

All the Vice Chancellor's Neuroscientists: Unity to Achieve Success in Solving Malaysia's Diseases via Upgrading Clinical Services and Neuroscience Research

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Abstract

President Obama of the United States of America announced this April the Brain Research Through Advancing Innovative Neurotechnologies (BRAIN for short) investment, while Professor Henry Markram's team based in the European Union will spend over a billion euros on the Human Brain Project, breaking through the unknowns in the fifth science of the decade: Neuroscience. Malaysia's growth in the same field needs to be augmented, and thus the Universiti Sains Malaysia's vision is to excel in the field of clinical brain sciences, mind sciences, and neurosciences. This will naturally bring up the level of research in the country simultaneously. Thus, a center was recently established to coordinate this venture. The four-year Integrated Neuroscience Program established recently will be a sustainable source of neuroscientists for the country. We hope to establish ourselves by 2020 as a global university with neurosciences research as an important flagship.

Keywords: brain science, history, Malaysia, behavioral sciences, neuroscience, Universiti Sains Malaysia

Since the idea was first mooted in 2005 to establish an Institute or Center that could improve the clinical service and thus, research in Brain, Mind, and Neuro sciences (1), many activities needed to be done. In 2007, we looked at the history of Neurosciences at Universiti Sains Malaysia (USM), which lead us to find new niches in clinical services (2) for epilepsy, movement disorders, and awake craniotomy (3,4). We became involved in the Decade of the Mind (5). Such science had been lacking in Malaysia, but the Academy of Science of Malaysia supported the push to make neuroscience seen and heard amongst the decision makers in the Government of Malaysia by publishing the PINK book (6).

Professor Dato' Dr Mohd Roslani Abdul Majid (Figure 1) had a vision that neuroscience would be a flagship for the Health Campus 20 years ago when he was the Founder Dean of School of Medical Sciences, USM. The birth in 2013 (7,8) of the Neuroscience Center for Service and Research at the Universiti Sains Malaysia, also known as the *Pusat Perkhidmatan dan Penyelidikan Neurosains (P3Neuro)* was envisioned by the current Vice Chancellor of Universiti Sains Malaysia, Professor Dato' Omar

Osman (Figure 2), and the director general Professor Datuk Dr Rujhan Mustafa (Figure 3) after the Honorable Dato' Seri Mohamed Khaled Nordin, the Minister of Higher Education of Malaysia (Figure 4), awarded USM the status of Potential Neuroscience Center of Excellence with a seed fund of two million ringgit on 16th December 2011. Universiti Sains Malaysia made it onto the Brain and Neuroscience world map (Figure 5) when the USM Senate approved the integrated Neuroscience Program in 2012 and the first post-graduate students were admitted in September 2012 for the Integrated Master/Doctor of Neuroscience Program, the first such integrated course in Southeast Asia.

Historically, the Brain, Mind, and Neuro sciences service and research group in this university evolved from the Brain Science research group, which was formally established by the previous Vice Chancellor, Tan Sri Datuk Professor Dzulkifli Razak, during the "*Hala Tuju dan Penubuhan Pelantar Penyelidikan*" at a research workshop led by Professor V. Navaratnam from Center for Drug Research on 1st July 2004 at Gurney Hotel Penang. The group established itself as the Brain Network led by Professor Zalina

Ismail. Five years later on 29th October 2009, the Brain Mind Nexus was established after a meeting chaired by Professor Asma Ismail, the USM Deputy Vice Chancellor (Research and Innovation), with Professor Zalina Ismail continuing on as the head of the Nexus, which included many fellow researchers as collaborators; Professor Jafri Malin Abdullah, Professor Kamarulazizi Ibrahim, Professor Mohd Zaid Abdullah, Professor Ruzhan M. Idrus, Professor Susie See Ching Mey, Associate Professor K. Sudesh Kumar, Associate Professor Wan Ahmad Kamil Wan Abdullah, and Associate Professor Zainal Ariffin Ahmad.

The metamorphosis in teaching included the Master of Surgery (Neurosurgery) established 12 years ago in 2001 by the School of Medical Sciences, Universiti Sains Malaysia under the fourth Dean of the School, Professor Dr Zabidi Azhar Hussin (Figure 6). The program has produced 32 neurosurgeons working both in government and private practice. Then the Advanced Master of Medicine (Neurology) was established under the fifth dean, Professor Dr Aziz Baba (Figure 7), with the first batch graduating in May 2010. Dr Shalini Bhaskar (Figure 8) was the first neurologist from the three-year program. She was taught by Professor John Tharakan (Figure 9), who also initiated the Epilepsy Surgery (ES) as well as the Deep Brain Stimulation (DBS) programs for movement disorders and taught neurology to the 32 neurosurgical trainees. Thus, came the words: "Examine the patient like John Tharakan and operate on the patient like Yasargil." The first five cohorts of neurosurgical trainees were also taught by the previous Chair of the Department of Neurosurgery at Universitair Ziekenhuis Ghent, Belgium, Professor Luc Calliauw (Figure 10), who became a favourite visiting professor. Neurosurgery thus, underwent "Calliauwisation" amongst the younger generation of neurosurgeons in Malaysia, including the current Associate Professor Zamzuri Idris, Dato' Dr Abdul Rahman Izaini Ghani and Dr Badrisyah Idrus, who became members of the Department of Neurosciences.

The first batch of students with a Master of Neuroscience and PhD by pure research mode graduated in 2008. Of other Malaysian-bred neuroscientists, a third are overseas doing their PhD training in Germany, Switzerland, Ireland, Australia, and the United Kingdom. Dr Farizan Ahmad from the first batch of neuroscientist from USM returned from University of Eastern Finland with a PhD in the field of Gene Therapy.

The return of Dr Muzaimi Mustapha from

the United Kingdom in 2009 (Figure 11) helped me push the agenda to bring post-graduate neuroscience to another higher level. Having graduated with both an undergraduate medical degree and a PhD from University of Cardiff, exposing him to the Integrated Neuroscience program there, Dr Muzaimi was seen to be a scion who could evolve the still existing pure-research program and initiated to an integrated one. I noticed that as in many other neuroscience post-graduate programs organized by pure research modes, students were struggling as their first degrees were not from neurosciences or medicine or pharmacy, and they had to learn and relearn many aspects of neurosciences without proper modules or examinations. He managed to set up the syllabus as well as follow the strict requirements of the Malaysian Qualification Agency with the assistance of more than 25 lecturers from different schools in this university.

I also asked Dr Muzaimi to be the editor of the first Southeast Asian Neuroscience Journal, The Orient Neuron Nexus, which was established June 2010. I noticed that neuroscience was not a common research topic in Southeast Asian countries, except Singapore, the source of most of the publications in Brain, Mind, and Neurosciences.

Sustainability was another big problem, as post-doctoral fellows mainly from the Indian subcontinent would come and go without a good group of replacement neuroscientists and future academicians. I remembered having a meeting on Saturday, October 24th, 2009 at 10 am in the Department of Radiotherapy, Oncology and Nuclear Medicine Meeting Room with 17 lecturers and trainee lecturers from the different fields of Radiology, Physics, Chemistry, Biology, Veterinary Medicine, Biomedicine, Psychology, Medicine, and Computer Sciences where we decided that everyone should not duplicate each others' fields when doing their PhDs and that the common denominator was both human and animal neuroimaging as well as behavioral neurosciences supported by neurophysics, computational neurosciences, and neuroinformatics (Figure 12). This has lead to our trainees doing color and vision experiments in non-human primates with functional magnetic resonance imaging (fMRI), neuropsychology and electroencephalography (EEG), neurofeedback and fMRI, Ultra High Field 7 Tesla fMRI and visual neurosciences, drug discovery and EEG, medicinal chemistry and electrophysiology, stem cell therapy in animal models as well as neuro-oncology to supplement

the existing Cellular and Molecular Neurosciences group in the Department of Neurosciences, School of Medical Sciences, USM.

The existing specialties in clinical service in this University had been the DBS and ES programs. The last year has seen an increase in the use of intraoperative radiotherapy, awake craniotomy for tumors in eloquent areas in the brain, surgery for spasticity, minimal invasive neurosurgery guided by functional MRI, EEG as well as Magnetoencephalography (MEG), transcranial magnetic stimulation (TCMS) for brain mapping and motor cortex augmentation after brachial plexus anastomosis. Most recently we initiated our neuropsychology assessment

and rehabilitation for traumatic brain injury and cerebrovascular disease patients as well as a human leukocyte antigen (HLA) and biomarker service for antiepileptic drugs, anti-platelet therapy, tumor markers for chemotherapy and radiotherapy.

We signed Memoranda of Understanding with numerous institutions. For example, at the Cuban Neuroscience Center in the field of Neuroinformatics we cooperated with Professor Mitchell Valdes Sosa and Professor Pedro Valdes Sosa (Figure 13); at the Center for Intelligent Signal and Imaging Research at the Universiti Teknologi PETRONAS in the field of Artificial Intelligence and Cognitive Neuroscience and



- Figure 1:** Professor Emeritus Dato' Dr Mohd Roslani bin Abdul Majid, Founding Dean of the School of Medical Sciences.
- Figure 2:** Professor Dato' Dr Omar Osman, the Vice Chancellor of Universiti Sains Malaysia.
- Figure 3:** Professor Dato' Dr Rujhan Mustafa, the Director General of the Ministry of Higher Education Malaysia.
- Figure 4:** The Honorable Datuk Seri Mohamed Khaled Nordin, the Ministry of Higher Education, Malaysia.
- Figure 5:** First batch of Integrated Neuroscience Program, candidates with lecturers involved in the neuroscience teaching program.
- Figure 6:** Professor Dr Zabidi Azhar Hussin, 4th Dean of School of Medical Sciences, Universiti Sains Malaysia.
- Figure 7:** Professor Dr Aziz Baba, 5th Dean of School of Medical Sciences, Universiti Sains Malaysia.
- Figure 8:** Dr Shalini Bhaskar, first graduate of the Advanced Master of Medicine (Neurology) Program.
- Figure 9:** Professor John Tharakan, started the first Advanced Master of Medicine (Neurology) Program.
- Figure 10:** Professor Luc Calliauw, previous Head of Department of Neurosurgery, University Hospital Ghent, Belgium, who visited Universiti Sains Malaysia numerous times.
- Figure 11:** Dr Muzaimi Mustapha, coordinator of Integrated Neuroscience Program, School of Medical Sciences, Universiti Sains Malaysia. He is the current Editor of the Orient Neuron Nexus.

Epileptology with the collaboration of Professor Ir Dr Ahmad Fadzil bin Mohd Hani Deputy Vice Chancellor Academic, Universiti Teknologi PETRONAS; at Universiti Malaysia Trengganu in the field of stem cell growth factor research; at The Spastic Children's Association of Selangor and Federal Territory to increase the care of spastic children that may need specialized neurosurgical care.

We hope to sign scientific cooperation agreements with the European Neuroscience Institute at the University of Goettingen, Germany foreseen in the mid of 2013 collaborating with Professor Micheal Horner (Figure 14). This idea came about thanks to Hans Reiner Polder of npi electronic GmbH, Instruments for the Life Sciences (Figure 15) who co-organised

two Deutscher Akademischer Austauschdienst (DAAD) Fundamental Electrophysiology Neuroscience summer schools with us.

The fate of Brain, Mind and Neuro sciences within Asia (9–12) depends on China, Japan, India and South Korea leading, and Singapore and Malaysia following. The neuroscience innovators from the different universities in Asia will soon be the biggest contributor to biotechnology and industrial growth in Asia. It will require much collaboration and strong fundamental knowledge to match the Human Brain Project (13) as well as USA's Brain Research through Advancing Innovative Neurotechnologies (14). I hope that the recent launching of the Neuroscience center will lead to excellent growth in the field of research in the brain and neuro sciences (Figure 16a,b,c).



Figure 12: Trainee neuroscience lecturers from the Department of Neurosciences as well as the School of Medical Sciences meeting on the 24th October 2009 to decide on their PhD tracks and specialisations.



Figure 13: Visiting Professor Pedro Valdes Sosa from the Cuban Neuroscience Center.



Figure 14: Professor Michael Hörner who coordinated and organised the first and second DAAD workshops in Malaysia.

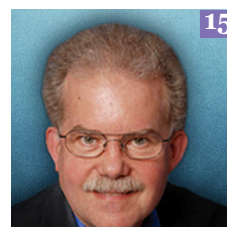


Figure 15: Hans Reiner Polder initiated the set up of electrophysiology lab in the School of Medicine, Universiti Sains Malaysia.

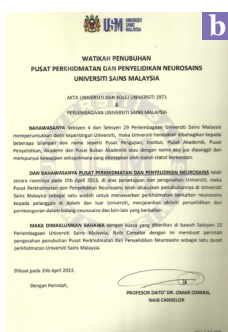


Figure 16(a,b,c): Launching of the 'Pusat Perkhidmatan dan Penyelidikan Neurosains (P3 Neuro)' known as Center for Neuroscience Service and Research, USM (CNSR) by the Vice Chancellor of Universiti Sains Malaysia Professor Dato' Dr Omar Osman on the 17th April 2013 in the USM, Health Campus.

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