

Guidelines
for
Competency Based Training Programme
in
DNB- Neurology



NATIONAL BOARD OF EXAMINATIONS

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AIM

The aim of the course is to develop human resources and personnel in the field of Neurology who shall

- Provide the health care to the patients needing Neurology care
- Teach and train future undergraduate and postgraduate medical students and junior doctors in Neurology in Medical Colleges, Institutions and other Hospitals.
- Carry out and guide research to improve the practice of the art and science of Neurology
- Have management capabilities to manage personnel and budgets etc. to make health care more cost-effective.
- Organise health teams to provide care during natural or man-made calamities

PROGRAMME GOAL

At the end of the Postgraduate training in the discipline concerned the student shall be able to

- Recognise the importance of Neurology in the context of the health needs of the community and national priorities in the health sector.
- Practice Neurology ethically as per the Hippocratic oath and in step with the principles of primary health care, International GCP guidelines (Good Clinical Practice) .
- Demonstrate sufficient understanding of the basic sciences relevant to Neurology.
- Identify social, economic, environmental, biological and emotional determinants of health in a given case, and take them into account while planning therapeutic, rehabilitative, preventive, and promotive measures/strategies.
- Diagnose and manage majority of conditions in the specialty of Neurology on the basis of clinical assessment, and appropriately selected and conducted investigations.
- Plan and advice measures for the prevention and rehabilitation of patients suffering from disease and disability related to the specialty of Neurology.

- Demonstrate skills in documentation of individual case details as well as morbidity and mortality data relevant to the assigned situation.
- Demonstrate empathy and humane approach towards patients and their families and exhibit interpersonal behaviour in accordance with the societal norms and expectation.
- Play the assigned role in the implementation of National Health Programmes, effectively and responsibly.
- Organise and supervise the Neurological Health Care services demonstrating adequate managerial skills in the clinic/hospital in the field situation.
- Develop skills as a self-directed learner, recognise continuing educational needs: select and use appropriate learning resources.
- Demonstrate competence in basic concepts of research methodology and epidemiology and be able to critically analyse relevant published research literature.
- Develop skills in using educational methods and techniques as applicable to the teaching of medical/nursing students, general physicians and paramedical health workers.
- Function as an effective leader of a health team engaged in health care, research or training.

PROGRAMME OBJECTIVES

The major objectives of Post-Graduate Curriculum are

1. Theoretical Knowledge
2. Practical and Clinical skills
3. Attitudes including Communication skills
4. Knowledge about research methodology

At the end of the DNB Neurology course, students shall be able to

- Practice the art and science of Neurology in his/her field of practice and seek and provide consultation as required. He will have knowledge, skill and attitude to provide comprehensive neurology care.
- Conduct researches and communicate the findings, results and conclusion to his fraternity.
- Acquire necessary skills of teaching and training his junior colleagues and medical students.
- Keep abreast with the latest developments by self-learning and /or participating in Continuing Medical Education programmes.
- Organize and manage administrative responsibilities for routine day to day work as well as new situations including natural and/or man-made accidents/calamities etc. and be able to manage situations calling for emergency interventions in the sphere of neurology care and also routine problems in their areas.
- Exhibit awareness of the importance of audit and the need for considering cost effectively in patient management. Deliver preventive and rehabilitative care

KNOWLEDGE:

At the end of the course, upon successful completion of training and passing the examination the student is expected to

- Acquire comprehensive knowledge of the basics of Neurology including all allied specialities related to Neurology like Neuroanatomy, Neurophysiology, Neurochemistry, Neuropharmacology, Neuroimaging, Neuropathology, Neuroinfections, Neuroimmunology, Preventive Neurology, Neuroepidemiology, Paediatric Neurology and Neurosurgery.
- Possess a complete knowledge of all the commonly used Neurophysiological diagnostic Tests like Electroencephalography, Electromyography, evoked Potentials.
- Possess knowledge of the recent advances in the subject of Neurology and all its allied specialities and working knowledge of the sophisticated and routine equipments, consumables used in Neurology especially with respect to Neurochemistry, Neurogenetic and molecular diagnostic techniques.

- Possess knowledge of principles of research work in the field of Neurology in both the Clinical and experimental field with the ability to analyse data.
- Acquire knowledge in the performance and interpretation of special investigations such as Polysomnography, Video EEG, autonomic function tests, Transcranial Doppler tests.
- Acquire knowledge in interpretation of common neuroimaging investigations such as CT scanning, MRI scanning, MR and Digital subtraction angiography, MR spectroscopy and Single Photon Emission Computerised Tomography).

ATTITUDE AND VALUES

- Demonstrate empathy and humane approach towards patients and their families and exhibit interpersonal skills and behavior in accordance with the societal norms and expectation.

SKILLS

- Diagnose and manage majority of conditions in the specialty of Neurology on the basis of clinical assessment, and appropriate investigations.
- Possess complete Clinical Diagnostic Skills for the recognition of common Nervous system diseases.
- Acquire skills in the performance and interpretation of special investigations such as Polysomnography, Video EEG monitoring, EEG-Telemetry, autonomic function tests, Transcranial Doppler tests.
- Acquire skills in invasive procedures such as lumbar puncture, intrathecal drug administration, CSF manometry; assisting in digital subtraction angiography and intraarterial thrombolysis; and Nerve and muscle biopsy and their interpretation of relevant histopathology.
- Acquire exposure in sophisticated neuromodulation procedures such as planning of deep brain stimulation, vagal nerve stimulation.
- Able to apply sound clinical judgement and rational cost effective investigations for the diagnosis and management of Neurology Cases in the OPD, Wards, Emergency Room and Intensive Care unit.

- Be able to teach undergraduate students MBBS and Post Graduate Students MD Med or Pediatrics or Psychiatry as well as investigative Neurology.
- Be able to perform Clinical and Investigative studies and to present in Seminars, meetings and conferences etc.
- Have the ability to organise specific teaching and training programmes for para medical staff, associated professionals and patient education programmes.
- Should be able to develop good communication skills and give consultations to all other departments of the hospital.
- Demonstrate skills in documentation of individual case details as well as morbidity and mortality data relevant to the assigned situation.
- Demonstrate empathy and humane approach towards patients and their families and exhibit interpersonal behaviour in accordance with the societal norms and expectation.
- Develop skills as a self-directed learner, recognise continuing educational needs: select and use appropriate learning resources.
- Develop skills in using educational methods and techniques as applicable to the teaching of medical/nursing students, general physicians and paramedical health workers.

ELIGIBILITY CRITERIA FOR ADMISSIONS TO THE PROGRAMME

(A) DNB Neurology Course:

1. Any medical graduate with ***MD/DNB in General Medicine or Paediatrics*** qualification , who has qualified the ***Entrance Examination*** conducted by NBE and fulfill the eligibility criteria for admission to DNB ***Super Specialty*** courses at various NBE accredited Medical Colleges/ institutions/Hospitals in India is eligible to participate in the Centralized counseling for allocation of DNB ***Neurology*** seats purely on merit cum choice basis.
2. Admission to 3 years DNB ***Neurology*** course is only through ***Entrance Examination*** conducted by NBE and Centralized Merit Based Counseling conducted by National Board of Examination as per prescribed guidelines.

Duration of Course: 3 Years

TEACHING AND TRAINING ACTIVITIES

The fundamental components of the teaching programme should include:

1. Case presentations & discussion- once a week
2. Seminar – Once a week
3. Journal club- Once a week
4. Grand round presentation (by rotation departments and subspecialties)- once a week
5. Faculty lecture teaching- once a month
6. Clinical Audit-Once a Month
7. A poster and have one oral presentation at least once during their training period in a recognized conference.

The rounds should include bedside sessions, file rounds & documentation of case history and examination, progress notes, round discussions, investigations and management plan) interesting and difficult case unit discussions.

The training program would focus on knowledge, skills and attitudes (behavior), all essential components of education. It is being divided into theoretical, clinical and practical in all aspects of the delivery of the rehabilitative care, including methodology of research and teaching.

Theoretical: The theoretical knowledge would be imparted to the candidates through discussions, journal clubs, symposia and seminars. The students are exposed to recent advances through discussions in journal clubs. These are considered necessary in view of an inadequate exposure to the subject in the undergraduate curriculum.

Symposia: Trainees would be required to present a minimum of 20 topics based on the curriculum in a period of three years to the combined class of teachers and students. A free discussion would be encouraged in these symposia. The topics of the symposia would be given to the trainees with the dates for presentation.

Clinical: The trainee would be attached to a faculty member to be able to pick up methods of history taking, examination, prescription writing and management in rehabilitation practice.

Bedside: The trainee would work up cases, learn management of cases by discussion with faculty of the department.

Journal Clubs: This would be a weekly academic exercise. A list of suggested Journals is given towards the end of this document. The candidate would summarize and discuss the scientific article critically. A faculty member will suggest the article and moderate the discussion, with participation by other faculty members and resident doctors. The contributions made by the article in furtherance of the scientific knowledge and limitations, if any, will be highlighted.

Research: The student would carry out the research project and write a thesis/ dissertation in accordance with NBE guidelines. He/ she would also be given exposure to partake in the research projects going on in the departments to learn their planning, methodology and execution so as to learn various aspects of research.

SYLLABUS

- The Clinical Method of Neurology
- Cardinal Manifestations of Neurologic Disease
- Growth and Development of the Nervous System
- the Neurology of Aging

BASIC SCIENCES RELATED TO NEUROLOGY

NEUROANATOMY

The Neuroanatomy with special emphasis on development of Neuraxis (brain, spinal cord and neurons and glia), autonomic nervous system and their maturation process in the post natal, childhood and adolescent states; the location and significance of stem cells, CSF pathways, Blood supply and sinovenous drainage of brain and spinal cord, the meninges, skull and vertebral column, the cranial nerves, spinal roots, plexuses, and their relation to neighbouring structures; anatomy of peripheral nerves, neuromuscular junction and muscles; histology of cerebrum, cerebellum, pituitary gland, brain stem and spinal cord, nerves and neuromuscular junction and muscle. Functional anatomy of lobes of cerebrum and white matter tracts of brain and spinal cord, craniovertebral junction, conus and epiconus and cauda equina, brachial and lumbosacral plexuses, cavernous and other venous sinuses; New developments in understanding of ultrastructural anatomy of neurons, axonal transport, neural networks and synapses and nerve cell function at molecular level.

NEUROPHYSIOLOGY

Neurophysiology will cover all the physiological changes in the nervous system during its normal function with special reference to nerve impulse transmission along myelinated fibres, neuromuscular junction and synaptic transmission, muscle contraction; visual, auditory and somatosensory and cognitive evoked potentials; regulation of secretions by glands, neural control of viscera such as

heart, respiration, GI tract, bladder and sexual function; sleep-wake cycles; maintenance of consciousness, special senses, control of pituitary functions, control of autonomic functions, cerebellar functions, extrapyramidal functions, reflexes, upper and lower motor neuron concepts and sensory system.

MOLECULAR BIOLOGY

Brain is the one structure where maximum genes are expressed in the human body. Principles of molecular biology including Gene Structure, Expression and regulation; Recombinant DNA Technology; PCR Techniques, Molecular basis for neuronal and glial function, Molecular and cellular biology of the membranes and ion-channels, mitochondrial genome, role of RNA in normal neuronal growth and functional expression, receptors of neurotransmitters, molecular and cellular biology of muscles and neuromuscular junction, etc, The Human Genome and its future implications for Neurology including developmental and neurogenetic disorders, bioethical implications and genetic counselling, Nerve growth and other trophic factors and neuroprotectors, Neural Tissue modification by genetic approaches including Gene Transfer, stem cell therapy etc, Molecular Development of neural tissue in peripheral nerve repair are exciting areas where students need to have basic exposure.

NEUROCHEMISTRY

All aspects of normal and abnormal patterns of neurochemistry including neurotransmitters associated with different anatomical and functional areas of brain and spinal cord, especially with respect to dopaminergic, serotonergic, adrenergic and cholinergic systems, opioids, excitatory and inhibitory aminoacids; their role in pathogenesis of parkinsonism, depression, migraine, dementia, & epilepsy; neuromuscular junction and muscle contractions; carbohydrate, aminoacid and lipid metabolism and the neural expression of disorders of their metabolism, electrolytes and their effect on encephalopathies and muscle membrane function, storage disorders, porphyrias

NEUROPHARMACOLOGY

Application of neuropharmacology is the mainstay of all medical therapy of epilepsy, Parkinsonism, movement disorders, neuropsychiatric syndromes, spasticity, pain syndromes, and disorders of sleep and dysautonomic syndromes. Their drug interactions with commonly used other drugs, usage during disorders of renal, hepatic function and in the demented, their adverse reactions etc.

NEUROPATHOLOGY

All pathological changes in various neurological diseases with special reference vascular, immune mediated, de/dysmyelinating, metabolic and nutritional, genetic and developmental, infectious and iatrogenic and neoplastic aetiologies to clinical correlation included. Special emphasis on pathological changes in nerve and muscle in neuropathies and myopathies. Ultrastructural pathologies such as apoptosis, ubiquitinopathies, mitochondrioses, channelopathies, peroxisomal disorders, inclusion bodies, prion diseases, disorders mediated by antibodies against various cell and nuclear components, paraneoplastic disorders etc.

NEUROMICROBIOLOGY

The various microbiological aspects of infectious neurologic diseases including encephalitis, meningitis, brain abscess, granulomas, myelitis, cold abscess, cerebral malaria, parasitic cysts of nervous system, rhinocerebral mycoses, leprous neuritis, neuroleptospirosis, Primary and secondary Neuro HIV infections, congenital TORCH infections of brain, slow virus infections such as JCD and SSPE, neurological complications of viral infections such as Polio, EBV, Chickenpox, Rabies, Herpez, Japanese encephalitis and other epidemic viral infections.

NEUROTOXICOLOGY

Organophosphorus poisoning, hydrocarbon poisoning, lead, arsenic, botulinum toxin and tetanus toxicity, snake, scorpion, spider, wasp and bee stings are important tropical neurotoxic syndromes whose prompt diagnosis and effective therapy are crucial in life saving

NEUROGENETICS AND PROTEOMICS:

Autosomal dominant and recessive and Xlinked inheritance patterns, disorders of chromosomal anomalies, Gene mutations, trinucleotide repeats, dysregulation of gene expressions, enzyme deficiency syndromes, storage disorders, disorders of polygenic inheritance, and proteomics in health and disease

NEUROEPIDEMIOLOGY:

Basic methodologies in community and hospital based neuroepidemiological studies such as systematic data collection, analysis, derivation of logical conclusions, concepts of case-control and cohort studies, correlations, regressions and survival analysis; basic principles of clinical trials. 9 snake envenomation

CLINICAL NEUROLOGY INCLUDING PEDIATRIC NEUROLOGY and NEUROPSYCHIATRY.

GENERAL EVALUATION OF THE PATIENT

The science and art of history taking, Physical Examination including elements of accurate history taking, symptoms associated with neurological disease, The physical examination of adults, children, infants and neonates, syndromes associated with congenital and acquired neurological disease, cutaneous

markers, examination of unconscious patients, examination of higher mental functions, cranial nerves, the ocular fundus, examination of tone, power of muscles, proper elicitation of superficial and deep reflexes including the alternate techniques and neonatal and released reflexes, neurodevelopmental assessment of children, sensory system, peripheral nerves, signs of Meningeal irritation, skull and spine examination including measurement of head circumference, shortness of neck and carotid pulsations .and vertebral bruits.

1. COMA

Pathophysiology and diagnosis of COMA, Diagnosis and management of coma, delirium and acute confusional states, reversible and irreversible causes, persistent vegetative states and brain death, neurophysiological evaluation and confirmation of these states and mechanical ventilation and other supportive measures of comatose patient and prevention of complications of prolonged coma. The significance of timely brain death in organ donation and ICU resource utilization

2. SEIZURES AND EPILEPSY and SYNCOPES

Diagnosis of seizures, epilepsy and epileptic syndromes, Recognition, clinical assesment and management of seizures especially their electrodiagnosis, videomonitoring with emphasize og phenomenology and their correlation with EEG and structural and functional brain imaging such as CT and MRI and fMRI and SPECT scan, Special situations such as epilepsy in pregnant and nursing mothers, driving, risky occupations, its social stigmas dfferentiation from pseudoseizures, use of conventional and newer antiepileptic drugs, their drug interactions and adverse effects etc., modern lines of management of intractable epilepsies, such as ketogenic diet, vagal nerve stimulation, epilepsy surgery and about presurgical evaluation of patients. Management of status epilepticus and refractory status epilepticus; Differentiation of seizures from syncopes, drop attacks, cataplexy, startles etc.

3. HEADACHES AND OTHER CRANIAL NEURALGIAS

Acquisition of skills in analysis of headaches of various causes such as those from raised intracranial pressures, migraines, cranial neuralgias, vascular malformations, Meningeal irritation, psychogenic etc. and their proper pharmacologic management.

CEREBROVASCULAR DISEASES

Vascular anatomy of brain and spinal cord, various causes and types of cerebrovascular syndromes, ischemic and hemorrhagic types, arterial and venous types, anterior and posterior circulation strokes, OCSF and TOAST classifications, investigations of strokes including neuroimaging using dopplers, CT and MR imaging and angiography, acute stroke therapy including thrombolytic therapy, interventional therapy of cerebrovascular diseases, principles of management of subarachnoid hemorrhage etc. Special situations like strokes in the young, Strategies for primary and secondary prevention of stroke

DEMENTIAS

Concept of minimal cognitive impairment, Reversible and irreversible dementias, causes such as Alzheimer's and other neurodegenerative diseases and vascular and nutritional and infectious dementias, their impact on individual, family and in society, Genetic and familial syndromes. Pharmacotherapy of dementias, Potential roles of cognitive rehabilitation and special care of the disabled

PARKINSONISM AND MOVEMENT DISORDERS

Disorders of extrapyramidal system such as parkinsonism, chorea, dystonias, athetosis, tics, their diagnosis and management, pharmacotherapy of parkinsonism and its complications, management of complications of parkinsonism therapy, including principles of deep brain stimulation and lesional

surgeries. Use of EMG guided botulinum toxin therapy, management of spasticity using intrathecal baclofen and TENS.

ATAXIC SYNDROMES:

Para infectious demyelinations, cerebellar tumors, hereditary ataxias, vestibular disorders; Diagnosis and management of brainstem disorders, axial and extra-axial differentiation.

CRANIAL NEUROPATHIES:

Disorders of smell, vision, visual pathways, pupillary pathways and reflexes, internuclear and supranuclear ophthalmoplegia; other oculomotor disorders, trigeminal nerve testing, Bell's palsy, differentiation from UMN facial lesions, brainstem reflexes, Investigations of vertigo and dizziness, differentiation between central and peripheral vertigo, Differential diagnosis of nystagmus, investigations of deafness, bulbar and pseudobulbar syndromes,

CNS INFECTIONS:

Diagnosis and management of viral encephalitis, meningitis :bacterial, tuberculous, fungal, parasitic infections such as cysticercosis, cerebral malaria, SSPE, Neuro HIV primary and secondary infections with exposure to gram stain and cultures, bac tec, QBC, ELISA and PCR technologies

NEUROIMMUNOLOGIC DISEASES

Diagnosis and management of CNS conditions such as Multiple sclerosis, PNS conditions such as GBS, CIDP, Myasthenia gravis, polymyositis

NEUROGENETIC DISORDERS

Various chromosomal diseases, single gene mutations such as enzyme deficiencies, autosomal dominant and recessive conditions and X-linked disorders,

trinucleotide repeats, disorders of DNA repair. Genetics of Huntington's disease, familial dementias, other storage disorders, hereditary ataxias, hereditary spastic paraplegias, HMSN, muscular dystrophies, mitochondrial inheritance disorders

DEVELOPMENTAL DISORDERS OF NERVOUS SYSTEM

Neuronal migration disorders, craniovertebral junction diseases, spinal dysraphisms, phacomatoses and other neurocutaneous syndromes- their recognition and management.

MYELOPATHIES

Clinical diagnosis of distinction between compressive and non-compressive myelopathies, spinal syndromes such as anterior cord, subacute combined degeneration, central cord syndrome, Brown-sequard syndrome, tabetic syndrome, Eellsberg phenomenon. Diagnosis of spinal cord and root compression syndromes, CV junction lesions, syringomyelia, conuscauda lesions, spinal AVMs, tropical and hereditary spastic paraplegias, Fluorosis.

PERIPHERAL NEUROPATHIES

Immune mediated, hereditary, toxic, nutritional and infectious type peripheral neuropathies; their clinical and electrophysiological diagnosis

MYOPATHIES AND NEUROMUSCULAR JUNCTION DISORDERS

Clinical evaluation of patients with known or suspected muscle diseases aided by EMG, muscle pathology, histochemistry, immunopathology and genetic studies. Dystrophies, polymyositis, channelopathies, congenital and mitochondrial myopathies.. Neuromuscular junction disorders such as myasthenia, botulism, Eaton-lambert syndrome and snake eand orgganphosphorus poisoning, their eletrophysiological diagnosis and management. Myotonia, stiff person syndrome.

PAEDITRIC NEUROLOGY:

Normal development of motor and mental milestones in a child, Cerebral palsy, Attention deficit disorder, Autism, developmental dyslexias, Intrauterine TORCH infections, Storage disorders, Inborn errors of metabolism affecting nervous system, developmental malformations, Child hood seizures and epilepsies, neurodegenerative diseases.

COGNITIVE NEUROLOGY AND NEUROPSYCHIATRY:

Detailed techniques of higher mental functions evaluation, basics of primary and secondary neuropsychiatric conditions such as anxiety, depression, schizophrenia, acute psychosis, acute confusional reactions (delirium), organic brain syndrome, primary and secondary dementias, differentiation from pseudodementia

Anxiety disorders, Hysteria and personality disorders, depression and Bipolar disease, Schizophrenia Delusional and paranoid state

TROPICAL NEUROLOGY

Conditions which are specifically found in the tropics like neuro cysticercosis, cerebral malaria, tropical spastic paraplegia, Snake/scorpion/ Chandipura encephalitis, Madras Motor Neuron disease etc. will be dealt with in special detail in the curriculum

DIAGNOSTIC AND INTERVENTIONAL NEUROLOGY INCLUDING NEUROLOGICAL INSTRUMENTATION

DIAGNOSTIC NEUROLOGY

Performing and interpreting Digital Electroneurogram, Electromyogram, Evoked potentials, Electroencephalography, Interpretation of skull and spine X rays, computerized tomography of brain and spine, Magnetic resonance images of

brain including correct identification of various sequences, angiograms, MR spectroscopy, basics of functional MRI, Interpretation of digital subtraction imaging , SPECT scans of brain, subdural EEG recording, transphenoidal electrode EEG Techniques for temporal lobe seizures, video EEG interpretation of phenomenology and EEG-phenomenology correlations, EEG tapemetry, Transcranial Doppler diagnosis and monitoring of acute ischemic stroke, subarachnoid haemorrhage, detection of right-to-left shunts etc; Colour duplex scanning in Carotid and vertebral extracranial segment screening

NEUROINSTRUMENTATIONS

To acquire skills in Procedures like a)intrathecal administration of antispasticity drugs, beta interferons in demyelination, opiates in intractable pain etc., b) EMG guided Botox therapy for dystonias, c) subcutaneous administration of antimigraine and antiparkinsonian drugs d) Intrarterial thrombolysis in extended windows of thrombolysis in ischemic strokes, e) Transcranial Ultrasound clot-bust intervention in a registry in acute stroke care unit e) Planing in deep brain stimulation therapy in uncontrolled dyskinesias and on-off phenomena in long standing parkinsonism f) Planning in vagal nerve stimulation in intractable epilepsy

RECENT ADVANCES IN NEUROLOGY: ADVANCES IN NEUROIMAGING TECHNIQUES, BIONICS IN NEURAL PROSTHESIS AND REHABILITATION, NEUROPROTEOMICS AND NEUROGENETICS, STEM CELL AND GENE Y, GENE THERAPY

ADVANCES IN NEUROIMAGING TECHNIQUES:

Integration of CT, MR, SPECT images with each other and with EEG, EVOKED potentials based brain maps in structural and functional localization in neurological phenomena and diseases, Fluorescent ye tagged study of neurons in diseases in animal models in vivo and in tissue cultures in-vitro.

BIONICS IN NEURAL PROSTHESIS AND REHABILITATION:

Advanced techniques in neurorehabilitation such as TENS, principles of man-machine interphase devices in cord, nerve and plexus injuries, cochlear implants, artificial vision.

NEUROPROTEOMICS AND NEUROGENETICS:

Brain functions are regulated by proteomics and genomics linked to various proteins and genes relevant to the brain, body's maximum number of proteins and genes being expressed in brain as neurotransmitters or channel proteins and predisposing brain to a number of disorders of abnormal functioning of these proteins.

STEM CELL AND GENE THERAPY:

Principles of ongoing experiments on stem cell therapy for nervous system disorders such as foetal brain tissue transplants in parkinsonism; intrathecal marrow transplants in MND,MS, Spinal trauma; myoblasts infusion therapy in dystrophies

NEUROEPIDEMIOLOGICAL STUDIES AND CLINICAL TRIALS:

The students of the DNB course will be trained in conducting sound neuroepidemiological studies on regionally and nationally important neurological conditions as well as on diseases of scientific and research interest to the department. They will also be trained in principles of clinical trials with exposure to research

Areas in which knowledge is to be acquired:

- Biostatistics, Research Methodology and Clinical Epidemiology

- Ethics
- Medico legal aspects relevant to the discipline
- Health Policy issues as may be applicable to the discipline

TEACHING SCHEDULE:

FIRST YEAR:

- During the first year, the student will be working fully in the Department of Neurology. In the morning time, he/she will be familiarized with clinical neurology, neurological examination, localization and differential diagnosis, relevant laboratory and radiological investigations and pharmacotherapeutics.
- He/she will attend all the outpatient services and get himself/herself aware of the common neurological problems.
- In addition, he/she will work in the electrophysiology laboratories and get himself/herself fully familiar with EMG, evoked potential and electroencephalography (EEG).
- He/she should be competent to handle the equipments and report independently. In the afternoon, he/she will concentrate on the basic sciences and will undertake the research study within three months after admission in the course.

SECOND YEAR:

The student may be sent to the best centre for training and learning the following subjects. This comes under 'visit to other centres'. The total period is for five months. Following will be the subject and duration of training:-

Neuropathology – 30 days.

Neuro-radiology (including interventional radiology) – 30 days.

Intensive Care in Neurology – 30 days.

Psychiatry – 15 days.

Paediatric Neurology – 30 days.

Neurosurgery – 15 days.

THIRD YEAR:

During the period, the student will work in the Neurology department concentrating on clinical and theoretical neurology, clinical psychiatric relevant investigations and medical as well as para medical management of the patients. Besides, he shall handle and report the EEG and EMG by himself/herself

THESIS PROTOCOL & THESIS

The candidates are required to submit a thesis at the end of three years of training as per the rules and regulations of NBE.

Guidelines for Submission of Thesis Protocol & Thesis by candidates

Research shall form an integral part of the education programme of all candidates registered for DNB degrees of NBE. The Basic aim of requiring the candidates to write a thesis protocol & thesis/dissertation is to familiarize him/her with research methodology. The members of the faculty guiding the thesis/dissertation work for the candidate shall ensure that the subject matter selected for the thesis/dissertation is **feasible, economical** and **original**.

Guidelines for Thesis Protocol

The protocol for a research proposal (including thesis) is a study plan, designed to describe the background, research question, aim and objectives, and detailed methodology of the study. In other words, the protocol is the 'operating manual' to refer to while conducting a particular study.

The candidate should refer to the NBE Guidelines for preparation and submission of Thesis Protocol before the writing phase commences. The minimum writing requirements are that the language should be clear, concise, precise and consistent without excessive adjectives or adverbs and long sentences. There should not be any redundancy in the presentation.

The development or preparation of the Thesis Protocol by the candidate will help her/him in understanding the ongoing activities in the proposed area of research. Further it helps in creating practical exposure to research and hence it bridges the connectivity between clinical practice and biomedical research. Such research exposure will be helpful in improving problem solving capacity, getting updated with ongoing research and implementing these findings in clinical practice.

Research Ethics: Ethical conduct during the conduct and publication of research is an essential requirement for all candidates and guides, with the primary responsibility of ensuring such conduct being on the thesis guide. Issues like Plagiarism, not maintaining the confidentiality of data, or any other distortion of the research process will be viewed seriously. The readers may refer to standard documents for the purpose.

The NBE reserves the right to check the submitted protocol for plagiarism, and will reject those having substantial duplication with published literature.

PROTOCOL REQUIREMENTS

1. All of the following will have to be entered in the online template. The thesis protocol should be restricted to the following word limits.
 - Title : 120 characters (with spacing) page
 - Synopsis [structured] : 250-300
 - Introduction : 300-500
 - Review of literature : 800-1000
 - Aim and Objectives : Up to 200
 - Material and Methods : 1200-1600
 - 10-25 References [ICMJE style]
2. It is mandatory to have ethics committee approval before initiation of the research work. The researcher should submit an appropriate application to the ethics committee in the prescribed format of the ethics committee concerned.

Guidelines for Thesis

1. The proposed study must be approved by the institutional ethics committee and the protocol of thesis should have been approved by NBE.
2. The thesis should be restricted to the size of 80 pages (maximum). This includes the text, figures, references, annexures, and certificates etc. It should be printed on both sides of the paper; and every page has to be numbered. Do not leave any page blank. To achieve this, following points may be kept in view:
 - a. The thesis should be typed in 1.5 space using Times New Roman/Arial/ Garamond size 12 font, 1” margins should be left on all four sides. Major sections viz., Introduction, Review of Literature, Aim & Objectives, Material and Methods, Results, Discussion, References, and Appendices should start from a new page. Study proforma (Case record form), informed consent form, and patient information sheet may be printed in single space.
 - b. Only contemporary and relevant literature may be reviewed. Restrict the introduction to 2 pages, Review of literature to 10-12 pages, and Discussion to 8-10 pages.
 - c. The techniques may not be described in detail unless any modification/innovations of the standard techniques are used and reference(s) may be given.
 - d. Illustrative material may be restricted. It should be printed on paper only. There is no need to paste photographs separately.

3. Since most of the difficulties faced by the residents relate to the work in clinical subject or clinically-oriented laboratory subjects, the following steps are suggested:
 - a. The number of cases should be such that adequate material, judged from the hospital attendance/records, will be available and the candidate will be able to collect case material within the period of data collection, i.e., around 6-12 months so that he/she is in a position to complete the work within the stipulated time.
 - b. The aim and objectives of the study should be well defined.
 - c. As far as possible, only clinical/laboratory data of investigations of patients or such other material easily accessible in the existing facilities should be used for the study.
 - d. Technical assistance, wherever necessary, may be provided by the department concerned. The resident of one specialty taking up some problem related to some other specialty should have some basic knowledge about the subject and he/she should be able to perform the investigations independently, wherever some specialized laboratory investigations are required a co-guide may be co-opted from the concerned investigative department, the quantum of laboratory work to be carried out by the candidate should be decided by the guide & co-guide by mutual consultation.
4. The clinical residents are not ordinarily expected to undertake experimental work or clinical work involving new techniques, not hitherto perfected OR the use of chemicals or radioisotopes not readily available. They should; however, be free to enlarge the scope of their studies or undertake experimental work on their own initiative but all such studies should be feasible within the existing facilities.
5. The DNB residents should be able to freely use the surgical pathology/autopsy data if it is restricted to diagnosis only, if however, detailed historic data are required the resident will have to study the cases himself with the help of the guide/co-guide. The same will apply in case of clinical data.
6. Statistical methods used for analysis should be described specifically for each objective, and name of the statistical program used mentioned.

General Layout of a DNB Thesis:

- **Title-** A good title should be brief, clear, and focus on the central theme of the topic; it should avoid abbreviations. The Title should effectively summarize the proposed research and should contain the PICO elements.

- **Introduction-** It should be focused on the research question and should be directly relevant to the objectives of your study.
- **Review of Literature** - The Review should include a description of the most relevant and recent studies published on the subject.
- **Aim and Objectives** - The 'Aim' refers to what would be broadly achieved by this study or how this study would address a bigger question / issue. The 'Objectives' of the research stem from the research question formulated and should at least include participants, intervention, evaluation, design.
- **Material and Methods-** This section should include the following 10 elements: Study setting (area), Study duration; Study design (descriptive, case-control, cohort, diagnostic accuracy, experimental (randomized/non-randomized)); Study sample (inclusion/exclusion criteria, method of selection), Intervention, if any, Data collection, Outcome measures (primary and secondary), Sample size, Data management and Statistical analysis, and Ethical issues (Ethical clearance, Informed consent, trial registration).
- **Results-** Results should be organized in readily identifiable sections having correct analysis of data and presented in appropriate charts, tables, graphs and diagram etc.
- **Discussion**—It should start by summarizing the results for primary and secondary objectives in text form (without giving data). This should be followed by a comparison of your results on the outcome variables (both primary and secondary) with those of earlier research studies.
- **Summary and Conclusion-** This should be a précis of the findings of the thesis, arranged in four paragraphs: (a) background and objectives; (b) methods; (c) results; and (d) conclusions. The conclusions should strictly pertain to the findings of the thesis and not outside its domain.
- **References-** Relevant References should be cited in the text of the protocol (in superscripts).
- **Appendices** -The tools used for data collection such as questionnaire, interview schedules, observation checklists, informed consent form (ICF), and participant information sheet (PIS) should be attached as appendices. Do not attach the master chart.

Thesis Protocol Submission to NBE

1. DNB candidates are required to submit their thesis protocol within 90 days of their joining DNB training.
2. Enclosures to be submitted along with protocol submission form:
 - a) Form for Thesis Protocol Submission properly filled.
 - b) Thesis Protocol duly signed.
 - c) Approval letter of institutional Ethical committee. (*Mandatory, non receivable of any one is liable for rejection*)

Thesis Submission to NBE

1. As per NBE norms, writing a thesis is essential for all DNB candidates towards partial fulfillment of eligibility for award of DNB degree.
2. DNB candidates are required to submit the thesis before the cut-off date which shall be 30th June of the same year for candidates appearing for their scheduled December final theory examination. Similarly, candidates who are appearing in their scheduled June DNB final examination shall be required to submit their thesis by 31st December of preceding year.
3. Candidates who fail to submit their thesis by the prescribed cutoff date shall NOT be allowed to appear in DNB final examination.
4. Fee to be submitted for assessment (In INR): 3500/-
5. Fee can be deposited ONLY through pay-in-slip/challan at any of the Indian bank branch across India. The challan can be downloaded from NBE website www.natboard.edu.in
6. Thesis should be bound and the front cover page should be printed in the standard format. A bound thesis should be accompanied with:
 - a. A Synopsis of thesis.
 - b. Form for submission of thesis, duly completed
 - c. NBE copy of challan (in original) towards payment of fee as may be applicable.
 - d. Soft copy of thesis in a CD duly labeled.
 - e. Copy of letter of registration with NBE.
7. A declaration of thesis work being bonafide in nature and done by the candidate himself/herself at the institute of DNB training need to be submitted bound with thesis. It must be signed by the candidate himself/herself, the thesis guide and head of the institution, failing which thesis shall not be considered.

The detailed guidelines and forms for submission of Thesis

Protocol & Thesis are available at

www.natboard.edu.in.thesis.php

LOG BOOK

A candidate shall maintain a log book of operations (assisted / performed) during the training period, certified by the concerned post graduate teacher / Head of the department / senior consultant.

This log book shall be made available to the board of examiners for their perusal at the time of the final examination.

The log book should show evidence that the before mentioned subjects were covered (with dates and the name of teacher(s)) The candidate will maintain the record of all academic activities undertaken by him/her in log book .

1. Personal profile of the candidate
2. Educational qualification/Professional data
3. Record of case histories
4. Procedures learnt
5. Record of case Demonstration/Presentations
6. Every candidate, at the time of practical examination, will be required to produce performance record (log book) containing details of the work done by him/her during the entire period of training as per requirements of the log book. It should be duly certified by the supervisor as work done by the candidate and countersigned by the administrative Head of the Institution.
7. In the absence of production of log book, the result will not be declared.

Leave Rules

1. DNB Trainees are entitled to leave during the course of DNB training as per the Leave Rules prescribed by NBE.
2. A DNB candidate can avail a maximum of 20 days of leave in a year excluding regular duty off/ Gazetted holidays as per hospital/institute calendar/policy.
3. MATERNITYLEAVE:
 - a. A female candidate is permitted a maternity leave of 90 days once during the entire duration of DNB course.
 - b. The expected date of delivery (EDD) should fall within the duration of maternity leave.
 - c. Extension of maternity leave is permissible only for genuine medical reasons and after prior approval of NBE. The supporting medical documents have to be certified by the Head of the Institute/hospital where the candidate is undergoing DNB training. NBE reserves its rights to take a final decision in such matters.
 - d. The training of the candidate shall be extended accordingly in case of any extension of maternity leave being granted to the candidate.
 - e. Candidate shall be paid stipend during the period of maternity leave. No stipend shall be paid for the period of extension of leave.
4. Male DNB candidates are entitled for paternity leave of maximum of one week during the entire period of DNB training.
5. No kind of study leave is permissible to DNB candidates. However, candidates may be allowed an academic leave as under across the entire duration of training program to attend the conferences/CMEs/Academic programs/Examination purposes.

DNB COURSE	NO. OF ACADEMIC LEAVE
DNB 3 years Course (Broad & Super Specialty)	14 Days
DNB 2 years Course (Post Diploma)	10 Days
DNB Direct 6 years Course	28 days

6. Under normal circumstances leave of one year should not be carried forward to the next year. However, in exceptional cases such as prolonged illness the leave across the DNB training program may be clubbed together with prior approval of NBE.
7. Any other leave which is beyond the above stated leave is not permissible and shall lead to extension/cancellation of DNB course.
8. Any extension of DNB training for more than 2 months beyond the scheduled completion date of training is permissible only under extraordinary circumstances with prior approval of NBE. Such extension is neither automatic nor shall be granted as a matter of routine. NBE shall consider such requests on merit provided the seat is not carried over and compromise with training of existing trainees in the Department.
9. Unauthorized absence from DNB training for more than 7 days may lead to cancellation of registration and discontinuation of the DNB training and rejoining shall not be permitted.

10. Medical Leave

- a. Leave on medical grounds is permissible only for genuine medical reasons and NBE should be informed by the concerned institute/hospital about the same immediately after the candidate proceeds on leave on medical grounds.
- b. The supporting medical documents have to be certified by the Head of the Institute/hospital where the candidate is undergoing DNB training and have to be sent to NBE.
- c. The medical treatment should be taken from the institute/ hospital where the candidate is undergoing DNB training. Any deviation from this shall be supported with valid grounds and documentation.
- d. In case of medical treatment being sought from some other institute/hospital, the medical documents have to be certified by the Head of the institute/hospital where the candidate is undergoing DNB training.

- e. NBE reserves its rights to verify the authenticity of the documents furnished by the candidate and the institute/hospital regarding Medical illness of the candidate and to take a final decision in such matters.

11.

- a. Total leave period which can be availed by DNB candidates is $120+28 = 148$ days for 6 years course, $60+14=74$ days for 3 years course and $40+10 = 50$ days for 2 years course. This includes all kinds of eligible leave including academic leave. Maternity / Paternity leave can be availed separately by eligible candidates. Any kind of leave including medical leave exceeding the aforementioned limit shall lead to extension of DNB training. It is clarified that prior approval of NBE is necessary for availing any such leave.
- b. The eligibility for DNB Final Examination shall be determined strictly in accordance with the criteria prescribed in the respective information bulletin.

EXAMINATION

FORMATIVE ASSESSMENT

Formative assessment includes various formal and informal assessment procedures by which evaluation of student's learning, comprehension, and academic progress is done by the teachers/ faculty to improve student attainment. Formative assessment test (FAT) is called as "Formative" as it informs the in process teaching and learning modifications. FAT is an integral part of the effective teaching. The goal of the FAT is to collect information which can be used to improve the student learning process.

Formative assessment is essentially positive in intent, directed towards promoting learning; it is therefore part of teaching. Validity and usefulness are paramount in formative assessment and should take precedence over concerns for reliability. The assessment scheme consists of Three Parts which has to be essentially completed by the candidates.

The scheme includes:-

Part I:- Conduction of theory examination

Part-II :- Feedback session on the theory performance

Part-III :- Work place based clinical assessment

Scheme of Formative assessment

PART – I	CONDUCT OF THEORY EXAMINATION	Candidate has to appear for Theory Exam and it will be held for One day.
PART – II	FEEDBACK SESSION ON THE THEORY PERFORMANCE	Candidate has to appear for his/her Theory Exam Assessment Workshop.
PART – III	WORK PLACE BASED CLINICAL ASSESSMENT	After Theory Examination, Candidate has to appear for Clinical Assessment.

The performance of the resident during the training period should be monitored throughout the course and duly recorded in the log books as evidence of the ability and daily work of the student

1. Personal attributes:

- **Behavior and Emotional Stability:** Dependable, disciplined, dedicated, stable in emergency situations, shows positive approach.
- **Motivation and Initiative:** Takes on responsibility, innovative, enterprising, does not shirk duties or leave any work pending.

- **Honesty and Integrity:** Truthful, admits mistakes, does not cook up information, has ethical conduct, exhibits good moral values, loyal to the institution.
- **Interpersonal Skills and Leadership Quality:** Has compassionate attitude towards patients and attendants, gets on well with colleagues and paramedical staff, is respectful to seniors, has good communication skills.

2. Clinical Work:

- **Availability:** Punctual, available continuously on duty, responds promptly on calls and takes proper permission for leave.
- **Diligence:** Dedicated, hardworking, does not shirk duties, leaves no work pending, does not sit idle, competent in clinical case work up and management.
- **Academic ability:** Intelligent, shows sound knowledge and skills, participates adequately in academic activities, and performs well in oral presentation and departmental tests.
- **Clinical Performance:** Proficient in clinical presentations and case discussion during rounds and OPD work up. Preparing Documents of the case history/examination and progress notes in the file (daily notes, round discussion, investigations and management) Skill of performing bed side procedures and handling emergencies.

3. Academic Activity: Performance during presentation at Journal club/ Seminar/ Case discussion/Stat meeting and other academic sessions. Proficiency in skills as mentioned in job responsibilities.

FINAL EXAMINATION

The summative assessment of competence will be done in the form of DNB Final Examination leading to the award of the degree of Diplomate of National Board in Neurology. The DNB final is a two-stage examination comprising the theory and practical part. An eligible candidate who has qualified the theory exam is permitted to appear in the practical examination.

Theory Examination

1. The theory examination comprises of **Three/ Four** papers, maximum marks 100 each.
2. There are 10 short notes of 10 marks each, in each of the papers. The number of short notes and their respective marks weightage may vary in some subjects/some papers.
3. Maximum time permitted is 3 hours.
4. Candidate must score at least 50% in the aggregate of **Three/ Four** papers to qualify the theory examination.

5. Candidates who have qualified the theory examination are permitted to take up the practical examination.
6. The paper wise distribution of the Theory Examination shall be as follows:

PAPER 1: Basic sciences applied to Neurology, Symptoms of Neurologic diseases, Infections of Nervous system, vascular diseases Diseases of cerebrospinal fluid, spinal cord diseases, Research Methodology

PAPER 2: Nutritional disorders affecting nervous system, Degenerative disorders affecting nervous system, Trauma and birth injuries, Toxic injuries of CNS, Developmental anomalies and genetic diseases of CNS Peripheral neuropathies & Cognitive disorders.

PAPER 3: Movement disorders, Immunological disorders of CNS Myopathies, Demyelinating and storage disorders, Neurological involvement with Systemic diseases, Neuro rehabilitation & Recent advances and Investigations

a) Practical Examination:

1. Maximum Marks: 300.
2. Comprises of Clinical Examination and Viva.
3. Candidate must obtain a minimum of 50% marks in the Clinical Examination (including Viva) to qualify for the Practical Examination.
4. There are a maximum of three attempts that can be availed by a candidate for Practical Examination.
5. First attempt is the practical examination following immediately after the declaration of theory results.
6. Second and Third attempt in practical examination shall be permitted out of the next three sessions of practical examinations placed alongwith the next three successive theory examination sessions; after payment of full examination fees as may be prescribed by NBE.
7. Absentation from Practical Examination is counted as an attempt.
8. Appearance in first practical examination is compulsory;
9. Requests for Change in center of examination are not entertained, as the same is not permissible.
10. Candidates are required not to canvass with NBE for above.

Declaration of DNB Final Results

1. DNB final is a qualifying examination.
2. Results of DNB final examinations (theory & practical) are declared as PASS/FAIL.
3. DNB degree is awarded to a DNB trainee in the convocation of NBE.

RECOMMENDED TEXT BOOKS AND JOURNALS

BOOKS

- DeJong's The Neurological Examination, 7th Edition.
Stephanie Lessig, MD edited by William Campbell, 671 pp., illus.,
Philadelphia, Lippincott Williams & Wilkins,
- Localization in Clinical Neurology By Brazis, Paul W, Masdeu, Joseph C. ,
Biller, Jose ; 7th edition 2006.Lippincott and Williams
- Principles of Neuroscience: Kandel and Schwartz 5th edition
- Applied neuroanatomy: Carpenter, 9th Edition
- Aminoff,s electrodiagnosis in Clinical neurology: Aminoff M, 6th edition
- Evoked potentials. Chiappa.
- Molecular Neuropharmacology: Seigal. 3rd edition
- The Mental Status Exam. in Neurology. Strub and Black 4th edition
- Examination of a comatose patient: Plum and Posner 3rd edition
- Handbook of Neurology; Vinken and Bruyn.
- Tropical Neurology. JS Chopra 2nd edition
- Tropical Neurology: NH Wadia
- Neurology in Clinical Practice. 2 volumes; 7th edition, 2016 by Bradley,
Gerald M. Fenichel, Robert B. Daroff, Joseph Jankovic
- Diseases of the Nervous System: Clinical Neuroscience and Therapeutic
Principles (diseases of the nervous system (Asbury). 2002
- Adams & Victor's Principles of Neurology, 10th Edition Allan H. Ropper,
Martin A. Samuels
- Aminoff's Neurology and General Medicine, 5th Edition
- Epilepsy: A Comprehensive Textbook 3 Volumes; Editors 2nd edition.
Jerome Engel Jr., MD, PhD, Timothy A. Pedley MD
- Epilepsy and Epileptic syndrome. Hans Luders.
- Electroencephalography. Niedermeyer. 6th Ed. 2011.
- Parkinson's disease and movement disorders. By Joseph Jankovic,
Eduardo Tolosa. 5th edition
- Stanley Fahn, C. David Marsden, Donald Brian Calne Editors Stanley
Fahn, C. David Marsden, Donald Brian Calne; Publisher Raven Press,
1988
- Clinical Pediatric Neurology, 7th Edition - A Signs and Symptoms
Approach: Expert Consult - By Gerald Fenichel
- Pediatric Neurology. Swaiman & Wright
- Caplan's Stroke: A Clinical Approach; 5th edition by Louis Caplan

- Stroke: A practical management: by Charles Warlow, Jan Van Gijn, Joanna M. Wardlaw, Martin S. Dennis. 2008, 3rd edition
- Sleep Disorders Medicine: Basic Science, Technical Considerations, and Clinical Aspects Edited by Sudhansu Chokroverty. 504 pp. Boston, Butterworth-Heinemann, 1994. Edition 3, 2009.
- Continuum in Neurology. (American Academy of Neurology)
- Adams & Victor's Principles of Neurology - Allan H. Ropper, Martin A. Samuels. 10th Edition McGraw Hill, 2014.

JOURNALS

- Annals of Indian Academy of Neurology
- Neurology India
- Neurology
- Annals of Neurology.
- Journal of the Neurological Sciences.
- Journal of Neurology, Neurosurgery and Psychiatry.
- Brain
- Stroke
- Neurology Clinics of North America
- Current opinion in Neurology
- The Lancet
- Journal of the Association of Physicians of India.
- Journal of the Indian Medical Association.
- Bulletin of the ICMR
- Bulletin of the WHO
- Journal of the American Medical Association
- Medical Clinics of North America.
- Annals of Indian Academy of Neurology
- Neurology India
- Neurology
- Annals of Neurology.
- Journal of the Neurological Sciences.
- Journal of Neurology, Neurosurgery and Psychiatry.
- Brain
- Stroke
- Neurology Clinics of North America
- Current opinion in Neurology

- The Lancet
- Journal of the Association of Physicians of India.
- Journal of the Indian Medical Association.
- Bulletin of the ICMR 15. Bulletin of the WHO
- Journal of the American Medical Association.
- Medical Clinics of North America.