SINGAPORE EYE RESEARCH INSTITUTE
Quarterly Newsletter

Singapore National
Eye Centre
SingHealth

AUGUST 2020

VOL 1 ISSUE 1

A MESSAGE FROM OUR EXECUTIVE DIRECTOR, PROF AUNG TIN

I am pleased to present SERI's first e-newsletter to you, during such turbulent times. The world has changed overnight for most of us, and we are learning to communicate virtually and work remotely, while striving to maintain the research excellence that's the hallmark of SERI.

At the outset, let me thank each one of you for responding promptly and efficiently to the challenges posed by the Covid-19 pandemic. With ever-changing guidelines and disruption happening every week, we are trying hard to ensure that our clinicians, researchers and staff have access to critical resources while keeping their safety as the topmost priority.

We hope this quarterly newsletter will help you stay connected with the happenings at SERI and will bring us all closer, during these times of isolation. I hope our SNEC/SERI family remains healthy, safe and vigilant, while we continue to promote good safety measures and a positive work environment, both virtually and in our workplace.

Thank you for your continued support of our mission and vision as we brace ourselves to welcome a new normal in our working lives.

Prof Aung Tin

New Research Heads at SERI

DR DANIEL TING SHU WEI
Head,
AI & Digital Innovations

SERI has established a new AI & Digital Innovation Research Group in 2020, headed by Dr Daniel Ting Shu Wei. It brings together a multi-disciplinary team consisting of experienced ophthalmologists, clinician scientists, as well as computer scientists, AI and block chain technology experts.

His team aims to harness the power of Artificial Intelligence (AI), big data and digital technology to provide world-class eye care service while ensuring great patients' experience and journey.

Dr Michael GIRARD,
Co-head
Bioengineering & Devices

At SERI, Dr Girard is heading the Ophthalmic Engineering & Innovation Laboratory (OEIL) and co-heads the Bioengineering & Devices Research Group.

Through his 15-years expertise in Ocular Biomechanics and AI/Imaging, he will aim to maintain his leadership in the field of Glaucoma, but also pose and address new questions of clinical relevance in the general field of Ophthalmology.

DR RUPESH AGRAWAL
CO-HEAD
ANTI-INFECTIVES RESEARCH

At SERI, Dr Rupesh co-heads the Anti-infectives Research Group. His team aims to develop and spearhead a global integrated hub for the advancement of basic and translational research in ocular infections and antimicrobials.

Ocular infections demand prompt attention by both patients and clinicians. He believes that decisions about treatment of ocular infections must be informed by scientific understanding of both systemic and ocular infections and antimicrobials.
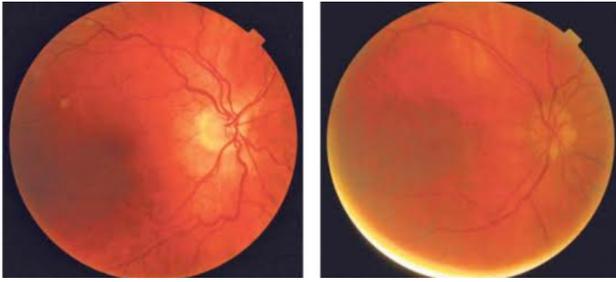
Image of the Optic Nerve Head/Disk at the back of the eye in a normal patient (left) compared to the Optic disk of a patient with brain tumor showing subtle changes in them (right). *PC: SNEC*

USING AI TO DETECT PAPILLEDEMA & SERIOUS HEALTH RISKS FROM EYE IMAGES

Papilledema is the swelling of the optic nerve, that is located at the back of the eye. One of the important causes of this swelling is fluid build-up around the brain, leading to an increase in intracranial pressure. However, there could be underlying serious conditions causing this swelling such as brain abscess, brain tumors and infections such as meningitis or encephalitis. Even though Papilledema is rare, it can lead to blindness or even death, hence it is crucial to detect this early.

An international consortium called BONSAI (BONSAI: Brain and Optic Nerve Study with Artificial Intelligence) has successfully used an AI-based, deep learning system to look at multiple photographs of the back of the eye (optical disk) to infer whether the eye is normal, has papilledema due to intracranial pressure or papilledema due to other abnormalities. This is a landmark study, because the AI system has shown 96% sensitivity in detecting eye images that show papilledema and that too in a few seconds, at minimal cost! This could be particularly helpful in emergency departments, in neurology practices and even in general practitioner clinics where there may be a lack of trained ophthalmologists to diagnose.

This AI system was developed by a global collaboration of scientists, including researchers from Singapore Eye Research Institute (SERI), Duke-NUS Medical school and Agency for Science, Technology and Research (A*STAR). The study involved over 7,532 patients from multi-ethnic communities from 25 centres around the world and the AI-system was trained to detect papilledema and normal optical discs from over 15,846 ocular fundus photographs.

"Papilledema is rare.. In this study, the machine was trained by being exposed to more pictures of papilledema and other optic disc abnormalities than what one specialist can see in a normal practice over a long career. Transferring such skills to AI-based medical devices may contribute to evolving new ways of practising medicine at a distance, in order to better protect patients and healthcare providers, especially in our Covid-19 era", said Professor Dan Milea, a neuro-ophthalmologist and a senior consultant at the Singapore National Eye Centre (SNEC) who was part of the study.

The study was published in the prestigious medical journal, *New England Journal of Medicine* titled "**Artificial Intelligence To Detect Papilledema From Ocular Fundus Photographs**" in April 2020. Currently, this AI-based system is being used in a pilot, prospective, real-life study at Singapore National Eye Centre.
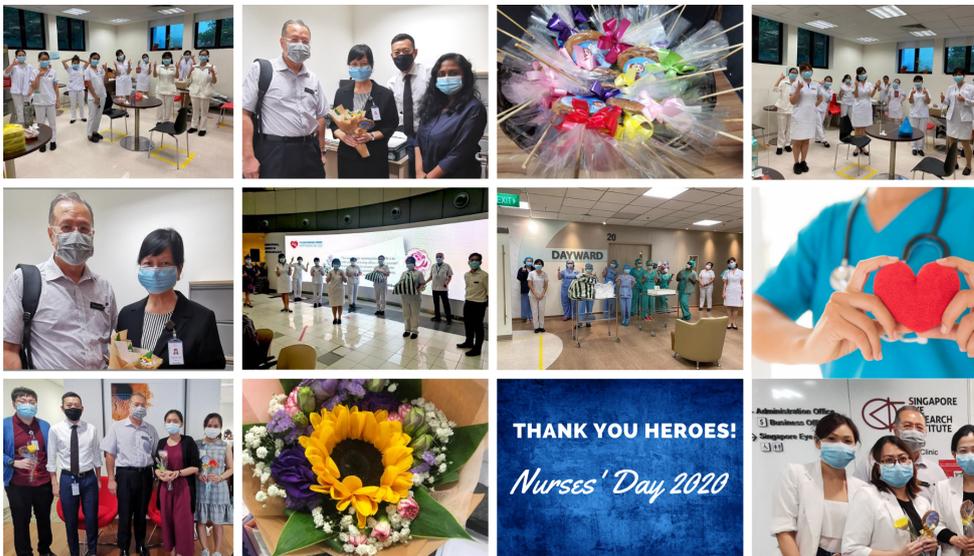
CAREER DEVELOPMENT SEMINARS

Dr Sarada Bulchand,
Lead, Career Development Program,
Lead Associate AMEI,
Duke-NUS Medical School

1st Professional Development Webinar was on "**Scientific presentations: The small things that make a big difference**"

Mr Kyle D. Hegarty,
Author, Managing Director of
Leadership Nomad

2nd Professional Development Webinar was on "**THINK ABOUT YOU – Build self-awareness and learn how to enhance workplace relationships remotely**"

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