

PATIENT CARE

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Patients in Neurosurgery/ p.6

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Seeking Future Breakthroughs for
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RESEARCH ACROSS THREE PILLARS

How developments in
patient care, education
and clinical & basic
science studies are shaping
our research canvas



National
Neuroscience Institute
SingHealth

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Endovascular Stroke Treatment 101

“NNI has the capabilities for both tPA and EVT with its team of trained interventional neuroradiologists, advanced neuroimaging technology and innovative devices.”

Endovascular Treatment (EVT) is a minimally invasive procedure that has been proven to be clinically beneficial for stroke patients. The treatment is now strongly recommended by the American Heart Association/American Stroke Association (AHA/ASA) for acute ischaemic stroke. Based on new clinical trial data from eight randomised clinical trials and other relevant data published since 2013, EVT results in better function compared to existing stroke treatments.

A/Prof Deidre Anne De Silva, Senior Consultant, Department of Neurology, NNI, and President, Singapore National Stroke Association (SNSA), said, “Endovascular treatment revolutionises stroke care. The treatment benefits have been confirmed in numerous trials and will result in patients having better function after stroke, limiting

physical disability and long-term social burden.”

EVT is performed using a catheter device that initially stents (creates a passage) the blood vessel, then retrieves the clot that is clogging it up. Previously, the only acute treatment of ischaemic stroke due to blockage of brain blood vessels was the clot-busting drug (called tissue plasminogen activator or tPA), which can be administered to some eligible patients in the first 4.5 hours from stroke onset.

Said A/Prof Francis Hui, Chairman, Medical Board, NNI, “The new trials have shown that new stent devices working like trawler nets have proven to be more effective than the old corkscrew (wine opener) retrievers in the removal of blood clots blocking the flow in brain arteries. This was our experience too in Singapore, and we have switched to the new devices for the past few years.”

Given the narrow time-window for tPA and EVT of 4.5 hours and 6 to 8 hours respectively, time is of the essence when it comes to stroke treatment. Early recognition of stroke symptoms and rapid access to treatment is therefore key to better stroke outcomes. However, currently less than 25 per cent of stroke patients arrive promptly enough to hospital to be considered for acute stroke treatment.

A/Prof Ng Wai Hoe, Medical Director, NNI, said, “The effective window for treatment is only a few hours in an acute stroke and any delay can lead to irreversible brain damage. We must stress the importance of early recognition of stroke symptoms and transfer the patient to a comprehensive stroke facility for prompt and definitive treatment.”



This Solitaire™ Revascularization Device is one of many stents that work like trawler nets to remove clots from the brain arteries.

Picture Credit: Medtronic International Ltd.

How Do You Recognise a Stroke? Remember F.A.S.T:

- F** **FACE**
If someone has his or her Face drooping when smiling
- A** **ARM**
Arm weakness or drifting when held up
- S** **SPEECH**
Speech is slurred or does not make sense
- T** **TIME**
It is Time to call an ambulance at 995

Stroke in Singapore

Stroke is a Significant Cause of Death and Disability

- In 2013, stroke was the 4th highest cause of death, accounting for 8.9 per cent of total deaths in Singapore.
- Stroke is the Number One cause of adult disability.
- Two-thirds of stroke patients have long-term residual impairments and disability.

Stroke is Common

- 3 to 4 out of every 100 Singapore residents over the age of 50 has had a stroke.
- There are 9,000 new stroke cases every year in Singapore.

24/7 Stroke Care

- Stroke is cared for around the clock; a multidisciplinary medical team is always on guard to provide immediate attention for acute stroke patients.



FACES

OF HEALTHCARE

PATIENT CARE

Anecdotes from our Patient Care Advocates



I graduated as a Registered Nurse and I worked mostly with Neurosurgical patients. Over time, I was inspired to embark on a clinical research career as I felt that evidence-based practice has become increasingly important in the search for a cure.

As a research administrator, I hope to find important clues to solve basic problems that affect the quality of research outcomes. Simply put, we need to 'know-it-all, know first and be all-rounder'. Just like James D. Watson said, 'The most complex thing we have yet discovered in our universe'

*Ms Jocelyn Cheong Mei Yoke
Clinical Trial Research Unit (CTRU)
Senior Executive, Department of Research*



My ex-manager once told me that anyone can do the job as long as they put their heart into it. This is true especially now, when healthcare professionals like me have to gain multiple skills and knowledge, and learn to coordinate and communicate with patients and colleagues.

*Ms Winnie Goh Mei Lian
Senior Enrolled Nurse,
Neuroscience Clinic*



I keep a list of Chinese neurological terms on hand so that I can translate the terms for elderly patients who only understand Chinese. If patients look confused about their medication or appointment dates, I'll write instructions down for them in Chinese too. Simple gestures such as these give them added assurance.

*Ms Jessiline Teo
Patient Services Assistant,
Neuroscience Clinic*



I am intrigued by how 125 trillion synapses can spontaneously organise to give rise to consciousness. Neuroscience is moving from mere theory to allowing us to literally see thoughts and dreams in real time. Science fiction needs to play catch-up with neuroscience!

*Dr Justin Ker
Year 3 Neurosurgery Resident
Extracted from SingHealth
Residency Medical Students
Connect: Issue 31. Visit
http://www.singhealthresidency.com.sg/Pages/msc_31_fs.aspx to find out more about Justin's story.*

Harmonising Care for Patients in Neurosurgery



A Unique Collaboration

When someone is admitted into Tan Tock Seng Hospital (TTSH) or Singapore General Hospital (SGH) for a neurological condition, the patient benefits from the expertise of the doctors and surgeons from NNI, the ward nurses from TTSH and SGH, as well as the specialist nurses from NNI. Their collective expertise advance patient care to far reaching heights when put together.

Involving Nurses in Ward Rounds

One significant development as a result of this close collaboration is that nurses are now involved in daily ward rounds. Dr Vincent Ng, Co-Director, Neurosurgical Intensive Care Unit Programme, and Consultant from the Department of Neurosurgery at NNI, shared, “In historical times, doctors have their own traditional ward rounds, comprising of a team

of consultants, registrars and medical officers. They will document down all the instructions for what needs to be done, and the nurses will pick up the orders. However, communication gaps occur as the interaction is done through documentation.”

By involving the nurses on the ward rounds, doctors now benefit from receiving updated and detailed information from the nurses, who look after the patients around the clock.



(Seated From Left) Ms Emily Ang, Advanced Practice Nurse, NNI, Ms Serene Tan, Advanced Practice Nurse, TTSH, Dr Vincent Ng, Co-Director, Neurosurgical Intensive Care Unit Programme, NNI, Dr Goh Jia Jun, Senior Resident Physician, NNI, and Sister Mariam Piperdy, Senior Nurse Manager (Unit), TTSH.

Standing with the Ward Nurses from TTSH and Nurse Clinicians from NNI are Mr Ivan Tan, Nurse Manager, TTSH (Standing on extreme left) and Ms Hasfizah Bte Mohd Hanef, Nurse Manager, TTSH (Standing on second from right).



(From Left) Ms Joluene Yong, Senior Staff Nurse, Department of Neurosurgery, NNI, Dr Ady Thien, Senior Resident, Department of Neurosurgery, NNI, Ms Serene Tan, Advanced Practice Nurse, TTSH, and Ms Fu Liqing, Nurse Educator, TTSH.



“It doesn’t matter if you’re from NNI or TTSH, we’re here for the patients. We have equal respect for each other’s specialisation. Whether you’re an NNI Nurse Clinician or a TTSH Nursing Officer, we all have a role to play and we function as one.”

- Sister Mariam Piperdy
Senior Nurse Manager (Unit), TTSH

Said Ms Serene Tan, Advanced Practice Nurse (APN), TTSH, “In the past, when nurses did not attend ward rounds, they were at times unsure of the plan, and had to call the doctor to get updates. With this implementation, nurses now know the current status of the patients, and the procedures that will be done for the patient, and they are confident enough to update family members.”



(From Left) Mr Noel Loke, Nurse Clinician, Neuroscience ICU, SGH, Sister Kamsiah, Senior Nurse Manager, Department of Neurosurgery, SGH, and Dr Nicole Keong, Consultant, Department of Neurosurgery, NNI.

Implementation of External Ventricular Drain (EVD) Protocols

Another area where patients are benefitting from this collaboration is the EVD protocol implementation (see sidebar on next page), which has been in place since January 2015.

An initiative of Dr Nicole Keong, Consultant from the Department of Neurosurgery at NNI, she and her team of doctors and nurses from the TTSH and SGH campuses put together a system of protocols to standardise the way EVDs are inserted and maintained throughout. Dr Keong explained that the impetus for the project was that patients should have fair access to the best treatment for their particular condition wherever they were. She added, “There are good practices in every campus, so we wanted to incorporate those and share them across the network. We wanted to be able to deliver clinical gold-standard on every site.”

Sister Kamsiah Bte Jaafar, Senior Nurse Manager at the Department of Neurosurgery in SGH, shared that teamwork was paramount for the EVD protocol implementation to be successful. She said, “By bringing together the doctors and nurses from both campuses, we were able to share our experiences of what worked and what didn’t work. For example, at SGH, we found that samples taken farther away from the brain reduced the risk of infection, and this was something we wanted to share with the other campus.”

Ms Fu Liqing, a nurse educator at TTSH, added, “At the end of the day, the team needs to disseminate the information and everyone has to be on the same page. On the doctors’ side, there is a person liaising between the consultants, registrars and MOs. On my part, I have to educate my nurses on the new protocols, and a senior

sister will maintain the communication channel between the doctors and nurses.”

Shortening Nil-by-Mouth Time (NBMt)

A third collaborative project started out as a service quality project between APN Serene Tan, APN Emily Ang and Senior Resident Physician, Dr Goh Jia Jun, both from NNI.

As early as 2013, APN Tan began to collect data to record the NBMt (see sidebar on next page) of patients undergoing Tracheostomy Tube Change (TTC). She observed that even though patients were only required to fast for two hours before a TTC, they would often end up fasting for periods much longer than that.

Hence in 2014, APN Tan, together with APN Ang and Dr Goh, decided to go for a quality improvement training course so that they could formally tackle the issue.

Dr Goh said, “These patients are usually fasted well before their procedure. We tried to tweak the fasting time duration so that patients don’t have to be without feeds and hydration for long periods of time.”

In order for the project to be successful, the nurses in Ward 10 (Neuroscience Wards) had to be engaged to collect information on the NBMt for over a six-month period.

Continued on Page 8



“This is a problem worth solving. Some of these patients cannot speak for themselves. Even though the number of patients requiring TTC is small, they are definitely still worth the effort,” said Emily.

Ultimately, an important point is that patients benefit, and as Emily shared, “We now fast them at 10 am instead of 6 am, so they have one more feed. We are also reviewing the need for a chest x-ray, which can help to shorten the overall fasting time.”

As a result of their good work, the team received the Merit Prize (Service Quality Category) at the Singapore Healthcare Management Congress 2015.

Overcoming Challenges

Mr Noel Loke, a Nurse Clinician from the Neuroscience ICU at SGH, believes that “two-way communication” is key. This is why every Friday, doctors and nurses from SGH, TTSH and NNI come together to discuss patient issues and share their experiences from the past week.

Sister Kamsiah added, “Keeping one another updated also helps us, for example, when doctors may be in another hospital or in the operating theatre. Nurses can then assist with preliminary education for the patients.”

It is perhaps not surprising to find out that beneath this serious group of medical professionals lies a close-knit team. Nurse Manager, Mr Ivan Tan from TTSH, explained, “We want to build integration, rapport and bridges with each other. It’s a lot easier to work together when you know each other.”

For Sister Mariam Piperdy, Senior Nurse Manager (Unit), TTSH, she believes that everything comes together when patients are the central focus, which resonates with SingHealth’s tagline, “Patients. At the heart of what we do”.

“It doesn’t matter if you’re from NNI or TTSH, we’re here for the patients. We have equal respect for each other’s specialisation. Whether you’re an NNI Nurse Clinician or a TTSH Nursing Officer, we all have a role to play and we function as one,” said Sister Mariam.

Echoing Sister Mariam’s sentiment is Dr Ng, who already feels that the collaboration is almost seamless. “In fact, I think the challenge is how to maintain and continue this very close collaboration, and how to inculcate these values and working practices to new staff; and to carry on to the next generation,” he concluded.

Useful Facts About NBMt and Tracheostomy Tubes

- Nil-by-Mouth time or NBMt is the time by which no food or fluids are to be taken orally.
- Tracheostomy tubes are inserted into patient’s airway to assist them with breathing. These tubes can only last for a month and have to be changed regularly.
- Usually, a patient is required to fast for at least two hours before a Tracheostomy Tube Change (TTC). This is a precaution against pulmonary aspiration (contents from the stomach rising and entering the respiratory system) which can cause suffering and even death.
- After a TTC, patients traditionally have to undergo a chest X-ray and wait for a doctor to review it before they can start feeding again (Phase II of the project is to revisit the need for post TTC CXR).

What is EVD?

EVD or External Ventricular Drain is a basic tool in neurosurgery and is used when patients’ conditions cause them to have a build-up of excessive cerebrospinal fluid (CSF) in the brain, which leads to raised pressure in the head. Conditions that cause this include aneurysms, trauma or a tumour.

A

Visionary

Educator



The epitome of an exemplary clinician educator, Professor Lim Shih Hui was presented with the National Outstanding Clinician Educator Award by the Ministry of Health (MOH) at the National Medical Excellence Awards (NMEA) Ceremony on 21 August 2015. Prof Lim is renowned for his expertise in clinical neurology, epilepsy and electroencephalography (EEG) as well as his educational efforts, placing Singapore on the Asia Pacific and international map of neurology, epilepsy and EEG education.

Co-Chair at the Joint Committee on Specialists Training (JCST).

It is, however, Prof Lim's belief in lifelong learning that led him on the path of an educator alongside his clinical role at NNI as a Senior Consultant in the Department of Neurology. And since 1993, Prof Lim has devoted time to teaching clinical neurology and internal medicine to generations of prominent neurologists and physicians today.

As a lifelong learner, Prof Lim continues to pursue his own education. Besides obtaining an MBA from the National University of Singapore (NUS), he is one of the few Western-trained doctors to have been registered with the Traditional Chinese Medicine Board after completing an acupuncture course. With his license, he proceeded to set up an acupuncture unit at SGH, displaying a vision to provide more integrated and holistic healthcare for patients.



A committed mentor, Prof Lim Shih Hui guides his students in developing their clinical acumen, while instilling strong ethics and professional standards.

Prof Lim is also a committed mentor who guides his students in developing their clinical acumen, while instilling the strong ethics and standards demanded of the profession. He continues his teaching through SingHealth's Internal Medicine Residency Programme and the Neurology Senior Residency Programme at the NNI-SGH campus.

A visionary educator with extraordinary contributions and dedication towards medical training and education in Singapore and throughout the region, Prof Lim is an inspiration for the generations of clinicians and field of medical education to come.

His latest accolade is the icing on the cake of a list of impressive achievements garnered by the dedicated and passionate clinician educator, including SingHealth's inaugural Distinguished Educator Award and the Outstanding Educator Award and Pioneer Award from Duke-NUS Medical School (Duke-NUS) in 2011.

Prof Lim's outstanding impact has extended well beyond Singapore. As Chairman of the Commission on Asian Oceanic Affairs of International League Against Epilepsy (IALE) from 1997 to 2009, he trained local and overseas neurology and epilepsy fellows, making Singapore General Hospital (SGH) one of the training centres for Epilepsy Fellows in the Asian-Oceanic region. He also set the standards of EEG practice by establishing an EEG Certification Examination in Asia.

On top of his role as Group Director of Education at SingHealth, Prof Lim is also Co-Director of Academic Medicine at the Education Institute (AM.EI), Senior Associate Dean of Duke-NUS as well as



Prof Lim Shih Hui
Group Director, Education, SingHealth
Senior Consultant, Department of Neurology, NNI
Winner of the National Outstanding Clinician Educator Award

The Residency Experience

If you thought medical school was long, consider that the road towards becoming a specialist consultant in the field of neuroscience takes another six to seven years. In this issue, we speak to three doctors undergoing their residency programme to demystify what the experience entails.

A Platform for Learning

Dr David Lim is in the second year of his residency programme, specialising in Diagnostic Radiology. Currently, on his rotation at NNI to do Neuroradiology, Dr Lim appreciates that “NNI offers more structure”, and that “training is more in-depth”.

“At 8.30 every morning, we will meet with consultants to go through the difficult cases from the previous night, which is something

unique to NNI. It is a good opportunity for residents to ask questions, and residents are encouraged to ask,” says the Junior Resident.

Outside their area of specialisation, residents also get to benefit from weekly multi-disciplinary rounds. Every Wednesday morning, neurologists, neurosurgeons and neuroradiologists come together for combined rounds, where residents are expected to prepare and present their various cases.

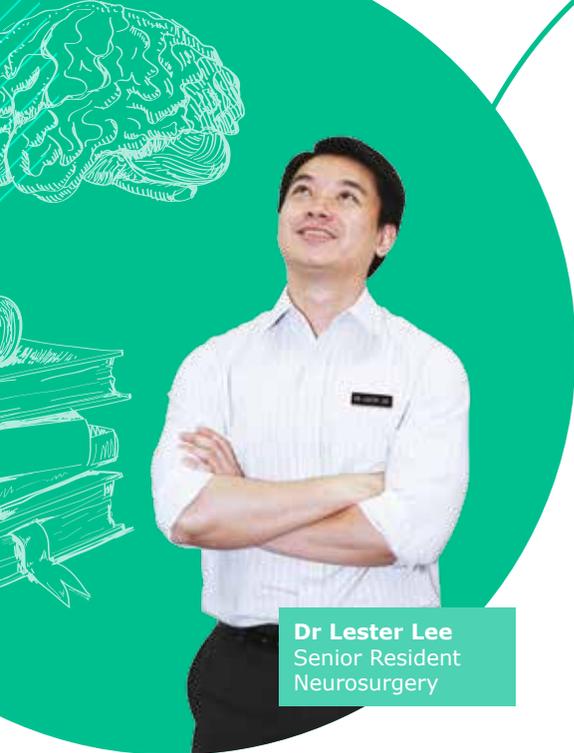
Dr Queck Kian Kheng, who is in his third and final year of his senior residency in neurology, tells us more on one of the things he appreciates about his residency programme. “The training programme is designed to expose us to different sub-specialties, so that we can make informed decisions on which area to sub-specialise in future.”

Besides the training that Dr Queck receives on a weekly basis, from EEG to neuromuscular and neurocognitive specialisations, third-year senior residents also get to rotate among various clinics dedicated to ultrasound, movement disorders and epilepsy.

But, it goes beyond learning on the job. For Dr Lester Lee, a fifth-year neurosurgery resident, his Friday afternoons are spent on residency teaching, during which consultants will give lectures on a particular topic of neurosurgery. “There is a lot of emphasis on teaching. Even during surgery, consultants will excuse you to go for unit meetings and residency teaching,” Dr Lee shares.



Dr David Lim
Junior Resident
Diagnostic Radiology



Dr Lester Lee
Senior Resident
Neurosurgery

Mentorship

Mentors play an important role in the learning process. For Dr Lim and Dr Lee, they appreciate the group mentoring approach that they have encountered in NNI.

Dr Lee, who has been inclined towards surgery even during his medical student days, explains, “Every mentor is different and you take away a bit of everything. It is nice to see a senior consultant do a basic, straightforward operation that you can do by yourself. You observe the different ways they approach certain things and you improve your own methods from there.”

Dr Lim adds, “Our mentors have been encouraging and meticulous, and take the effort to come and teach us.”

And for Dr Queck, one major lesson that he takes away from his mentor is the emphasis on studying a case beforehand. Throughout his senior residency, he has had to do his homework to think of all the different possible approaches in dealing with a case before he meets up with his supervisor. “Learning is an on-going process for medicine. Preparing a case before you see a patient can help you to manage the patient much better,” says Dr Queck.

What Lies Ahead?

For Dr Lim, he feels that it is too early to decide on the area that he will be sub-specialising in. For now, he is enjoying the journey of learning more about the different fields in radiology, and is contented with focusing on completing his training.

Dr Lee is looking forward to embarking on a research year in 2016 as part of his residency programme. This will give him more opportunities to be more involved in

research on topics close to his heart, such as the efficacy for surgery on elderly patients above 90 years old, as well as blood clotting among Asians in surgery.

With just a few months to go in completing his residency programme, Dr Queck already feels quite inclined towards the area of stroke. If things go as planned, he can expect another year of overseas training in his area of sub-specialisation after he completes his training.

Parting Words

Finally, we ask the three doctors for some advice for those considering on embarking on a residency programme in neuroscience. Here is what they have to say.

Dr Lim: “To fully maximise your experience at NNI, you have to come with an attitude of wanting to learn. The consultants are very willing to teach and you will definitely benefit from the constant interactions that you get with the other neurosurgeons and neurologists. These interactions also provide us with a unique insight and influences our decision making process.”

Dr Lee: “Neurosurgery is extremely tough, not glamorous, and has long hours. But if you are one who enjoys challenges, it can be a very rewarding experience.” He adds, “The

set-up at NNI is very intimate, and I do not know of any other place in Singapore or in the world that has such an integrated facility under one roof. This makes it easy for us to get our job done, as we are so close to the other neurologists and neuroradiologists. NNI is like a family.”

Dr Queck: “There is this common misconception in neurology that many diseases have no treatment, hence there is little satisfaction to be found. I have found my experience to be quite different, and there is actually a lot that we can do to improve a patient’s life.”



Dr Queck Kian Kheng
Senior Resident
Neurology

Education Research for Nursing



In the ever-changing world of healthcare, where systems are continually evolving, it is important for nursing professionals to keep themselves updated on the latest practices. We sat down with Ms Linda Lim, an Advanced Practice Nurse (APN) from the Department of Neurology, National Neuroscience Institute (NNI), to find out the importance of Education Research in Neuroscience Nursing.

What is the purpose of Education Research for nursing at NNI?

APN Lim: Medicine is a dynamic field, with a heavy emphasis on evidence-based practice. With nurses' roles continually expanding, nursing is no longer contained to just providing the best bedside care to patients. To equip them to get their job done, they require additional specialised training programmes. We see Education Research as a way to achieve all these and to keep nurses up to speed.

Tell us more about the team that is involved in Education Research at NNI?

APN Lim: Our team is currently made up of a group of passionate nurses who have an interest in developing nursing education at NNI in a more structured manner. They are not full-time nursing educators, but nurses

who also hold heavy responsibilities in their own clinical settings.

The nurses that make up this team include Nurse Clinician (NC) Zhou Li Feng, who handles in-service education and training, and APN (Intern) Tan Il Fan, who is working on a project to create a structured orientation programme for new nursing staff.

As for myself, besides coordination work, I also ensure that the students on attachment optimise their learning experience. I conduct weekly debrief sessions with students studying for the Advanced Diploma at Nanyang Polytechnic (NYP), as well as the Masters of Nursing at the National University of Singapore (NUS).

How does the team come up with new tools and methods for effective training programmes, and what are some of the challenges faced?

APN Lim: We keep ourselves updated by attending medical educational conferences, interacting with other educators, and having dialogue sessions with students attached to NNI.

Time is our biggest challenge. We juggle between 90 per cent of clinical work and 10 per cent of educational work. To enable us to work closely, we keep each other updated; not only through face-to-face meetings, but also with WhatsApp chats.

What is in store for 2016?

APN Lim: For 2016, we plan to get nurses who have attended conferences, both locally and overseas, to share their experiences with the rest of the nursing community. We are also going to focus more on "how to teach", rather than "what to teach", since most of us are already quite the content experts.



Ms Linda Lim
Advanced Practice Nurse (APN)
Department of Neurology, NNI

NEUROSCIENCE NURSING SEMINAR

Based on the theme, “Revealing the Untold Stories”, the Neuroscience Nursing Seminar was held this year on July 29 at the TTSH Theatre. The Guest-of-Honour, Ms Tan Soh Chin, Chief Nursing Officer, Ministry of Health (MOH), graced the seminar and spoke in her opening address about how the event encourages nurses to focus on career development and multidisciplinary collaborations to advance in patient care standards.

DEMENTIA AWARENESS DAY



Dementia Awareness Day took place on October 6, once again joining hands with the People's Association (PA) to engage the community with complimentary memory screening and cognitive evaluation. Public forum sessions also ran concurrently, with dementia specialists sharing valuable advice and tips on the importance of early and regular assessments.

NNI EDUCATION DAY



The NNI Education Day took place on October 7 at Ramada Singapore, Zhongshan Park. Graced by Guest-of-Honour, A/Prof Chan Choong Meng, Campus Education Director, SGH, the annual event carried on as an interactive platform for staff to bring forward new ideas to enhance the teaching and learning experience at NNI.

5TH NNI EMG-AFT-NEUROMUSCULAR ULTRASOUND WORKSHOP

The 5th NNI EMG-AFT-Neuromuscular Ultrasound Workshop took place this year from 26-29 November, providing a stimulating learning experience in the field of electrodiagnosis, ultrasound and neuropathology in neuromuscular diseases. The biennial event was chaired by Dr Kamal K. Verma, Senior Consultant, Department of Neurology, NNI.

Local and international faculty members conducted interactive tutorials and live demonstrations on electrodiagnostic assessments. Participants also had the opportunity to sample during the hands-on sessions with patients and interact with the faculty to gain a deeper understanding of the practice.

EVENTS AT A GLANCE



ASEAN NEUROSCIENCE 2015



The ASEAN Neuroscience 2015 congress was held on July 30-31 by the Clinical Neuroscience Society of Singapore to address pertinent up-to date issues in neurology and neurosurgery practices. Chaired by Dr David Low, Consultant, Department of Neurosurgery, NNI, and Dr Bernard Chan, Senior Consultant, Division of Neurology, National University Hospital (NUH), the congress stressed on the importance of clinicians and researchers to come together from multidisciplinary fields in neuroscience to treat patients and improve outcomes.

15TH ADVANCED NEURORADIOLOGY COURSE

The 15th Advanced Neuroradiology Course took place this year from October 14-16, hosting lectures and discussions on diagnostic and interventional procedures. The event was chaired by Dr Sumeet Kumar, Consultant, Department of Neuroradiology, NNI, and topics included advanced neuroimaging, stroke treatments, brain tumours, small vessel diseases and head & neck imaging.



Seeking Future for Neurological

In the mission to improve treatment and discover cures for neurological diseases, clinical trials help to translate scientific findings in the laboratory into point-of-care treatments for patients. However, the long-drawn process – from pre-trial planning and start-up to patient observation and data resolution – may take up to 10 years or longer. Ultimately, the success of a clinical trial determines if and when a potential treatment may finally see the light and bring hope to patients around the world.

As a leading neuroscience research facility in Singapore, the National Neuroscience Institute (NNI) has participated in many Phase II to IV pharmaceutical drug trials. This continues to build on its strengths towards becoming a productive site for neurological clinical trials and future medicine.

Wide Scope

NNI's clinicians look after over 70 per cent of the neurology and neurosurgery patients in Singapore. This includes over 7,000 neurology inpatients and 4,000 neurosurgery inpatients annually. NNI has the largest pool of neuroscience clinicians with 37 neurologists, 25 neurosurgeons and eight neuroradiologists. In addition, our research is supported by over 50 research assistants and fellows who are involved in clinical and basic/translational research at both Tan Tock Seng Hospital (TTSH) and Singapore General Hospital (SGH) campuses.

Research Collaborations

NNI clinicians have a long and illustrious history in clinical research and have active local, regional and international

collaborations. Many of NNI's clinical scientists hold adjunct or joint faculty appointments at local universities, including Duke-NUS Medical School (Duke-NUS) and the National University of Singapore (NUS).

National Neuroscience Research Institute Singapore (NNRIS)

The NNRIS was established in 2014 as a joint venture between NNI and Duke-NUS with the aims to integrate research programmes and resources for common use, as well as develop a new research facility for neuro-behavioural experiments. Bringing together the strengths, talent and resources from both institutes makes it fertile ground for scientific discoveries and medical breakthroughs.

Past Clinical Trial Experience

NNI conducted a total of 66 trials over the past 10 years with a total of 4,333 patients.

Neurology	Phase 1 & 2	Phase 3 & 4	Total	Number of patients
Ischaemic Stroke	2	18	34	3,904
Alzheimer's Disease & Other Dementia	-	3	4	69
Movement Disorders, Parkinson Disease	2	7	9	69
Multiple Sclerosis	-	1	2	5
Neurosurgery	Phase 1 & 2	Phase 3 & 4	Total	Number of patients
Surgical Neurotechnology	-	2	4	145
Head Injury	1	6	8	62
Brain Haemorrhage	-	2	3	59
Neuro-Oncology	-	2	2	20

Breakthroughs Diseases

Areas of Research

NNI's main areas of research cover the breadth and depth of neurological conditions relevant to the needs of Singapore and its region.

1

ISCHAEMIC STROKE

Ischaemic stroke is the most common neurological condition among in-patients. Annually, NNI clinicians see over 5,000 stroke patients. The team has vast experience in stroke clinical trials and is a top recruitment site for many trials.

2

ALZHEIMER'S DISEASE & OTHER DEMENTIA

NNI has a combined database of over 2,000 patients with dementia. Over the last three years, NNI has been the leading centre for Dementia Clinical Trial recruitment in Singapore.

3

PARKINSON DISEASE AND MOVEMENT DISORDERS

NNI's Parkinson Disease and Movement Disorders Centre has been designated as a National Parkinson Foundation (NPF) Centre of Excellence. This recognition is awarded to healthcare institutions that excel in Parkinson-related comprehensive care, research and community outreach programmes.

4

MULTIPLE SCLEROSIS

NNI actively manages around 150 cases of multiple sclerosis (60 per cent) and neuromyelitis optica (40 per cent) at the neuroimmunology clinic, the largest pool in Singapore.

5

BRAIN HAEMORRHAGE

A type of stroke relatively more common among Asians, NNI treats about 1,000 patients who suffer from brain haemorrhages annually.

6

HEAD INJURY/STROKE/ TRAUMATIC BRAIN INJURY

In 2014, NNI saw over 800 patients with head injuries. Approximately five per cent of the patients suffered from severe head injuries and required hospital care.

7

NEUROTECHNOLOGY (SURGICAL NAVIGATION)

The use of medical technology and neuro-navigational imaging to support clinical diagnosis and treatment in neurosurgery is a rapidly developing field and a key focus of research in NNI.

8

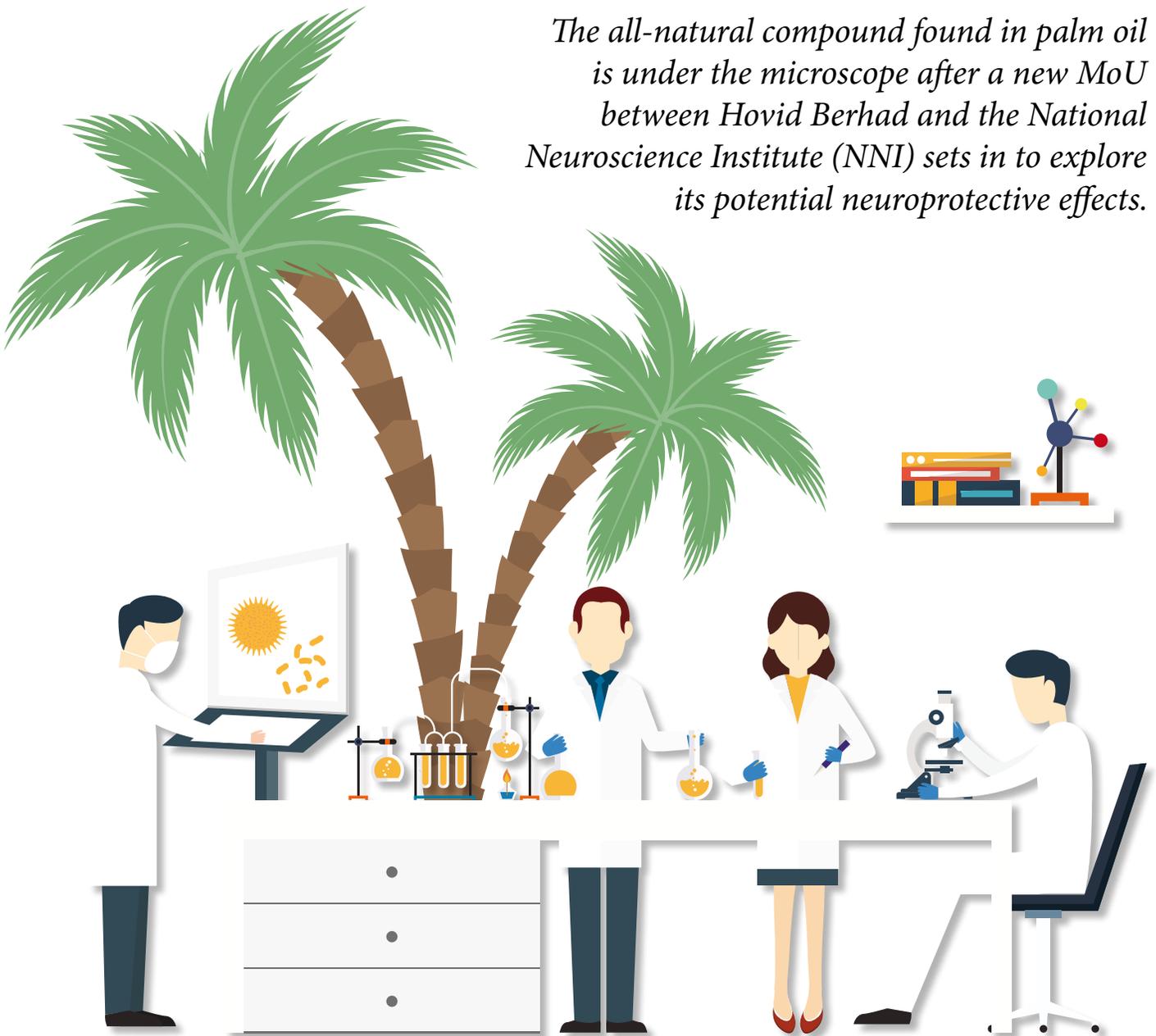
NEURO-ONCOLOGY

Every year, NNI sees about 200 patients with brain tumours. The Neuro-Oncology research programme at NNI focuses on developing patient-tailored therapy for malignant gliomas.

RESEARCH

In the Lab: Palm Tocotrienols for Parkinson's Disease

The all-natural compound found in palm oil is under the microscope after a new MoU between Hovid Berhad and the National Neuroscience Institute (NNI) sets in to explore its potential neuroprotective effects.



Hovid Berhad and NNI signed a Memorandum of Understanding (MoU) on 8 May 2015 to embark on research to study the neuroprotective effects of palm tocotrienols in Parkinson Disease (PD). Hovid Berhad is an established pharmaceutical manufacturer and also the leading pioneer in palm tocotrienols' innovation.

Professor Tan Eng King, Director of Research, NNI, said, "As Singapore's national specialty centre for the management and treatment of neurological diseases, we are keen to partner with Hovid Berhad to investigate the potential of palm tocotrienol as a preventative therapy for these diseases that affect a growing number of patients. We hope that embarking on this translational clinical research programme to tackle ageing-related brain disorders will help facilitate greater cooperation among medical researchers and industries in the region."

Clinical investigations have shown that palm tocotrienols have therapeutic and preventive effects for neurological diseases in the areas of stroke and dementia. These studies show that 200mg of palm tocotrienols, when taken twice daily, is able to protect human nerves from neurological damage.

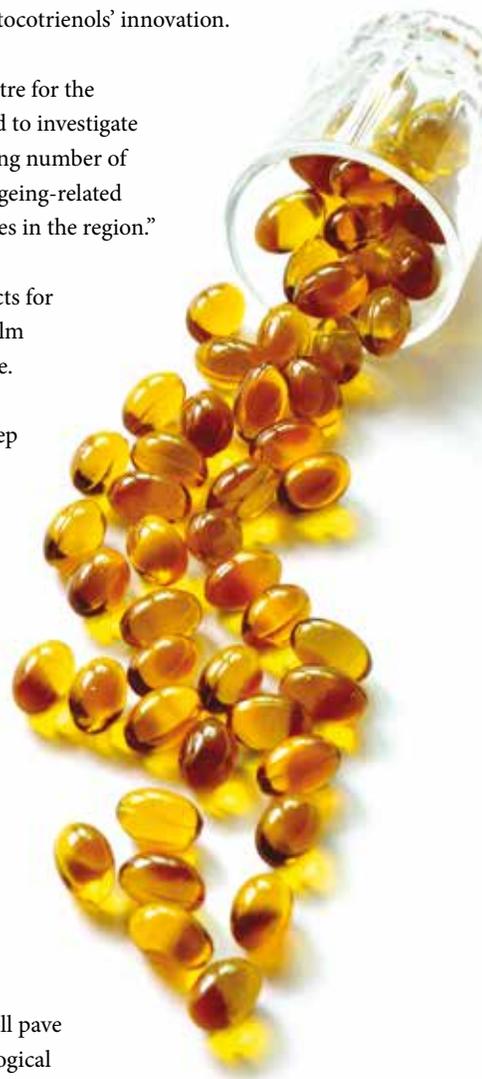
Currently, there are limited treatment options for PD patients, such as oral medication and Deep Brain Stimulation (DBS) surgery. However, many treatments mainly improve the symptoms of the disease. Furthermore, medications have side effects and the challenge for PD research is to develop a drug that can prevent PD from developing or delay the onset of the disease.

Looking Deeper into Tocotrienols

The research collaboration hopes to demonstrate that tocotrienols can reverse or reduce damage in neuronal cells derived from PD patients and also in animal models. The research aims to investigate the role of tocotrienols in PD using various in vitro and in vivo models.

Utilising human neuronal cells lines and animal models of PD, the research team will determine the optimal safety range of tocotrienols, and conduct therapeutic tests in wild-type and mutant models.

The number of age-related neurological diseases is expected to rise with Singapore's ageing population. This partnership between NNI and Hovid Berhad is a major stepping stone that will pave the way for further collaborations on the treatment and prevention of other age-related neurological diseases such as dementia and stroke.



(Left) From NNI: Assoc Prof Ng Wai Hoe, Medical Director, and Prof Tan Eng King, Director, Research, with Mr David Ho, Managing Director, Hovid, and Professor Yuen Kah Hay, University Sains Malaysia.

"We hope that embarking on this translational clinical research programme to tackle ageing-related brain disorders will help facilitate greater cooperation among medical researchers and industries in the region."

- Professor Tan Eng King
Director of Research, NNI

Reducing the Occurrence of Falls



Increasing Number of Falls at NSOC

The idea to embark on a research project to reduce the occurrence of falls at the Neuroscience Clinic (NSOC) in NNI first came to Sister Rohana Bte Basri, Nurse Manager, NSOC, back in 2014. She shared her observations, “Sometimes, while standing at the counter, we would see patients fall suddenly.”

She then approached the Head of NSOC, Dr Kamal K Verma, to discuss the possibility of a research project on fall prevention. It was known that many of these patients had pre-existing medical conditions, such as epilepsy, Parkinson Disease (PD), stroke or neuro-muscular disorders, which put them at an increased risk of falls. But more research had to be done.

Embarking on the Research Project

To assist her in leading the research and helping fellow nurses at the NSOC, Sister Rohana formed a team with three nurses who were keen on the project; namely Nazaria, Winnie and Juraidah. A screening form was then created with Nazaria’s help, together with some consultation by Dr Kamal and an EPIC (SingHealth’s Enhancing Performance Improving Care) facilitator.

The group then embarked on a six-month project from June to December 2014, which consisted of several stages. Ms Nur Nazaria Baharudin, a Senior Staff Nurse from NSOC, explained, “The first stage involves screening of patients over the age of 65, with medical conditions such as movement disorders. Using the fall risk assessment form that we created, we classified patients with a score of at least 2 to be fall-risk patients.”

Nazaria added, “Whilst waiting for their doctor’s consultation, we conducted a pre-education knowledge test on them to gather data on their level of awareness to factors which increased fall-risk. Fall prevention education was then conducted after their doctor’s appointment. The final step was a post-education knowledge test, which we conducted on the patients between one to three months later.”

Based on the results of the research project, the team was able to identify the demographics of patients most at risk, as well as the various risk factors for falls. “But perhaps, the most encouraging result was from the post-education test which showed that 98 per cent of patients complied with fall prevention measures. In fact, between June to December 2014, the gap between falls increased significantly from 32 to 175 days,” Sister Rohana shared.

Challenges Faced

Ms Juraidah Bte Abdul Rahman, a Senior Enrolled Nurse also from NSOC, told us that they faced some teething problems at the beginning of the project. She said, “For example, we were limited by the time-frame between the doctor’s consultations. There were times when the doctor was ready to see the patients, but we hadn’t conducted the pre-education knowledge test. In the end, we had to do the test after the consultation, which was not the ideal case.”

Sister Rohana added, “However, over time, we gained the acceptance from our colleagues. We have also simplified and smoothened the process. Today, it is just a simple online NNI Fall Risk Assessment form.”

But there were also issues that came from the patients. “For example, problems with language during the assessment. Luckily, we had help from the various nurses with different language abilities who were able to translate between the various languages and dialects,” said Sister Rohana.

Another challenge faced at the beginning was that patients were unhappy that they had to do the fall risk assessment, as it made it seem like there were many falls occurring, and making the clinic look bad.

“Some explanation was needed, but eventually they accepted it and even came back for additional brochures in different languages,” shared Sister Rohana.



(From Left) Nurses Juraidah Bte Abdul Rahman, Winnie Goh and Nur Nazaria Baharudin worked with Sister Rohana, Nurse Manager, to initiate the research project on reducing falls in the Neuroscience Clinic.

Patient Education

Beyond reducing the occurrence of falls at the clinic, patient education also contributed to positive changes outside the clinic and at home. Juraidah explained, “Once we got over the initial barriers, we received a lot of positive feedback with regards to the patient education. Not only do we educate the patients, we also share the brochures with their families and helpers.”

Sister Rohana agreed, “Some really appreciate the patient education, and have gone on to engage contractors to install grab bars at home, get better shoes or use a tongkat (walking stick).”

Ms Winnie Goh, Senior Enrolled Nurse from NSOC, also observed that many of the factors for falls are in fact environmental. “We have to tell them to remove clutter at home, place things lower, and not to stand on stools, wires must be coiled, etc,” she said.

“Patients’ children also often ask us to tell their parents not to do these things. When they tell them, they do not listen. But they tend to listen when we say it,” Nazaria quipped.

Future Plans

As a result of their project, the team won the second place at the Singapore Healthcare Management Congress 2015. “We didn’t expect to win, but it feels good that the judges feel that our project can make a positive difference in the lives of our patients,” said Nazaria.

With the positive feedback gathered, Sister Rohana feels that the next logical step would be to collaborate with physiotherapist services to control fall risk due to gait/mobility problems.

“We are also looking into working with occupational therapists to conduct house visits to see what can be done in their environment to prevent future or recurrent falls,” she said.

Leading the Way in Brain Tumour

New discovery may alter the treatment of brain tumours.

Paradigm Shift in Analysing Brain Tumours

A new discovery by scientists from the Neuro-Oncology Programme at the National Neuroscience Institute (NNI) may radically change the way doctors look at brain tumours.

The team, led by A/Prof Ang Beng Ti, Head and Senior Consultant, Department of Neurosurgery, NNI (SGH campus), and Dr Carol Tang, Senior Research Scientist, has identified a gene, known as *ST3Gal1*, which triggers tumour cells to aggressively spread throughout the brain. Using a molecular signature, which consists of a set of genes, proteins, genetic variants and other variables as a biomarker, they were able to measure the increase in *ST3Gal1* activity in patients, and provide insight into understanding the tumour behaviour.

This method of diagnosis is significantly different from traditional means of looking at age, tumour grade and patient functional status; it is also more reliable.

Said A/Prof Ang and Dr Tang, “This finding is significant because it introduces a novel paradigm in treatment decision and patient care; that is, we should not be relying on tumour characteristics seen under the microscope to guide therapy. We need to establish molecular grouping approaches to more accurately target the group of patients susceptible to a specific chemotherapy.”



Involved in Neuro-Oncology research at NNI are: (From Left) A/Prof Ang Beng Ti, Head and Senior Consultant, Department of Neurosurgery, NNI (SGH campus), and Dr Carol Tang, Senior Research Scientist, Neuro-Oncology Research Laboratory, NNI.

While tumours may look alike under the microscope, their behaviour varies in patients. Understanding these differences can explain why some patients respond differently to drug treatments. A/Prof Ang further explained that by focusing on the molecular pattern of the patient's tumour to guide the selection of specific chemotherapy, patients could be spared from the side effects and financial costs of certain chemotherapy treatments, if their molecular information indicated poor response to it. This method of focusing on the molecular pattern of the tumour is an example

Research

of Precision Medicine, which was acknowledged by United States President, Barack Obama, during his State of the Union address in 2015. It potentially opens up a new era of medicine in which researchers, providers and patients work together to develop individualised care.

One of the reasons for a brain cancer patient's poor survival rate is the changing molecular pattern of these tumours. When the cancer cells spread, patients will become highly resistant to first-line drugs and unfortunately succumb to their disease after a year or so.

Including molecular information into brain tumour classification might then change the way tumours are being treated – by targeting individual tumours based on their susceptibility to specific drugs, which could improve patients' quality of life.

The Methodology Behind the Research

Besides A/Prof Ang and Dr Tang, the research team also included A/Prof Nguan Soon Tan from Nanyang Technological University and Dr Joanna Holbrook from the Singapore Institute for Clinical Sciences, A*STAR.

The study, which has been published in the prestigious Journal of the National Cancer Institute, was based on “live cell lines” derived from surgically removed tumours, and molecular and clinical information relating to the patient and tumour investigation. This contrasts with the normal method of using processed or fixed tissue samples obtained at surgery.



Dr Chong Yuk Kien (Extreme Left), Postdoctoral Fellow, and Mr Edwin Sandanaraj (Extreme Right), Senior Research Fellow, from the Neuro-Oncology Research Lab, are the principal authors of the study that was led by A/Prof Ang and Dr Tang.

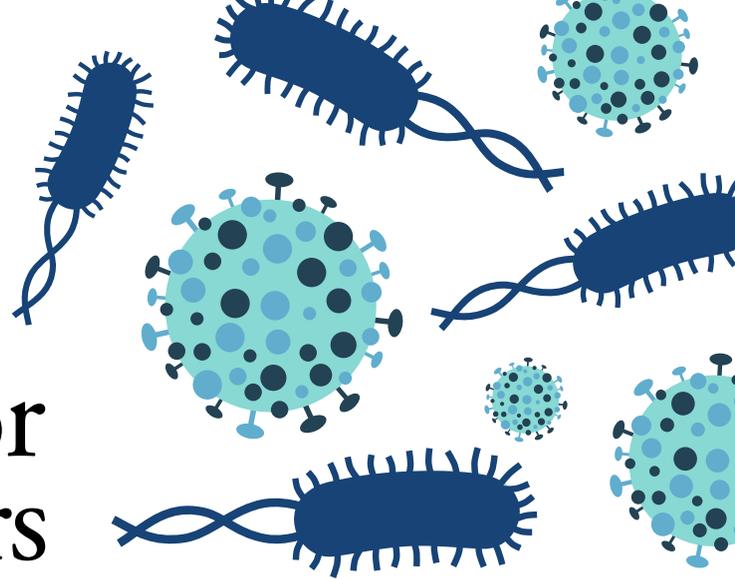
Using tumour cell lines, the team recreated the tumour in a mouse model. Specific questions relating to tumour biology and its response to specific drugs could then be tested on the tumour-laden lab mouse.

Applications Beyond Brain Tumours

The effects of this groundbreaking discovery go beyond brain tumour treatment applications. As researchers learn more about the changes in cancer cells and how they are provoked, the development of drugs also moves towards cures that specifically target these triggers. Currently, targeted therapies are being used for advanced lung, liver and gastric cancers.

RESEARCH

Looking Deeper for Answers



Dr Mitesh Kumar clues us in on the role of radiology in dealing with Central Nervous System (CNS) infections.

Making a Difference

For Dr Mitesh Kumar, a Clinical Associate at the Department of Neuroradiology in NNI, his decision to specialise in neuroradiology was by no means an accident.

During his residency days at the Rajah Muthiah Medical College and Hospital (under the Annamalai University in Tamil Nadu, India), Dr Mitesh developed a fascination for the use of machines to diagnose diseases. At the same time, he also noticed that back in his hometown of Purnia, many suffered from Central Nervous System (CNS) disorders, yet good neuroradiologists were few and far in between. Putting two and two together, Dr Mitesh decided that specialising in the field of neuroradiology was where he was going to be able to make the biggest difference.

About CNS Infections

Dr Mitesh explains that the majority of CNS infections are due to the presence of micro-organisms such as bacteria, viruses and parasites and can affect the body in the following ways: “The micro-organisms causing CNS infections can either affect the meninges leading to meningitis, the grey matter of brain parenchyma resulting in encephalitis, the white matter of nerves or vessels, or a combination of any of these,” he said.

And while infections tend to be more

prevalent and serious in undeveloped and developing countries, due to factors such as bad hygiene, poor nutrition, and a lack of proper medical care, these infections could still pose serious problems for us.

“In spite of the advances in the medical and surgical management of these infections, they can still be potentially life threatening at times. Hence, this stressed on the importance of neuroradiology in the early detection of complications of these infections,” Dr Mitesh elaborated.

Detecting CNS Disorders

Dr Mitesh tell us that while the main methods used to diagnose CNS infections are blood, serum and cerebrospinal fluid analysis, the distinct advantage of neuroimaging lies in its ability to promptly detect these infections and their complications.

“Due to the advanced nature of the technology, we are now able to pinpoint the exact underlying micro-organism and thus reduce the incidence of biopsies,” he shared.

Today, the two most common types of neuroimaging used in the diagnosis and management of CNS infections are CT scans and MRIs.

And with CT scans being inexpensive and widely available, they now play a significant role in the formulation of management plans, enabling doctors to monitor responses to treatment.

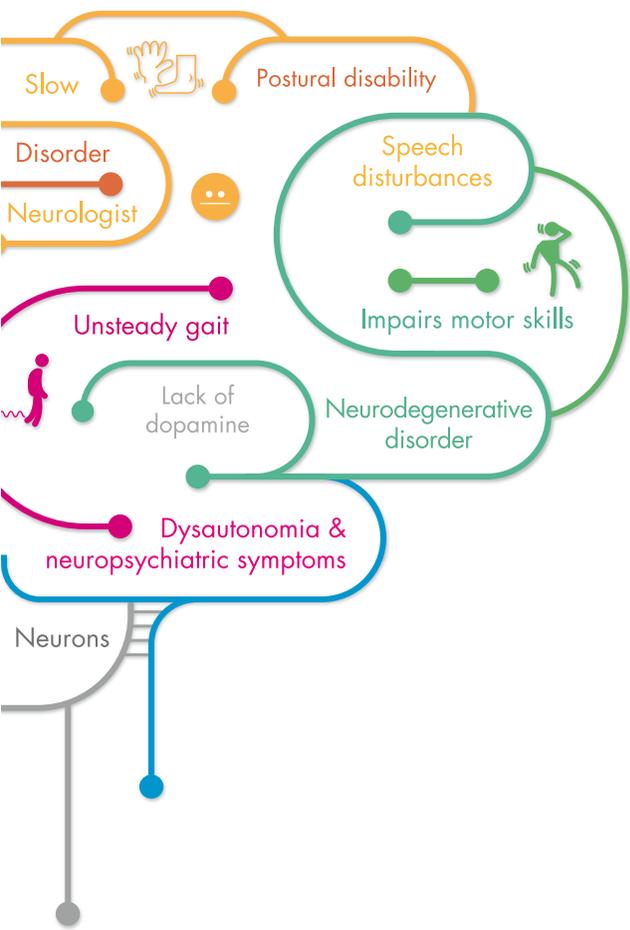
Safer and More Effective

Finally, responding to concerns of the negative side effects of neuroimaging, Dr Mitesh gives us an update on the advances in the technology and software.

“The latest generation of CT scanners, one of which has been recently installed in our department has been optimised to reduce the radiation dose to the patient without compromising its quality. Similarly, the side effects of the intravenous contrast media used in CT and MRI studies have also been reduced due to advances in their chemical composition,” said Dr Mitesh.



Dr Mitesh Kumar
Clinical Associate
Department of Neuroradiology, NNI



7th

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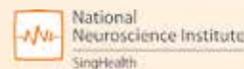
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