

## Paper II: Technical Subject

### 1. Basic

- 1.1 Principles of clinical diagnosis in the neurological examination
- 1.2 Diagnosing muscle weakness : Symptoms, Cerebral hemisphere lesions, Brainstem lesions, Spinal cord lesions, Neuromuscular diseases, Fluctuating weakness
- 1.3 Somato-sensory abnormalities
- 1.4 Symptoms of neurological disorders : Delirium and Dementia; Aphasia, Araxia, and Agnosia; Syncope and Seizure; Coma; Pain and Paresthesias; Dizziness and hearing loss; Impaired vision; Headache; Involuntary movements; Gait disorders
- 1.5 Autonomic disorders
  - 1.5.1 Clinical features of Autonomic disorders, Autonomic function testing and Causes of autonomic failure
- 1.6 Neurological Investigations
  - 1.6.1 Clinical Neurophysiology – procedure and interpretation – Electroencephalogram (EEG) and Evoked potentials (EP) - VEP, SSEP, MEP, BAER, ENMG, TMS
  - 1.6.2 Neuroimaging : CT, MRI, fMRI, MRS, SPECT, PET, DTI, Vascular imaging, Neuroangiographic anatomy, TCD
  - 1.6.3 Imaging of cerebral circulation : Catheter angiography; Duplex sonography; CT angiography and perfusion imaging; MR angiography and perfusion imaging; Transcranial Doppler sonography
  - 1.6.4 Nerve conduction studies and electromyography
    - 1.6.4.1 Lumbar puncture and CSF examination
    - 1.6.4.2 Neurological autoantibodies
- 1.7 Clinical Neuro-anatomy
  - 1.7.1 Embryonic development and structure of CNS, PNS
  - 1.7.2 Covering of the nervous system
  - 1.7.3 Blood brain barrier
  - 1.7.4 Vascular anatomy- Arterial and Venous system (sinuses)
- 1.8 Neurophysiology and Neurochemistry
  - 1.8.1 Structure and function of neural membranes including cell membrane; membrane transport; Ion Channels and channelopathies, electrical excitability of cell membrane, lipid biochemistry, structure and function of myelin and various diseases of myelin
  - 1.8.2 Synaptic transmission, neurotransmitters (acetylcholine, catecholamines, serotonin, histamine, opioids, GABA and Glycine), Neurochemistry of drug abuse, neurotransmitter disorders of basal ganglia, neurochemistry of degenerative diseases like Parkinsons and Alzhiemer's ; Neurochemistry of epilepsy and antiepileptic drugs
  - 1.8.3 Muscle fiber structure, proteins with application in muscular dystrophies
  - 1.8.4 Axonal transport, neural plasticity, aging biochemical basis, neuronal hypoxia and ischemia

- 1.8.5 Metabolic disorders affecting brain – disorders of carbohydrate, fatty acid, aminoacid, mitochondrial disorder, urea cycle disorder. Organic acid disorders; Vitamin and other nutritional deficiency; Metabolic encephalopathies ; Genetic disorders of lipid, glycoprotein and mucopolysaccharide; Endocrine system and nervous system
- 1.8.6 Genetics basics and advances and application in neurological diseases – cell cycle, genetic imprinting, X – inactivation, Human genome project, cytogenetics and molecular genetics, Karyotyping, Mutations, Patterns of inheritance, genetic counseling, genetics of common neurological disorders
- 1.9 Microbiology and Pathology
  - 1.9.1 Infections in brain : Meningitis, encephalitis : Various agents responsible, their diagnosis, pathogenesis and complications
  - 1.9.2 Pathology of different disorders affecting CNS and PNS – demyelination, vasculitis, infections, recognition on specimen, tissue preparation, stain, interpretation of biopsies – brain, nerve and muscles including special stain, IHC and EM
- 1.10 Neuropharmacology
  - 1.10.1 Pharmacology of drugs used in various neurological disorders: Epilepsy, Parkinsonism, stroke, Myasthenia, Migraine, dementia, various medications used in critical care
  - 1.10.2 Side effects, interactions, overdose of various medication sedatives
  - 1.10.3 Newer drug delivery system
  - 1.10.4 Pain Management
  - 1.10.5 Neuro-intensive care
- 1.11 Others
  - 1.11.1 Neuro-ophthalmology - afferent visual system, ocular motor system, Neuro-otology, Neuro-urology, Neuroepidemiology, Neurogenetics/DNA diagnosis, Neuroimmunology, Neurovirology, Neuroendocrinology
- 1.12 Neuropsychology/ Neuropsychological evaluation

## 2. Clinical

### 2.1 Clinical approach to common Neurological problems

- 2.1.1 Clinical methods of neurology
- 2.1.2 Cardinal manifestations of neurological diseases
- 2.1.3 Localisation in neurology and syndromic approach: in cases of Delirium, episodic impairment of consciousness, falls and drop attacks, stupor and coma, memory impairment, Apraxias, aphasia, agnosia, dysphagia, vision loss, diplopia, Nystagmus, dizziness and vertigo, tinnitus and hearing loss, brainstem syndromes, ataxic disorders, movement disorders, gait disorders, hemiplegia, paraplegia and spinal cord disorders, pattern of weakness, hypotonic child, delayed milestone and regression of milestone, sensory abnormalities of limbs, trunk and face

## 2.2 Neurological diseases

Clinical features, evaluation and management of:

- 2.2.1 Neurological infections
  - 2.2.1.1 Meningitis
  - 2.2.1.2 Encephalitis and infectious encephalopathies
  - 2.2.1.3 Intracranial space occupying infections and neurological HIV disease
- 2.2.2 Nerve and muscle diseases
  - 2.2.2.1 Lower cranial nerves and dysphagia
  - 2.2.2.2 Polyneuropathy
  - 2.2.2.3 Focal peripheral neuropathy
  - 2.2.2.4 Motor neuron disorders
  - 2.2.2.5 Muscle diseases
- 2.2.3 Structural diseases affecting brain, spinal cord, and nerve roots (Trauma and Tumors)
  - 2.2.3.1 Head injury
  - 2.2.3.2 Spinal injury
  - 2.2.3.3 Intravertebral disks & radiculopathy
  - 2.2.3.4 Cervical spondylosis
  - 2.2.3.5 Lumbar spondylosis
  - 2.2.3.6 Peripheral & cranial nerve lesions
  - 2.2.3.7 Neuropathic pain
  - 2.2.3.8 Post traumatic pain syndrome
  - 2.2.3.9 Radiation injury
  - 2.2.3.10 Electrical & lightning injury
  - 2.2.3.11 Decompression sickness
  - 2.2.3.12 Raised intracranial pressure, cerebral edema and hydrocephalus
  - 2.2.3.13 Tumors of skull & cranial nerves
  - 2.2.3.14 Tumors of meninges
  - 2.2.3.15 Glioma
  - 2.2.3.16 Lymphoma
  - 2.2.3.17 Pineal region tumours
  - 2.2.3.18 Tumors of pituitary gland
  - 2.2.3.19 Congenital & childhood central nervous system tumors
  - 2.2.3.20 Vascular tumors & malformations
  - 2.2.3.21 Metastatic tumors
  - 2.2.3.22 Spinal tumors
  - 2.2.3.23 Cauda equine lesions, radiculopathy and sphincter disorders
  - 2.2.3.24 Paraneoplastic manifestations affection brain
- 2.2.4 Vascular, demyelinating, inflammatory and degenerating disorders of central nervous system
  - 2.2.4.1 Cerebrovascular disease
  - 2.2.4.2 Cerebral & cerebellar haemorrhage

- 2.2.4.3 Subarachnoid haemorrhage
- 2.2.4.4 Cerebral veins & sinuses thrombosis
- 2.2.4.5 Vascular disease of the spinal cord
- 2.2.4.6 Disorders of cerebrospinal & brain fluid
- 2.2.4.7 Hydrocephalus
- 2.2.4.8 Brain oedema & disorders of intracranial pressure
- 2.2.4.9 Superficial siderosis of the central nervous system
- 2.2.4.10 Vasculitis and collagen vascular disease
- 2.2.4.11 Multiple sclerosis and other demyelinating disease
- 2.2.4.12 Paraneoplastic disorders and neuro-immunology
- 2.2.4.13 Tremor, ataxia and cerebellar disorders
- 2.2.4.14 Movement disorders : (Huntington disease, Sydenham & other forms of chorea, Myoclonus, Gilles de la Tourette syndrome, Dystonia, Essential tremor, Parkinsonism, Progressive supranuclear palsy, Tardive dyskinesia & other neuroleptic induced syndrome )
- 2.2.5 Vascular diseases of nervous system – Stroke – ischemic, haemorrhagic, aneurysm and SAH, AV malformation, stroke in young and children. Spinal cord vascular diseases, CNS vasculitis
- 2.2.6 Birth injuries and developmental abnormalities
  - 2.2.6.1 Floppy infant syndrome
  - 2.2.6.2 Static disorders of brain development
  - 2.2.6.3 Structural malformation
  - 2.2.6.4 Genetic diseases of the central nervous system
  - 2.2.6.5 Chromosomal diseases
  - 2.2.6.6 Disorders of amino acid metabolism
  - 2.2.6.7 Disorders of purine metabolism
  - 2.2.6.8 Lysosomal & other storage diseases
  - 2.2.6.9 Peroxisomal diseases
  - 2.2.6.10 Disorders of metal metabolism
- 2.2.7 Disorders of mitochondrial DNA
  - 2.2.7.1 Mitochondrial encephalomyopathies
  - 2.2.7.2 Leber hereditary optic neuropathy
- 2.2.8 Neurocutaneous disorders
  - 2.2.8.1 Neurofibromatosis
  - 2.2.8.2 Encephalotrigeminal angiomatosis
  - 2.2.8.3 Incontinentia pigmenti
  - 2.2.8.4 Tuberous sclerosis
- 2.2.9 Peripheral neuropathies
  - 2.2.9.1 Hereditary neuropathy
  - 2.2.9.2 Acquired neuropathy
- 2.2.10 Infections of nervous system : Bacterial infections, Viral infections, Acquired immunodeficiency syndrome, Fungal & yeast infections,

- Neurosarcoidosis, Spirochete infections, Parasitic infections, Prion diseases, Whipple disease, Reye syndrome
- 2.2.11 Spinal cord diseases
- 2.2.11.1 Hereditary & acquired spastic paraplegia
- 2.2.11.2 Hereditary & acquired motor neuron diseases
- 2.2.11.3 Syringomyelia
- 2.2.12 Disorders of the neuromuscular junction
- 2.2.12.1 Myasthenia gravis
- 2.2.12.2 Lambert-Eaton syndrome
- 2.2.12.3 Botulism & antibiotic- induced neuromuscular disorder
- 2.2.12.4 Acute quadriplegic myopathy
- 2.2.13 Myopathies
- 2.2.13.1 Progressive muscular dystrophies
- 2.2.13.2 Congenital disorders of muscle
- 2.2.13.3 Muscle cramps & stiffness
- 2.2.13.4 Dermatomyositis
- 2.2.13.5 Polymyositis, inclusion body myositis & related myopathies
- 2.2.13.6 Myositis ossificans
- 2.2.14 Demyelinating diseases
- 2.2.14.1 Multiple sclerosis
- 2.2.14.2 Marchiafava- Bignami disease
- 2.2.14.3 Central pontine myelinosis
- 2.2.15 Autonomic disorders
- 2.2.15.1 Neurogenic orthostatic hypotension & autonomic failure
- 2.2.15.2 Acute autonomic neuropathy
- 2.2.15.3 Familial dysautonomia
- 2.2.16 Paroxysmal disorders
- 2.2.16.1 Migraine and other headaches
- 2.2.16.2 Epilepsy and disorders of consciousness
- 2.2.16.3 Transient global amnesia
- 2.2.16.4 Meiners syndrome
- 2.2.16.5 Sleep disorders
- 2.3 Brain Death
- 2.4 Neurology and Medicine
- 2.4.1 Neurological complications of systemic diseases
- 2.4.2 Neurology and the blood: haematological abnormalities in ischemic stroke
- 2.4.3 Neurology and the heart
- 2.4.4 Neurology and the bone marrow
- 2.4.5 Diabetes mellitus and the nervous system
- 2.4.6 Dystonia & chorea in acquired systemic disorders
- 2.4.7 Neurology of pituitary gland
- 2.4.8 Neurology and the gastrointestinal system
- 2.4.9 Neurology and the kidney

- 2.4.10 Neurology and the liver
- 2.4.11 Respiratory aspects of neurological disease
- 2.4.12 Neurology and the skin
- 2.4.13 Neurology of the vasculitides & connective tissue diseases
- 2.4.14 Neurology of pregnancy
- 2.5 Developmental Neurology
  - 2.5.1 Clinical approach to developmental neurology
  - 2.5.2 Development, degeneration and regeneration of the CNS
  - 2.5.3 Neuro-developmental disorders
  - 2.5.4 Neurometabolic disorders
  - 2.5.5 Neurocutaneous syndrome
  - 2.5.6 Inborn errors of metabolism of nervous system, mitochondrial disorders and channelopathies
- 2.6 Psychiatric disorders
  - 2.6.1 Anxiety neuroses, hysteria and personality disorders
  - 2.6.2 Depression and bipolar diseases
  - 2.6.3 Schizophrenias and paranoid states
- 2.7 Environmental neurology
  - 2.7.1 Alcoholism
  - 2.7.2 Drug dependence
  - 2.7.3 Iatrogenic disease
  - 2.7.4 Occupational and environmental neurotoxicology
- 2.8 Rehabilitation : Neurologic rehabilitation
- 2.9 Ethical and legal guidelines : End- of- life issues in neurology

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