# NEUROLOGY

## Introduction

Neurology is a major branch of internal medicine. The importance of neurology increases as the country advances and longevity improves. Because of the shortage of neurologists in the country, neurological training in Ministry of Health should be broad-based to enable trained physicians to have a wide knowledge of neurological disorders, economic cost, treatment, prevention and rehabilitation.

The reasonable target for the country is to have one neurologist per 500,000 populations in 5-10 years. This should progressively improve and in year 2020, by which time Malaysia hopes to achieve developed nation status, the ratio should be 1:150,000.

**The Objectives** of the programme:

- To produce doctors knowledgeable, competent and possessing the necessary skills in the practice of neurology capable of independent practice.
- To produce doctors with a broad and balanced understanding with regards to the practice of neurology including socioeconomic implication of neurological diseases, their diagnoses and treatment, prevention, rehabilitation and impact of technology.
- To cultivate and strengthen the positive attitudes towards learning and knowledge, quality assurance and research.

## Entry Requirement

i) A qualification in Internal Medicine such as M.Med (Int. Medicine) from any local universities, MRCP (UK or Ire) or any qualification recognized by the Malaysian Medical Council.

ii) Four years of supervised training in Internal Medicine.

## Duration of training

A total duration of three years, one of which may be spent in an approved overseas centre(s).

**Year 1:**

**Training in clinical neurology**

This period is used to familiarize with clinical method, spectrum of neurological disorders, diagnostic procedures and treatment modalities.

**Year 2:**

**Further experience in clinical neurophysiology will be acquired.**

Candidates will be introduced to clinical neurophysiology in stages leading to hands on experience and skills in interpretation and performance of common neurophysiological test

**Year 3:**

**The final year of training may be completed in an approved institution overseas.**

At least 6 months shall be spent in clinical neurology and the other 6 months in either clinical neurophysiology, neuroradiology, neuropathology or any neurology subspecialty or research. Reports of overseas training need to be completed.

The objectives of overseas training are:

1. To broaden the knowledge of clinical neurology
2. To further develop the clinical skills and expertise in clinical neurology and clinical neurophysiology or neurology related subspecialty.
3. To learn new techniques and new modalities of investigation and treatment.
4. To learn clinical research methods in neurology and clinical neurophysiology and neuropathology.

The topics to be covered in clinical neurology and clinical neurophysiology are as in Appendix 1A.

**At the ending three year, the trainee should also complete a minimum of 1 research project.**

## Training Programme

The training is divided into 3 phases focusing in the areas of:

i) Clinical Neurology
ii) Clinical Neurophysiology
iii) Neuropathology/Neuroradiology or allied Neurology Subspecialty

i) Clinical Neurology

24 months training in clinical neurology under direct supervision of an accredited consultant. The trainee occupies a position requiring full clinical participation and direct patient responsibility with call duties to ensure adequate exposure and opportunities for independence judgment and decision-making.

The programme is organized and conducted in a manner so as to emphasize good medical practice. Trainees will be encouraged to examine and appraise the result of their own and department activities. Patient care will be based on comprehensive patient management taking cognizance of the patient environment, family interaction, consequences of treatment and need for rehabilitation.

ii) Clinical Neurophysiology

At least six months shall be spent in an accredited clinical neurophysiology laboratory. The programme requires the trainee to have a good understanding of relevant neuroanatomy, physiology, indications and limitations of neurophysiological tests.

iii) Neuropathology/Neuroradiology or allied Neurology subspecialty

This is an optional area of training where candidates may spend for up to six months in an accredited laboratory or department.

**Modes of training**

The major characteristic of the training is direct participation in patient care activity of the department or unit to enable the trainees to gain maximum benefit from the clinical material.

The importance of continuous education shall be emphasized through various activities such as participation in journal reads, clinical meetings, radiology/pathology/mortality conferences, under graduate teaching, seminars, workshops etc.

Trainees will be encouraged to attend and participate in national, regional and international meetings.

## Logbook

Trainees shall maintain a logbook to record clinical procedures done, clinical neurophysiology activities performed, CME activities, QA activities, publication and participation in professional meetings (see credentialing of procedures in neurology appendix 1B) throughout the 3 years of training.

## Training Institutions & Accredited Trainers

### Training Institutions

Several hospitals or institutions are accredited for the whole or part of local training. Accreditation is based on the availability of neurologists, neurophysiology laboratory and technicians, workload and the strength of related professional departments such as imaging and diagnostic departments, neurosurgery and neuropathology. All accredited departments shall have the basic requirements for CME activities such as seminar-room, projectors, video players etc. The list of accredited institutions will be periodically reviewed. The ratio of trainer: trainee should not exceed 1:2. For overseas centers, candidates' training should be reviewed on a case-to-case basis. The training can be recognized in part or in total of it is found to be equivalent to the local training programme.

### Accredited Trainers

Training shall be under direct supervision of an accredited neurologist or clinical neurophysiologist. Accreditation of trainers is based on good professional standing and interest in teaching. A minimum of two years working experience after gazettement in their own field is required.

### Responsibility of Trainee

The trainee is required to complete the stipulated programme to the satisfaction of the supervisor. He/she should show, throughout the whole training period a high standard of professional conduct, possesses the positive attitudes to knowledge and learning and committed to continuous education.

The candidate should equip him or herself with necessary knowledge and should acquire the necessary professional competence and skills to enable him to function independently later.

Full participation in CME is mandatory and he is required to teach medical students from time to time.

One-research project shall be completed which is of sufficiently high standard to be published in peer review journal or presented professional meeting either locally or overseas.

### Selection of candidates:

Eligible candidates shall apply to the Fellowship Training Secretariat, Ministry of Health. A committee shall decide on the application and subsequent emplacement to accredited unit throughout the country. This committee shall meet at least once a year to make decisions regarding the above.

Selection of candidates shall be based on several criteria, which include:

1. Academic and professional performance
2. Interest
3. Attitudes

## Certification

On satisfactory completion of the training period, a trainee shall apply to be exit certified. The specialty shall establish a Board of Assessors for certifying completion of training. It will be guided by the assessment report from the annual reviews, logbook, clinical workshop and other clinical activities.

An exit exam comprising of a viva voce and written exam will be held. The written exam, covering 2 hours in duration, shall consist of 1 long essay (gray case) and 4 short, stemmed questions.

The research paper will also be evaluated.

The examiners will consist of 2 KKM neurologists, and 1 examiner from the private sector or Universities.

The examination will be held once a year, at a time convenient to accommodate the returning trainee after post-clinical attachment period. It shall not be later than the 1-year post-completion of training.

Venue of the examination will be in any accredited center in the Klang Valley.

## Neurology Training Committee

A committee shall be formed to organise and oversee the conduct of the training programme. The Committee shall meet at least twice a year.

**Members:**

Head of Department of Neurology, HKL
2 other neurologists from the Ministry of Health
1 Neurologist from the local Medical Faculty

The committee shall be responsible for:

- Advice on structure, content and mode of training
- Accreditation of centers and trainers
- Selection of candidates
- Placement of trainees
- Review progress of trainees

| | |
|---|---|
| The Chairperson: | Dr. Raihanah Abdul Khalid<br>(Acting Head of Neurology Department HKL) |
| Members: | Dr. Samuel Easaw (Hospital Pulau Pinang) |
| | Dato' Dr. Mohd. Hanip Rafia (Hospital Sultanah Aminah, Johor Bharu) |
| | Prof. Tan Chong Tin (UMMC) |
| | One representative from the Malaysian Society of Neurosciences |

**APPENDIX 1 A**

TOPICS IN CLINICAL NEUROLOGY

Anatomy of brain and spinal cord.
Physiology of cerebrospinal fluid
Anatomy and physiology of muscle and neuromuscular junction
Neurotransmitters, neurohormones and neuromodulators
Congenital and hereditary disorders of brain, spinal cord, nerve and muscle.
Metabolic, toxic and deficiency disorders of nervous system.
Infective disorders including meningitis, encephalitis, brain abscess, granuloma, empyma and AIDS.
Non-infective inflammatory disorders including multiple sclerosis, lupus erythematosus and sarcoidosis.
Vascular disorders including thrombosis, embolism, cerebral subarachnoid haemorrhage and subdural haematoma:

Epilepsies
Headaches and migraine
Diseases of muscle including dystrophy, congenital myopathy, polymyositis and metabolic muscle disorders.
Disorders of neuromuscular function.
Tumours of nervous system
Hydrocephalus : Aetiology and treatments.
Motor neurone disease.
Degenerative disorders including Parkinson's disease, Alzheimers.
Prolapsed vertebral disc
Cervical spondylosis

PROCEDURES IN CLINICAL NEUROLOGY

Insertion of endotracheal tube

Insertion of central venous line

Lumbar puncture

Insertion of lumbar catheter (ELD)

Muscle biopsy

(Nerve biopsy- in near future)

TOPICS IN CLINICAL NEUROPHYSIOLOGY

Physiology of neurones, neurotransmission, membrane potential and muscle.

Physiological basis of EEG

Balanced amplifiers

Electronics of EEG, EMG and evoked potential machines.

Indications and uses of EEG

Normal EEG recording

Special EEG recording

EEG in children and adults

Indications and uses of EMG and nerve conduction studies.

Indications and uses of evoked potential

Visual evoked potential

Brain stem evoked potential

Somatosensory evoked potential

Procedures in brain death

Evoked potentials in surgery.

Video EEG monitoring and Polysomnography

PROCEDURES IN CLINICAL NEUROPHYSIOLOGY

Machine test

Trouble shooting

Electrode placements in EEG

EEG recording

Concentric EMG

Nerve conduction studies

Decrement studies

Visual evoked potential

Brain stem evoked potential

Somato sensory evoked potential

Procedures in brain death

Procedures during surgery.

Transcranial Doppler

**Appendix 1B**

## CREDENTIALING OF PROCEDURES IN NEUROLOGY

**Principle:**

Doctors in training at the Postgraduate level must be guided by the principle that the acquisition of knowledge and practical skill require a strong commitment to self-learning coupled with sense of duty for continuous improvement. Regular hands on work are necessary to ensure maintenance of the practical skill.

There will be an accreditation body consisting of 3-5 members representing senior neurologists from the Ministry of Health, Universities and the private sector. The function of the body is to:

i) Assess the suitability of the training center.
ii) Assess whether an individual candidate has satisfactorily completed the required training.
iii) Assess the accreditation of candidates whose qualification and training may require individual consideration.

**1. List of procedures:**

1. 1. Electroencephalogram (EEG) including videotelemetry
1.2. Evoked Potential (EP)
1.3. Nerve Conduction Studies and Electromyogram (NCV and EMG)
1.4. Botulinurn Toxin Injections
1.5. Polysomnography
1.6. Transcranial Doppler

**2. Guideline For Clinical Competence:**

**2.1. EEG**

**Indications:**

Epilepsies, encephalitis, encephalopathies, meningitis, head injury, headache syndromes, dementias and psychiatric disorders.

**Contraindications**

None.

**Complications**

The activating procedures used may provoked seizures.

**Minimal training Necessary For Competence:**

Attend 10 tutorials on basic EEG covering recording techniques, normal adult EEG, normal paediatric EEG, awake and sleep records and common abnormalities.

Observations of 100 reports, supervised reporting of 100 records and independent reporting of 100 records.

**Maintenance of Competence:**

Must performance and report EEG regularly and must not break for more than a year.

**Documentation of Experience:**

Maintain a record of performance.

## 2.2. Evoked Potential (EP)

**Indications**

Various disorders of brain, brain stem, cranial nervous and spinal cord.

**Contraindications**

None

**Complication**

None

**Minimal Training For Competency:**

10 tutorials in neuroanatomy, physiology, normal values and abnormalities of various types of evoked responses (visual evoked potential, brain stem evoked potential and somatosensory evoked potential). Observation of 20 reports, performance of 20 supervised reports and 20 independent reports.

**Maintenance of Competence**

Must perform and report EP regularly and must not break for more than 1 year.

**Documentation of Procedure:**

Maintain a record of performance.

## 2:3 Nerve Conduction Studies and Electromyogram.

**Indications:**

Various disorders of spinal cord, nerve roots, nerves and muscle.

**Contraindications**

None

Precautions are necessary in diseases that can be transmitted by needle pricks.

**Complications**

Injury to nerve and artery.

**Minimal Training For competence:**

10 tutorials in anatomy and physiology of nerves, normal values and abnormalities of NCV and EMG.

Observation of 50 reports, performances of 50 supervised reports and 50 independent reports.

**Maintenance of Competence:**

Perform and report NCV and EMG regularly and must not break for then a years.

**Documentation of Experience:**

Maintains a records of performance.

## 2.4. Botulinum Toxin Injection

**Indications:**

Various type of movement disorders, dystonic disorders, disorders of muscle tone and muscle imbalance.

**Contraindications**

Sensitivity or allergy to botulinum toxin, myasthenia gravis, acute or subacute neuropathies.

**Complications:**

Paralysis of muscle injury to nerve and artery.

**Minimal training For Competency:**

6 tutorials in pharmacology of botulinum toxin and clinical disorders in which the treatment is indicated. 10 treatments observed, 10 performed with supervision and 10 supervised treatment sessions covering various indication (disorders)

**Maintenance of Competence:**

Regular performance of the procedure and any break must not exceed more than a year.

**Documentation of Experience:**

Maintenance of a record of performance.

## 2.5. Polysomnography

Indications:

All type of primary and secondary sleep disturbance including narcolepsy, hypersomnias, insomnia, and parasomnias.

**Contraindications**

None

**Complications**

None

**Minimal Training For Competency:**

Attend 6 tutorials on PSG
Observed 5 session of PSG reporting
Write 5 PSG report with supervisors
Write 10 PSG reports independently

**APPENDIX 2**

Below is the list of accredited trainers and training centers:

| | Institution | Accredited Period |
|---|---|---|
| 1. | Department of Neurology Hospital K. Lumpur | 2 years |
| 2. | Department of Medicine Hospital P. Pinang | 1 year |
| 3. | Department of Medicine University Kebangsaan | 2 years |
| 4. | Department of Medicine University Hospital | 1 years |

**List of Trainers**

| | | |
|---|---|---|
| i) Dr. Raihanah Abdul Khalid | - | Hospital K. Lumpur |
| ii) Dr. Samuel Easaw | - | Hospital P. Pinang |
| iii) Dr. Haji Azmi Abdul Rashid | - | Hospital Kuala Lumpur |
| iv) Prof. Madya Dr. Raymond Azman Ali | - | Hospital UKM |
| v ) Professor Tan Chong Tin | - | Hospital University(UMMC) |
| vi) Dr. Md. Hanip bin Rafia | - | Hospital SAJB |
| vii) Dr. Julai Shahnaz Merican | - | Hospital Kuala Lumpur |
| viii) Dr. Zariah Abd. Aziz | - | Hospital Kuala Lumpur |
| ix) Dr. Sim Bee Fung | - | Hospital Kuala Lumpur |

**APPENDIX 3**

RECOMMENDED BOOKS AND JOURNALS

1. Principles of Neurology
   Ed. R.P. Adams and M. Victor
   Mc Graw Hill 5th Ed. 1993

2. Brain's Diseases of The Nervous System
   Ed. JN Walton
   Oxford University Press 10th Ed 1992

3. Neurology In Clinical Practice
   Ed. Wh Bradley, RB Daroff, GM Fenichel and CD Marsden
   Butterworth Heinemam 1st Ed 1991

4. Stroke: Pathophysiology, Diagnosis and Treatment
   Ed: HJM Barnett, JP Mohr, BM Stein and F.M. Yatsu
   Churchill Living Stone 2nd Ed. 1991

5. A. Textbook of Epilepsy
   Ed. J. Laidlaw, A. Richens and D. Chadwick
   Churchill Livingstone 4th Ed. 1993

6. De Jong's: The Neurologic Examination
   Ed: A.F. Haerer
   J.P. Lippincott 1992

7. Textbook of Child Neurology
   Ed. J.H. Menkes
   Lea and Febiger 4th Ed 1990

8. Electroencephalography: Basic Principles, Clinical Applications and Related Fields
   Ed. E. Niedermyer and F. Lopes da Silva
   Urbans and Schwarzenberg 1992.

9. Electrodiagnosis In Diseases of Nerve and Muscle: - Principles and Practice Jun Kimura
   F.A. Davis Co. 2nd Ed 1989.

10. Evoked Potential Testing: Clinical Applications
    Ed: J.H. Owen
    H Davis
    Grune and Stration Inc 1985.

**JOURNALS**

**NEUROLOGY**

Archives of Neurology

Annals of Neurology

Journal of Neurology, Neurosurgery and Psychiatric

Brain

Epilepsia

Stroke

Neurological Journal of S.E.Asia

PROFESSIONAL MEETINGS:

Annual Meeting of Malaysian Neuroscience Society

Asian Neurological Association Meeting

Asian and Oceania Congress of Neurology

World Congress of Neurology

European Congress of Epileptology

European Stroke Congress

International Congress of Epilepsy

International Congress of Neuromuscular Disease

Internal Congress of EMG and Clinical Neurophysiology

American Neurological Association Annual Meeting