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Centre for the Brain, Spine, Nerve and Muscle

A Quarterly Newsletter



National
Neuroscience Institute
SingHealth

july - september 2005 • Volume 7 No. 2 • MITA (P) 225/10/2004

Spotlight On Sleep Medicine

Sleep Medicine took centre stage at the recently concluded Polysomnography Course & Sleep Medicine Review, jointly organised by the Singapore Sleep Society and National Neuroscience Institute. The 2-day didactic programme, comprising lectures, video presentations and workshops, was held at the Health Promotion Board Auditorium from 17-18 September 2005.

Dr K Puvanendran, Senior Consultant Neurologist, NNI, was instrumental in making this important teaching forum a reality and a success. Also President of the Singapore Sleep Society, Director of the Sleep Disorders Unit at Singapore General Hospital and a pioneering Sleep Physician in Singapore, Dr Puvan recognises the need for raising awareness of sleep disorders and standards of practice in Sleep Medicine both locally and regionally.

"The event was greatly appreciated by the delegates and has achieved our purpose of increasing awareness and education in sleep medicine in this part of the world. We were glad to be able to share our knowledge in this field."

This inaugural teaching forum in Sleep Medicine for healthcare professionals attracted over 200 delegates from 11 countries, including Bangladesh, Hong Kong, India, Indonesia, Malaysia, the Philippines, South Korea, Sri Lanka and Thailand. The teaching faculty comprised experts from the region, representing academic centres in Australia (Sydney Children's Hospital), the Philippines (Chong Hua Hospital), Thailand (Chulalongkorn University, University of Chiangmai) and South Korea (Korea University College of Medicine) as well as local Sleep physicians from Changi General Hospital, Gleneagles Medical Centre, KK Women's & Children's Hospital, Mount Elizabeth Medical Centre, the National Neuroscience Institute, National University Hospital and the Singapore General Hospital.

The intensive curriculum covered the range of commonly encountered sleep disorders, such as insomnia and obstructive sleep apnoea from both adult and paediatric perspectives, with an emphasis on the recording and interpretation of sleep studies.

This meeting achieved several firsts. It is the first teaching forum of its kind in the region, for its emphasis on practical polysomnography, wide regional participation and its multidisciplinary perspective.

Guest faculty touring the Sleep Disorders Unit at Singapore General Hospital: (L to R) Dr Nantaporn Tiyapun (Thailand), Bruce Williamson (Australia), Dr Albert Rafanan (Philippines), Dr Tayard Desudchit (Thailand), Dr Lim Li Ling, Dr Jenny Tang (Singapore), Dr Han Jin Kyu (South Korea), Dr Lee Seung Hoon (South Korea) and Dr Andrew Pan (Singapore).



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“The surge of interest in Sleep Medicine at this meeting was palpable, culminating in the formation of an ad-hoc interest group comprising sleep advocates from each delegate country, who came together on the last day of the symposium to discuss the formation of a regional clinical Sleep Medicine society.”

Dr Lim Li Ling
Course Director
Polysomnography Course & Sleep
Medicine Review



Dr K Puvandendran (front row, 3rd from L) with Dr Lim Li Ling (2nd from L) and committee members of the Singapore Sleep Society hosting the faculty dinner.

Faculty and delegates represented the breadth of subspecialties encompassed in the field of Sleep Medicine, including Dentistry, Neurology, Otorhinolaryngology, Paediatrics, Psychiatry and Pulmonology. It was a rare occasion for physicians, polysomnography technologists, respiratory therapists and other allied healthcare professionals encompassing different subspecialties to meet, network and learn about Sleep Medicine together.

Feedback from delegates was overall very positive. Some were pleasantly surprised that Sleep could be so interesting, and many were very appreciative of the opportunity to learn so much in a short time, and in very practical aspects of clinical Sleep

Medicine. Said Dr Puvan, “This event has catalysed a wave of enthusiasm in sleep medicine. Delegates are requesting to make this a regular sleep educational school for this part of the world and for us to accept fellows for training as sleep professionals. We hope we can make use of our leadership position in Sleep Medicine and our experience in organising this course to perpetuate an ongoing educational forum to benefit all.”

The surge of interest in Sleep Medicine at this meeting was palpable, culminating in the formation of an ad-hoc interest group comprising sleep advocates from each delegate country, who came together on the last day of the

symposium to discuss the formation of a regional clinical Sleep Medicine society, with the objective of sharing in resources to improve training, clinical practice and research in Sleep Medicine, including the performance and interpretation of sleep studies.

Besides achieving its academic objectives and providing the rare opportunity for local and regional sleep professionals to meet and network, plans are in line for future educational initiatives and research projects in Sleep Medicine locally. The success of this event would not have been possible without the hard work of the NNI secretariat, the generous support of SingHealth Foundation and our corporate sponsors working together with the organising committee of the Singapore Sleep Society.

For healthcare professionals interested in joining activities of the Singapore Sleep Society and contributing to the formation of the regional clinical Sleep Medicine society, please visit www.singaporeleepsociety.com or write to its committee members at admin@singaporeleepsociety.com.



EEG demonstration by Dr Andrew Pan



Live sleep study demonstration by Bruce Williamson, RPSGT

"...there has been a great explosion of interest in this area of neurosurgery, as it is a relatively young field. There presently exists no such robotic system that can perform image-guided robotic skull-base surgery, so this will be a pioneering first."



The First Prototype of Neuroμ

A novel robotic system Neuroμ is currently being developed at the newly set up Advanced Integrated Medical Systems Laboratory (AIMS Lab) in the National Neuroscience Institute for Skull-Base Surgery. This project is currently funded by the Biomedical Research Council of A-STAR.

Skull base surgery requires years of training in surgical microanatomy and specialized surgical skills, including competency with the high-speed drill. In addition, skull base approaches may be associated with significant complications. Skull-base surgery is a discipline that requires issues such as accuracy and safety to be taken into consideration. The main reason why this project was envisaged is due to the fact that commercially available systems are lacking in the dexterity required for such a meticulous procedure. Eminently, the robotic manipulators used in other systems possess a large workspace leading to unconstrained motion that poses a danger to both the patient and surgeon alike.

Neuroμ aims to help neuro and ENT surgeons achieve quick and precise drilling of the skull-base. Neuroμ is

Neuroμ – A First in Robotic Skull Base Surgery

Charles Lo Vui Hong
Research Engineer
Neurosurgery

made up of four distinct but interdependent modules, namely the surgical planning module, the registration & tracking module, the robot positioning module and the main robot arm itself. Specially designed patient markers that are biocompatible and radio-opaque, are mounted on the skull. This patient marker system is subsequently registered and tracking is done intra-operatively by the registration and tracking system. Neuroμ uses an image-guided cum surgical planning system that combines CT and MRI images, presenting the information in 3-D to the surgeon. The surgeon pre-operatively defines the areas that are to be avoided and the system automatically proceeds to generate the required path using a proprietary path generation algorithm. The surgeon then verifies the path before instructions are sent to the positioning system carrying the robot arm. The positioning system places the robot arm in an optimal position with respect to the patient before it is locked rigidly. The robot then proceeds to perform the drilling sequence in accordance to the pre-planned path. The entire surgery is performed with the surgeon having both a virtual view and a real-world perspective of the procedure.

There are many challenges in developing this system. One of which is the use of a parallel manipulator, the Hexapod, which is a 6 axis parallel kinematic robot, over the conventional serial robot. The other is to achieve good positioning accuracy of up to 1 millimeter.

This project has been the result of an amalgam of faculties of thoughts ranging from medicine to software computing to robotics engineering.

In each field, this project has broken new grounds. In terms of medicine, robotic surgery is currently considered to be a new frontier especially one where the robot is performing the surgical task automatically. In terms of software computing, various computational geometrical algorithms have been discovered and employed in the application of robotic path planning. This robot is a combination of parallel and serial manipulators. Known as a hybrid manipulator, it is new in the field of robotics and much work is done to identify its characteristics.

World wide, there has been a great explosion of interest in this area of neurosurgery, as it is a relatively young field. As there presently exists no such robotic system that can perform image-guided robotic skull-base surgery, this will be a pioneering first. The current team working on this project is made up of three neurosurgeons and three research engineers. The team is lead by Dr Ivan Ng, Principal Investigator, with Dr Ang Beng Ti, Dr Ho Chi Long, and research engineers Md Irwan Md Kassim, Frank Chan Chee Fatt and I.



Research Engineers from the AIMS Lab
(Clockwise from Top Left – Frank Chan,
Irwan Kassim and Charles Lo)

“The Grant is for pupils who demonstrate high intellectual attainment, high achievement in CCA and are exemplary in character and leadership. In essence, a candidate must demonstrate the potential to be a Person who is a Thinker, Leader and Pioneer.”

Research Interns Win Prestigious Motorola Foundation International Grant

Two Raffles Institution students have won the coveted 2005 Motorola Foundation International Grant in support of the Raffles Programme (RP). Alex Ang and Daniel Yip, both Secondary Four students, have done their Research Education internship project at the Neurodegeneration Research Laboratory, headed by Dr Lim Kah Leong, Principal Investigator, NNI Research Faculty.

The wonder duo beat their peers to emerge as winners for the prestigious title. According to their teacher-supervisor Mrs Low Mei Choo, “The Grant is for pupils who demonstrate high intellectual attainment, high achievement in CCA and are exemplary in character and leadership. In essence, a candidate must demonstrate the potential to be a Person who is a Thinker, Leader and Pioneer.”

Dr Jeanne Tan May May, a postdoctoral fellow in Dr Lim’s

laboratory was directly supervising the duo and was elated with the news of their award. She remarked, “Alex and Daniel are such a joy to teach. They are extremely smart boys who were asking all the right questions since the beginning of their attachment. Some of the experiments were even initiated by them!” Agreeing, Ms Tay Shiam Peng, a research assistant who co-supervised the boys, said “Alex and Daniel picked up research skills effortlessly and were very focussed on their experiments. In a short time, they were generating useful data.”

Dr Lim, whose first pair of research interns from Ngee Ann Polytechnic (NP) also bagged a prestigious award (the 2004 NP Technology Award), was obviously very pleased with the winning streak of the research interns under his care. Beaming, he remarked, “Alex and Daniel are my second formal pair of research

interns. They are very talented individuals whose scientific reasoning measures no less than a typical Ph.D. student. I remain very impressed with their abilities and am very happy that their talents are recognised by the Motorola Foundation.”

Alex and Daniel have participated in a research project in Dr Lim’s lab that seek to address whether aberrant cell cycle re-entry represent a route for neuronal death seen in neurodegenerative diseases such as Parkinson’s disease (PD). They were examining the potential role of parkin, a Parkinson’s disease-linked gene product, in cell cycle regulation. The depletion of functional parkin through mutations or aging predisposes an individual to PD. Interestingly, Alex and Daniel found that parkin is also depleted in cancer cells. Furthermore, the team demonstrated that the restoration of parkin in these cancer cells slows down their division rate. Taken together, their results suggest that the absence of parkin may promote cellular proliferation, and in the case of post-mitotic neurons in the brain, parkin absence may trigger neurodegeneration, as differentiated cells cannot re-embark on a cell cycle program.

Since its inception, the NNI research department has been hosting student interns from various polytechnics. This year, the NNI has extended its research internship program to include Rafflesians (RI, RGS and RJC). Laboratories keen to take in student interns from Raffles Institution may contact Mrs Low Mei Choo at Mei@ri.sch.edu.sg



From L to R: Dr Jeanne Tan, Daniel, Alex and Shiam Peng.

National Healthy Lifestyle Campaign

Ms Stella Wang
Nurse Clinician
Nusing

September was a month to promote healthy lifestyle in the workplace with the launch of the National Healthy Lifestyle Walk-a-jog cum Wheelathlon on 9 September. The exciting route started from the Padang through the scenic Marina Promenade and Republic Avenue to finish off at Connaught Drive back at the Padang! Many of us from NNI participated in the run.

In conjunction with the National Healthy Lifestyle Campaign, Health Promotion Board together with Singhealth and NHG, set up booths at the Suntec City Convention Hall from 9 to 11 September to promote healthy lifestyle and created public awareness on certain health concerns.

Nurses from Nursing Admin put up posters to educate the public on stroke and epilepsy. 2 questions from each category were put across to the public to assess how much they know about the conditions. Most were able to give the correct answers. However, when it comes to management of seizures, many still believe wrongly that placing a spoon into the mouth will help the victim. Through the event, we understand better what is lacking in the public's knowledge about certain health concerns and the importance of creating public awareness in managing these conditions.



Gearing up for the public at the event.



A lady participating in the quiz.

HMDP in Vancouver, Canada

Dr Au Wing Lok
Associate Consultant
Neurology

We catch up with Dr Au Wing Lok after his 1-year HMDP to share his experiences at the Pacific Parkinson's Research Centre.

I left for Vancouver, Canada, in late December 2003 under the Health Manpower Development Programme (HMDP) to do a one-year clinical research fellowship at the Pacific Parkinson's Research Centre. The centre is located at the Vancouver Health Sciences Centre and the

University of British Columbia. It is the main tertiary referral centre for Movement Disorders in British Columbia, a province in Canada with a population of 4.2 million people.

The centre is renowned not only for its clinical expertise but also for its translational research in Movement Disorders. It has five Movement Disorders specialists, all of whom are clinician scientists who see patients as well as conduct research involving basic and clinical sciences. My



supervisor was Dr Jon Stoessl, the Centre Director, who also holds the Canada Research Chair. He is one of the leading experts in the field of positron emission tomography (PET) in Movement Disorders.

I was interested in the progression of Parkinson's disease, and PET imaging has a definite role in the in vivo assessment of brain functions. Using three different types of presynaptic dopaminergic PET tracers, namely [18F]-fluoro-L-dopa (FD), [11C](O)-dihydrotrabenzazine (DTBZ), and [11C]-d-threo-methylphenidate (MP), we were able to demonstrate consistently a non-linear rate of disease progression in Parkinson's disease, with the progression rates being faster initially. We also noted the progression rates as measured by FD were faster than those measured by the other two tracers in early disease, but in late stages, all three tracers showed comparable progression rates. Further studies are needed to identify possible factors influencing these changes, although disease severity, treatment effects, and compensatory changes have been implicated.

Besides PET imaging, the centre also conducts research using other modalities such as electroencephalography (EEG) and functional magnetic resonance imaging (fMRI). EEG has added advantage over PET and fMRI in that it is relatively inexpensive, non-invasive, easily accessible by most

centres, and has superior temporal resolution than other modalities. One of my research projects in Vancouver is to identify possible surrogate markers of the cortical dopaminergic system using EEG. Subjects with Parkinson's disease and normal volunteers underwent continuous joystick tracking tasks of varying difficulties while EEGs were being recorded. Using independent component analysis, a technique applied on EEG data to isolate the various source components that are active in the brain while a subject is performing a certain task, we were able to isolate a central midline theta rhythm whose powers showed a negative relationship with the cortical dopaminergic activities. The preliminary findings are encouraging, suggesting a role for EEG in monitoring the cortical dopaminergic system. I was awarded the National Medical Research Council (NMRC) Medical Research Fellowship for this project from January to July 2005.

Overall, the HMDP/NMRC fellowship at the Pacific Parkinson's Research Centre has been a fruitful experience. I learned a lot from the clinician scientists, especially Dr Martin McKeown, my supervisor for the NMRC project. He is

also the Co-Director of the Biomedical Signal and Image Computing Laboratory at the University of British Columbia. I was also fortunate to have as my clinical teachers, eminent clinicians like Dr Donald Calne, one of the 'gurus' in Movement Disorders, and Dr Joseph Tsui, one of the pioneers in using botulinum toxin injections to treat dystonia. The HMDP/NMRC fellowship has definitely enhanced my professional training, and I hope the knowledge on the application of functional imaging and electrophysiology in Movement Disorders will be an asset to the Institution.

Lastly, those who have been to Vancouver will definitely agree with me that Vancouver is one of the most scenic cities in the world. Located at the Southwest of British Columbia, it is surrounded by water on three sides with costal mountains in the North. The climate is also one of the mildest in Canada, with average temperature in winter of around 3 to 5 degrees Celsius. It has the largest Chinatown in Canada, and finding Chinese food or even Asian food has never been a problem. One may even find durians in the supermarkets!



Dr Jon Stoessl (3rd from R) with Dr Au (far R) and clinical research fellows (past and present) of the Pacific Parkinson's Research Centre.

“Though the G2019S mutation appears uncommon locally, this is the first time a common mutation (G2019S) of a gene has been determined as a cause of PD in such an extensive manner across the world. This would potentially allow the introduction of genetic testing to diagnose PD in clinics and help doctors in genetic counselling.”

A Hope for Better Treatment in Movement Disorders



Dr Tan Eng King, Chairman (R), with Prof Oliver Rascol.



Dr Au Wing Lok, (far R) Organising Committee member, with delegates from the Philippines.



Video session at the symposium.

Movement disorders are on a rapid rise worldwide and a growing neurological subspecialty internationally, with exciting headway in the domains of genetics and clinical therapeutics. The recent establishment of the Asian & Oceania Section of the International Movement Disorders Society, where Singapore has played a pivotal role, points towards the mission of movement disorders neurologists in furthering the education, training and research of the disease in this region.

On 9 -10 September 2005, over 250 local and overseas participants congregated for the 3rd Singapore International Parkinson's Disease and Movement Disorders Symposium organised by the NNI and endorsed by the International Movement Disorders Society. The 2-day event provided a pertinent juncture to review the significant recent advances made in Parkinson's disease and movement disorders in the fields of basic science, molecular genetics, epidemiology and clinical therapies.

One of the latest and exciting developments in Parkinson's disease (PD) is the discovery of a new causative gene called LRRK2 in PD patients. Investigators from Mayo Clinic, Jacksonville, USA and other researchers have discovered a common mutation of this LRRK2 gene in different PD populations around the world. A/Prof Matthew Farrer, the lead Principal Investigator of the LRRK2 discovery team from Mayo Clinic was one of the invited speakers at the Symposium.

Here in Singapore, researchers and clinician-scientists at the NNI, in collaboration with Genome Institute of Singapore (GIS) and Mayo Clinic have also found various mutations of this gene. According to Dr Tan Eng King, organising chairman for the Symposium, “Though the G2019S

mutation appears uncommon locally, this is the first time a common mutation (G2019S) of a gene has been determined as a cause of PD in such an extensive manner across the world. This would potentially allow the introduction of genetic testing to diagnose PD in clinics and help doctors in genetic counselling. With this discovery, development of drugs aimed at inhibiting the potential toxic function of LRRK2 mutations is currently underway.”

For participants at the Symposium, the practical workshops conducted were a success. Besides informative lectures, the workshops offered insights into various approaches, methods and skills in managing different aspects of Movement Disorders through case presentations, video presentations, interactive discussions and live-demonstrations on patients.

The overall feedback at the Symposium was heartening and many enjoyed the video session, which saw both local and ASEAN patients with interesting movement disorders. Video presenters were able to have a lively panel discussion with the Faculty which included experts like Prof Olivier Rascol from France, Dr Apichart Pisarnporn from Thailand and Dr Wu Yih Ru from Taiwan.



PDMD faculty and friends.

6TH ADVANCED NEURORADIOLOGY COURSE

November 21-23, 2005



Venue:

Lecture Theatre
Tan Tock Seng Hospital, Singapore



SCIENTIFIC PROGRAMME

| | | |
|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 0830 Registration | 0830 Registration | 0830 Registration |
| 0900 Opening Ceremony | SCIENTIFIC SESSION 3 | SCIENTIFIC SESSION 5 |
| SCIENTIFIC SESSION 1 | 0900 Spinal Cord AV Shunts: Classification and Endovascular Treatment by Dr George Rodesch | 0900 Approach to Orbital Imaging by Dr Chan Ling Ling |
| 0915 Hydrocoil Clinical Data – Durable Registry by Dr Harish N Showkeen | 0925 "Not tonight dear – I have a headache ...": Uncommon Cases by Dr Tchoyoson Lim | 0925 A Primer on Ophthalmic Ultrasonography by Dr Goh Kong Yong |
| 0940 Questions & Answers | 0950 Questions & Answers | 0950 Neuro-ophthalmic Case Discussions |
| 1000 Tea Break | 1000 Tea Break | 1015 Questions & Answers |
| 1030 Live Demo of Interventional Neuroradiology Procedure | 1030 Live Demo of Interventional Neuroradiology Procedure | 1030 Tea Break |
| 1300 Lunch | 1300 Lunch | 1045 Maxillofacial AVM's: How to Differentiate the False AVM's by Dr George Rodesch |
| SCIENTIFIC SESSION 2 | SCIENTIFIC SESSION 4 | 1110 Carotid Stenting by Dr Frands Hai |
| 1400 Nasopharyngeal Carcinoma by Dr Vincent Chong | 1400 MR Angiography at 3 Tesla by Dr Sitoh Yih Yian | 1135 Questions & Answers |
| 1425 Oral Cavity and Oropharyngeal Carcinoma by Dr James Khoo | 1425 Congenital Vascular Lesions in the Head & Neck by Prof Kim Hyung-Jin | 1145 Closing Remarks by Dr Sitoh Yih Yian |
| 1450 Laryngeal/Hypopharyngeal Carcinoma by Dr Julian Goh | 1450 Questions & Answers | 1200 End of Conference |
| 1515 Questions & Answers | 1500 Tea Break | |
| 1530 Tea Break | 1530 Neuroimaging Manifestations in Systemic Lupus Erythematosus by Dr Tan How Ming | |
| 1600 Soft Tissue Sarcoma of the Head & Neck by Prof Kim Hyung Jin | 1555 New Diagnostic Tools for the Assessment of Cerebral Tissue Viability by Dr Xavier Golay | |
| 1625 Classifications of Congenital Head & Neck Vascular Lesions by Dr George Rodesch | 1620 Questions & Answers | |
| 1650 Questions & Answers | 1630 End Day 2 | |
| 1700 End Day 1 | | |

COURSE FACULTY

| | |
|-----------------------------|--------------------------------------------------------------------------------------------------|
| Dr George Rodesch France | Neuro Radio Diagnostique et Thérapeutique, Hôpital Foch, |
| Dr Harish N Showkeen | The Neuroscience Institute, Winfield, Illinois and Loyola University Medical Center, Illinois |
| Prof Kim Hyung-Jin | Samsung Medical Centre, Sungkyunkwan University, South Korea |
| Dr Frands Hai | National Neuroscience Institute |
| Dr Tchoyoson Lim | National Neuroscience Institute |
| Dr Xavier Golay | National Neuroscience Institute |
| Dr Vincent Chong | National University of Singapore |
| Dr James Khoo | National Cancer Centre |
| Dr Goh Kong Yong | Tan Tock Seng Hospital |
| Dr Chan Ling Ling | Singapore General Hospital |
| Dr Tan How Ming | Singapore General Hospital |
| Dr Julian Goh | Tan Tock Seng Hospital |

REGISTRATION FEES

On or before 1 November 2005
Doctors : SGD\$150.00
Other Healthcare Professionals : SGD\$100.00

After 1 November 2005
Doctors : SGD\$180.00
Other Healthcare Professionals : SGD\$120.00

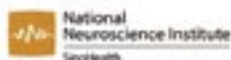
(Cheque payment should be made payable to
"National Neuroscience Institute of
Singapore Pte Ltd")

ENQUIRY & REGISTRATION

Course Secretariat, 6th Advanced Neuroradiology Course
c/o Department of Neuroradiology, National Neuroscience Institute, 11 Jalan Tan Tock Seng, Singapore 308433
Tel: +65 6357-7033/6357-7040, Fax: +65 6358-1259, E-mail: haslindah_salim@nni.com.sg

For the latest course updates, please visit our website: <http://www.nni.com.sg>

Organised by:



National
Neuroscience Institute
Singapore



Singapore Radiological
Society



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