

MOHAMMED V UNIVERSITY OF RABAT SCHOOL OF MEDICINE AND PHARMACY

DEPARTMENT OF NEUROLOGY

NEUROLOGY RESIDENCY PROGRAMME

Professor Mustapha El Alaoui-Faris

RABAT, SEPTEMBER 2024

NUMBER OF YEAR OF TREATING: FOUR YEARS

FIRST YEAR

TOTAL NUMBER OF TEACHING HOURS: 100 HOURS

I. NEUROBIOLOGY AND NEUROPHARMACOLOGY (10 HOURS)

1. Physiology of the cerebral blood flow
2. Neurogenetics: genes, proteins, principal techniques of molecular biology
3. Physiology of sleep
4. Physiology of memory
5. Antiepileptic medications
6. Antiparkinsonian medications
7. Psychotic and antidepressant medications

II. NEUROANATOMY: ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM (20 hours)

1. Embryology of the Central Nervous System
2. Descriptive Anatomy and Systematization of the Central Nervous System
 - a. Cerebral Cortex
 - b. Thalamus
 - c. Basal Ganglia
 - d. Brain Stem
 - e. Spinal Cord
3. Blood Supply of the Brain and Brain Stem
 - a. Carotid System
 - b. Vertebrobasilar System
 - c. Nervous System
4. Anatomy of the Spinal Cord
5. Blood Supply of the Spinal Cord
6. Anatomy of the Cranial Nerves
 - a. Olfactory and Gustatory Nerves
 - b. Optical Nerves
 - c. Oculomotor nerves
 - d. Trigeminal Nerve
 - e. Facial Nerves
 - f. Auditory and Vestibular Nerves
 - g. Bulbar nerves
 - h. Hypoglossal Nerve
7. Anatomy of peripheral nerves and muscles
 - a. Nervous cell (morphology, characteristics)

- b. Synapses and nervous impulses
- c. Chemical mediators: acetylcholine, adrenaline, dopamine, serotonin, GABA, COM
Physiology of the sensory pathways
- d. Physiology of pain
- e. Physiology of muscular tonus
- f. Physiology of the cerebrospinal fluid

III. NEUROPHYSIOLOGICAL EXAMINATION (15 HOURS)

1. EEG
 - a. EEG: Technical Realisation
 - b. Indications of EEG in Epilepsy
 - c. Indication and other Brain disorders
2. EMG
 - a. EMG: technical Realisation
 - b. Indications of EMG in Peripheral Nerve diseasesc
 - c. Indications of EMG in Muscle diseases
3. Evoked Potentials in Neurology: Technical Realisation and Indications
4. Transcranial magnetic stimulation
5. Neuro Ultrasound (extra/intracranial vessels), peripheral nerves and muscles
6. Exploring autonomic nervous system function
7. CSF studies: interpretation of CSF cytology

IV. NEURORADIOLOGICAL EXAMINATIONS (10 HOURS)

1. CT:
 - a. Technical realisation
 - b. CT of the Brain
 - c. CT of Spine Cord
2. MRI
 - a. MRI: Technical realization
 - b. MRI of the Brain
 - c. MRI Spine Cord
3. Cerebral Arteriography
4. Spine Cord Arteriography
5. Metabolic neuroimagery: SPECT and PET Scan

V. SEMIOLOGY OF NEUROLOGICAL DISORDERS (35 HOURS)

1. General Semiology
 - a. Semiology of motor function
 - b. Semiology of muscular tonus and different types of muscular hypertonia
 - c. Semiology of the sensory system
 - d. Semiology of the cranial nerves
 - e. Semiology of higher cortical function: aphasia, apraxia, agnosia and memory disorders
 - f. Semiology of Genito-urinary disorders
2. Neurological Syndromes
 - a. Hemiplegia: types and causes
 - b. Paraplegia and tetraplegia: types and causes
 - c. Ataxia: cerebellar, vestibular, and spinal ataxias
 - d. Bulbar and pseudobulbar syndromes
 - e. Extraparamidal syndromes: Parkinsonism, tremor, dystonia, chorea
 - f. Cauda Equina: signs and causes

- g. Progressive myelopathy: signs and causes
- h. Semiology of the cortical frontal, temporal, parietal and occipital lobes
- i. Dementia syndromes: signs and causes
- j. Principal chronic headaches: migraine, tension-type headache, histaminic cephalalgia
- k. Trigeminal neuralgia and other facial pain
 - l. Facial nerve palsy
- m. Seizures: semiology, EEG, neuro-imagery and treatment
- n. Meningitis and encephalitis: clinical, CSF, neuro-imagery features, causes and treatment
- o. Idiopathic intracranial hypertension neuro-imagery, diagnosis and management
- p. Cerebral management venous thrombosis, neuro-imagery, diagnosis and management
- q. Metabolic encephalopathies: clinical and EEG features, main causes and management
- r. Semiology of peripheral, radicular, plexus and truncal syndromes
- s. Myopathies: clinical, neurophysiological features, causes and management
- t. Neuro-muscular junction disorders: clinical, neurophysiological features, causes and management.

VI. COMMON NEUROLOGICAL EMERGENCIES: 10 HOURS

1. Acute hemiplegia diagnosis and management
 2. Acute paraplegia diagnosis and management
 3. Guillain-Barré Syndrome: diagnosis and management
 4. Myasthenia crisis: diagnosis and management
 5. Acute headache: diagnosis and management
 6. Status epilepticus: diagnosis and management
 7. Management of ischemic stroke in emergency room
 8. Management of the hemorrhagic stroke in emergency room
 9. Delirium: diagnostic and treatment
 10. Comas: diagnosis, causes and treatment
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SECOND YEAR

TOTAL NUMBER OF HOURS: 100

I. VASCULAR DISORDERS

1. Ischaemic strokes: clinical presentations based on the affected vascular territory, para-clinical examinations, and main causes. Management of acute ischaemic stroke and preventive measures
2. Cerebral haemorrhages: clinical presentations, examinations in emergency settings, causes and patient care
3. Subarachnoid meningeal haemorrhages: clinical presentations, complementary examinations, causes and complications
4. Spinal vascular diseases: clinical and para-clinical presentations and causes.
5. Vascular dementia
6. Normal Pressure Hydrocephalus

II. EPILEPSIES

1. Physiopathology and pathophysiology of seizures
2. The ILAE 2017 classification of seizures and epilepsies
3. Partial epilepsies
4. Generalized epilepsies
5. Epilepsy in children
6. Epilepsy in adults
7. Pharmacology of antiepileptic drugs
8. Medical treatment
9. Pharmaco-resistant epilepsy
10. Surgical treatment of epilepsy

III. INFECTIOUS, PARASITIC AND MYCOTIC PATHOLOGIES (1st part)

1. Brain abscess: clinical and radiological presentations, causes and treatment
2. Tuberculous meningitis: clinical, CSF, neuro-imagery, complication, and management
3. Neuro-syphilis: clinical, CSF, neuro-imagery, complication, and management
4. Neurologic manifestation of HIV: clinical, CSF, neuro-imagery, complication, and management
5. Purulent meningitis: clinical presentation, cerebrospinal fluid data, treatment, and complications
6. Herpes viral encephalitis: diagnosis and treatment
7. Infectious acute myelopathy: clinical presentation, para-clinical examination, main causes and patient care
8. Parasitosis and fungal meningitis: diagnosis and treatment

IV. INFLAMMATORY AND AUTO-IMMUNE DISORDERS

1. Multiple sclerosis and other central nervous system's demyelinating disorders: physiopathology, clinical presentation, para-clinical examinations, and treatment
2. Neurological manifestations of systemic diseases: systemic lupus erythematosus, Behçet's disease, Sjögren's disease, rheumatoid arthritis, systemic vasculitis and sarcoidosis
3. Acute and chronic polyradiculoneuropathies: physiopathology, clinical presentation, paraclinical examinations, and treatment
4. Parsonage-Turner Syndrome: clinical and paraclinical diagnosis

V. E/ MUSCULAR DISORDERS

1. Muscular dystrophy in children and adults: genetic classification, clinical presentation and diagnostic tests
2. Polymyositis, dermatomyositis and other inflammatory myopathies: clinical presentation, para-clinical examinations and treatment
3. Myasthenia and neuromuscular junction disorders: clinical presentation, diagnostic tests

and treatment

VI. PERIPHERAL DISORDERS

1. Peripheral neuropathy: clinical presentation, neurophysiology, causes and aetiology
 2. Hereditary neuropathy: types and genetic classification
 3. Diabetic and metabolic neuropathy: diagnosis, causes and treatment
 4. Dyskaliemic periodic paralysis
 5. Toxic neuropathy: diagnosis, causes and treatment
 6. Infectious neuropathy: diagnosis, causes and treatment
 7. Lateral amyotrophic sclerosis and progressive spinal muscular atrophies
 8. Spinal muscular atrophies: clinical presentation and genetic classifications
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THIRD YEAR

TOTAL NUMBER OF HOURS: 100

I. NEURODEGENERATIVE DISEASES OF THE CENTRAL NERVOUS SYSTEM

1. Alzheimer' diseases: physiopathology, clinical presentations para-clinical examinations, and treatment
2. Other degenerative dementia: Frontotemporal dementia, Lewy Body Dementia, Cortico-basal degeneration
3. Vascular dementia: Clinical and radiological presentations and care
4. Parkinson's disease and other Parkinsonian syndroms: Anatomy and biochemistry of the basal ganglia, physiopathology, clinical and paraclinical presentations and treatment)
5. Multiple system atrophy: clinical presentations and Parkinson's disease differential diagnoses
6. Dominant and recessive hereditary ataxia: Dominant ataxias and genetics, clinical and genetic presentations of the Friedrich's ataxia and vitamin E deficit and other diagnostic analytics
7. Chorea: clinical presentation, main aetiologies of acute and chronic chorea types
8. Dystonia: clinical presentation and main genetic types

II. NEURO-INFECTIOUS DISEASES (SECOND PART)

1. Neurological manifestations of COVID-19 virus
2. Neurological complications of Zika virus
3. Neurological manifestations of West Nile virus
4. Neurological complications of HTLV-1 and other retroviruses
5. Neuroborreliosis
6. Brain and Spinal hydatid cysts
7. Acute poliomyelitis and post-poliomyelitis syndrome
8. Spondylodiscitis
9. Arachnoiditis

III. NEURO-ONCOLOGY

1. Primary tumors in the brain: major histological types, clinical and radiological aspects, treatment
2. Primary tumors in the spine cord: major histological types, clinical and radiological aspects, treatment
3. Metastasis in the Brain and the spine cord: diagnosis and treatment
4. Carcinomatous meningitis: diagnosis and causes
5. Paraneoplastic syndromes: different clinical presentation, immunological aspects
6. Neurological complications of radiotherapy and chemotherapy

IV. CONGENITAL CONDITIONS AND CORTICAL DYSPLASIAS

1. Malformation of the cervico-occipital joint: clinical signs, radiological diagnostic, and surgical treatment
 2. Syringomyelia: clinical and radiological presentations, treatment protocols
 3. Cervical spondylotic myelopathy: clinical and radiological diagnostic and treatment
 4. Narrow lumbar canal: clinical and radiological presentations
 5. Craniosynostosis: radiological and clinical presentations
 6. Infantile hydrocephalus: diagnosis, evaluation, and treatment
 7. Cortical dysplasia: clinical, radiological and pathological aspects
 8. Phacomatosis: neurological signs, radiological aspects, and genetics
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FOURTH YEAR

TOTAL NUMBER OF HOURS: 80

I. NEUROLOGICAL COMPLICATIONS OF METABOLIC, DEFICIENCY AND ENDOCRINE DISEASES

1. Wilson's disease: clinical presentation, diagnostic tests, therapeutic management
2. Acute intermittent porphyria: clinical presentation, diagnostic tests, therapeutic management
3. Wernicke encephalopathy and other deficiency encephalopathy
4. Hepatic and uremic encephalopathy

II. NEUROLOGICAL COMPLICATIONS OF TOXIC AGENTS

1. Neurological presentations of chronic alcoholism: main neurological complications, clinical presentation, and diagnostic tests
2. Neurological presentations of carbon monoxide poisoning: clinical and para-clinical presentations
3. Neurological complications chemical agents

III. TRAUMA OF NERVOUS SYSTEM

1. Closed Head and cranial trauma
2. Spinal cord and vertebral trauma
3. Post-traumatic cerebral syndrome
4. Peripheral nerve trauma

IV. D/ SPECIFIC TREATMENT OF NEUROLOGICAL DISORDERS

1. Ischemic stroke care: Thrombolysis and thrombectomy
2. Treatment of status epilepticus
3. Use of plasma exchange and immuno-globulin in neurology
4. Use of steroid and immunosuppressant medications in Neurology
5. Interventional radiology in neurology
6. Rehabilitation for neurological disorders

DURATION OF THE TRAINING ON NEUROLOGY SPECIALITY

The training in clinical neurology lasts 4 years (8 semesters) including 6 semesters in a neurology department, 1 semester in Neurophysiology unit, 3 months in Psychiatry and 3 months in Neuroradiology department. During the neurology internships, the resident will attend the outpatient consultation and the various specialized units: Stroke unit, movement disorders unit, memory clinic.

KNOWLEDGE AND SKILLS THAT THE RESIDENT MUST KNOW DURING TRAINING

1. Assimilate the theoretical knowledge in neuroscience and clinical neurology taught during the four years of training, so the resident has an exam to check his knowledge at the end of each academic year.
2. He must know how to take a history adapted to each particular neurological situation. Perform a complete neurological exam and use tests or scales, if necessary, in appropriate neurological diseases.
3. To perform lumbar puncture and interpretation of CSF cytology
4. Know how to perform an EEG and EMG and interpret them appropriately
5. Know how to interpret CT and MRI of the brain and the spine cord
6. Know diagnose and treat the main neurological diseases and correctly use the neurological medications (antiepileptics, antiparkinsonians)

At the end of each year a practical exam is carried out where the resident must examine a patient and present his clinical file and interpret the complementary examinations (EEG, EMG, CSF, Neuroimaging) and discuss the case with a jury.

FINAL EXAM

In order to pass the final exam, the resident must validate the theoretical and practical exams of the three first years of training and also validate the clinical neurology, neurophysiology, neuroradiology and psychiatry internships. and it must also submit a research on clinical neurology.

The final exam consists of two written exams covering all the courses given during the four years of training and a practical exam during which the resident must examine a patient and discuss the clinical, radiological therapeutic aspects of case with the jury.

Successful completion of the final examination entitles the resident to the degree of neurologist.

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