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New Hope For Paediatric Leukaemia Patients

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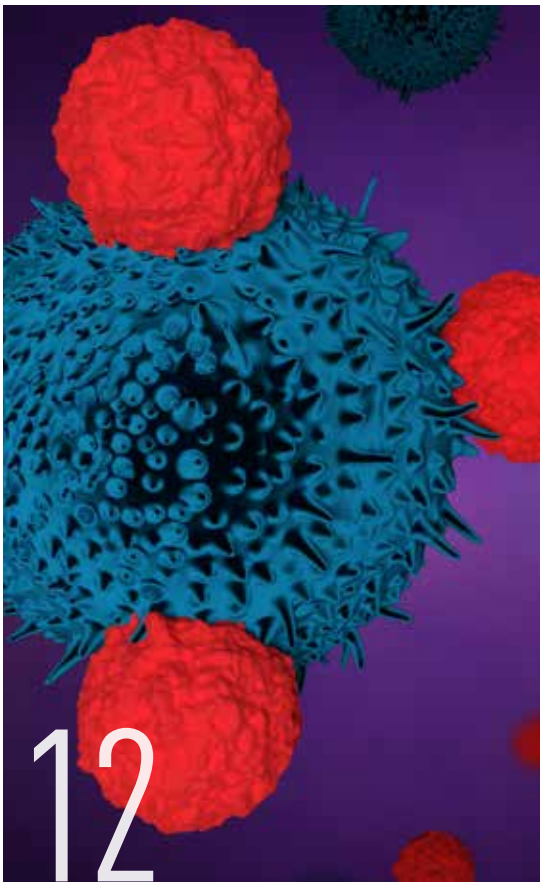

COVER STORY

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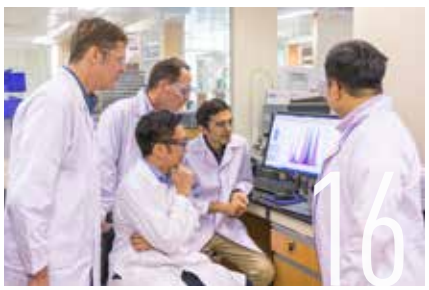

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A team of researchers from the Department of Pharmacology identified biomarkers for the prediction of Type 2 diabetes.

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Prof Aymeric Lim's recent talk provided staff and students at the National University Health System some insight into his journey in orthopaedic surgery.

NUS Yong Loo Lin School of Medicine

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DEAN'S MESSAGE

Dear Reader,

The vision of a Singaporean medical school to train doctors was made real through the generous support of the local community. Over the years, our student intake has become more diverse and more closely reflects the socio-economic fabric of our society. While generalisations of these young men and women as academically outstanding are common, what is less known is the fact that one in six of our students today receive financial support to enable them to continue with their studies.

So it was with much gladness that we welcomed the announcement by the Prime Minister during the National Day Rally in August, that government bursaries for the Medicine undergraduate programmes in local universities would be boosted from the next academic year. The good news meant that along with bursaries from the universities, needy students would pay tuition fees of at most $5,000 a year. This quote from the Prime Minister is noteworthy: "We should not let the cost of medical school deter good students from studying medicine and becoming doctors. In fact, we want doctors to come from different segments of society, and have diverse educational and family backgrounds."

Here at the NUS Yong Loo Lin School of Medicine, we do our best to ensure that our students are not deprived of a good education because of financial difficulties. Thanks to the Government and the generosity of donors, our financially disadvantaged students are given the peace of mind to focus on their studies.

In AY 2018/2019, the NUS medical school awarded a total of 68 student bursaries and scholarships to 216 students. Of these, 22 are established by alumni. We will continue to raise funds for student bursaries to ensure that we can help as many students as possible. With the increased financial aid and the continued support of our donors, we are confident that we will be able to help more students who need financial assistance. And in this way, we continue to maintain NUS Medicine's founding vision as a medical school made possible through the steadfast support of the community that it serves.

Yours sincerely,

Yap Seng

Experimenting new looks with the new NUS Medicine scarves.

At The Beginning With You

Students filling in reflection cards with their motivations and impetus for studying Medicine.

Students showing off the 2019 Bicentennial Edition of the NUS Yong Loo Lin School of Medicine Scarf and Tie.

Welcome Dinner

At the NUS Yong Loo Lin School of Medicine's inaugural Welcome Dinner on 28 July 2019, Phase I students gathered in the dining hall of the College of Alice and Peter Tan, to mark the beginning of their medical education. Through a symbolic candle-lighting ceremony with their professors, the new students pledged to set out on their journey with humility, integrity, respect and compassion. There was much banter and laughter over dinner with new-found family.

“The five years that you are going to spend with us will be transformative ones that will shake you and shape you. Shake you, because much of what you will see, learn and experience will rattle your pre-conceived notions and ideas. Shape you, because the rigorous training that you will undergo will challenge you not just to become a competent doctor. ...We want you to become the kind of doctor you yourself would choose to care for your loved ones.

— Prof Chong Yap Seng
Dean, NUS Medicine

TOP:
Assoc Prof Lau Tang Ching, Vice Dean for Education at NUS Medicine giving the opening address on behalf of the Dean.

LEFT:
Ten Phase I House Representatives bearing their house flags, preparing for the ceremonial march-in.

BOTTOM:
The NUS Medicine faculty preparing to share their legacy with the incoming students with a ceremonial passing of candles.

White Coat Ceremony

The annual White Coat Ceremony saw 280 first year students gathered at the University Cultural Centre, on 15 August 2019. For medical students worldwide, this significant robing ceremony is a rite of passage and symbolic start into the medical profession. Witnessed by their friends and family, these new students received their first white coats from their professors. The ceremony saw them taking the medical students' pledge, promising to adhere to the conduct and practice of medicine, and exercise compassion, integrity, humility and respect in all they undertake.

1.

"This event is not a mere ritual. It signifies three important things: the beginning of a meaningful education in medicine; an acknowledgement of your potential as a doctor; and most crucially - a solemn promise that you will, henceforth, uphold the integrity of the medical profession that you are preparing yourselves for.

— Prof Chong Yap Seng
Dean, NUS Medicine

2.

3.

"Our patients and their families expect us to act respectfully, with integrity, compassion and humility. That is what the physician's white coat symbolises, and I hope you will bear this in mind every time you put on one. This is also why Medicine is a "calling" and not just a "career".

— Dr Koh Poh Koon
Senior Minister of State for Trade and Industry

1.
Dean, NUS Medicine, Prof Chong Yap Seng delivers a speech.

2.
Guest-of-Honour Senior Minister of State for Trade and Industry, Dr Koh Poh Koon (middle); Dean of the NUS Yong Loo Lin School of Medicine, Prof Chong Yap Seng; Vice-Dean for Education, Assoc Prof Lau Tang Ching and other professors of the School gathered to present the new Phase I students with their first white coats.

3.
Phase I students taking the Medical Students' Pledge.

Healthcare Mass Induction

Students from the Yong Loo Lin School of Medicine, the Alice Lee Centre for Nursing Studies, NUS Dentistry and NUS Pharmacy were welcomed to the healthcare fraternity in Singapore at the inaugural Healthcare Mass Induction 2019. The occasion was held on the first day of school on 13 August to give the budding healthcare workers a sense of the healthcare landscape. Students heard from key leaders of the National University Health System (NUHS), their seniors from the various disciplines and joined in an interesting panel discussion on the impact of technology and digitalisation on healthcare.

1.

2.

3.

4.

1.
Panel discussion by guests (from L-R): NUHS Chief Executive, Prof John Eu-Li Wong; MOH Director for Medical Services, Assoc Prof Benjamin Ong; NUS Associate Provost (Undergraduate Education), Prof Erle Lim; Johnson & Johnson Regional Director - Supply Chain Business Technology, Medical Services, Mr Bala Badinedi; Capgemini Director, Applied Innovation Exchange, Mr Steffen Schacher.

2.
(Clockwise) Students were addressed by NUHS Chief Executive Prof John Eu-Li Wong, Prof Chong Yap Seng and Assoc Prof Lau Tang Ching on their first day of school.

3.
Seniors from Dentistry, Nursing, Medicine and Pharmacy share their learning experiences, giving first year students insight into what they could expect.

4.
Q&A session with the panelists.

KEEPING SHARP WITH AN ACTIVE CLINICAL PRACTICE

An increasing number of NUS Alice Lee Centre for Nursing Studies (NUS Nursing) faculty is serving as nurse clinicians and advanced practice nurses, in addition to their roles as educators at the University. Here, we feature some of our educators who not only develop nurses at baccalaureate and graduate levels, but also demonstrate a commitment to providing direct patient care in hospitals and in the community.

Dr Zhou Wentao (right) sees a patient with Parkinson's disease at her home. Photo Credit: SingHealth

Contributing to the care of Parkinson's patients in the community

Dr Zhou Wentao is Senior Lecturer at NUS Nursing and Director of its Master of Nursing programme, which trains advanced practice nurses (APNs) for Singapore's healthcare sector. She also works as an APN at the National Neuroscience Institute.

In her practice, Dr Zhou cares for patients in the advanced stages of Parkinson's disease in their homes. For many of these patients, the disease has taken a toll on their mobility and rendered regular visits to the doctors unfeasible.

"I see these patients in between their biannual doctor's appointment to prevent complications that could arise and cause them to be readmitted into the hospital," says Dr Zhou, adding that since she came on board, the physicians could reduce the time in between their patients' appointments to once every nine months or even longer.

Going to her patients' homes allows Dr Zhou to assess them more holistically, taking into account the social and environmental factors in the management of their illness and its co-morbidities, instead of just looking from the medical perspective.

"The beauty of a home visit is the ability to explore these home-based factors and build relationships with the patient's family members, which a 15-minute clinic consultation cannot achieve," adds Dr Zhou, who has a list of 62 active patients.

During her visits, Dr Zhou takes the opportunity to conduct advanced care planning discussions with family members. She also educates them to better understand the disease and plan for future care.

One of the most important outcomes of having advanced practice nurses in hospitals, clinics and the community is the level of knowledge they bring in reshaping local healthcare. As an APN herself, Dr Zhou believes that with advanced clinical training, APNs acquire critical-thinking skills and competencies to address complex healthcare needs of individuals and families. They are equipped to "reform" healthcare to promote health by empowering consumers, as well as improving care accessibility and affordability.

> The beauty of a home visit is the ability to explore these home-based factors and build relationships with the patient's family members, which a 15-minute clinic consultation cannot achieve.
>
> — Dr Zhou Wentao, Senior Lecturer at NUS Nursing and Director of Master of Nursing Programme

"Going out to practise and being on par with the rapidly changing needs of our local healthcare sector allows me to bring practical relevance to the programme. It also enhances my confidence and competency in training leaders who can think differently; and encourage them to identify and solve problems in their practice environments," says Dr Zhou.


Dr Shawn Goh

Maintaining clinical competency in psychiatric nursing

Dr Shawn Goh, an Assistant Professor of Nursing, is a Master's-prepared mental health nurse. He is also a member of the community psychiatric unit of the National University Hospital, known as the Assessment and Shared Care Team (ASCAT).

Dr Goh conducts home visits in Western Singapore where he sees patients referred to ASCAT by Family Service Centres (FSCs), Residents' Committees (RCs) and other grassroots organisations. These patients often have a combination of psychiatric and underlying medical conditions but are not willing to leave their homes to seek medical and/or psychiatric help for some reason.

> We assess the patients' mental well-being and look at the psychosocial factors that may impede them from seeking medical help.
>
> — Dr Shawn Goh, Assistant Professor of Nursing

"We assess the patients' mental well-being and look at the psychosocial factors that may impede them from seeking medical help," explains Dr Goh.

"As a mental health nurse, my experience and understanding of the conditions and treatment modalities allow me to establish rapport and build relationships with my patients, which is key to getting them on a medical or psychiatric treatment programme," says Dr Goh.

Another important prong of his work is conducting psycho-education for patients. He also runs regular talks at FSCs, RCs and even at police divisions to educate frontline staff on how to identify and communicate with people with mental health needs. In addition, Dr Goh conducts research with ASCAT to improve psychiatric community care.

He believes the academic-practice link, a model practised only by our faculty, makes the NUS Nursing programme stand out. "It brings about currency of knowledge and practice, and dispels the notion that teachers are in their ivory towers. This level of expertise ensures both the relevance and applicability of instruction that take place within the school."

Nursing students also appreciate the opportunity to learn from his direct experience. "Nothing beats the sharing of experience from the field and learning from actual clinical cases versus textbook ones —and from the students' feedback I can see that they appreciate this too," says Dr Goh.

Bridging the gap between theory and practice

Dr Rosalind Siah is a lecturer at NUS Nursing. She is also a nurse clinician (specialty care) focusing on geriatric care at the Singapore General Hospital.

There are occasions when she finds herself working alongside her students and ex-students at Ward 63, where she makes clinical rounds to evaluate elderly patients, many of whom have sustained fractures from a fall, or suffer from depression and dementia. She also reviews patient records to understand medical histories and reasons for admission.

> Working within the profession keeps my clinical knowledge and skills up-to-date, allowing me to bring real-world expertise into the classroom to help students bridge the learning gap
>
> — Dr Rosalind Siah, Lecturer at NUS Nursing

Dr Siah's practice is of personal importance to her, apart from the benefit it provides students. "I've always wanted to work with the elderly since I started out as a nurse," she says. When she first began basic nursing work, geriatrics as a specialist discipline was not as highly emphasised as it is now. Her work now improves patient care, she adds, which is crucial in addressing the needs of Singapore's rapidly ageing population.

Maintaining an active practice also helps Dr Siah establish credibility among students and allows her to teach beyond the textbook. "Working within the profession keeps my clinical knowledge and skills up-to-date, allowing me to bring real-world expertise into the classroom to help students bridge the learning gap," she says.

It also gives her a clearer identity as a nurse educator, she adds, as she believes that patient care is an integral part of nursing.

Dr Siah's involvement in geriatric practice has also been valuable in strengthening clinical partners' trust in NUS Nursing's geriatric curriculum, in addition to keeping the curriculum relevant to Singapore's context.

"Last year, we met with the various healthcare sector partners to realign our curriculum on geriatrics, and because I had an understanding of the current issues, our curriculum could stand up to scrutiny in terms of its relevancy to Singapore's context. Our partners trust us since we are working in geriatrics as well," she says.


Dr Rosalind Siah interviews an elderly patient at Ward 63 of SGH where she evaluates and assesses these patients to improve geriatric care.

A Reflection: My Dissection Elective

Poon Wynne Hsing is a second year medical student from NUS Medicine. This is a reflection she penned following the completion of a dissection elective that took place over the semester break between her first and second year. In the reflection, she addresses Associate Professor Ng Yee Kong, the anatomy professor in charge of the Silent Mentors programme in the school. The NUS Medicine Silent Mentors programme takes care of body donations to the school and organises dissection classes for students and residents in addition to the anatomy prosection classes, where students study cadavers that have already been dissected by experts.

Dear Prof Ng,

Yesterday was my last day at a dissection elective session, where I've been working on and working with Mdm L. I regret being unable to go in today to finish up my attempts at (some improvised) subcutaneous stitching to restore Mdm L's face, after managing about 3/4 yesterday, due to other school commitments.

I just wanted to thank you for (re)starting this dissection elective, and to also extend thanks to the Anatomy Department for making these weeks of learning happen. In my opinion, dissection did not teach me very much more about anatomy that what the Year 1 syllabus has already taught (if I still don't know my anatomy I don't think I should pass Year 1...). What it did do is to allow me time to appreciate anatomy better – I felt that the experience of cutting, separating and getting through the layers not emphasised as "important structures" in the anatomy textbook diagrams, and clean prosections, allowed me to better understand anatomy as it would be found in patients.

My favourite times in dissection (or suturing) were usually in the quiet hours of morning, lunchtime and closing. I liked working away at the gastrointestinal tract, or heart, or leg – consider the amounts of fat around organs, what each finding could mean about Mdm L. while she was alive, decipher what I was looking at, suture in peace without people jarring Mdm L. in attempts to suture. The atmosphere in the hall felt quietly respectful to our Silent Mentors. I think those moments are what I enjoyed; when I felt that I was doing justice to Mdm L.'s decision to let me/us medical students study and learn.

Clearing fat, suturing skin (especially returning the skull cap – I knew I wanted to try do Mdm L. the basic courtesy of returning her with a proper head shape) is rather boring, repetitive work. Yet, I find that it is the minimum requirement to maximize our learning (otherwise, our silent mentors would have donated their bodies for nothing). I will admit to hands smelling of Anatomy Hall, fingers feeling either crampy or swollen (after suturing; maybe I have bad technique) after dissection days.

I still think these 3 weeks of attending the dissection elective were among the most impactful days of learning in Year 1. My takeaways were immaterial but also invaluable; I think of Mdm L. – 74 years old, younger than my grandmother (possibly somebody's grandmother), her family who let us have her to learn from – and find that this body donation process is evidence of human generosity. I don't think I can thank our silent mentors and their families enough for letting us study, learn and possibly be more human through the process of dissection and suturing.

I hope the dissection elective will continue through the years. I also find that suturing is a very vital section not to be left out, not so that we can learn new suturing techniques (there will be time for that in our later years I believe), but so that there is closure. We cut them open, we sew them back – I think there is significance in that. In Z's words "it lets me sleep at night" and I agree – my relatives often ask me why it doesn't spook me and I think it is simply that I know we did our best both dissecting and learning, and suturing them back.

What I mean to say is, thank you Prof and everyone in the anatomy department! Every minute spent in dissection has been great.

Best regards,

Wynne

HARVARD EXPERIENCE

Phase 4 student *Lim Sheng Yang* looks back on his month's elective module in Boston

— THE DREAM —

I remember googling the world university rankings for medicine many years back. Harvard turned up the top. Ah what a waste. I could never study medicine in the United States of America (USA); their system is different from Singapore's.

Ever since then, I've left my Harvard dream unfulfilled. So imagine my excitement when I got news that I was going on an exchange to Harvard medical school! With 14 other capable people, in fact. It was going to be fun. Especially since we would be living together in one house, 15 people sharing three toilets.

THE JOURNEY —

The journey to the USA was difficult. Right from the beginning, lots of paper work had to be settled. Three of us were even rejected a month prior to our flight due to administrative miscommunications. Thankfully, we all eventually made it there: I got a Paediatric Ophthalmology posting at Boston Children's Hospital.

THE HOUSE —

Living with 15 people surprisingly went without a hitch. We shared 4 bedrooms and 3 bathrooms (which were often pushed to the limits of acceptable hygiene standards before one of us bit the bullet and cleaned it).

Before we arrived, we were all concerned if relations would be soured by clashes in bathroom schedules and arguments over the limited resources available. We imagined many possible situations – a long queue of people showering for work, before sleep; fighting to use the washing machine, ironing board; clamoring to use the pots and pans. We were all ready to sit down and discuss allocated slots for amenities and chores. Unfortunately, the hectic first few days, paired with jet lag, meant the cancellation of those plans.

It was thus incredibly satisfying to see everything fall into place. Our reporting time spanned 5am to 9am, which meant there was always a free bathroom whenever one needed it. The standard deviation for dinner time was also large, from 5pm to 11pm. Pots and pans were washed and ready for the next person almost as soon as a meal was completed. It was a sight to behold.

THE FOOD —

A month in the USA also meant getting used to American food. Or not. Many of us decided to let our inner chefs out for the first time. There were many hilarious moments, including accidentally cooking enough macaroni and cheese for 16 people when we meant to cook for four. Eventually we moved from safer foods like spaghetti to more adventurous ones like steak. Portions went quickly, as we impressed ourselves with what we had whipped up.

We had planned to exercise daily to keep fit but our discovery of cooking threw a wrench in the works. The only comforting thought was that we could tell others we became more 'American' after a month, at least in terms of our average weight.

Hiking the White Moutains in New Hampshire

THE ADVENTURES —

All work and no play makes Jack a dull boy. Weekends were our time to enjoy ourselves. We had three weekends planned, and one long weekend which coincided with Memorial Day. This is against the backdrop of some of us needing to stay for one weekend call per week (Given Harvard Medical School's high standards).

One weekend, a group of us headed to hike White Mountains to get our much-needed dose of sunlight and exercise. Not knowing the hiking standards in the area, we had specifically chosen the easiest of trails. Despite the effort, we were still wiped out by the two tiring climbs that day, though we left with our hearts full and the amazing summer scenery etched in our minds.

On another weekend, we headed to Vermont, to fully immerse ourselves in nature; an experience that is far removed from Singapore. In the countryside, we had the amazing privilege of riding through the forest on horseback and visiting farms and cheese factories – a much-welcomed respite from the hustle and bustle of Boston city life.

It was interesting to be exposed to different expectations of time in the States. A drive of fewer than four hours' duration is regarded as 'short' and easily accessible whereas in Singapore, any place that requires a travel time of more than an hour is declared 'out of the way'. Driving on the other side of the road kept us on our toes because the mind does naturally slip back into Singaporean driver's mode when the roads are clearer.

THE HEALTHCARE —

The pilgrimage to the United States was eye-opening. First and foremost because I was attached to ophthalmology (no pun intended), but also because of the great differences between our systems.

Being at the best children's hospital in the US gave us better insights into various aspects that make up a healthcare system. While both systems have their strengths and weaknesses, the experience allowed us to further appreciate Singapore's hospitals.

We saw how technology can play an important part in healthcare, from online video translators to games for kids while removing their casts. Telehealth applied in all its splendor, allowing doctor consults to be conducted across 24 different geographic zones. The use of robotics for precise movements and incisions in surgery was a sight to behold as well.

One of the greatest differences would be the degree of healthcare freedom. The US ranks high on the healthcare freedom scale. Singapore ranks lower. As a result, new therapies can be used in practice in the US as soon as FDA approval is received. Meanwhile, the journey from bench to bedside takes a longer path in Singapore. A new therapy would have to be in use abroad for at least half a decade before is introduced in Singapore. However, hospitals in the US have to individually negotiate agreements with pharmaceutical and insurance companies. This significantly raises the cost of healthcare despite broadening the range of treatments available.

It was also disconcerting to see the power that insurance companies hold over healthcare in USA. One of the patients was restricted to five follow-ups with the ophthalmologist. Anything beyond that would not be funded. It appeared to be an arbitrary limit placed on decisions that should have been under the purview of specialists. It seemed to affect the quality of healthcare provided.

At the gates of Boston Children's Hospital

THE PATIENTS —

Though diseases were similar, the patients that they afflict were vastly different. Besides the clinically relevant disease demographics and genetics, it was refreshing to observe the social norms from patient interactions.

Patients were incredibly friendly, and always welcoming when they heard I was an exchange student from Singapore. This was then followed by genuine interest in our country and education. These encounters would end with warm well wishes when they realised I have a final exam coming up.

In Paediatric Ophthalmology, I also had the privilege of observing the weird and wonderful – rare genetic conditions. As medical students, we are often excited to see rare diseases, but it is important to step back and consider the impact such conditions have on families. Such conditions often accompany a child, and their family, from cradle to grave. It is in this setting that I saw incredible love and resilience of the human spirit, with parents driving hours to seek medical treatment and continuing to shower their children with warmth and attention despite the obvious fatigue. All while holding out hope for the chance of a cure.

THE RESEARCH —

Research was also heavily emphasized throughout the hospitals. A typical day in the clinic would see no fewer than three patients being enrolled in new clinical trials. Many of these trials were the first of their kind in the literature.

Some of the treatments used were interesting applications taken from another field. For instance, the use of Donepzeil in the treatment of amblyopia, because it has been shown to lower the threshold for stimulation of the brain.

Cross-field application, or the use of medicine off-label, always fascinates me. While the effects are intuitive when analysed from the perspective of mode of action, few actually consider the use of medications outside their indications.

The US' graduate medical education system may have imbued its graduates with this perspective. Medical students typically have to study another major in their undergraduate years before being able to apply for medical school. Speaking to Harvard Medical School graduates in Boston then meant talking to physicians who were also trained scientists, biologists or even engineers! It is no wonder that lateral thinking and innovation are trademarks of the country.

Meeting new friends

THE MENTORS —

I have been immensely blessed to be under the guidance of Dr David Hunter, a master surgeon and physician. He has constantly encouraged me to step up and step out by allowing me to be an integral part of the team. I was allowed to scrub-in for operations, throw knots and sutures in the operating room. Under his tutelage, I have also learnt that mastery is not attempting heroic procedures, but the consistent and precise practice of basic ones. Making sure to plan, check and be efficient. Also, to properly educate and partner the patients in their care.

He was one of the founding members of the department and has since brought it from strength to strength: the department today has a paediatric equivalent to every adult ophthalmology sub-specialty.

Even while juggling his many clinical and management responsibilities, Dr Hunter continued to push boundaries tirelessly. This culminated in a new device -'Blinq' - after 20 years of hard work that can provide automated screening for strabismus.

With the greatest mentor – Dr David Hunter

THE TAKEAWAY —

One month goes by like the blink of an eye. Under the guidance of great mentors, I had the opportunity to practice surgery on porcine eyes and apply what I had learnt (in controlled conditions) in patients' eyes.

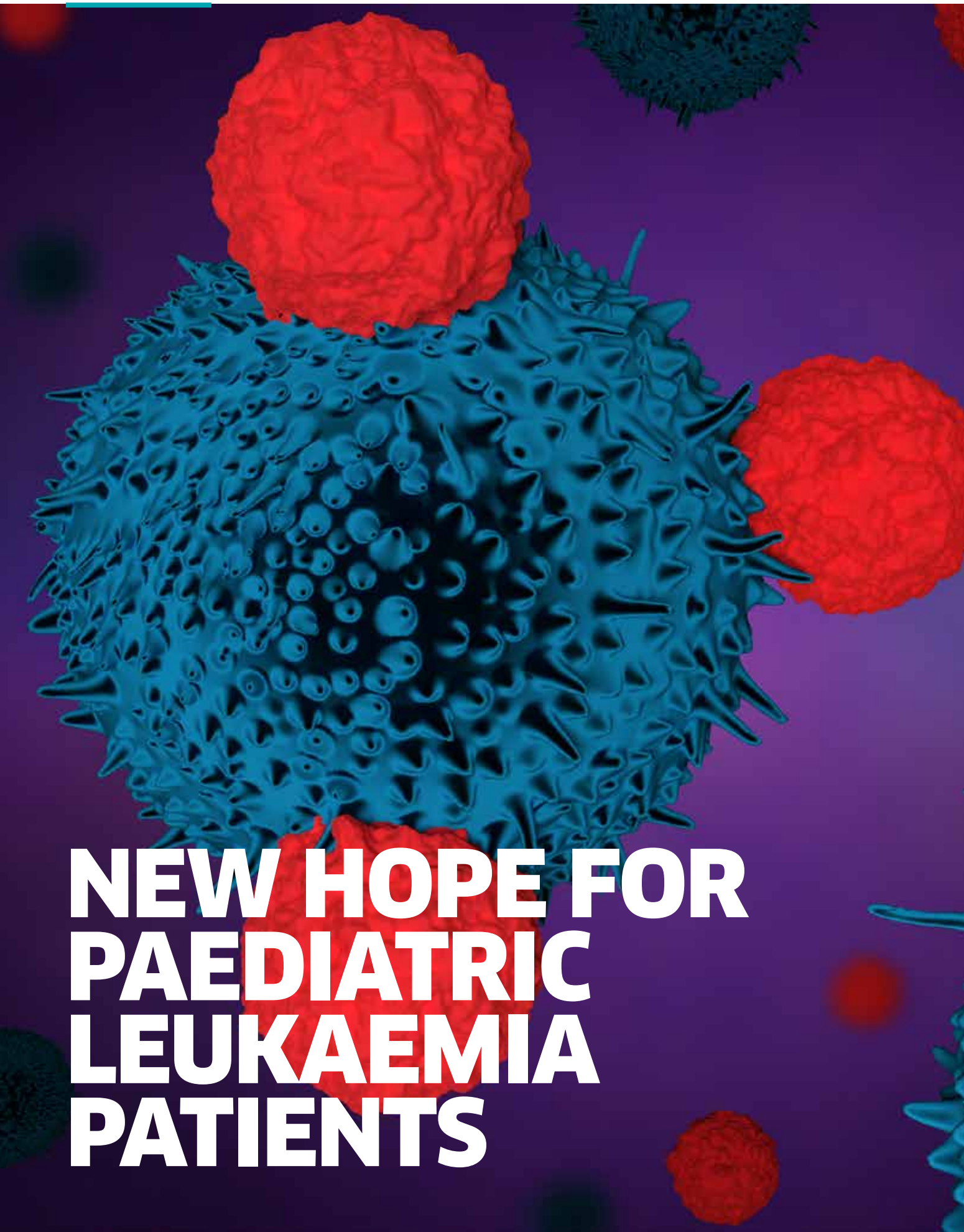
I was fully immersed in another healthcare system, and from that, I see the strengths and weaknesses that lie in our own.

I had the great pleasure of touring the USA with an amazing group of 15 classmates and having some laughs before final year commences.

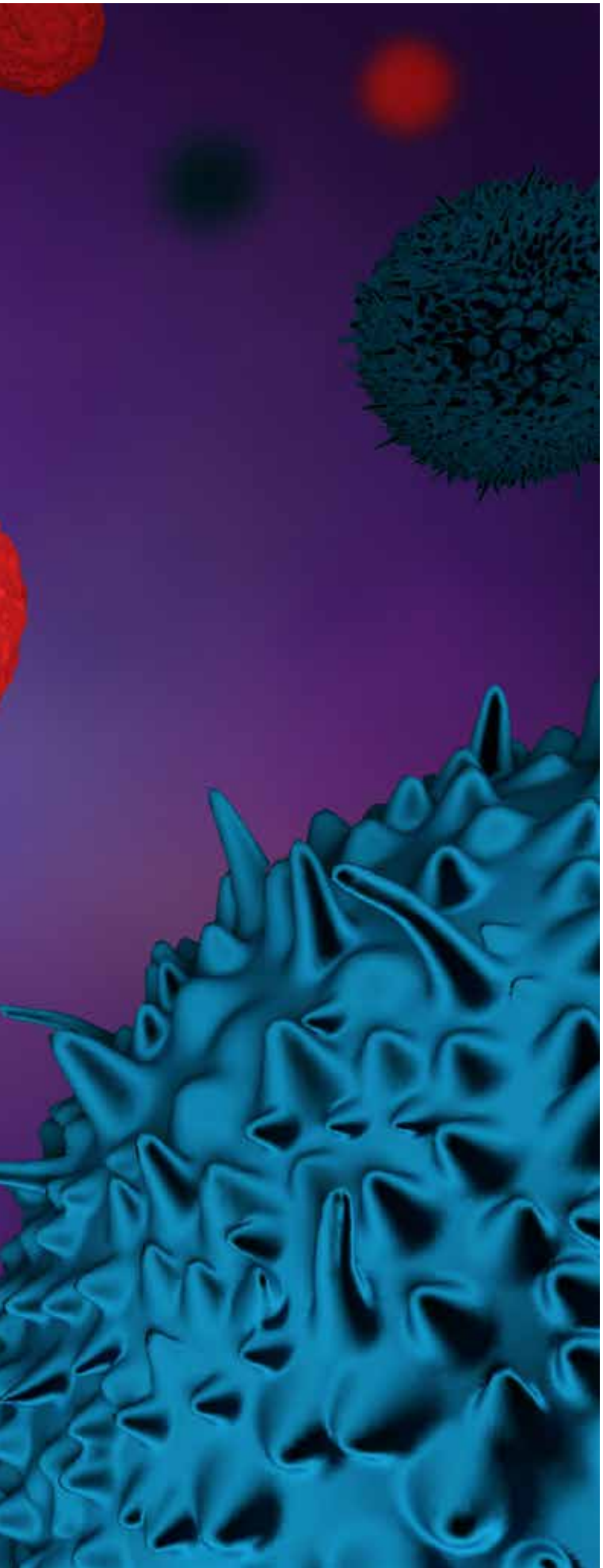
I am thankful to have my long-time dream fulfilled. It is my hope to apply all that I have learnt back within the Singapore context and to continue learning from esteemed institutions around the world. With that said, it is time to face reality in Singapore once more – onward towards the final exams that so many have given me encouragement for.

Celebrating birthdays with the gang

At the famed Harvard Medical School wall



NEW HOPE FOR PAEDIATRIC LEUKAEMIA PATIENTS



NUS Medicine's Professor Dario Campana wins Gabbay Award for discovery of life-saving immune cell therapy

by Dr Khor Ing Wei
Senior Manager, Research Division

In recent years, advances in chemotherapy and anti-cancer antibodies have improved the cure rates for several leukaemias and lymphomas. However, the prognosis for patients who fail to respond to chemotherapy or whose cancer recurs after an initial response remain poor. One of the biggest challenges for these patients is the lack of effective treatment options.

This bleak landscape was brightened with the discovery of an innovative therapy, CAR-T cell therapy, which was due in large part to the work of Professor Dario Campana, the Mrs Lee Kong Chian Chair in Advanced Cellular Therapy and Director of the Division of Immunopathology and Cell Therapy at the Department of Paediatrics, NUS Medicine. In recognition of his contributions, Prof Campana was conferred the 2019 Jacob and Louise Gabbay Award, along with Professor Michel Sadelain, Director of the Center for Cell Engineering at the Memorial Sloan Kettering Cancer Center. In October, Prof Campana travelled to Brandeis University in Massachussetts, USA, to receive the award and give a presentation about his work.

The CAR-T cell therapy involves taking a patient's T cells (the immune system's attack machines) and modifying their receptors to chimeric antigen receptors (CAR), which recognise the cancer cells. This produces CAR-T cells that can hunt down and kill the cancer cells.

CAR-T cell therapy has shown impressive results in patients with leukaemia and lymphoma. In four trials involving a total of 140 patients with relapsed acute lymphocytic leukaemia (ALL), 70% to 90% of patients showed complete remission in the first few months after CAR-T cell treatment and up to 80% of patients maintained complete remission for 1 year after treatment.[1-4] This is in contrast to the 17% of relapsed ALL patients who achieved complete remission with chemotherapy.[5]

Prof Dario Campana (standing) with Assoc Prof Allen Yeoh (second from left) and their patients.

> “CAR-T cell therapy has revolutionised the treatment of patients with ALL, who are resistant to chemotherapy. Our vision is that cellular therapy will become a standard component of the treatment for leukaemia, lymphoma, and other forms of cancer.
>
> **– Prof Dario Campana**
> The Mrs Lee Kong Chian Chair in Advanced Cellular Therapy and Director of the Division of Immunopathology and Cell Therapy at the Department of Paediatrics

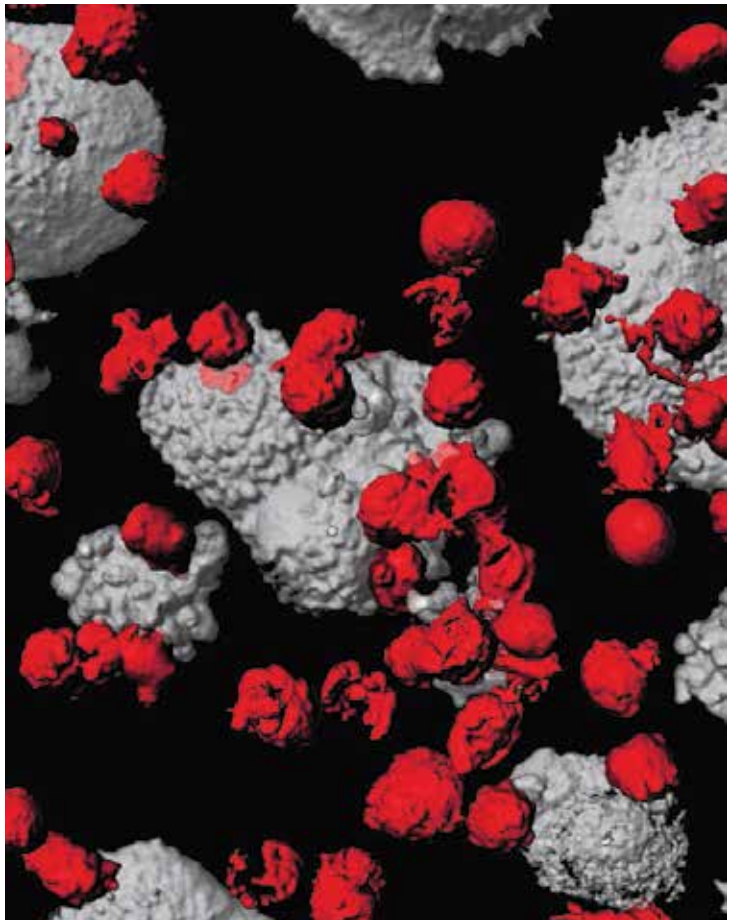
Based on these and other encouraging results, two CAR-T cell therapies have now been approved by the U.S. Food and Drug Administration (FDA) and the European Medicines Agency (EMA). Axicabtagene ciloleucel (Yescarta®, Gilead) was approved by the FDA in 2017 and the EMA in 2018 for the treatment of relapsed or refractory diffuse large B-cell lymphoma.[6,7] Tisagenlecleucel (Kymriah®, Novartis) was approved by the FDA in 2017 for the treatment of relapsed or refractory B-cell ALL in patients up to 25 years of age,8 and for relapsed or refractory diffuse large B-cell lymphoma in 2018.[9] It was approved by the EMA for treating both cancers in 2018.[10]

Although CAR-T cell therapy is not yet available on the Singapore market, some patients are receiving it through clinical trials. For example, Prof Campana and Associate Professor Allen Yeoh, Viva-Goh Foundation Associate Professor in Paediatric Oncology and Head, Division of Paediatric Haematology and Oncology, NUS Medicine, have treated 10 patients with high-risk ALL with CAR-T cell therapy. These patients, who range in age from 3 to 28 years, had not responded well to chemotherapy, with a significant number of cancer cells remaining after treatment. Thus far, the 10 patients in the trial are responding well to the CAR-T cell therapy.

Profs Campana and Yeoh are now also testing the CAR-T cell therapy in adults with ALL, who have poorer outcomes with chemotherapy than children affected by ALL. If results are promising, this immunotherapy could provide much-needed hope for a group of patients who have very limited treatment options.

Towards the goal of making more cell therapies available to patients, Prof Campana has started three companies, including MediSix in Singapore as well as Unum Therapeutics and Nkarta Therapeutics, both in the U.S., to commercialise therapies for leukaemias, lymphomas and other cancers.

“CAR-T cell therapy has revolutionised the treatment of patients with ALL, who are resistant to chemotherapy,” said Prof Campana. “Our vision is that cellular therapy will become a standard component of the treatment for leukaemia, lymphoma, and other forms of cancer.”



CAR-T cells (red) attacking cancer sells (grey)

REFERENCES

1 Maude SL, Frey N, Shaw PA, et al. Chimeric antigen receptor T cells for sustained remissions in leukemia. *N Engl J Med.* 2014;371:1507-1517.

2 Maude SL, Laetsch TW, Buechner J, et al. Tisagenlecleucel in children and young adults with B-cell lymphoblastic leukemia. *N Engl J Med.* 2018;378:439-448.

3 Davila ML, Riviere I, Wang X, et al. Efficacy and toxicity management of 19-28z CAR T cell therapy in B cell acute lymphoblastic leukemia. *Sci Transl Med.* 2014;6:224ra25.

4 Lee DW, Kochenderfer JN, Stetler-Stevenson M, et al. T cells expressing CD19 chimeric antigen receptors for acute lymphoblastic leukaemia in children and young adults: a phase 1 dose-escalation trial. *Lancet.* 2015;385:517-528.

5 von Stackelberg A, Volzke E, Kuhl JS, et al. Outcome of children and adolescents with relapsed acute lymphoblastic leukaemia and non-response to salvage protocol therapy: a retrospective analysis of the ALL-REZ BFM Study Group. *Eur J Cancer.* 2011;47:90-97.

6 U.S. Food and Drug Administration. FDA approves CAR-T cell therapy to treat adults with certain types of large B-cell lymphoma. October 18, 2017. https://www.fda.gov/news-events/press-announcements/fda-approves-car-t-cell-therapy-treat-adults-certain-types-large-b-cell-lymphoma. Accessed September 3, 2019.

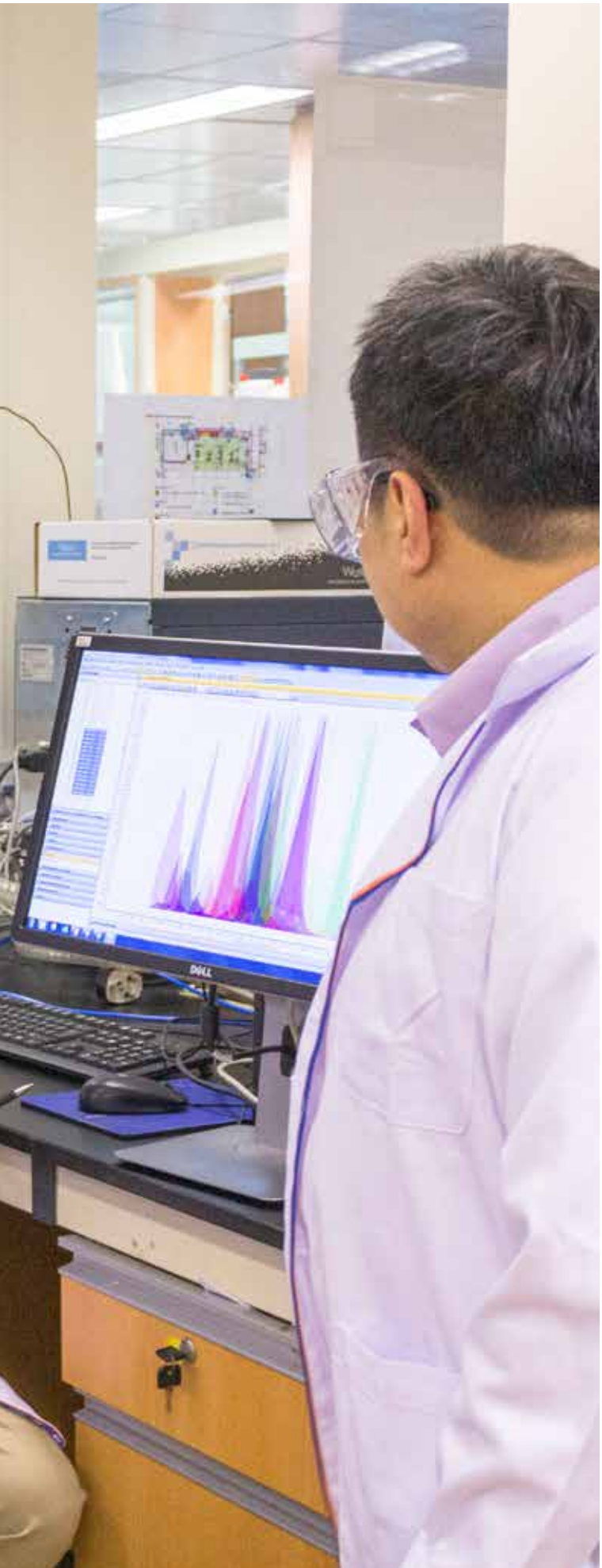
7 Gilead Sciences, Inc. Yescarta® (Axicabtagene Ciloleucel) Receives European Marketing Authorization for the Treatment of Relapsed or Refractory DLBCL and PMBCL, After Two or More Lines of Systemic Therapy. August 27, 2018. https://www.gilead.com/news-and-press/press-room/press-releases/2018/8/yescarta-axicabtagene-ciloleucel-receives-european-marketing-authorization-for-the-treatment-of-relapsed-or-refractory-dlbcl-and-pmbcl-after-two-o. Accessed September 3, 2019.

8 U.S. Food and Drug Administration. FDA approves tisagenlecleucel for B-cell ALL and tocilizumab for cytokine release syndrome. September 7, 2017. https://www.fda.gov/drugs/resources-information-approved-drugs/fda-approves-tisagenlecleucel-b-cell-all-and-tocilizumab-cytokine-release-syndrome. Accessed September 3, 2019.

9 U.S. Food and Drug Administration. FDA approves tisagenlecleucel for adults with relapsed or refractory large B-cell lymphoma. May 3, 2018. https://www.fda.gov/drugs/resources-information-approved-drugs/fda-approves-tisagenlecleucel-adults-relapsed-or-refractory-large-b-cell-lymphoma. Accessed September 3, 2019.

10 Novartis AG. Novartis receives European Commission approval of its CAR-T cell therapy, Kymriah® (tisagenlecleucel). August 27, 2018. https://www.novartis.com/news/media-releases/novartis-receives-european-commission-approval-its-car-t-cell-therapy-kymriah-tisagenlecleucel. Accessed September 3, 2019.

PREDICTING AND TREATING TYPE 2 DIABETES



by Dr Deron R. Herr
Assistant Professor, Department of Pharmacology

The "war on diabetes" was first declared by the government in 2016 amid concerns of a steadily increasing prevalence of diabetes and the rising cost of burden from this disease in Singapore. According to the Ministry of Health, around 440,000 Singaporeans had diabetes in 2014. This number is projected to increase to 1 million in 2050 by the NUS Saw Swee Hock School of Public Health. Understanding of the pathogenesis of type 2 diabetes has vastly improved over the past several decades with continuous advancement in research and metabolomics techniques. Nonetheless, questions remain regarding the specific molecular events leading to the onset of type 2 diabetes.

To this end, a research team at NUS has identified two molecules that become elevated in the blood of individuals in a local population several years before they develop Type 2 diabetes. This large collaborative study involving physicians and scientists at NUH and NUS was designed to look for new diabetes risk factors that would aid the development of novel predictive tests or new ways to prevent or treat diabetes. Supported by the Aspiration Fund Research Grants Partner and the National Research Foundation Investigatorship Grant, the research team was jointly spearheaded by Dr Deron Raymond Herr, Professor Tai E Shyong, and Professor Markus R. Wenk. Dr Deron Raymond Herr is an Assistant Professor from the NUS Medicine Department of Pharmacology whose research interests focused on the metabolism and signal transduction of bioactive lipids. Professor Tai E Shyong is a Senior Consultant in the NUH Division of Endocrinology and a highly accomplished Clinician Scientist in the field of obesity and diabetes. Professor Markus R. Wenk is the Head of the NUS Medicine Department of Biochemistry as well as the leading lipidomics expert in Singapore.

Members of the research team review raw data from the study in the form of mass spectroscopy chromatograms.

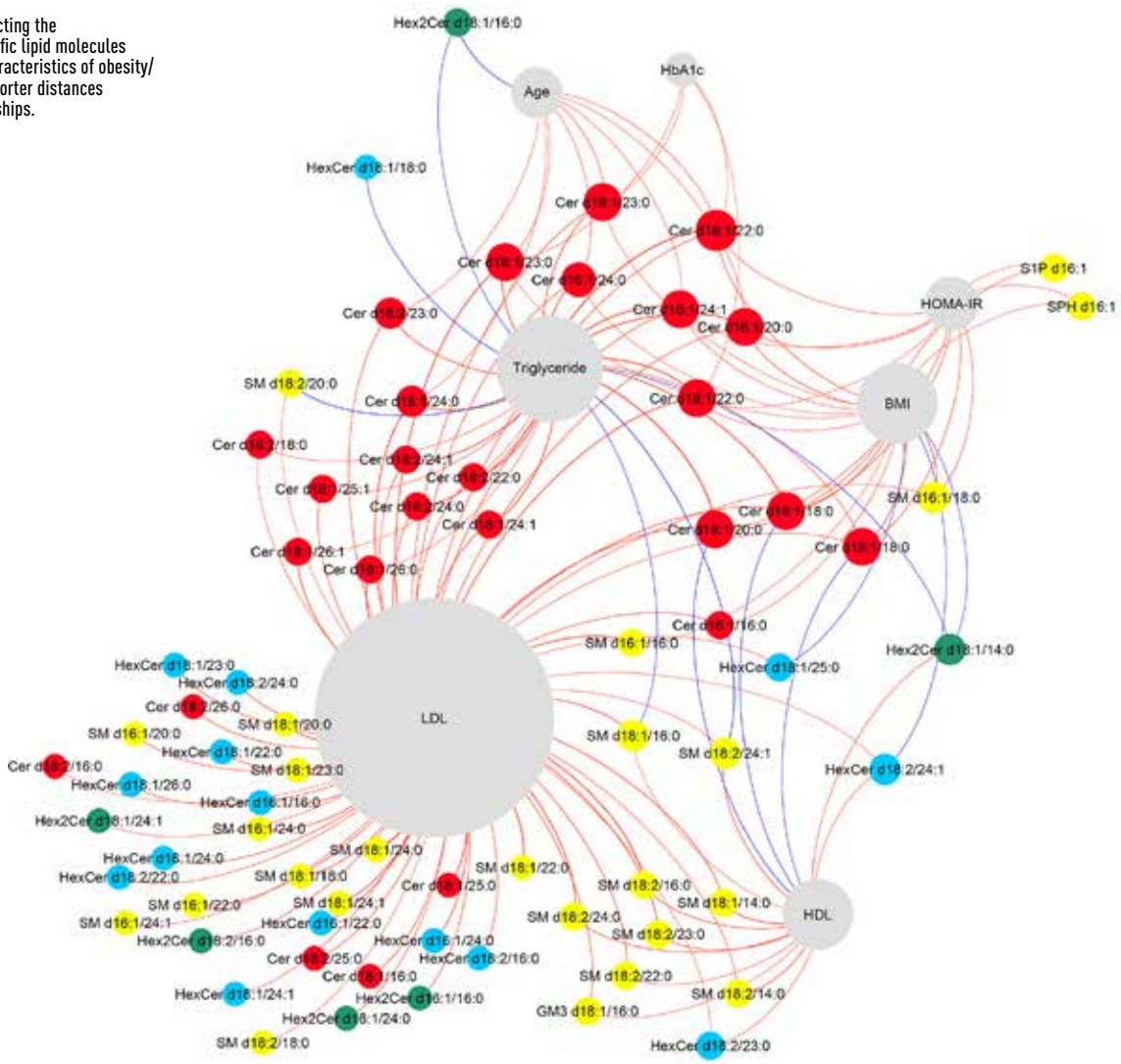
Other members of the multi-disciplinary team include Dr Chew Wee Siong, Dr Federico Torta, Ms Ji Shanshan, Associate Professor Choi Hyungwon, Dr Husna Begum, Dr Sim Xueling, Dr Khoo Chin Meng, Dr Eric Khoo Yin Hao, Professor Ong Wei Yi, and Associate Professor Rob M Van Dam. Dr Chew and Dr Torta were the key personnel driving the lipidomics experiments and the lead authors of the study which was published in JCI Insight. Ms Ji and Associate Professor Choi were involved in the statistical analysis of the data while Dr Sim and Associate Professor Van Dam provided the essential clinical and diabetes data for the study. Dr Begum, Dr Khoo, Dr Eric Khoo, and Professor Ong contributed valuable advice and expertise on the discussion of the study results.

This study, which was carried out to identify associations between specific lipid molecules and parameters of obesity and diabetes, is one of the largest population-based lipidomic study in an East Asian population to date. According to Dr Herr, "There are notable differences in the risk factors and the epidemiology of diabetes between the Asian population and those of European ancestry. Thus, it is imperative that diabetes research is also carried out on the Singaporean population to provide useful and relevant insights into the pathophysiology of diabetes in the local context." Participants were recruited between 2004 and 2007 as part of two large population-based studies which are the Singapore Prospective Study Program (SP2) and the Singapore Cardiovascular Cohort Study (SCCS2). Because of the known variations in lipid profiles among the different ethnic groups within Singapore, non-Chinese participants were excluded from this study to facilitate the interpretation of the results.

Blood samples were analyzed from 2,302 Chinese Singaporeans, then participants were followed for the next 11 years to identify those that subsequently became diabetic. Measurement of the blood lipid profile was carried out with the support and technical expertise of the Singapore Lipidomics Incubator (SLING). Under the leadership of Professor Wenk, SLING has become the leading regional lipidomics research facility centered in Singapore and is a key partner of the NUS Medical Science Cluster (MSC) initiative. Utilizing cutting edge mass spectrometry-based lipidomic analysis, the team selected a panel of 80 lipid molecules and the lipid profile of each participant was paired with its matching clinical data. Of the 80 molecules that were examined, two molecules were 40% more likely to be elevated in those that later became diabetic. These molecules, known as d16:1/18:0 sphingomyelin and d18:1/18:0 sphingomyelin, are lipids that were not previously known to have a specific predictive function.

Figure 1.

Force-directed graph depicting the relationships among specific lipid molecules (coloured circles) and characteristics of obesity/ diabetes (gray circles). Shorter distances indicate stronger relationships.



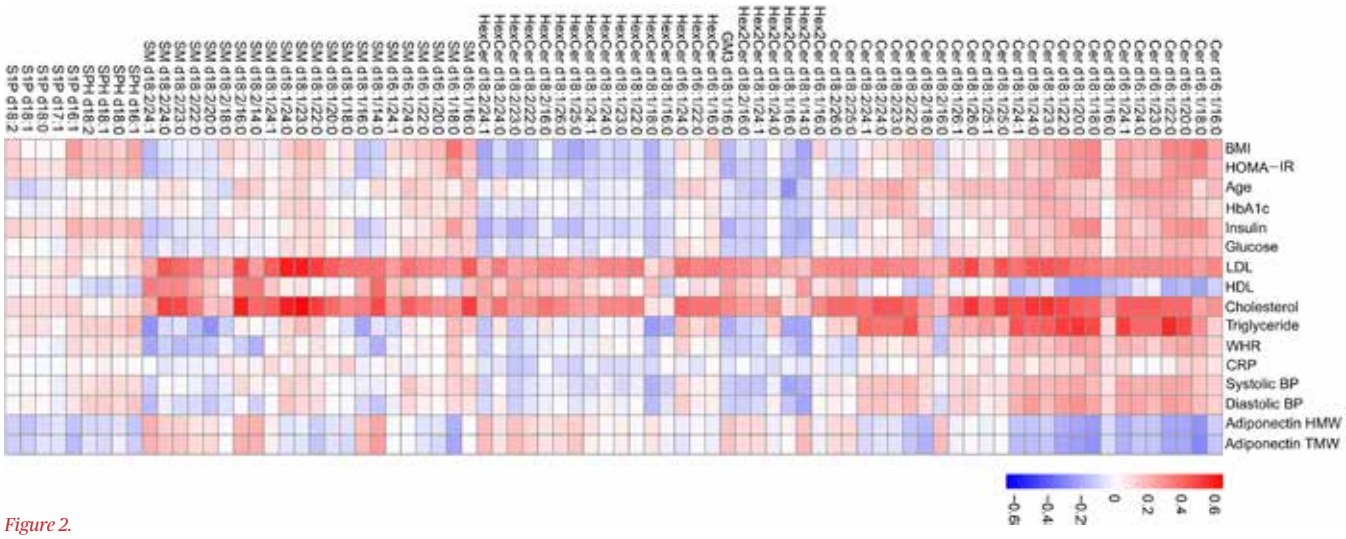


Figure 2.

Heat map depicting the correlations between lipids and clinical characteristics of obesity/diabetes. Red indicates positive correlations while blue indicates negative correlations. Colour intensity indicates the strength of the relationship.

Dr. Chew Wee Siong (front) and Dr. Federico Torta (back), preparing samples for mass spectrometry analysis.

In addition, several uncommon types of lipid structures, such as shorter fatty acid chain length, were found to be associated with obesity and diabetes. These structural changes suggest that lipid metabolism is altered in obese individuals, and that this altered metabolism may contribute to the development of diabetes. "There are two exciting implication based on our findings," said Dr Deron Raymond Herr. "The first implication is that measuring the level of these two sphingomyelin molecules may help to improve prediction of diabetes risk and secondly, understanding the metabolic changes in obese individuals could result in new treatments that can prevent or treat diabetes," explained Dr Herr. Continued research efforts are underway to investigate the translation of these initial findings into improved quality of life for at-risk Singaporeans.

> "There are notable differences in the risk factors and the epidemiology of diabetes between the Asian population and those of European ancestry. Thus, it is imperative that diabetes research is also carried out on the Singaporean population to provide useful and relevant insights into the pathophysiology of diabetes in the local context.
>
> **– Dr Deron R. Herr**
> Assistant Professor,
> Department of Pharmacology

THE GEL'S THE KEY:

Eyeing better outcomes for retinal detachment

by Dr Khor Ing Wei
Senior Manager, Research Division

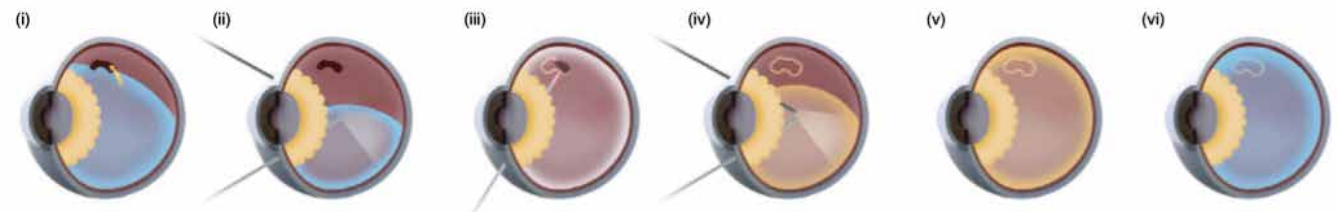


Figure 1.

Imagine having to lie face down for weeks, as well as not being able to go on flights for months. This is the reality for many patients after surgery to repair a detached retina. Now, a discovery from researchers at NUS Medicine, A*STAR and Singapore Eye Research Centre (SERI) may one day lead to the end of such difficult post-surgery requirements.

The vitreous humor is a clear, gel-like substance that fills the space in the eye between the lens and retina. As we age, the vitreous becomes more liquid. This increases the risk of retinal detachment.[1] In the surgical management of many retinal disorders, the vitreous often has to be removed and replaced post-operatively by a temporary substitute such as an inert gas or silicone oil. These agents serve as a tamponade agent, allowing the retina to be re-attached to the back of the eye.

However, current tamponade agents have many drawbacks. Inert gases require patients to remain face-down for a prolonged period of time post-operatively. This allows the gas to provide sufficient support to the posterior part of the eye. Air travel is not recommended because low atmospheric pressure could cause the gas tamponade to expand and result in a vision-threatening rise in eye pressure. Gases are also associated with the formation of cataracts. Silicone oil is toxic to the eye if left for prolonged periods. Hence, an additional removal surgery is required after the retina has re-attached.[1,2] Hence, a new tamponade agent without these disadvantages will be an attractive alternative for patients who are undergoing surgery for retinal detachment repair.

Working together with researchers from the Institute of Materials Research and Engineering (IMRE) and the Institute of Molecular and Cell Biology (IMCB), A*STAR, NUS Medicine researchers tested a new temperature-sensitive hydrogel as an alternative tamponade agent. This hydrogel was previously created by Dr Xian Jun Loh, Head of the Soft Materials Department at A*STAR, and has since been commercialised for applications such as cosmetic fillers. When clinician scientist, Assistant Professor Su Xinyi, from the Department of Ophthalmology at NUS Medicine was looking for a novel material capable of solving the disadvantages of current endotamponade agents, Dr Loh's hydrogel presented an intriguing possibility.

> "The thermogel has the potential to transform vitreo-retinal surgery. This is the first description of using advanced biomaterials to facilitate the replacement of ocular tissues in-vivo to form a vitreous-like body.
>
> **– Assistant Professor Su Xinyi**
> Department of Ophthalmology

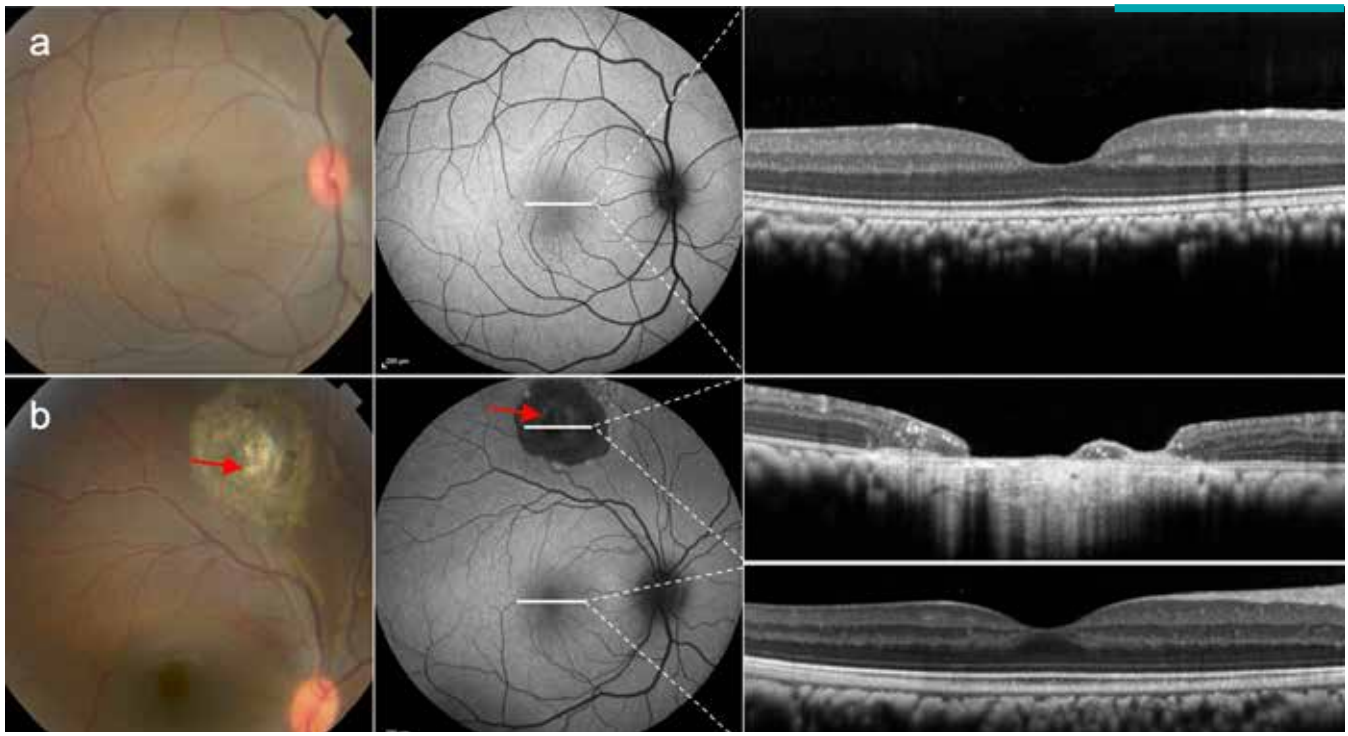


Figure 2.

A. Normal fundus and macula.
B. Eye with surgical retinal detachment and gel replacement. Retinotomy (red arrows).

The hydrogel consists of a thermosensitive, biodegradable polymer called EPC. At 25°C the polymer is in a liquid state, and can be injected easily through a small bore needle. Once injected into the eye, it quickly changes into a gel state due to the exposure to body temperature, mimicking the surface tension and consistency of the natural vitreous.

In the study, the team demonstrated the biocompatibility of EPC-7% gel for up to 6 months after injection into the vitreous cavity (Figure 1). In those eyes, the cornea remained clear with no cataract formation, and retina function was preserved (Figure 2). In addition, they also demonstrated that the gel was able to function as an endotamponade agent to support the detached retina for up to 1 year. These findings were published in the August issue of Nature Biomedical Engineering.[3]

Another, very surprising finding was as the EPC-7% gel biodegrades, it was able to facilitate the reformation of a vitreous-like body by 3 months post-surgery. This reformed vitreous-like body is rich in vitreous structural proteins such as collagen and hyaluronon-binding proteins. The researchers hypothesise that the hydrogel may act as a scaffold structure, which enables the newly-synthesised proteins produced by the eye, to organise into a structure that closely resembles the vitreous body.

Earlier in May 2019, the researchers started a spin-off company, Vitreogel Innovations Pte Ltd, with an aim to bring this technology to the clinic. If successful, the technology will be a disruptive innovation in vitreo-retinal surgery, and will revolutionise patient care.

As Dr Su says, “The thermogel has the potential to transform vitreo-retinal surgery. This is the first description of using advanced biomaterials to facilitate the replacement of ocular tissues in-vivo to form a vitreous-like body.”

REFERENCES

1 Los LI, van der Worp RJ, van Luyn MJ, Hooymans JM. Age-related liquefaction of the human vitreous body: LM and TEM evaluation of the role of proteoglycans and collagen. *Invest Ophthalmol Vis. Sci.* 2003;44:2828-2833.

2 Su, X. et al. Recent progress in using biomaterials as vitreous substitutes. Biomacromolecules. 2015;16:3093-3102.

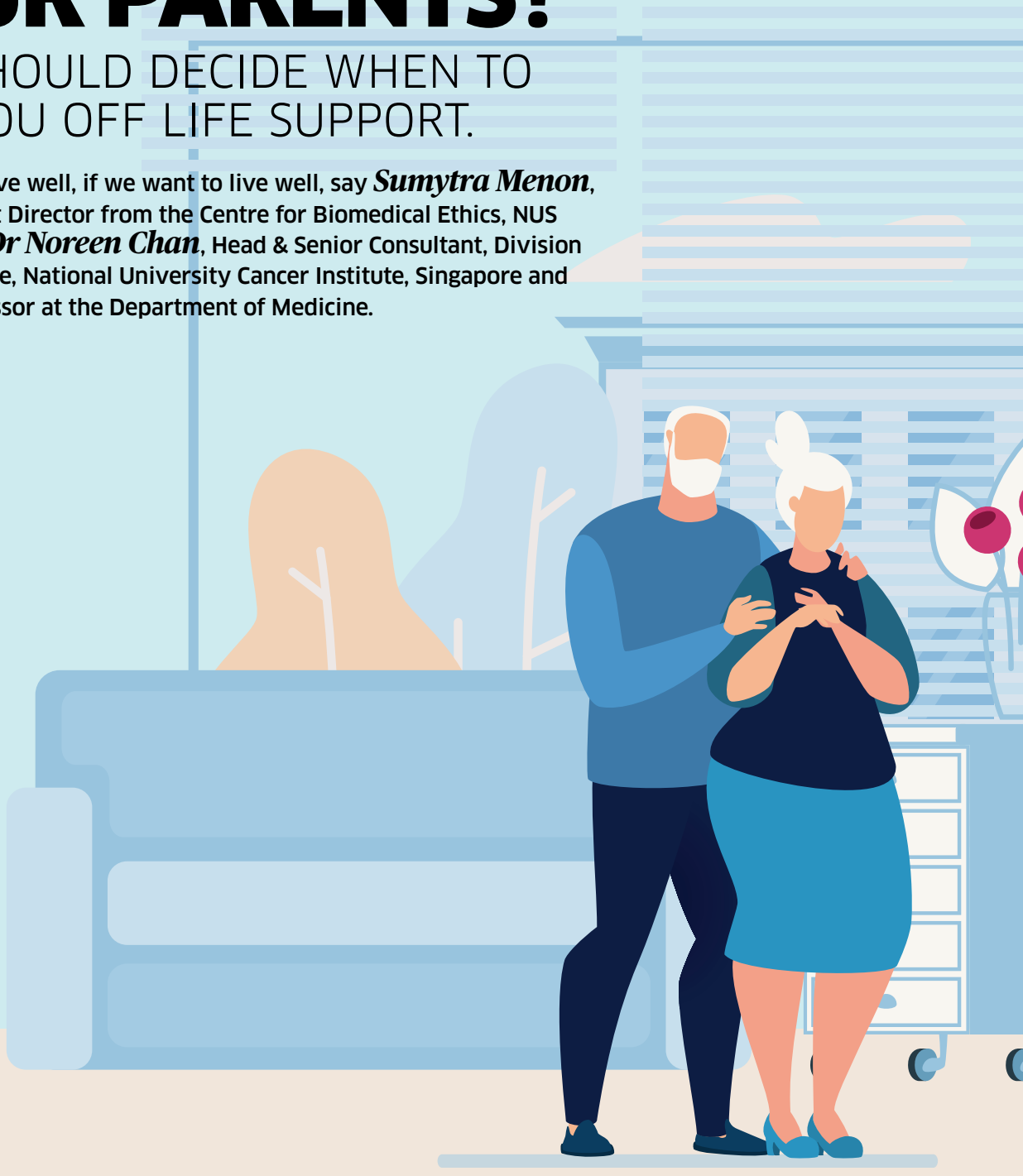
3 Stappler T, Morphis G, Irigoyen C, Heimann H. Is There a Role for Long-Term Silicone Oil Tamponade for More than Twelve Months in Vitreoretinal Surgery? Ophthalmologica. 2011;226(suppl 1):36–41.

4 Liu Z, Liow SS, Lai SL, et al. Retinal-detachment repair and vitreous-like-body reformation via a thermogelling polymer endotamponade. *Nat Biomed Eng.* 2019;3:598-610.

YOUR SPOUSE OR YOUR PARENTS?

WHO SHOULD DECIDE WHEN TO TAKE YOU OFF LIFE SUPPORT.

Plan how to leave well, if we want to live well, say ***Sumytra Menon***, Senior Assistant Director from the Centre for Biomedical Ethics, NUS Medicine; and ***Dr Noreen Chan***, Head & Senior Consultant, Division of Palliative Care, National University Cancer Institute, Singapore and Assistant Professor at the Department of Medicine.



42-year-old Vincent Lambert made headline news around the world when his relatives split into two camps and fought bitterly in court over whether his life should be sustained artificially or withdrawn so he could pass away. Mr Lambert, who has since died, had been in a vegetative state for more than a decade since a 2008 motorcycle accident left him with quadriplegia and irreversible severe brain injury.

While Lambert's wife, Rachel, wanted to pull his life support – agreeing to doctors recommendation to do so as efforts to improve his conditions were in vain, and that her husband had previously expressed his wish not to be kept alive if he was in a vegetative state – Lambert's parents and some other relatives disagreed despite some of Lambert's siblings taking Rachel's side.

Lambert's case has gotten many to ponder over who should decide when to take you off life support.

All of us will die one day, it is only a matter of when, where and how. Yet for a phenomenon that is universal, we spend very little time planning for it.

WHO DECIDES?

If you are ever in Lambert's position, the best person to decide is yourself.

But the reality of being in a coma or a vegetative state is that you are incapacitated and unable to communicate your wishes. It would then be left to the healthcare team and your loved ones to work out the best way forward.

To avoid misunderstanding, guilt and conflict, one should discuss and communicate their values, goals and wishes ahead of time. Understandably, talking about death and dying is still a taboo topic in Singapore, as it is in many societies. But holding back wouldn't do us any good.

Lambert was in his thirties when he lost the mental capacity to make his own medical decisions due to the accident, which was probably the last thing he was expecting to happen. But it did. How many of us have planned for something like that? Have we made a will, or bought ourselves accident or life insurance?

All of us will die one day, it is only a matter of when, where and how. Yet for a phenomenon that is universal, we spend very little time planning for it.

Those decisions are left to the doctor who must make the decision based on the person's best interests.

ADVANCE PLANNING

There are ways you can plan for circumstances like Lambert's. For example, by agreeing to let the doctor decide whether or not to prolong your life through the signing of an advance medical directive (AMD), or planning the management of your affairs in advance through a lasting power of attorney (LPA).

But these plans have their limitations. An AMD only applies if you are terminally ill, experiencing imminent death, and the provision of extraordinary life-sustaining treatment will only postpone the moment of death. It wouldn't apply if you were in Mr Lambert's position as he was still breathing unaided even at his vegetative state.

Meanwhile you can appoint a proxy decision-maker, called a donee, to make your medical decisions through an LPA. However, the donee is only empowered make decisions on non-serious medical treatments; not decisions relating to life-sustaining treatment or treatment to prevent serious deterioration in the patient's health.

Those decisions are left to the doctor who must make the decision based on the person's best interests. This means that if you found yourself in a similar position as Lambert and had made an LPA, your donee cannot decide to take you off life support – only the doctor can decide.

LIVING WELL AND LEAVING WELL

Last year the Ministry of Health announced the republic's national severe disability insurance scheme, CareShield Life. It noted that one in two healthy Singaporeans aged 65 could become severely disabled in their lifetime, and about three in 10 Singaporeans are expected to live a decade or more with their disability.

These facts tells us that it is not just a good idea, but an imperative, that we begin these discussions sooner rather than later.

When you are fit and healthy, being disabled or dependent on others for your basic needs may seem like an unthinkable scenario or an unacceptable way to live; but human beings are adaptable, and people may find a way to cope with unwanted changes in their health status.

These discussions should raise questions of what it means to be living well before leaving well. The answer may vary, not just between individuals, but with same person across his or her life stages.

These discussions should raise questions of what it means to be living well before leaving well. The answer may vary, not just between individuals, but with same person across his or her life stages.

START TALKING ABOUT DEATH

Many people probably worry about burdening their family, emotionally and financially, but do not realise that this burden may be lessened by having conversations with their loved ones about their values and what a good life means to them.

Start the conversation with your loved ones at home, perhaps using guidance from the "Living Matters" website which was set up by the Agency for Integrated Care (AIC).

Take part in a discussion about your healthcare preferences with your healthcare provider. Many healthcare institutions offer advance care planning (ACP) — the process of planning for future health and personal care — for patients to explore their beliefs, values and healthcare preferences.

Through ACP, reflect on and express your personal beliefs and wishes, and let your love ones know what constitutes a good and meaningful life to you.

Atul Gawande in his best-selling book *Being Mortal* said, "Well-being is about the reasons one wishes to be alive. Those reasons matter not just at the end of life, or when debility comes, but all along the way."

By having these ACP conversations, and by understanding what well-being means to you, your family and healthcare providers will be able to appreciate your values and preferences. In this way too, you would not be "burdening" your family with the weight of such important decisions if you no longer have mental capacity, to make these decisions for yourself. You would also be assured the care you receive will also likely be aligned with your wishes and your best interests.

The time for these conversations, whether as individuals or as a society, is now. Otherwise, it will always too early, until it is too late.

Reflect on and express your personal beliefs and wishes, and let your love ones know what constitutes a good and meaningful life to you.

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NOT BY MY HAND ALONE — A SURGEON'S JOURNEY

So-so medical student, struggling houseman, long-suffering orthopaedic and hand microsurgery training and tribulation in the Temples of Doom, Sacrifice and Respite, and final redemption – NUHS Physician-in-Chief ***Professor Aymeric Lim*** (Class of 1990) shares about the ups and downs, ins and outs, highs and lows of his multi-faceted life.

Professor Aymeric Lim from the Department of Orthopaedic Surgery, at an operating theatre.
Photo credit: National University Hospital

“Pain and pleasure come to us not as opposites but as twins, strangely joined . . . a massage after a long day in the garden . . . a log fire after a hike in a snowstorm. . . . Nearly all my memories of acute happiness involve some element of pain or struggle.

– Paul Brand
Pain: The Gift Nobody Wants

WALKING IN PAUL BRAND’S SHADOW

Good morning. My aims today are three: one, to thank all the people who’ve helped me on this journey. Two, to share what a great job surgery is, and three, to show all young residents that it is possible to be an academic surgeon. It can be very tough though, but they have to hang in there. I feel very proud that I’m part of the Department of Orthopaedic Surgery, which has such a great heritage.

If there’s a role model I have – it’s Dr Paul Brand, the English orthopaedic surgeon who transformed the treatment of leprosy sufferers through his ground-breaking surgical work. If there’s a journey that I would have wanted to emulate – well, part of it would have to be that of Paul Brand’s.

The son of missionaries, he was sent back to the UK because his parents stayed in India. He later returned to India where he started his leprosy work.

Paul was once greatly touched when unable to speak the local language, he gave a leprosy patient a friendly touch to assure him he would help him as much as he could. Tears started to stream down the man’s face and Brand asked a colleague what he had done to distress him. She replied “You touched him and no one has done that for years. They are tears of joy.”

Brand wrote in his book “Pain: The Gift Nobody Wants”, “Previously I had thought of pain as a blemish of creation, God’s one great mistake. But pain stands out as an extraordinary feat of engineering valuable beyond measure.”

Pain is part of medicine. Pain is a necessary part of one’s career. And pain is part of one’s life. So this is not just a metaphor for disease, it is a metaphor for our lives, and it is also a metaphor for the work that we do, which centres a lot around the relieving of pain.

A second quote by Brand elaborates the role of pain. “Pain and pleasure come to us not as opposites but as twins, strangely joined”, and he gives some examples.[1] I think most of us would agree in our careers that more often than not, the greatest joys come after long periods of pain or suffering.

I have always wanted to be a surgeon since I was nine. My journey began in medical school and my medical school record is quite stark. Three or four re-exams, three re-vivas. I think I only got two Cs – one was for O&G. and one was for Anatomy, and the rest was all Ds. So it wasn’t a brilliant career in medical school. I struggled. But I had good times too, thanks to my friends Jui Lim, Ivor Lim, and Chayan.

Lifelong friends: Dr Jui Lim and Dr Ivor Lim

National Service in the army was a good break and working hard there gave me some credit for when I applied for a traineeship.

THE WONDER OF ANATOMY

Though medical school was a struggle, I want to mention one of the most inspiring teachers I've ever had, and that's Professor Rajendran K. He taught me the wonder of Anatomy. In those days before digitalisation, we had two PowerPoint projectors. He would place layers and layers of anatomical drawings upon each other. That wonder — it wasn't just the teaching of anatomy — it was the wonder of it which has stayed in my head for all my life.

THE KEY TO UNDERSTANDING MEDICINE

Another person who gave me the key to understanding medicine is Associate Professor Yeoh Khay Guan. He doesn't like this story, but I'll tell it. I was a very confused fourth year medical student, we were in Ward 58 and we were all struggling. Khay Guan probably was a H.O. (House Officer) and we were all grumbling. But he said "No, medicine is simple". And we said "What do you mean it's simple?" He said "Look, everything is either infection; inflammation; infarct; tumour etc" – and we all know this. So, I think it took me about a month to digest and a month to actually believe it. But once I had that key, it actually became a lot simpler and I was able to pass my final year exams without too many problems.

Another person who exercised huge impact in medical school was Prof Bala. There was a patient who came in with a limp, and I couldn't identify the gait. So he grabbed hold of my ear, and during this time, he was making this poor patient with an antalgic gait walk up and down. He tugged at my ear till my head was on the table, then someone whispered "antalgic", I said "antalgic" and finally, he let go of my ear.

I think we should return to this kind of teaching. I mean, right now with students and residents writing whistle-blowing reports when they're scolded in the ward, I think it's time to reset things a little bit!

ORTHOPAEDIC TRAINEESHIP

I went on next to Orthopaedic traineeship. After completing a posting in Orthopaedics NUH, I was still holding my forceps in a certain way and got scolded by Chew Soo Ping. He said "How can you hold instrument like this?" I said "I've never been taught how to hold it". He taught me how to hold the instruments properly.

ABU RAUF AND THE FELLOWSHIP OF THE ROYAL COLLEGE OF SURGEONS

Next came Part 1 in Fellowship of the Royal College of Surgeons. It was in the anatomy dissection hall and again, I was struggling. There was a really mean Scottish examiner and basically, my ship was sinking. He was asking question after question on the abdomen, and I was going down. The other examiner was Prof Abu Rauff. He kind of stepped in and took over. He asked me what are the lobes of the liver and I also could not remember! So I said they are like – which is true – the cantonments of Paris. That is actually how they were named. That's all I could remember. Anyway, he realised that there were problems. He said "What's this?" and I said "That's the gall bladder" and he said "Very good, boy". We kind of delayed things – it was delaying tactics - until the bell rang and I passed my Part 1!

MICROSURGERY

Then I was introduced to microsurgery. My first surgical procedure there was with Prof Kumar. We wheeled in the microscope and when I looked through it, there was a whole different world. I was completely fascinated. That's where I decided — it was probably the most painful decision I ever took in my life —to try and join the Department of Hand and Reconstructive Microsurgery.

People couldn't understand why. My friend, Ivor Lim, was trying to get me in and I remember what Khong Kok Sun said: "Why you want to join that department?" I said "Because I want to do microsurgery. So, he said "Don't worry, no one wants to join. In three years' time, there'll still be a position there", because it was really tough.

So I asked to join the department.

THE THREE PROFESSORS — PHO, SATKU, KUMAR

Hand and Reconstructive Microsurgery was a tough department for some wrong reasons and some right ones.

It was defined by the three professors – Prof Robert Pho, Prof Satku and Prof Kumar. It was a hard school. It was like going through the surgical version of the SAF's Ranger course . I was doing 10 calls a month, and on the non-call days I often had to come back to help the senior registrar with microsurgery. That was really tough. There were many opportunities though. I think it is very important for young surgeons to do a lot of surgery. Because it's just like golf or tennis – when you're young, you play a lot, you'll have the right strokes. I was taught how to do surgery by my professors.

The Awesome Threesome: (clockwise) Prof V. Prem Kumar, Prof Robert Pho, Prof Kandiah Satkunanantham.

THREE OPERATING THEATRES, THREE TEMPLES

So three professors, there were three operating theatres, and it felt like three temples. These were the Temple of Doom, the Temple of Sacrifice and the Temple of Respite.

The Temple of Doom – that was going to Prof Pho's operating theatre. It's hugely stressful. You go in, you scrub, and we all go and look – Prof Pho is analysing the case – but we go look at the x-ray box for about half an hour while Prof Pho thinks and discusses it. That's what we used to call "praying to the x-ray god". Then the surgery starts, and there was such an aura of mystique, it was almost mythical.

The second temple was the Temple of Sacrifice – that was Prof Satku's O.T. And this was like a Mayan Inca temple. So often it was human sacrifice, and the human sacrifice was usually me. It felt like Groundhog Day, well, every week. That was the kind of recurring theme of my Orthopaedic training. But I must say, I did 50 T.K.R. (Total Knee Replacement) and I was taken through them by Prof Satku.

The third temple was the Temple of Respite. You know, Prof Kumar – he's quite a fierce guy. So you can imagine going into his O.T. was considered a respite? But I remember that he taught me surgery and he taught me many things. One of the things he kept telling Prof Pho was – when Prof Pho was wondering how come I wasn't doing any research, or not doing well or whatever – he kept telling Prof Pho "you can lead a horse to the water ..." and all of you know the rest of the quote.

Prof Lim (extreme right) with colleagues from NUHS.

MAJOR SURGICAL INFLUENCES: WHAT THEY TAUGHT ME

Prof Satku was a harsh disciplinarian. I think I needed it – not all of it – but I needed some. He taught me real respect for the patient, and healthy obsession for hygiene and the conditions around the surgery. There is one thing I always tell everybody, whenever we did the rounds, we would start in Ward 51, a subsidised patients' ward. Prof Satku would treat his subsidised patients the same as his paying patients. I followed him closely for many years and I never, ever saw a difference. You know, just having a role model like that, just sets the tone for you for the rest of your life.

I'll go next to Prof Kumar.

He was a fountain of goodness. He always said to give people the benefit of the doubt. With Prof Kumar, that was the joy of surgery and teaching. I remember one day in the OT many years later, he said "Aymeric, this is the best job in the world". I asked him why, and he said he had just taught his registrar how to do a shoulder operation and he was just so happy about it. That was infectious, and that was very, very special. He taught me about shoulder surgery, which became very useful for brachial plexus surgery later.

Then there's Prof Pho. I think without him and all his struggles getting a microscope in in the 70s – and I think that's for the same reason, we should have a robot here. The robot of the 2000s is the microscope of the 70s. If he hadn't struggled so hard, if he didn't set us up at that level in the world, we would not be where we are. He's the one who taught me how to use the knife – not as a knife, but as a brush.

I wouldn't be where I am if it wasn't for my teachers and mentors: Prof Pho let me have the scalpel, Prof Kumar would take us out for drinks at the Guild House, and Prof Satku actually fed me grange wine in the Tanglin Club. He also operated on both my knees! So the justice and mercy, it was tempered by that.

Then there was (Kour) Anam Kuah. He was a fantastic hand surgeon. And when he was teaching me how to stitch, he said "Every stitch should be your best stitch. Do you understand that?" And I said "Yeah, every stitch should be your best stitch". "What does that mean?" I didn't get it. Then he said, "It means that if every stitch is your best stitch, your best stitch becomes the norm". That applies to everything in life. So in everything, do your best, and your best becomes your norm.

Another influential teacher was my mentor in France, Professor Michel Merle. He too has had a great influence on my career. Through his academic and surgical mentorship, I had many papers and also co-wrote two books with him, and edited two textbooks which are pretty good and have good diagrams, but are difficult to sell in Singapore!

I will now talk about leadership. A quote that aptly describes the values and qualities which I believe all leaders should possess is a verse from the Bible, Micah 6:8: "He has showed you, O man, what is good. And what does the Lord require of you? To act justly and to love mercy and to walk humbly with your God."

What are the elements there? To act justly – that also means rules and principles, and standards. To love mercy – that means you have to care for your people and your staff in what you are doing. And to walk humbly with your God – if you're leading, you're not leading for yourself, you are leading for a greater cause. If you have the opportunity to lead and if you have these three elements combined, it usually works.

The pain and suffering and joys when you are in leadership, they become more acute. I would say that you'll always need 20% of people to stand in the gap for the rest of the population. I'm really happy to say that here at the NUH and NUHS, many of you are standing in the gap for our patients, our work, and our institution. So I'm very proud to be part of this.

Prof Aymeric Lim (left) with a patient in Afghanistan.

MISSIONS

Another highlight of my professional life is going on medical missions. That's where I feel I'm most alive. Last year I was in Cambodia and I was walking to the Angkor Hospital for Children, and I thought "God, this is what I was born to do". There's nothing that inspires me more than doing missions so I try and do two a year.

An exciting medical mission was the 2009 one to Afghanistan in Spin Boldak. We did some surgeries here, and this is me with one of the young soldiers in Afghanistan there at that time. And they said they were going to kill Western foreign aid workers, so I thought I would grow a beard. It worked, they said I looked like a Kazakh.

Prof Lim (right) blending in with the locals in Afghanistan.

Another was with my close friend, Liew Shern-Ern who was in the Department of Orthopaedic Surgery for some time in Zambia. There, your resources are minimal and you need to do a lot of new things with so much less.

To end, I have a profound sense of gratitude to all the people I've worked with and learned from. I have been very, very blessed to enjoy such a great career. This verse says it all: "Surely goodness and mercy shall follow me all the days of my life: and I will dwell in the house of the Lord forever."

Thank you very much.

Firefighters undergo high level of heat stress during training and operation (Photo credit: Singapore Civil Defence Force).

BEATING THE HEAT

As the world begins to grapple with the uncomfortable reality of climate change, some of us find solace in the belief that its effects are confined to the polar regions of the globe. Its relevance has never appealed to an urban and tropical population that has either been conditioned to 35 degree Celsius (°C) or fortified within a false reality of an air-conditioned world. Until now.

by Department of Physiology

In January this year, Channel News Asia televised an episode as part of its "Why It Matters" programme, explaining why Singapore is heating up twice as fast as the rest of the world.[1] It turns out that the effect of global warming is amplified in urban environments, where heat-absorbing materials such as concrete roads have paved over the naturally dense, heat-regulating tropical landscape. This is also known as the Urban Heat Island effect, and by 2100, Singapore's ambient temperature is projected to reach a maximum of 35 to 37°C. While a mere 0.25 degree increase per decade hardly triggers an alarm, Associate Professor Jason Lee with the Department of Physiology at the NUS Yong Loo Lin School of Medicine explained that with our island's high humidity that limits our body's ability to dissipate heat, Singaporeans should be concerned. As efficient as the human body is at dissipating heat, or thermoregulation, the margin for error is very thin, and can be lethal.

Assoc Prof Jason Lee (third from right) and members of the WSHC Heat Stress Guideline Workgroup (Photo credit: Work Safety and Health Council).

Assoc. Prof. Lee is a subject matter expert in thermal physiology, having spent 12 years at the DSO National Laboratories as the Lead Physiologist and directed the Human Performance Programme. A key outcome of his research was the formulation of a holistic heat management system. This is achieved through profiling the associated heat strain in humans under various settings, formulating and evaluating heat mitigation strategies (physical conditioning regimes, heat acclimatisation, pre-activity cooling, work-rest cycles and hydration) and finally transiting them into policies such as training directives, training safety regulations and lesson plans.

In the light of recent heat-related injuries, the Ministry of Defence (MINDEF) established an external Review Panel on Heat Injury Management in 2018, of which Assoc. Prof. Lee is one of the panellists, to strengthen their approach to safeguard soldiers' safety. In particular, best international practices were reviewed and incorporated into our training system. "Fluid intake, long assumed as the single most important mitigation strategy to cope with heat, has minimal impact on attenuating heat strain during exercise. Instead, more emphasis should be placed on increasing one's capacity to regulate heat. This can be achieved through better aerobic fitness, as well as progressive heat acclimatisation," Assoc. Prof. Lee noted, as supported by his review meta-analysis. [2-3]

The debilitating effects of heat stress extend beyond the military. Assoc. Prof. Lee has been working with the Ministry of Home Affairs (MHA) to improve the performance and safety of our frontline officers. Specifically with the Singapore Civil Defence Force (SCDF), Assoc. Prof. Lee will co-organise the inaugural First Responders Safety and Performance Symposium in November 2019 in hope to gain insights on how to innovate their training, personal protective equipment as well as protecting the long-term occupational health of their emergency responders. [4]

Even if it does not mean death for most people, health and work productivity will likely be compromised. Almost 300,000 workers, or 13.6 per cent of our labour force is employed in the construction and logistics industries, where workers are exposed to the heat.[5] The Workplace Health and Safety (WSH) Council, recognising the vast implications of poor heat stress management, has recently established a Review of Heat Stress Guideline Workgroup, chaired by Assoc. Prof. Lee, to revise the guidelines on managing heat stress in the workplace. An increase in ambient temperature will inevitably result in productivity losses in these sectors of the economy and potentially increases health risk, including heat induced accidents.

Working with a grant from the Global Asia Institute's NUS Initiative to Improve Health in Asia, Assoc. Prof. Lee leads studies on the effects of environmental heat in Singapore and the region. The research, in a nutshell, aims to identify and quantify impacts of heat on health and work productivity due to climate change and to evaluate the impact of thermal stress on human cognitive performance. There is hope that the results will justify and incentivise the use of better heat management strategies.

Internationally, Assoc. Prof. Lee chairs the Scientific Committee on Thermal Factors at the International Commission on Occupational Health.[6] The committee lends their expertise to wider organisations such as the World Meteorological Organisation (WMO) and World Health Organisation (WHO) in co-authoring a report that is due in 2020 on providing evidenced-based recommendations to occupational and health professionals responsible for workers operating in the heat (indoor and outdoor). The goal is to encourage more scientists and practitioners to participate in this area of research so that the world will be better equipped to cope with a warmer climate.[7] Together with researchers at the N.1 Institute for Health at NUS, Assoc. Prof. Lee seeks to uncover individuals' tolerance to heat stress. While personalising heat management for every individual may not be feasible in every context, understanding individuals' responses to an absolute heat stress can allow stratification and therefore optimisation of work productivity and health.

REFERENCES

1 *Why It Matters: Killer Heat*, Channel NewsAsia. January 2019.

2 Alhadad, S.B., Tan, P.M.S., Lee, J.K.W. (2019). Efficacy of heat mitigation strategies on core temperature and endurance exercise: a meta-analysis. Frontiers in Physiology, 10 (71): 1-27.

3 *Drinking water not the best way to cool body, study finds*. The Straits Times. 19 March 2019.

4 First Responders Safety and Performance Symposium. https://www.scdf.gov.sg/home/first-responders-safety-and-performance-symposium-2019

5 Singapore in Figures 2018, Department of Statistics Singapore, https://www.singstat.gov.sg/-/media/files/publications/reference/sif2018.pdf

6 Kjellstrom, T., Lemke, B., Lee, J.K.W. (2019). WORKPLACE HEAT: an increasing threat to occupational health and productivity. American Journal of Industrial Medicine (In Press).

7 First Responders Safety and Performance Symposium. https://www.scdf.gov.sg/home/first-responders-safety-and-performance-symposium-2019

HEALTH INFORMATICS – EQUIPPING STUDENTS WITH SKILLS FOR THE DIGITAL AGE

Dr Kenneth Ban and Ms Shikha Kumari guiding students on the use of data visualisation.

by Dr Kenneth Ban
Senior Lecturer, Department of Biochemistry

The practice of medicine continues to evolve in its quest to improve the prevention, diagnosis and treatment of diseases. The practice of medicine now adopts a rational approach grounded on our scientific understanding of the human body and how it interacts with the environment.

Technological advances in the current Digital Age allow healthcare and clinical decision-making recommendations to be synthesised from different sources of information, ranging from patient case reports to randomised controlled clinical trials and large scale population studies. This evidence-based approach has become the backbone of modern clinical practice, driving steady improvement in healthcare outcomes for patients and the population.

Today, the practice of medicine is poised for another transformation, catalysed by the increasing use of technology to digitalise and store healthcare information. Patient records and laboratory results are no longer paper-based but encoded as electronic health records accessible to healthcare professionals, who can then query and retrieve relevant information in a timely manner to make informed clinical decisions.

Besides facilitating access to patient records and results, this accelerated digitalisation of healthcare data enables new data-driven approaches based on the remarkable progress in the emerging fields of data science and machine learning. Digitalised healthcare data can be analysed computationally at scale to identify patterns that would otherwise be missed by conventional inspection, revealing new insights to improve healthcare outcomes.

Given this inexorable shift towards data-driven medicine, how can we equip our future doctors with the necessary competencies to remain top-class?

To provide our medical students with foundational knowledge in healthcare-focused data science, a team of educators from the Medical Sciences Cluster (MSC) and the Academic Information Office (AIO) of the National University Health System (NUHS), collaborated to conduct a five-day Introductory Health Informatics workshop for Phase I and II medical students in May 2019.

This pilot workshop was designed to introduce students to informatics and the principles of organising, querying, cleaning, and visualising data through a guided series of hands-on, practical sessions (Figure 1). The workshop culminated in a mini-datathon that allowed students to use their newly-acquired skills to investigate a healthcare dataset.

Dr Ling Zheng Jye from AIO at NUHS began the workshop by introducing the broad principles of informatics. He led a series of group exercises requiring the students to define a health-related question, design appropriate survey questions to capture the relevant data, and finally to survey one another to obtain data for analysis. These exercises illustrated how defining a question determines what data needs to be captured, and the types of data collected and how the organisation of data determines how they can be used for analysis.

Building upon these core principles, I introduced students to key concepts regarding the handling of data. Students learnt about the relational data model and how to organise data in different forms so as to minimise errors and repetition. They then applied their learning through hands-on work to reorganise a healthcare dataset into a form suitable for database storage.

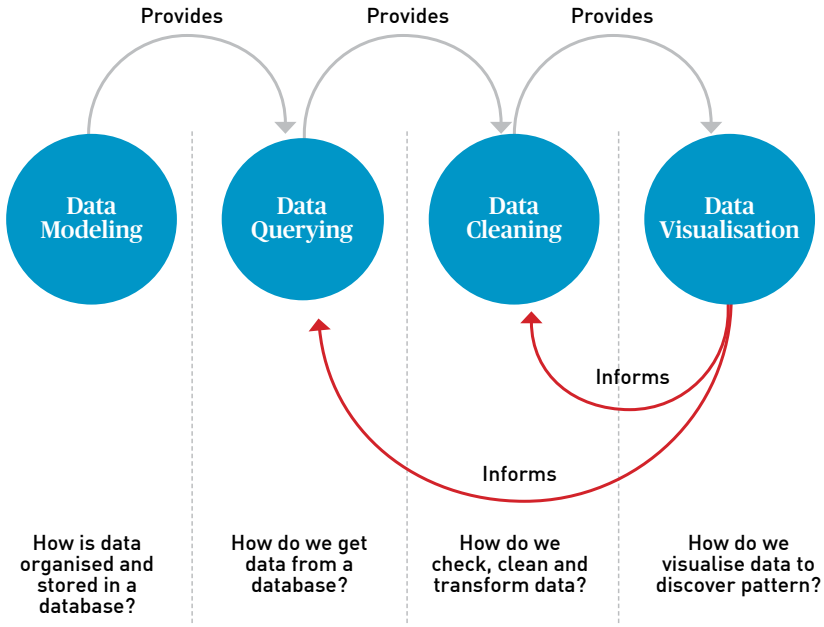


Figure 1.

Next, students learnt the fundamentals of querying and retrieving data, using a standard programming language for relational databases called Structured Query Language (SQL), as well as an emerging standard for healthcare data exchange, called Fast Healthcare Interoperability Resources (FHIR). They completed a series of tasks that required them to retrieve relevant data from simulated healthcare databases hosted at the Medical Sciences Cluster.

Following data retrieval, students verified the integrity of their data using a set of guidelines, including the necessary cleaning to transform data prior to analysis. Using an infectious disease outbreak dataset from a public database, students were guided to use a software tool (OpenRefine) to detect inconsistencies and correct anomalies in the dataset. This experience showed students that even curated datasets may contain anomalies that need to be checked, cleaned, and verified before they can be analysed.

Students presenting the outcomes of their group discussions.

To conclude the students' preparation for the mini-datathon, Ms Shikha Kumari, Ms Pamela Lim, and Ms Lin Shuting from AIO at NUHS taught students how to use data visualisation as an approach to discover patterns and formulate hypotheses. They used the Tableau platform for quick exploratory analysis of a dataset to discover patterns, and the students practised using Tableau to visualise the data in different forms.

The final activity, the mini-datathon, enabled students to synthesise their learning: they used Tableau to explore a healthcare dataset, identified an observation of interest and formulated plausible hypotheses accordingly.

The workshop concluded with a talk by Dr Ngiam Kee Yuan, Group Chief Technology Officer of NUHS. A pioneer in the application of artificial intelligence and machine learning for healthcare in Singapore, Dr Ngiam gave an exciting overview of NUHS projects that leverage clinical data to make predictions as an aid to clinical decision making.

This introductory workshop, which is intended for all Phase I students, will form the foundation for a longitudinal track in Health Informatics. Workshops currently in development for later Phases will incorporate statistical learning and address topics such as artificial intelligence and machine learning.

By equipping our students with the essential competencies to use data science for healthcare applications, the School aims to prepare students for the era of data-driven medical practice and empower them to be innovators, leveraging healthcare data to derive new insights to improve health and patient outcomes.

Dr Cheong Pak Yean in his clinic at Jalan Jurong Kechil. He has written three books on communication and humanism. The latest, *Being Human; Stories from Family Medicine*, is a compilation of drawings and stories from GPs and medical students attached to family medicine.

NARRATIVELY SPEAKING

Tracing his journey in family medicine as a student and educator, *Dr Cheong Pak Yean*, Adjunct Associate Professor at NUS Medicine (Class of 1974) was instrumental in developing family medicine as a specialty, and shares how the discipline has evolved since its early days.

1.

Family medicine (FM) is perhaps the earliest form of medicine practised by pioneering doctors, yet the specialisation was only officially recognised a few decades ago. Family medicine was not available as a course of study over forty years ago, when Dr Cheong Pak Yean graduated from the University of Singapore's then Faculty of Medicine in 1974. "There was no Masters in Family Medicine back in those days. Many doctors who aspired to be leaders in the medical profession did internal medicine (IM) as it is a generalist discipline. So I did the same," recalled Dr Cheong.

1.
The office above Dr Cheong's clinic today. The shophouse was built by Dr Cheong's grandfather in the 1920s, which was occupied by the Japanese during WWII.

Guests at the official opening of the Graduate Family Medicine Centre on 9 October 1998, a training centre recognised by the College of Family Physicians and the National University of Singapore post-graduate school in family medicine.

PLUGGING IN THE GAPS IN PRACTICE

After completing his housemanship and postgraduate studies, Dr Cheong started his clinic in 1980 in a shophouse built by his grandfather in Bukit Timah and began his practice as an internal medicine physician. Facing the challenges of practice, he saw the need for clinical assistants in hospitals and clinics to improve the healthcare delivery in Singapore. He championed Healthcare Assistants' training to enable professional clinic and hospital assistants to bridge the gap between doctors, nurses and patients. The training was taken up by the Institute of Technical Education (ITE), and later expanded into a full-fledged national programme. He also started a drug distribution and computerisation co-operative for private practitioners.

Addressing national needs, Dr Cheong assumed leadership positions in several healthcare institutions then. He was president of the Singapore Medical Association (SMA), the College of Family Physicians and also sat on the board of the ITE and the National Healthcare Group (NHG).

Dr Cheong with a group of postgraduate doctors at the office above Cheong Medical Clinic in 2014, commemorating 20 years since the centre was established.

ESTABLISHING A MASTERS PROGRAMME FOR PRIVATE PRACTITIONERS

Developing family medicine as a specialty became a lifetime passion for Dr Cheong. "Most specialities focus on depth, but family medicine is a generalist discipline that requires a breadth of knowledge and practice. It does not matter where you are — whether in community hospitals, nursing homes, hospice care, or polyclinics — family medicine sees to the preventive, personalised, comprehensive and continuing care of the whole patient."

When the Masters of Medicine (Family Medicine) course was first introduced in 1990, the programme was largely administered by the Ministry of Health (MOH), and doctors were attached to various government hospitals and polyclinics as part of its curriculum. The fraternity realised that there was a large demand coming from existing private general practitioners who were serving the community. Together with Associate Professor Goh Lee Gan and Dr Julian Lim, he developed the Private Practitioners' Stream (PPS) of the Masters of Medicine (Family Medicine) in 1994. Part-time courses were conducted in the office above his clinic, and the first candidate in the programme graduated in 1995.

Subsequently, the office was officially established as the Graduate Family Medicine Centre in 1998, and its training was accepted by the College of Family Physicians and the University of Singapore as pre-requisites for taking the MMed (FM) examination. Assoc Prof Goh, Dr Matthew Ng and Dr Cheong then went on to develop the Graduate Diploma in Family Medicine (GDFM) in 2000 as the Masters training was found to be onerous. Today, the GDFM programme has expanded to take in more than 200 doctors a year and is an entry pre-requisite for the Family Physicians Register.

TEACHING HUMANISM WITH NARRATIVES

Dr Cheong was appointed Adjunct Associate Professor at NUS Medicine in 2000. To enhance his own knowledge and teaching of the humanistic dimension of medicine, he read a Masters in Psychotherapy, an area in line with his interest in medical communication. Dr Cheong fervently relates to a particular note in an MOH publication Outcome and Standards in Undergraduate Medical Education in Singapore, which highlights that, 'As an overarching goal, medical education must seek to equip every graduate with all the requisite knowledge, technical skills, behavioural and communication skills (verbal, written and body language), empathy, compassion and professionalism in order to provide holistic, patient-centred care.'

In a series of his teaching workshops, Dr Cheong gets medical students to recall the most memorable clinical experience during their posting in family medicine, and express their reflection through drawings. He found their drawings insightful, despite studies that showed the level of apathy in students increases when they reach their third year of studies.

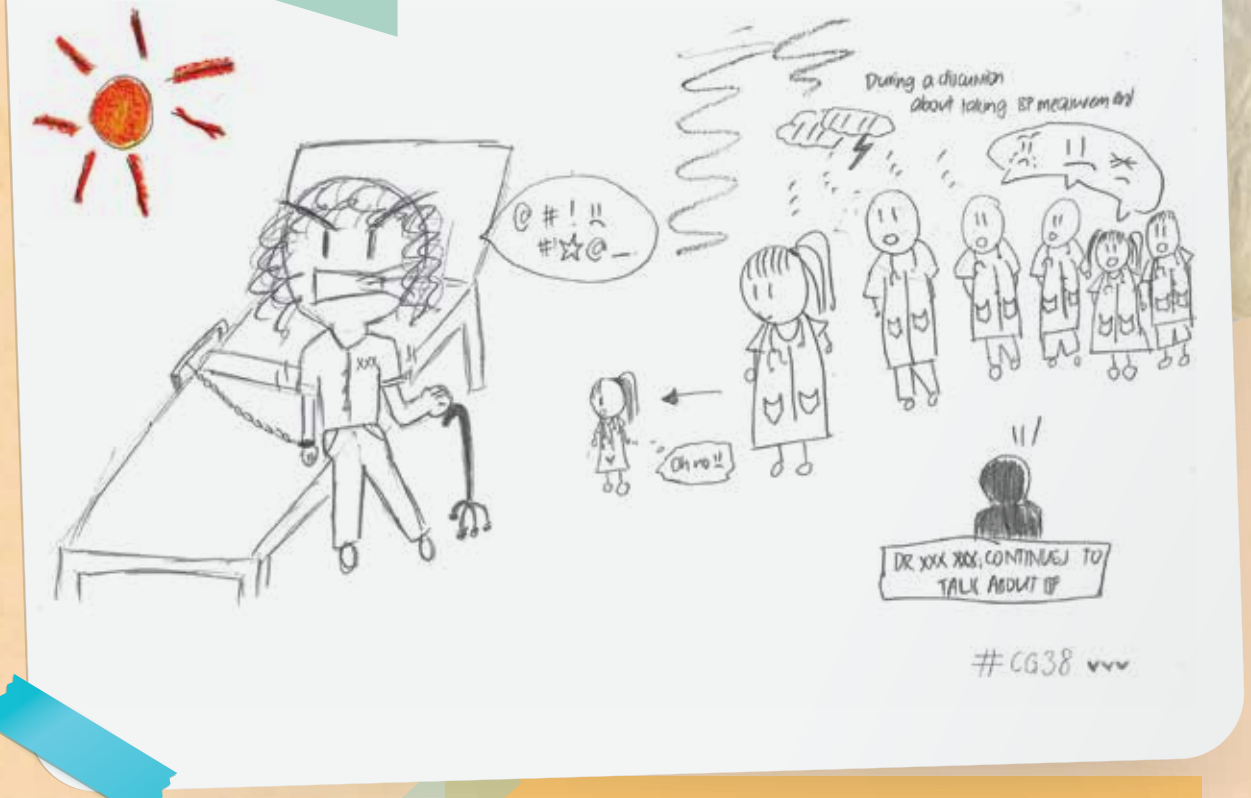
"Many people like to talk about evidence-based medicine when it comes to diagnosis. But I find that it may not be enough; we need to relate to the person in front of us. Are humanistic values teachable?" asked Dr Cheong. He used these student drawings for reflective sessions with experienced family doctors, who then wrote corresponding personal vignettes and commentaries based on the illustrations. These personal, reflective drawings and narratives were compiled into a book, Being Human, Stories from Family Medicine, which he co-edited with Dr Ong Chooi Peng and published recently.

In one of the stories, titled 'Doing Good and (not) Harm', Dr Cheong reflected on the passing of his mother, and a situation that he came across in a hospital attachment. They depict how respecting the patient's and family members' wishes, and putting oneself in the patients' shoes are forms of empathy. Should a doctor or tutor continue to teach at the bedside when a patient is agitated and hurling expletives? Could he have taught empathy and compassion by calming the patient?

Through this book, Dr Cheong hopes to cultivate the illness narrative as an experiential learning tool to teach compassion and other values to both medical students and doctors.

Read extracts of "Being Human, Stories from Family Medicine" on the next page.

Excerpts from
Being Human: Stories From Family Medicine



Doing Good And (Not) Harm

(page 146)

Beneficence and non-maleficence are two key pillars of medical ethics. In the doing of good, we must guard against doing unintended harm.

"In the drawing, medical students depict their experience of a bed-side tutorial. Their tutor, the dark figure, lectures a captive entourage of befuddled medical students about hypertension. He is oblivious to the expletives hurled by the agitated man restrained to the bed. Only the little child in the female medical student, all innocence as yet unacculturated by the medical system, steps forward and exclaims Oh no! in empathy. The tutor has unwittingly displayed poor role-modelling of professional values whilst providing medical training.

I confess that as a young doctor, there were times I provided good care without reference to the patient. I once had an elderly patient in a nursing home. She was ninety and had been bed-bound and uncommunicative for four years, and she had a Do Not Resuscitate directive on her charts. Despite this, she was defibrillated when she collapsed in the home and brought to the hospital. In the hospital, her children requested that no radiological or blood tests be done and no intravenous lines set up. She remained in sinus rhythm post-defibrillation for a few hours and her children were able to bid her farewell.

May we apply our knowledge and expertise with wisdom and empathy."

– Dr Cheong Pak Yean

Fragmentation Of Care

(page 32)

With the increasing complexity of medical care, medicine is organised into specialty groups based on body parts or treatment modalities. While such groupings are important for medical research and training, there is a danger of dividing patients up based on organ systems for care across the entire spectrum of disease severity. The patient ends up with one appointment for each dysfunctional organ system.

"The drawing depicts a bewildered wheelchair-bound patient with a host of specialist outpatient appointments following an acute admission. Sometimes such splintered care in disparate clinics may lead to a poor outcome.

We need to integrate clinical silos into the healthcare landscape by some common concepts and common action, aided by patient health literacy. Clinical practice guidelines and care pathways cannot substitute for doctors working in tandem and in harmony. This refers to the specialist and generalist doctors. The specialist-centric model needs to give way to a more collaborative partnership with the generalist. The generalist needs new rules of engagement to participate in integrated care.

The question that we need to face is not who but what. What is a generalist and what is a specialist? We can agree that the generalist is the doctor who is not organ-defined – hence the generalist physician, the geriatrician, and the family physician. Like specialist, these doctors have undergone structured training and assessment to get to where they are, and they each practice within a definite framework. It is time to recognise the generalist not distinct from the specialist. In the integrated new world, the generalist, looking after the whole person, is simply distinct from the one who looks after specific body parts."

– Drs Cheong Pak Yean, Goh Lee Gan, and Ong Chooi Peng

LIFE'S SECOND CHANCES

Inspired by the compassion of healthcare workers who treated and rehabilitated his stroke-ridden father, Phase IV medical student ***Chan Long Peng*** was determined to study Medicine, so that he too, could pay it forward and give patients a second chance at life.

Long Peng explaining otitis externa, or inflammation of the external ear canal, to a patient.

Long Peng and his family

"I was the main caregiver to my father, who suffered a stroke in 2013. It happened during my second year of National Service," recalled Phase IV medical student Chan Long Peng. The stroke resulted in a left hemiplegia which rendered his father bedridden.

This sudden infliction on the family led Long Peng to take two years off to care for his father. Each day, he assisted his father with bedside exercises and activities of daily living such as bathing, toileting and feeding. A large part of time and energy was also spent attending medical appointments. Part of rehabilitation meant a series of physiotherapy sessions to painstakingly retrain muscles that used to move so unconsciously in walking, sitting and standing. It included speech therapy, to help make sounds more intelligible and less frustrating.

He mused, "This was a trying period—I realised my father lost his identity as the family's able, sole breadwinner. We needed to help him regain his independence as well as confidence. I spent this time taking care of him to ensure that his rehabilitation was complete. He's since recovered and even had his driver's license reinstated!"

During this time spent in and out of hospitals and medical facilities, Long Peng was won over by the empowering nature of medical work. He started to seriously consider pursuing an education in Medicine.

Long Peng said, "In the course of treatment, we befriended a patient who suffered brain injuries from a car accident. I saw how a team of medical professionals developed programmes for his rehabilitation and rallied together to treat him. I realised that caring for patients goes beyond treating the body; a kind word means a lot to a healing person. Treatment also encompasses emotional care."

He elaborated that despite initial concerns on how he could fund his degree, Long Peng accepted a place at the University of New South Wales in Australia in 2015 and applied for financial aid, determined to secure funding for a medical education to alleviate his parents' burden. He was granted the Lee Foundation Overseas Medical Bursary Education Fund for his first semester, and continued to work in between his studies to support himself and his school fees.

"I worked as a cleaner at a residential college during term breaks and tutored medical students. At that time, my siblings were shouldering our home mortgage and I wanted to take responsibility for funding my fees. But it all got a bit much. I decided to come back home to be closer to family in my second year, and was accepted into NUS Medicine," said Long Peng.

> "I believe in taking a positive attitude in facing problems. It's all about how you perceive them. A mountain looks daunting when you stand at the its foot but once you scale it, the view you get at the top will be so beautiful.
>
> **– Chan Long Peng**
> Phase IV medical student

He continued to apply for and receive financial aid on his return home. A large part of his fees and some living expenses are defrayed by the awards from the Lee Foundation, the Ministry of Education and the NUS Medicine alumni-established Christine Chong Hui Xian bursary. His parents continue to support the rest of his school fees.

Long Peng pointed out that this has taught him to be resilient and courageous in the face of life's curve balls, "I believe in taking a positive attitude in facing problems. It's all about how you perceive them. A mountain looks daunting when you stand at the its foot but once you scale it, the view you get at the top will be so beautiful. All the challenges you've experienced along the way will become beautiful memories for you to share with people you will meet who might be facing similar circumstances. So don't give up. You only truly fail when you choose to give up."

He also highlighted that the support allows him to focus more on his studies. He is exploring various interests in the different disciplines and still thinking about whether he should eventually go into surgical or clinical practice. "However, I'm quite clear that I want to do something that will enable me to interact with my patients," he said. "As a medical student, I find that most patients need a listening ear and want to be heard. This is something that I've been doing in my hospital attachments so far, and I enjoy it."

Long Peng is looking forward to doing his bit to make a difference in people's lives as a doctor. "Because of what happened to my dad, I would like to help other people have a second chance at life, and enable them to move on after a setback. It sounds clichéd, but I realised what powerful roles medical professionals play—it's not always about curing, but providing the human touch in the process of treatment. I want to be part of the process."

Long Peng (extreme right) with fellow 'Playhouse 2019' students, who worked on an annual theatre production.

EXERCISE IS MEDICINE

Phase IV student *Ian Wee* has pushed the limits of his sporting interests, representing the nation as Singapore's male Crossfit champion at the recent international Crossfit Games in Madison, Wisconsin. MediCine sat down with Ian to find out more about his passion for Crossfit and how his training and participation in the sport has translated to his life as a future medical professional.

Ian at his training.

Watching the medical student, published medical researcher and accomplished athlete, one wonders how he finds enough time in a day to dedicate his energy to all that he undertakes. Ian shares that with strong discipline, ruthless prioritisation and time management, anyone can accomplish what they set their mind to.

When he had made the decision to participate in the Crossfit Games selection process, Ian realised that he would have to dedicate sufficient time to training twice a day. This saw him waking up as early as 4.30am to squeeze a gym session in the mornings before heading to the hospital for his clinical placements. Dog-tired from his already-long day, he would muster up the determination to hit the gym again for another session after work to ensure he was in good shape. His perseverance paid off when he was selected as Singapore's male champion in July this year.

On marrying his two loves, Ian explains that he has found many overlaps between Crossfit and Medicine, "In the hospital, you have to constantly adapt to the ever-changing situations and manage the unexpected — from different hospital cultures to the different workstyles of each doctor and professor — this is akin to the unpredictable nature of Crossfit workouts. Through my Crossfit training, I've learnt the importance of adaptability, versatility and resilience."

The influence of Crossfit on his medical career does not stop there; it has also developed his interest in becoming an Orthopaedic Surgeon. Beyond personal ambition, Ian hopes to see the day that Crossfit is promoted as a platform for people in the community to get active and healthy as he sees the potential of the sport in helping to combat chronic medical conditions like diabetes and hypertension.

With so many feathers in his cap, Ian credits his strong support network for providing him the boost of encouragement when the going was tough, "I am blessed and honoured to be able to share this achievement and joy with my loved ones and the entire Crossfit community in Singapore. My dad in particular was extremely happy when he watched me don a jersey with our family's surname "Wee" on it. My family has been my biggest supporters throughout this journey – mentally, physically, and financially."

2019

18 Nov — Simulation Faculty Development Workshop
Centre for Healthcare Simulation, MD6, NUS

23 Nov — Wong Hock Boon Society Research Day 2019
Level 1 Auditorium, Clinical Research Centre, MD11, NUS

25 Nov — NUS Neuroscience and Technology Symposium
Level 1 Auditorium, Clinical Research Centre, MD11, NUS

2020

6 Jan — NUS ncRNA Symposium 2020

8 - 12 Jan — 17th Asia Pacific Medical Education Conference (APMEC)
Resorts World Convention Centre, RWS

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School of Medicine