

Jafri Malin ABDULLAH

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Chief Editor, *Malaysian Journal of Medical Sciences*,
Universiti Sains Malaysia Health Campus,
16150 Kubang Kerian, Kelantan, Malaysia



Abstract

16 years have passed since the idea was mooted in 1999 by five neurosurgeons in the corridors of Hotel Perdana, Kota Bharu. They were Dato' Dr Johari Siregar Bin Adnan, Dato' Professor Dr Ahmad Zubaidi Abdul Latif, Dr Azmin Kass Bin Rosman, Dato' Dr Mohammed Saffari Bin Mohammed Haspani and Professor Dato' Dr Jafri Malin Abdullah. They initiated the beginning of the first programme in Neurosurgery in Malaysia. The rest is history.

Keywords: neuroscience, neurology, neurosurgery, Malaysia

Universiti Sains Malaysia (USM) initiated its postgraduate program in neuroscience in 2001 beginning with its Masters of Surgery (Neurosurgery) as well as its Masters of Science (Neuroscience) programs in 2007 (1–3). The advanced Masters of Medicine (Neurology) program was started in 2009 (4). The criticisms of these programs from within and from outside the university delayed the initial initiation of the Masters of Surgery (Neurosurgery) program by a period of two years.

The collaboration and cooperation between the Universiti Sains Malaysia and the Ministry

of Health of Malaysia for the past 14 years has been tremendous (Figure 1). It is due to this special relationship that the country has 45 neurosurgeons, 1 neurologist, and 19 neuroscientists via the Masters and PhD programs of the Department of Neurosciences, School of Medical Sciences, third University Hospital in Malaysia, based on the East Coast of West Malaysia, 73 km from the Thailand border. The coordinates of 6°05' N and 102°17' E serve as a catchment area of 54000 square kilometers with a population of 4.5 million (Figure 2 and 3).

The Society for Neuroscience (SFN) Kelantan



Figure 1: The external and internal examiners involved in the Masters of Surgery (Neurosurgery) Universiti Sains Malaysia Part 1 examinations in May 2014. In this photograph seven first year residents (back row) were examined by Professor Jeffrey Victor Rosenfeld from Australia. From left (front); Datuk Dr Mohammed Saffari Mohammed Haspani, Datuk Dr Johari Siregar Adnan, Dato' Dr Fadzli Cheah Abdullah, Professor Dato' Dr Jafri Malin Abdullah, Professor Jeffrey Victor Rosenfeld, Dr Azmi Alias, Associate Professor Dr Zamzuri Idris, Professor Dr John Tharakan. From left (back); Associate Professor Dato' Dr Ab Rahman Izaini Ghani@ Ab Ghani, Dr Kanmani Devi a/p Ganison, Dr Rakesh a/l Rethinasamy, Dr Prabu Rau Sriram, Dr Manvinder Singh Mangat, Dr Lai Chuang Chee, Dr Chan Chee Kong, Dr Mohd Syahiran Mohd Sidek, Dr Regunath a/l Kandasamy, Dr Badrisyah Idris.

Chapter, established 8 July 2010, has helped to improve the international recognition of neurosciences at the Universiti Sains Malaysia.

The Integrated Neuroscience Program, which accepted its first students on 1 September 2011,

has put us on the map of neuroscience programs focused on producing talented neuroscientist in our country (4). Interestingly, students as far as Saudi Arabia, South Africa, Nigeria and Pakistan have enrolled in the program. Malaysian students



Figure 2: 45 neurosurgeons and 1 neurologist graduated from the clinical neuroscience programme which begun in 2001. At least 10 of them are sub-specialists in epilepsy & functional neurosurgery, endovascular neurosurgery, spine surgery, awake craniotomy and pain treatment of patients in different hospitals in Malaysia.

with a background in biomedical engineering, education, psychology, and the arts have also enrolled in the program, which supported our market survey conducted a year prior to the course approval.

The Masters and PhD research programs offer the study of 50 branches of neurosciences ranging from molecular and cellular neuroscience to the neuroscience of music via both the Department of Neurosciences, Universiti Sains Malaysia, and the Centre for Neuroscience Services and Research, USM (via its Transdisciplinary Postgraduate Board) better known as Majlis Pengajian Siswazah Transdisiplinari. We hope to begin the Masters of Cognitive Neurosciences with Neuroinformatics as well as the Masters of Clinical Psychology and Doctorate of Neuropsychology soon.

We hope that the Department of Neurosciences and Center for Neuroscience

Services & Research (P3Neuro) remembers the long journey that USM had to undergo to achieve its level in the field of brain sciences as well as neurosciences in the academic world until its recognition as a training center under the World Federation of Neurosurgical Societies (WFNS) (1–5). It is therefore important to recognise the neurosurgical academic lineages that exists in USM which are as follows: My mentor and teacher was Professor Luc Calliauw of the Academische Ziekenhuis Hospital University of Ghent, Belgium who studied under Prof Henk Verbiest at the Hospital University of Utrecht, Holland who studied under Professor Clovis Vincent of the Pitié-Salpêtrière Hospital in Paris, who studied under Professor Joseph Jules François Félix Babinski of Hôpital de la Pitié, France and Prof Harvey Cushing of Harvard Medical School.



(Continued Figure 3 on next page)

(Figure 3 continued)



Figure 3: (a) "Effect of *Centella asiatica* Extract of Psychoactivity On Rat Hippocampus: In vivo and In vitro study"; Researcher: Mohd Nasir Bin Mat Nor; Supervisors: Professor Dr Jafri Malin Abdullah, Dr Habsah Mohamad, Professor Gerhard Rammes, Dr Zamzuri Idris and Associate Professor Dr Hasnan Jaafar; Duration of studies: Jun 2006–Jun 2009.
 (b) "Effect of *Mitragyna spesiosa* Korth Extract of Psychoactivity On Rat Hippocampus: In vivo and In Vitro"; Researcher: Mohd Harizal Bin Senik @ Nawi; Supervisors: Professor Dr Jafri Malin Abdullah, Professor Dr Sharif Mahsufi Mansor, Professor Gerhard Ramme, Professor Dr John Tharakan KJ and Associate Professor Dr Hasnan Jaafar; Duration of studies: Jun 2006–Jun 2009.
 (c) "Characterization of development stage and neural differentiation potential of rat stem cells in striatal brain tissues and bone marrow"; Researcher: Raisah Binti Abd Hadi; Supervisors: Associate Professor Dr Hasnan B. Jaafar, Professor Dr Jafri Malin Abdullah, Dr Ab Rahman Izaini B. Ab Ghani and Professor Lazara Castillo; Duration of studies: Jan 2007–Jan 2010.
 (d) "Proliferation, apoptosis and telomerase activity study of embryonic striatal stem cell culture under the influence of growth factors"; Researcher: Nor Entan Binti Supeno; Supervisors: Associate Professor Dr Hasnan Jaafar, Professor Dr Jafri Malin Abdullah and Dr Fauziah Mohamad Idris; Duration of studies: Dec 2008–Dec 2010.
 (e) "Comparison of the potential antiepileptic bioactive compounds acting on GABA (A) receptor from *Zizyphus mauritiana* and *Myristica fragrans*"; Researcher: Ahmad Tarmizi

- Bin Che Has; Supervisors: Professor Dr Jafri Malin Abdullah, Professor Steffen Hering, Dr Hasnah Osman and Dr Habsah Mohamad; Duration of studies: Jan 2008–Jan 2010.
- (f) *"The Study of BORIS Protein in Brain Tumor Clinical Samples"*; Researcher: Siti Zawani Binti Mohd Ramli; Supervisors: Associate Professor Dr Shaharum Shamsuddin and Professor Dr Jafri Malin Abdullah; Duration of studies: Dec 2008–Dec 2010.
- (g) *"Evaluation of 2 species of Sea Cucumber Extracts On Regenerating Astrocytes After Mechanically Induced Injury of Basal Ganglia"*; Researcher: Mohd Azim Patar; Supervisors: Professor Dr Jafri Malin Abdullah, Professor Syed Mohsin Syed Sahil Jamalulail and Professor Dr Hasnan Jaafar; Duration of studies: Jan 2008–Jan 2010.
- (h) *"Study of Cyclodextrins (CDs) As a Biodegradable Drug Delivery System and CDs-Vancomycin (VCM) Complexes Controlled Release"*; Researcher: Zarif Bin Mohamed Sofian; Supervisors: Associate Professor Dr Shariza Bt. Abdul Razak and Professor Dr Jafri Malin Abdullah; Duration of studies: July 2009–July 2011.
- (i) *"Quality of Life of Epilepsy Patients With Obstructive Sleep Apnea"*; Researcher: Siti Norhajah Binti Hashim; Supervisors: Dr Baharuddin Abdullah, Professor Dr John Tharakan KJ and Professor Dr Jafri Malin Abdullah; Duration of studies: Mac 2009–Feb 2011.
- (j) *"Cytotoxic Effects, S-phase Cell Cycle Arrest and Apoptosis Induction of Aloe Emodin on Human Glioblastoma Multiforme U-87 MG Cells"*; Researcher: Samhani Ismail; Supervisors: Professor Hasnan Jaafar (Internal Examiner), Professor Manaf Ali (External Examiner from UNISZA), Associate Professor Dr Siti Hawa (Chairman), Dr Mahaneem Mohamed (Dean's Representative), Dr Abdul Aziz Mohamed Yusoff (Main Supervisor), Dato' Dr Ab Rahman Izaini Ghani (Co-supervisor), Dr Farid Johan (Co-supervisor); Viva Date: 11th December 2013.
- (k) *"Isoniazid and Its Beta-Cyclodextrin Complexes: Molecular Modelling, Characterization and Stability Study"*; Researcher: Syed Fariq Fathullah bin Syed Yaacob; Supervisors: Associate Professor Dr Shariza Abdul Razak, Associate Professor Dr Rohana Adnan and Professor Jafri Malin Abdullah; Viva Date: 9 January 2014.
- (l) *"Epigenetic remodeling and pathway analysis for transdifferentiation of mesenchymal stem cells into neural progenitor stem cells targeting neurogenesis, proliferation and cell cycle"*; Researcher: Tee Jong Huat; Viva Date: 20 April 2014; Panel: Professor Dr Rosline Hassan; Vice Dean (Research) and Dr Badrul Hisham Yahaya (Head of the Cluster for Regenerative Medicine, Advanced Medical and Dental Institute (AMDI), Universiti Sains Malaysia.) JKPS Members: Professor Dr Mustafa Musa and Dr Mahaneem Muhammad; Chairman: Associate Professor Dr Abdul Razak Sulaiman Supervisor: Professor Dr Hasnan Jaafar; Co-Supervisor: Professor Dr Jafri Malin Abdullah.
- (m) *"Gene expression profiling of human U87 glioblastoma cell line towards aloe emodin treatment"*; Researcher: Khalilah Haris; Supervisors: Dr Abdul Aziz Yusoff; Co Supervisors: Dr Badrul Hisyam Yahaya and Associate Professor Dr Zamzuri Idris; External Examiner: Associate Professor Dr Nik Marzuki Sidik; Internal Examiner: Dr Nik Norliza Nik Hassan; Viva Date: 20 April 2014.
- (n) *"Influence of personality and coping styles on the performance of the Stroop Test among the medical students of Universiti Sains Malaysia"*; Researcher: Teo Yong Chang; Supervisors: Dr Nasir Che Mohd Yusoff; Co Supervisor: Dr Faruque Reza; External Examiner: Professor Dr Low Wan Yuh; Internal Examiner: Dr Tahamina Begum; Viva Date: 7 August 2014.
- (o) *"Cannabinoid (CBI) receptors in the cerebellum as molecular targets of mitrogyna speciosa (ketum) addiction in mitrogynine - sensitised albino swiss mice"*; Researcher: Nanthini a/p Jayabalan; Supervisors: Dr Muzaimi Mustapha; Co Supervisors: Professor Dr Hasnan Jaafar External Examiner: Professor Datin Dr Zanurin Internal Examiner: Associate Professor Dr K.N.S. Sirajuden; Viva Date: 11 September 2014.
- (p) *"CB1 cannabinoid receptor in brain mesolimbic system of mitragynine-sensitised Swiss albino mice as a candidate molecular target in Mitragyna speciosa Korth (ketum) addiction"*; Researcher: Nurul Iman Wan Ismail; External examiner: Associate Professor Dr Muhammad Taufik Hidayat (UPM) Internal Examiner: Associate Professor Dr Mummedy Swammy; Chairperson: Associate Professor Siti Hawa Ali; Dean Representative: Dr Mohd Suhaimi Ab. Wahab; Supervisor: Dr Muzaimi Mustapha; Co-Supervisors: Professor Hasnan Jaafar dan Professor Sharif Mahsufi Mansor; Viva Date: 23 September 2014.
- (q) *"The electrophysiological and behavioural effects of subchronic administration of*

standardised methanolic mitragyna speciosa extract on adult male Sprague-Dawley rats"; Researcher: Mohd Ulul Ilmie Ahmad Nazri; Examiner: Professor Dato' Dr Abu Bakar Abd Majeed; Supervisor: Professor Dato' Dr Jafri Malin Abdullah; Co-Supervisor: Professor Hasnan Jaafar and Professor Sharif Mahsufi Mansor Viva Date: 30 November 2014.

(r) *"Education and Gender Influences on Colour Induced N170 and P300 ERP Components in The Human Brain"*; Researcher: Rumaisa Abu Hasan; Supervisors: Dr Tahamina Begum; Co Supervisors: Dr Faruque Reza; External Examiner: Professor Rahmatullah Khan Abdul Wahab Khan; Internal Examiner: Dr Muzaimi Mustapha; Viva Date: 26 January 2015.

"Evaluation of Cognitive Function by using Visual Oddball Paradigm in Mild Traumatic Brain Injury (MTBI) Patients: An Event-related Potential (ERP) Study"; Researcher: Mohd Ibrahim Abdullah; Supervisors: Dr Tahamina Begum; Co Supervisor: Dr Faruque Reza; External Examiner: Professor Rahmatullah Khan Abdul Wahab Khan; Internal Examiner: Dr Mohd Nasir Che Mat Yusof; Viva Date: 27 January 2015.

"Comparison of Perceptual Reasoning Index of Intelligence Between Personalities of Extravert and Ambivert in Medical Students"; Researcher: Nazirah Hanim Sharipudin; Supervisors: Dr Mohd Nasir Che Mat Yusof; Co Supervisors: Dr Saiful Bahri; External Examiner: Professor Rahmatullah Khan Abdul Wahab Khan; Internal Examiner: Dr Faruque Reza; Viva Date: 26 January 2015.

(s) *"In Vitro and Preclinical Evaluation of Newcastle Disease Virus Strain V4UPM as an Oncolytic Virus Candidate for Novel Human Malignant Glioma Targeted Theraphy"*; Researcher: Dr Zulkifli Mustapha; Supervisors: Professor Dr Jafri Malin Abdullah; Co Supervisors: Professor Aini Idris, Professor Hasnan Jaafar and Professor Abdul Manaf Ali; External Examiner: Professor Mohd Hair Bejo (UPM); Internal Examiner: Professor Dr Shahrarum Shamsuddin and Professor Nik Soriani Yaakob; Viva Date: 16 June 2014.

I quote the poem by Emily Dickinson (1830–86).

PART ONE: Life
CXXV1

*The Brain is wider than the sky,
For, put them side by side,
The one the other will include,
With ease, and you beside.*

*The brain is deeper than the sea,
For, hold them, blue to blue,
The one the other will absorb,
As sponges, buckets do.*

*The brain is just the weight of "God,"
For, life them, pound for pound,
And they will differ, if they do,
As syllable from sound.*

Correspondence

Professor Dato' Jafri Malin Abdullah
MD, PhD, FRCS (Ed), FACS, DSCN (Belgium)
Chief Editor
Malaysian Journal of Medical Sciences
Universiti Sains Malaysia Health Campus
16150 Kubang Kerian
Kelantan, Malaysia
Tel: +609-767 6972
Fax: +609-767 2359
Email: mjms.usm@gmail.com

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