discoveries and new research evidence are fundamental in the development of medical innovations that can translate into better clinical practices and policies, leading ultimately to improved patient care and better health for our people.”

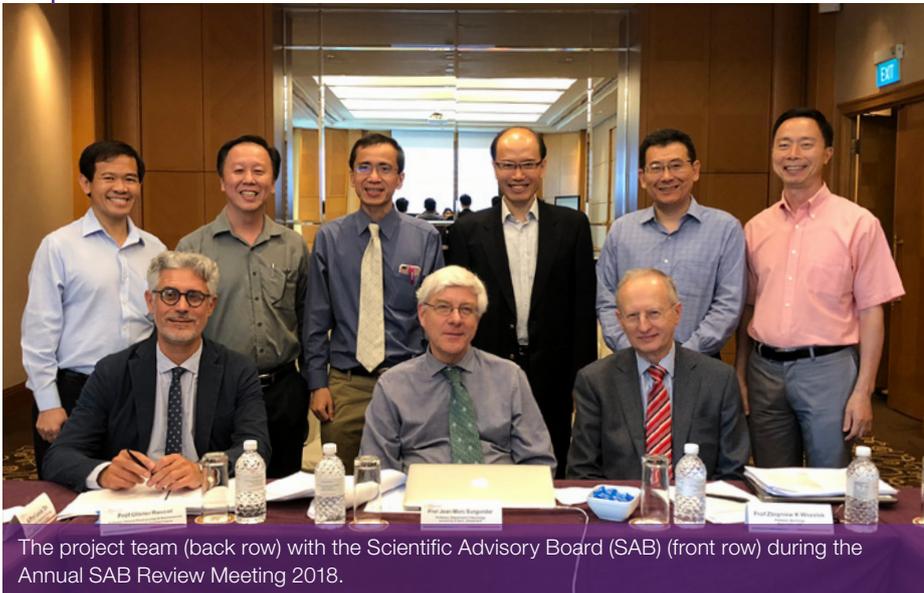
Guest-of-Honour,
Minister for Health,
Mr Gan Kim Yong



UNDER THE MICROSCOPE

A DEEPER LOOK INTO PARKINSON'S DISEASE

National Parkinson's Disease Translational Clinical Research Programme



The project team (back row) with the Scientific Advisory Board (SAB) (front row) during the Annual SAB Review Meeting 2018.

Project Details

Status/Progress:
Ongoing

Project Leader:
**Professor Tan Eng King,
National Neuroscience Institute (NNI)**

Funding:
**About \$25 million
(May 2014 to Nov 2019)**



Professor Tan Eng King

Imagine a future where Parkinson's Disease (PD) is no longer a burden. That is what Professor Tan Eng King and his team aim to achieve through research and clinical investigation. In the past four years, the team has accomplished significant milestones and secured various collaborations with academic and industry partners. The programme is one of the two largest funding programmes that NMRC awarded to the PI and team - Translational and Clinical Research (TCR) Flagship Programme and Singapore Translational Research Award (STaR).

A key objective is to take research endeavours and translate them into actual clinical results that are useful in the development of improved treatments for PD patients.

The team has also delved into the non-motor features of PD, an area that was previously overlooked despite being a common and significant part of disability in PD patients. Specifically, uric acid was found to be potentially neuroprotective for PD sufferers. By investigating the relationship between serum uric acid levels with motor and non-motor features in a prospective early PD cohort study, the team was able to conclude that higher serum uric acid levels were associated with less fatigue in early PD.

In the short-term alone, the first results regarding environmental factors identified from on-going cohorts will drive better understanding of risk factors — significant for the development of public health strategies. The team has also made contributions to the improvement of PD diagnostic and therapeutic guidelines. Looking forward, there is possible implementation of novel therapeutic and even personalised approaches.

“[We hope we] can make discoveries that can make a difference to reduce the disease burden for our patients. Even if we do not find a cure, we hope through our research we will be in a better position to better advise our patients to share with them the latest status of the various treatment options and potential preventive measures to take.”

Professor Tan Eng King



Research Milestones

One-a-day Pill

Developing a nano-capsule that allows for the release of multiple drugs at a controlled rate. In the future, a single pill might replace the nine pills conventionally prescribed to PD patients.

Lab-Grown Mini Brains

Studies and tests can now be conducted on newly developed drugs directly on mini brains grown in the lab.



Potential Breakthroughs

- Screening models for the screening of novel neuroprotective compounds.
- Innovative therapeutic and tailored approach to analysing and treatment of PD.
- Better understanding of risk factors that will be helpful for public health strategies.



Lab-grown mini brains, a breakthrough in medical science.



BEHIND THE SCIENCE

IN THE NICK OF TIME

Pre-Hospital Emergency Care with Professor Marcus Ong, NMRC Clinician Scientist Award (CSA) Recipient

“My goal is to make things better. This might be in the form of improving health outcomes for patients, finding more cost effective treatments, improving quality of life for patients or improving system efficiencies for staff.”

Professor Marcus Ong



As a young doctor in the Emergency Department, NMRC Clinician Scientist Award (CSA) Recipient Professor Marcus Ong saw many patients in cardiac arrest with ongoing resuscitation. For such patients, the odds of survival were traditionally low.

It was during his service as an Officer Commanding (OC) of the Singapore Armed Forces (SAF) paramedic school that he noticed something – there were many gaps to be filled in the prehospital chain of survival. Sparked off by the epiphany, he began to realise that it takes a holistic system to save lives. This inspired him to go into research, focusing primarily on pre-hospital emergency care, medical devices and health services research.

In a career spanning over 20 years, Professor Marcus Ong has received various awards, such as the Ian G. Jacobs Award for International Group Collaboration to Advance Resuscitation Science, by the American Heart Association, for his studies in the Pan-Asian Resuscitation Outcomes Study network. He has also published more than 200 papers in international and local peer-reviewed journals.

Some of his notable achievements for the medical industry and the general public include:

Medical Industry

100% of the Singapore Civil Defence Force (SCDF) dispatchers have been trained in providing members of public with instructions on how to perform CPR over the phone.

Advanced treatments such as mechanical CPR, laryngeal mask airways and intra-osseous vascular access for administration of drugs, were added to the national ambulance services to increase patient’s chances of survival from cardiac arrest.

Deployment of SCDF’s firebikers and firefighter/EMT high performance CPR teams as first responders to deliver quicker treatments to cardiac arrest patients.

Re-allocation of SCDF’s ambulances and staffing to optimise ambulance deployment and shorten ambulance response time

Public

The Dispatcher Assisted First REsponder (DARE) programme was successfully implemented, with over 85,000 people trained in simplified CPR and AED skills at schools, public and private organisations, places of worship and community centres, among others.

Close to 5,000 public access defibrillators have been installed islandwide at public housing blocks under the Save-a-Life initiative since 2015.

Technological innovations like the myResponder application, along with certifications like the CPRcard, continue to empower more laypersons to render help during a cardiac arrest event.

Over the last ten years, bystander CPR has more than doubled from 22% to over 50%, and bystander AED rate has increased from 1% to 5%.

Cardiac arrest survival rates have increased tenfold over the past 15 years, from 2% to more than 23%.

What Makes Work Rewarding

What makes my job exciting is that I can ask a research question as a clinician scientist, collect the evidence and interpret the data, translate that into policy, a protocol or even a new ambulance law, educate and train providers and paramedics, then evaluate again how it has been implemented. This closes the whole loop of implementation science, and is the best way to improve our system.

I have a fantastic research team. In particular, I want to acknowledge my research nurse, Ms Susan Yap, who is dearly missed, passing in February this year after a six-month battle with pancreatic cancer.

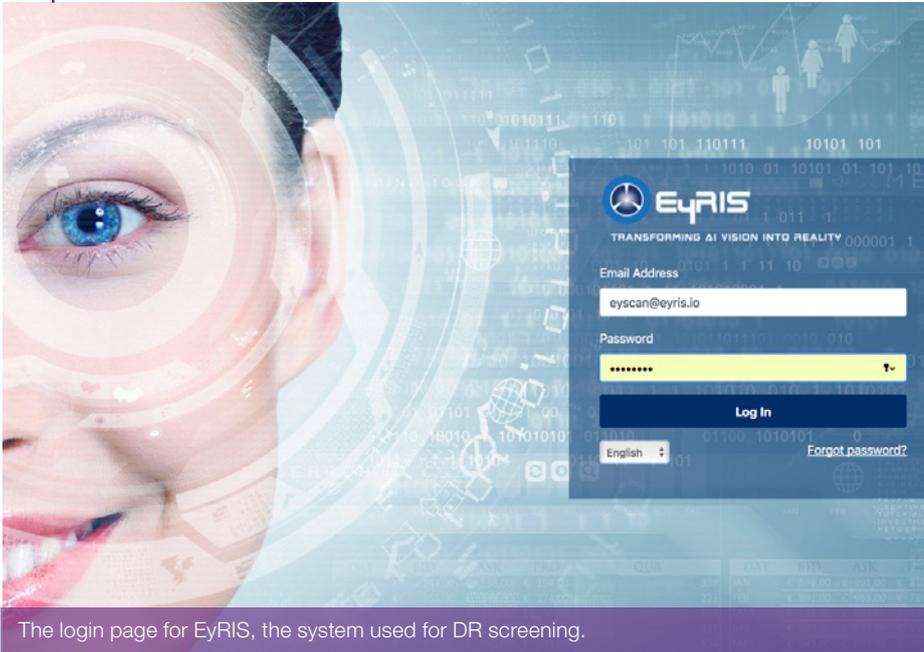


FROM LAB TO LIFE

SHINING A LIGHT ON DIABETIC RETINOPATHY

I2D Project — SELENA™

Singapore Eye LEsion Analyser



The login page for EyRIS, the system used for DR screening.

Diabetic Retinopathy (DR), a common and specific microvascular complication of diabetes, is one of the leading global causes of preventable blindness. In Singapore, a recent study found that 80% of patients with DR were undiagnosed, and 25% of them had developed vision threatening DR.

Early detection, accurate evaluation and timely treatments are essential to blindness prevention in DR. However, the manual-intensive process of examining and grading patient's retinal images is a hindrance to the effective widespread test for its detection.



Professor Wong Tien Yin

SELENA, a National Health Innovation Centre (NHIC) backed I2D project, and part of the NMRC-funded STaR programme awarded to Professor Wong Tien Yin, Medical Director, Singapore National Eye Centre (SNEC), employs cutting-edge image analysis and deep learning techniques to provide an automated and instantaneous detection for DR. This reduces the workload and cost for widespread DR screening.

The Artificial Intelligence (AI) algorithms in the deep learning system present in SELENA makes it possible for the assessment and categorising of the raw images captured. The images are first assessed for image quality, then categorised into non-referable and referable diabetic retinopathy, before going through subcategorisation to separate the cases where the damages are threatening the patient's sight.

This deep learning system was developed using over 70,000 images collected and anonymised from the Singapore Integrated Diabetic Retinopathy Programme (SIDRP) from 2010 to 2013, and validated through over 80,000 images collected in SIDRP over the next two years. Further validation of the system was done with ten additional datasets containing more than 3,000 diabetic patients, carefully chosen from international academic partners and the team's local epidemiology studies.

Diabetes in numbers



347 million people with diabetes mellitus worldwide

Projected to approach **600 million** people by 2035



1 in 3 Singaporeans (70 and above) is expected to have diabetes

Insights from NHIC

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

NHIC has been looking for quality and impactful healthcare projects to fund so that the funded technology can achieve economic as well as healthcare outcomes. SELENA is a successful translational example that has reshuffled the traditional clinical workflow and made an impact in creating value to the healthcare system.

Are there plans for future implementations of SELENA?

The Singapore Eye Research Institute (SERI) & National University of Singapore (NUS) project team has further expanded SELENA's capabilities in detecting other ocular conditions such as glaucoma and age-related macular degeneration. This enhanced version, SELENA+ has been licensed and spun off as a company named EyRIS Pte Ltd.

The team is also working with Integrated Health Information Systems (iHIS) to deploy SELENA+ in our SIDRP tele-ophthalmology platform, a real-time screening programme offered by Singapore National Eye Centre (SNEC) and Tan Tock Seng Hospital (TTSH) at all 19 polyclinics in Singapore.