SUMANDEEP VIDYAPEETH

(Declared as Deemed to be University under Section 3 of the UGC Act 1956)

Accredited by NAAC with a CGPA of 3.53 out of four-point scale at 'A' Grade

Category – I deemed to be university under UGC Act - 2018

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CURRICULUM
Doctor of Medicine (D.M.) in NEUROLOGY

Attested CTC

15/2/2021

Vice-Chancellor
Sumandeep Vidyapeeth
An Institution Deemed to be University
Vill. Piparia, Taluka: Waghodia.
Dist. Vadodara-391 760. (Gujarat)

Dean
Smt. B. K. Shah Med. Instt. & Rese. Centre

AMENDED UP TO DECEMBER -2020

PROGRAMMEOUTCOME:DM

The purpose of post-doctoral education is to create specialists who would provide high qualityhealthcareandadvance thecauseofsciencethroughresearch andtraining.

Programmespecificoutcome:DM

POS 1. The goal of the training in DM is to have trained physicians competent to managepatients in hospital and community settings independently and serve as a teacher for trainingundergraduates/postgraduates.

POS 2. He / She should also acquire skills in supervision of paramedical staff and be able toworkasateammemberofthe healthcare providers.

POS3. Inaddition,she/heshouldbewell versedtocarryoutresearch.

POS 4. Thus, the major components of the curriculum shall cover theoretical knowledge,practicalandclinicalskills, attitudeskillsandtraininginresearchmethodologyandsocialcare.

POS 5. Recognize the health needs of the community, and carry out professional obligationsethicallyand inkeeping with theobjectives ofthenationalhealthpolicy.

COURSEOUTCOME(CO): Attheendof thetraining courseinNeurologythestudentshouldbe able:

1. tofunctionasFaculty/consultantsinthespecialty
2. toplanandset upindependentNeurologyUnit cateringtoclinicalandinvestigativeNeurology
3. tocarryoutandhelp inconductingappliedresearchinNeurosciences.

TABLEOFCONTENTS

1. INTRODUCTION

Neurologyisthespecialtyencompassingthediagnosis,investigationandmanagementofpatients with neurological diseases. Presently, more than ten centers in the country offer basictraining in neurology leading to the qualification which enables one to practice as consultantneurologist. A working document encompassing the basic syllabus, methods of training andmethodsofassessmentduringneurologytrainingisaprerequisiteforNeurologytraining programme. With the recent advances in the medical field in general and Neurology inparticular,thereisalso aneedtorevise andupdatethe existing syllabus.

This document has been divided in three basic subheadings: (A) Syllabus; (B) Training includingmethods of clinical and research training; and (C) Assessment which includes assessmentduringtheperiod oftraining andthefinal assessment.

2. AIMS

The purpose of this curriculum is to define the competencies needed for the award of DM(Neurology) degree and the process of training and assessment for the DM (Neurology) degreeat Smt. B. K. shah medical institute and research center at Sumandeep Vidyapeeth, Vadodara,Gujarat.

The goal of the DM (Neurology) course is to produce competent specialists and/or medicalteachersin Neurologyspecialty

1. Who have completed the competency based curriculum and have mastered most of thecompetenciesin Neurologicalspecialtywhich arerequiredto bepracticed
2. Whoshallrecognizethehealthneedsofcommunityandwillcarryoutprofessionalobligati on ethically.
3. Whoshallbeaware of contemporaryadvancesanddevelopments intheNeurologicaldiscipline
4. Whoshallbeabletocarryoutbasic andclinicalresearchin Neurology
5. Whoshallbeable toteachpostgraduatestudentsingeneralmedicineand Neurology

3. SYLLABUS

ThisSyllabusdefinestheminimumlevelsofcompetenciesrequiredfortheawardofDM(Neurology) degree. This syllable provides only the broad guidelines about the minimum levelsofcompetenciesrequired.Weunderstandthatitmaynotbepossibleand/orfeasibletoassess the competency in every discipline, some of which are highly subjective, for each individual. Wehavedivided the syllabusin threebroadcategories:

1) GeneralandProfessional competency
2) CompetencyinmanagementofvariousNeurologicaldisorders
3) Competencyinvariousneurologysub-specialtiesandallied specialties

1. General and

ProfessionalcompetencyHistoryt

aking:

Physicianshoulddemonstratethefollowing abilities:

A. To obtain an appropriate, focussed and comprehensive history, including family history,socio-cultural history, and developmental history and communicate this verbally or inwritingand insummaryform.
B. To listen and deal with complex patients (e.g. angry or distressed patient) includingappropriate use of an interpreter for patients & families when their first language isdifferent
C. Toobtainrelevantinformationwithfullawarenessofpatientandfamily'ssensibilities

NeurologicalExamination:

Physicianshoulddemonstratethefollowing abilities:

A. Athoroughworkingknowledgeofneuroanatomy
B. To perform comprehensive neurological examination including fundus examination,screeningpsychiatricexamination andedrophonium, andcalorictesting
C. Togenerateahypothesisabouttheprobable neurologicallocalizationbased upon

historyandclinicalexamination

D. Tocompletetheneurologicalexaminationwithfullrespectforpatient'spersonaldignity

Differentialdiagnosis,Investigationsandmanagement

Physicianshoulddemonstratethefollowingabilities:

A. Knowledge of the different presentations of common and less common neurologicaldiseases

B. To generate a list of possible differential diagnoses based upon the history and clinicalexamination

C. Tounderstandingoftherolesandusefulnessofvariousinvestigationsincludingneuroimaging and neurophysiology and to order relevant investigations specific for theproblem in question. Physician should be able to order, carry out and interpret followingbasic investigations

   a. LumbarpunctureandCSFanalysis
   b. ElectroencephalogramandVideo-EEG
   c. NerveconductionstudiesandElectromyography
   d. Evokedpotentials
   e. Polysomnography
   f. Autonomicfunctiontesting
   g. Electronystagmogram
   h. Audiometry
   i. Perimetry
   j. RadiographicstudiesincludingCTscan,MRI,MRandCTangiography,anddigital susbtractionangiography
   k. Imagingwithultrasound(Duplex,transcranialDoppler)

D. To develop an overall plan for the patient based upon above information in consultationwithotherspecialties,ifrequired

A. Tocommunicateeffectivelywiththepatient,theirfamilyandcaregiversandotherstaffinrelationtotheindividualneedsofthepatientandwithappropriateregardforconfidentiality

B. To transmit information to patients in a clear and meaningful fashion and to educatepatientsandtheirfamilies,andprofessionalsaboutmedical,psychosocial,andbehavioralissues

C. Toprovideexplanationsofpsychiatricandneurologicaldisordersandtheirtreatmentina language well understood by the patient matching to the educational/intellectual levelsofpatientsandtheirfamilies

D. Toensurethatthepatientandfamilyhas understoodthecommunication

E. To explain the risks and benefits of the proposed treatment plan, including possible sideeffectsofmedicationsand/orcomplicationsofnon-pharmacologictreatmentsandalternatives (ifany)totheproposedtreatmentplan

F. Togiveaprognosis,toexplainthepatient'scondition,tobreakbadnews,toobtainfull andinformedconsentforinvestigationsandtreatment

G. To obtain, interpret, and evaluate consultations from other medical specialties, takeappropriatedecisionsanddiscussingtheconsultationfindingswiththepatientandfamily

H. Physicians shall demonstrate the ability to effectively work within a multidisciplinarytreatmentteam,acknowledgingandappreciatingefforts,contributionsandcompromises.

I. Tocontinuetorecognizethecommonpurposeoftheteamandrespecttheirdecisions

J. Abletoactas aleader,mentor,educatorandrolemodel

K. Towork withandrespectnonmedicalprofessionals andparamedicalandnursingstaff

Presentationandauditskills

Physiciansshall demonstratethefollowingcompetencies:

A. bilitytogivearangeoforalpresentationswiththeuseof appropriateaudio-visualaidsincluding powerpoint presentations. Presentations may involve clinical cases, audits,reviewtopicsorresearch papers.
B. Abilitytoinstigateandcollateanaudit project.

Academicandresearch skills

Physiciansshall demonstratethefollowingcompetencies:

A. Abilitytoformulatearesearchquestion,searchtherelevant literature,reachtherelevantconclusions and criticallyappraisetheavailable evidence
B. Ability to plan a clinically relevant research study, chalk out the research methodology,and implementthe same
C. Ability to interpret and synthesize the data from a study or trial and formulate meaningfulconclusions
D. Abilitytocommunicatethecasereports, originalresearch papersorreviewarticlestoscientific journals

2. CompetencyinmanagementofvariousNeurological disorders

Physicianwilldemonstratecompetencyinmanagementofvariousneurologicaldisorders and will have theoretical and practical knowledge of topics included in thesyllabus. Thiswillinclude,butnotlimitedto,followingtopics:

Basic sciences related

toneurologyNEUROANATOMY

- The Neuroanatomy with special emphasis on development of Neuraxis (brain, spinalcord, neurons and glia) and their maturation process in the post natal, childhood andadolescent states
- Autonomicnervous system

- Thelocationandsignificanceof stem cells,
- CSF pathways
- Bloodsupplyandsino-venousdrainageofbrainandspinalcord,themeninges,skullandvertebral column
- Cranial nerves
- Spinalroots,plexuses, andtheirrelationtoneighboring structures
- Anatomyof peripheralnerves,neuromuscularjunctionand muscles
- Histology of cerebrum, pituitary gland, brain stem and spinal cord, nerves andneuromuscularjunctionand muscle.
- Functionalanatomyof lobesof cerebrumandwhitemattertractsof brainand spinalcord,
- Functional anatomy of the craniovertebral junction, conus and epiconus, caudaequina,brachialand lumbosacralplexuses
- Cavernousandother venous sinuses
- Newdevelopmentsinunderstanding ofultra structuralanatomyof neurons,axonaltransport,neuralnetworksandsynapsesandnervecellfunctionatmole cularlevel.

NEUROPHYSIOLOGY

Neurophysiologywillcoverallthephysiologicalchangesinthenervoussystemduringitsnormalfun ction. Thisincludes:

- Neuromuscularjunctionandsynaptictransmission
- Musclecontraction
- Visual, auditoryandsomatosensoryandcognitiveevokedpotentials
- Regulationof secretionsbyglands
- Neuralcontrolofviscerasuchasheart,respiration,GItract,bladderandsexualfunction
- Sleep-wake cycles
- Maintenanceof consciousness
- Specialsensesincludingvisualsystem
- Controlofpituitary functions
- Controlofautonomic functions
- Functionsof variouslobesofbrain
- Cerebella functions

- xtrapyramidalfunctions
- Upperandlowermotorneuronfunctions,motorunit
- Conceptsofmotorandsensory system

MOLECULARBIOLOGY

- PrinciplesofmolecularbiologyincludingGeneStructure
- Expressionandregulationofgenes
- RecombinantDNATechnology
- PCRTechniques
- Molecularbasisforneuronalandglialfunction
- Molecularandcellularbiologyof themembranesandion-channels
- Mitochondrialgenome
- RoleofRNAinnormalneuronalgrowthandfunctionalexpression
- Receptorsofneurotransmitters,molecularandcellularbiologyofmusclesandneuromuscularjunction,etc.
- TheHumanGenomeanditsfutureimplicationsfor Neurologyincluding developmentalandneurogeneticdisorders
- Bioethicalimplicationsandgeneticcounseling
- Nervegrowthandothertrophicfactorsandneuroprotectors
- NeuralTissuemodificationbygeneticapproachesincludingGeneTransfer,stemcellthera pyetc.
- MolecularDevelopmentofneuraltissueinperipheralnerverepair

NEUROCHEMISTRY

- All aspects of normal and abnormal patterns of neurochemistry includingneurotransmittersassociatedwithdifferentanatomical and functional area ofbrainand spinalcord
- Dopaminergic,serotoninergic,adrenergicandcholinergicsystems
- Opioids,excitatoryandinhibitoryaminoacids
- Roleofvariousneurotransmittersinpathogenesisofparkinsonism,depression,migraine,dementia,epilepsy
- Neuromuscularjunctionand musclecontractions

- Carbohydrate,aminoacidandlipidmetabolismandtheneuralexpressionofdisordersof theirmetabolism
- Electrolytesandtheireffectonencephalopathies
- Musclemembranefunction, storagedisorders,porphyrias

NEUROPHARMACOLOGY

- Medical therapy of various neurological disorders including epilepsy, parkinsonism,stroke, other movement disorders, immune mediated disorders, neuropsychiatricsyndromes,spasticity,painsyndromes,disordersofsleepanddysautonomi csyndromes
- Pharmacokinetics,pharmacodynamiocsandadverseeffectprofileofvariousdrugsusedinne urology

NEUROPATHOLOGY

- Pathological changes in various neurological diseases with special reference tovascular,immunemediated,de/dysmyelinating,metabolicandnutritional,genetican d developmental,infectious and iatrogenic andneoplasticdisorders
- Pathologicalchangesinnerveandmuscleinneuropathies andmyopathies
- Ultrastructural pathologies such as apoptosis, ubiquitinopathies, mitochondrioses,channelopathies, peroxisomal disorders, inclusion bodies, prion diseases, disordersmediated by antibodies against various cell and nuclear components, paraneoplasticdisordersetc.

NEUROMICROBIOLOGY

- Microbiological aspects of infectious neurologic diseases including encephalitis,meningitis,brainabscess,granulomas,myelitis,coldabscess,cerebralmalaria,p arasiticcysts of nervous system, rhinocerebral mycoses, leprous neuritis, neuroleptospirosis,primaryandsecondaryNeuro HIVinfections,congenitalTORCHinfectionsof brain,slowvirus infections such as CJD and SSPE, neurological complications of viral infectionssuch as Polio, EBV, Chickenpox, Rabies, Herpez, Japanese encephalitis and otherepidemic viralinfections.

NEUROTOXICOLOGY

- Organophosphorus poisoning, hydrocarbon poisoning, lead, arsenic, botulinum toxintoxicity
- Snake, scorpion,spider,waspandbeestingsandtheirneurologicalmanifestations

NEUROGENETICSANDPROTEOMICS:

- AutosomaldominantandrecessiveandXlinkedinheritancepatterns,
- Disordersofchromosomalanomalies
- Genemutations
- Trinucleotiderepeats
- Dysregulationofgeneexpressions
- Enzymedeficiencysyndromes
- Storagedisorders,
- Disordersofpolygenicinheritance

NEUROEPIDEMIOLOGY:

- Basicmethodologiesincommunityandhospitalbasedneuroepidemiologicalstudiessuch assystematic datacollection, analysis, derivationoflogicalconclusions
- Conceptsof case-controlandcohortstudies,correlations,regressionsandsurvivalanalysis
- Basicprinciplesofclinicaltrials

CLINICALNEUROLOGY

GENERALEVALUATIONOFTHEPATIENT

- The science and art of history taking and physical Examination including elementsofaccurate history taking and evaluation of symptoms associated with neurologicaldisease,
- Thephysicalexaminationof adults, children, infantsandneonates
- Examination of syndromes associated with congenital and acquired neurologicaldiseaseand cutaneousmarkers
- Examinationofunconsciouspatients
- Examinationofhighermentalfunctions
- Examinationof cranialnerves
- Examinationoftheocularfundus

- Examinationof motorsystem includingevaluationfor bulk,toneandpowerofmuscles
- Properelicitationofsuperficialanddeepreflexesincludingthealternatetechniquesand neonatalandreleasedreflexes
- Neurodevelopmentalassessment of children
- Examinationofsensorysystemandperipheralnerves
- Evaluationforsignsof Meningealirritation
- Skullandspineexaminationincludingmeasurementof headcircumference, shortnessofneck,carotid pulsationsand vertebralbruits.

COMA

- PathophysiologyanddiagnosisofComa
- Diagnosisandmanagementofcoma
- Deliriumandacuteconfusionalstates,
- Reversibleandirreversiblecausesofcoma
- Persistentvegetativestates andbraindeath
- Neurophysiologicalevaluationandconfirmationofthesestates
- Mechanical ventilation and other supportive measures of comatose patientandpreventionofcomplications ofprolongedcoma.
- Thesignificanceoftimelybraindeathinorgandonationand ICUresourceutilization
- Prognosisofcomatosepatientsofvariousetiologies

SEIZURES,EPILEPSYANDSYNCOPE

- Diagnosisofseizures
- Definition, pathophysiology, classification and etiology of epilepsy and epilepsysyndromes
- Clinicalassessmentanddiagnosis
- Differentiationfrompseudoseizures,syncopeandotherorganicevents
- EEG andepilepsy
- Video-EEGmonitoring
- Structuralandfunctionalbrainimaging andepilepsy
- Medicalmanagementofepilepsyincludingpharmacologyof antiepilepticdrugs
- Specialsituationssuchasepilepsyinpregnantandnursingmothers, epilepsyinchildrenandelderly

- ignificanceof epilepsyfordriving,riskyoccupationsanditssocialstigmas
- Useofconventionalandnewerantiepilepticdrugs,theirdruginteractionsandadverse effectsetc.
- Management of intractable epilepsies including ketogenicdiet, Vagal nervestimulation,epilepsysurgeryandaboutpresurgicalevaluation ofpatients
- Managementofstatusepilepticusandrefractorystatusepilepticus
- Newseizureandepilepsyclassification
- Conceptofdrugresistantepilepsy
- Medicalandsurgicalmanagementofdrugresistantepilepsy
- Conceptofpresurgicalevaluationinepilepsy
- IndicationandevaluationofVideo-EEGmonitoring
- Concept,utility,andlimitationsofinterictalandictalEEG
- Utilityandlimitationsofvariousnoninvasivepresurgicalsourcelocalizationmethods: PET, SPECT,MEG,EEG-fMRI

HEADACHESANDOTHERCRANIALNEURALGIAS

- Acquisition of skills in analysis of headaches of various causes such as those fromraisedintracranial pressures,
- Epidemiology, pathophysiology, diagnosis and management of migraine and otherprimaryheadache disorders
- Autonomiccephalgias
- Cranialneuralgias
- Vascular malformationsandheadache
- Meningealirritationandheadache
- Psychogenicheadaches
- Pharmacologicmanagement of variousheadachedisorders
- Classificationofheadachedisorders
- Autonomiccephalgiasincludingclusterheadache,paroxysmalhemicranias,hemicrania continua, SUNCT,SUNA
- Rare headachedisorderssuchas hypnicheadache
- Newertherapiesinmigraine

(BoardofStudiesletterno.:SBKSMIRC/Dean/874,dated18/06/2020andVideNotificationofBoardof ManagementResolutionRef:No.SVDU/R/3383-A/2019-20dated31/07/2020)

- Intervention procedures for various headaches such as botulinum toxin andoccipitalnerveblockade

CEREBROVASCULARDISEASES

- Vascularanatomyof brainandspinalcord,
- Various causes, types, pathophysiology and management of cerebrovascularsyndromes
- Ischemicandhaemorrhagicstrokes
- Arterialandvenousstrokes
- Anteriorandposteriorcirculationstrokes,
- OCSPandTOASTclassifications
- Investigationsofstrokesincludingneuroimagingusingdopplers,CTandMRimaginganda ngiography
- Thrombolytictherapy,
- Interventionaltherapyofcerebrovasculardiseases
- Principlesofdiagnosisandmanagementofsubarachnoidhemorrhage
- Specialsituationslikestrokesintheyoung
- Strategiesfor primaryandsecondary preventionofstroke
- Indicationsandcontraindicationsforthrombolytictherapyincludingintra-arterialtherapy
- Concept of diffusionandperfusionmismatchanddiffusionFLAIRmismatch
- CurrentconceptsinInterventionaltherapyofacutestrokeincludingmechanicalthro mbectomyand decompressivecraniotomy
- Carotidendarterectomyandcarotidstentingforsymptomaticandasymptomaticcarotid stenosis

DEMENTIAS

- Conceptofminimalcognitiveimpairment
- Reversibleandirreversible dementias

- Epidemiology, pathophysiology, diagnosis and management of various degenerativedementias including Alzheimer's disease, vascular cognitive impairment and fronto-temporal dementias
- Dementiasassociatedwith parkinsonism
- Geneticandfamilial syndromes
- Pharmacotherapyof dementias
- Potentialrolesof cognitiverehabilitationandspecialcare ofthedisabledpatientswithdementias

PARKINSONISMANDMOVEMENTDISORDERS

- Disorders of extrapyramidal system such as parkinsonism, chorea, dystonias, athetosis,tics including theirdiagnosisandmanagement
- Pathophysiology and diagnosis of parkinson's disease and parkinsonism plussyndromes including progressive supranuclear palsy, multiple system atrophy,corticobasalganglionicdegenerationand diffuseLewybodydisease
- Pharmacotherapyofparkinsonismanditscomplications
- Managementofadvancedparkinson'sdiseaseincludingprinciplesofdeepbrain stimulationandlesionalsurgeries
- Use of EMG guided botulinum toxin therapy, management of spasticity using intrathecalbaclofenandTENS
- RecentadvancesinthegeneticsofParkinson's disease
- RecentadvancesindeepbrainstimulationandtransplanttherapyforParkinson's disease

ATAXICSYNDROMES

- Differentialdiagnosisofvarious ataxias
- Differentiationofcerebellarandsensory ataxias
- Epidemiology, pathophysiology, diagnosis, classification and management ofvarioushereditary ataxias
- Secondary ataxias related to parainfectious etiology, demyelination and cerebellartumors
- Vestibular disorders

- Diagnosisandmanagementofbrainstemdisorders

CRANIALNEUROPATHIES

- Disordersofsmellandvision
- Evaluation of visual pathways, pupllary pathways and reflexes, internuclearandsupranuclearophthalmoplegia,otheroculomotordisorders
- Anatomyandtestingofallcranialnerves
- Bell'spalsyanddifferentiationfromUMNfaciallesions
- Brainstemreflexes
- Investigations of vertigo and dizziness, differentiation between central andperipheralvertigo,differentialdiagnosisofnystagmus
- investigationsof deafness, bulbarandpseudobulbarsyndromes

CNSINFECTIONS

- Epidemiology, etiology, pathophysiology, diagnosis and management of various viralencephalitis
- Meningitis:Bacterial,tubercular,fungal
- Parasiticinfectionssuchascysticercosis
- Cerebralmalaria
- SSPE
- HIVandCNSinvolvement.

NEUROIMMUNOLOGICDISEASES

- Epidemiology,etiology,pathophysiology,diagnosisandmanagementofmultiplescl erosis andneuromyelitisoptica
- CentralnervoussystemvacsultisincludingprimaryCNSvasculitis
- Diagnosisandmanagement ofGBSandCIDP
- Autoimmune encephalitis including anti-NMDA antibody and anti-VGKC antibodymediatedencephalitis
- Myastheniagravis
- Polymyositis

- Collagenvasculardisorderandneurology
    - Useofimmune-modulatoryagentsinthemanagementofvariousimmunologicaldisordersincludingmycophenolate,RituximabandNatalizumab
    - AdvancesinthetUseofimmune-modulatory agents inthemanagementofvarious immunological disorders including mycophenolate, Rituximab andNatalizumab
    - Advancesinthetherapyofmultiplesclerosisincludingteriflunomide, dimethylfumarate,fingolimod,alemtuzumab,rituximabandocrelizumab
    - Conceptsofnewerbiomarkersformultiplesclerosis
    - Neweradvancesinautoimmuneencephalitisincludingpathogenesis,various autoantibodies,andmanagement
    - Newer autoimmune neurological disorders including neuromyelitisopticaspectrumdisordersandMOGassociateddisorders.
    - herapy of multiple sclerosis including teriflunomide, dimethylfumarate,fingolimod,alemtuzumab,rituximabandocrelizumab
    - Conceptsofnewerbiomarkersformultiplesclerosis
    - Newer advances in autoimmune encephalitis includingpathogenesis,various autoantibodies, andmanagement of Newer autoimmuneneurological disorders including neuromyelitis optica spectrum disordersand MOG associated disorders.(Board of Studies letter no.:SBKSMIRC/Dean/874, dated 18/06/2020 and Vide Notification of Board ofManagementResolution Ref:No.:SVDU/R/3383/2019-20dated31/07/2020

NEUROGENETICDISORDERS

- Variouschromosomaldiseases
- Singlegenemutationssuchasenzymedeficiencies
- AutosomaldominantandrecessiveconditionsandX-linkeddisorders
- Trinucleotiderepeatdisorders
- Disordersof DNArepair
- GeneticsofHuntington’sdisease
- Familialdementias

- Storagedisorders
- Hereditaryataxias
- hereditaryspasticparaplegias
- Hereditarysensorymotor neuropathies
- Musculardystrophies
- Mitochondrialinheritancedisorders

DEVELOPMENTALDISORDERSOFNERVOUSSYSTEM

- Neuronalmigrationdisorders
- Craniovertebraljunctiondiseases
- Spinaldysraphisms,
- Phacomatoses and other neurocutaneous syndromes- their recognition andmanagement.

MYELOPATHIES

- Clinical diagnosis of distinction between compressive and non-compressivemyelopathies, spinal syndromes such as anterior cord, subacute combineddegeneration,centralcordsyndrome,Brown-sequardsyndrome,tabeticsyndrome
- Diagnosisof spinalcordandroot compressionsyndromes
- CVjunctionlesions
- Syringomyelia
- Conusandcaudalesions,
- SpinalAVMs
- Hereditaryandtropicalhereditaryspasticparaplegias
- Variousnoncompressivemyelopathies
- Epidemiology, pathophysiology, diagnosis and management of motor neuron diseasesincludingamyotrophiclateralsclerosis

PERIPHERALNEUROPATHIES

- Epidemiology, pathophysiology, diagnosis and management of immune mediatedneuropathies
- Classificationanddiagnosisof hereditarysensorymotorneuropathies

- Toxic,nutritionalandmetabolicneuropathies
- infectioustypeperipheralneuropathiesincludingleprousneuropathy
- Clinicalandelectrophysiologicaldiagnosisofneuropathiesincludingprinciplesofnerve conductionstudies andelectromyography

MYOPATHIESANDNEUROMUSCULARJUNCTIONDISORDERS

- Clinicalevaluationofpatientswithknownorsuspectedmuscle diseasesaidedbyEMG
- Epidemiology,pathophysiology,diagnosisandmanagementofmusculardystrophies,
- Inflammatorymyopathies
- Toxic,nutritionalandmetabolicmyopathies
- Channnelopathies
- Congenitalandmitochondrialmyopathies
- Neuromuscular junction disorders such as myasthenia gravis, Botulism, Eaton-lambertsyndrome, snake bite and organophosphorus poisoning, their eletrophysiologicaldiagnosis andmanagement
- Epidemiology,pathophysiology,diagnosisandmanagementofmyastheniagravis
- Myotonia
- Stiffpersonsyndrome.

PAEDITRICNEUROLOGY:

- Normaldevelopmentofmotorandmentalmilestonesinachild
- Cerebralpalsy
- Attentiondeficitdisorder
- Autism
- Developmentaldyslexias
- IntrauterineTORCHinfections
- Storagedisorders
- Inbornerrorsof metabolismaffectingnervoussystem
- Developmentalmalformations
- Childhoodseizuresandepilepsies
- Neurodegenerativediseasesincludingleukodystrophiesandpoliodystrophies

COGNITIVENEUROLOGYANDNEUROPSYCHIATRY:

- etailedtechniquesofhighermentalfunctionsevaluation
- Basics of primary and secondary neuropsychiatric conditions such as anxiety,depression,schizophrenia,acutepsychosis,acuteconfusionalreactions(deliri um),organic brain syndrome, primary and secondary dementias, differentiation frompseudodementia

TROPICALNEUROLOGY

- Conditions which are specifically found in the tropics like neurocysticercosis,tuberculosis, cerebral malaria, tropical spastic paraplegia, Snake/scorpion/ Chandipuraencephalitis,Madrasmotorneurondiseaseetc.willbedealtwithinspecialdetailin thecurriculum

Sleepdisorders

- Knowledgeofnarcolepsy,daytimehypersomnolence,parasomnias,obstructivesleepapn oea,effectsofneurologicalconditionsonsleep
- Indications,scopeandlimitationsofthesleeplaboratory
- Principlesofphysicalandpharmacologicaltreatmentofsleepdisorders
- Anunderstandingof theeffectsofsleepontheEEG
- Knowledge of driving regulations and the consequences and complications of sleepdisorders.

CSFdisorders

- CSFcompositionanddynamics
- Anatomyandradiologyofthe ventricularsystem
- Genesisofhydrocephalus
- BiochemistryandimmunologyofCSF
- Bloodbrainbarrier
- Indications,techniques,andcontraindicationsofCSFexamination
- Methodsofintracranialpressuremonitoring
- Treatmentsofraisedintracranialpressure
- Management ofshunts

Disordersofautonomicnervoussystem

- Anatomyand physiologyofANS
- Clinical features of ANS disorders alone and as part of other condition e.g. multi-systematrophy
- Investigationsincludingautonomicfunctiontests
- Pharmacologicalandphysicalmanagementsof urinaryretention,erectiledisorder,constipation,postural hypotension,autonomicdysreflexia

Pain

- Theoriesofpaingeneration
- Painpatternsinneurologicalandsystemicdiseases
- Effectiveuse ofpharmacologicalagentsandothermeasuresforpainreliefincludingnerveblocks, TNS,acupunctureandneurosurgicalinterventions
- Roleof PainClinic
- Psychologicalandsocialeffectsof chronicpain

DIAGNOSTIC AND INTERVENTIONAL NEUROLOGY INCLUDINGNEUROLOGICALINSTRUMENTATION

DIAGNOSTICNEUROLOGY

- PerformingandinterpretingDigitalElectroneurogram
- Electromyogram,
- Evokedpotentials,
- Electroencephalography
- InterpretationofskullandspineXrays,
- Computerizedtomographyofbrain andspine
- Magneticresonanceimagesof brainincluding correctidentificationof varioussequences
- Angiograms
- MRspectroscopy
- BasicsoffunctionalMRI
- Interpretationofdigitalsubtractionimaging
- SPECTscansofbrain
- Subdural EEG recording, transphenoidal electrode EEG Techniques fortemporal lobeseizures

- VideoEEG interpretationof phenomenologyandEEG-phenomenologycorrelations
- Transcranial Doppler in the diagnosis and monitoring of acute ischemic stroke andsubarachnoidhemorrhage
- Colourduplexscanning inCarotidandvertebralextracranialsegmentscreening

INTERVENTIONALNEUROLOGYANDNEUROINSTRUMENTATIONS

Toacquireskills inProcedureslike

a) Intrathecaladministrationofantispasticitydrugs,betainterferonsindemyelination,opiates inintractable painetc.,

b) EMGguided Botoxtherapyfordystonias

c) Subcutaneousadministrationofantimigraineandantiparkinsoniandrugs

d) Intrarterialthrombolysisinextendedwindowsofthrombolysisinischemicstrokes

e) TranscranialUltrasoundclot-bustinterventioninaregistryinacutestrokecareunit

e) Planning deep brain stimulation therapy in uncontrolled dyskinesias and on-offphenomenainlong standingparkinsonism

f) Planningvagalnervestimulationinintractableepilepsy

RECENTADVANCESINNEUROLOGY

a. ADVANCES IN NEUROIMAGING TECHNIQUES: Integration of CT, MR, SPECTimages with each other and with EEG, EVOKED potentials based brain maps instructural and functional localization in neurological phenomena and diseases,FluorescentDyetaggedstudyofneuronsindiseasesinanimalmodelsinvivoandintissueculturesin-vitro.

b. IONICS IN NEURAL PROSTHESIS AND REHABILITATION: Advanced techniques inneuro-rehabilitation such as TENS, principles of man-machine interphase devices incord,nerve andplexus injuries,cochlearimplants,artificialvision.

c. NEUROPROTEOMICSANDNEUROGENETICS

d.To introduce New chapter / topic 'Intellectual Property Rights (IPR) for all theFirstyearPostgraduateResidentDoctorsfromacademicyear2020-2021 of duration of 4hrs (Board of Studies letter no.: SBKS/DEAN/742/2021,dated 05/06/2021 and Vide Notification of Board of Management Resolution Ref no.:SVDU/R/3051-1/2020-21, dated - 29" July 2021)

List of topics :

1. *Introduction-ConceptofIntellectualProperty,Historicalviewof Intellectual Property system in India and International Scenario, Evolution of Intellectual Property Laws in India, Legal basis of Intellectual Property Protection, Need for Protecting Intellectual Property, Theories on concept of property - Major IP Laws in India.*
2. *Types of IPR: Patents, Copyright, Trademark Industrial Designs, TradeSecrets.*
3. *Patents: Concept of Patent, Criteria of Patentability, Inventions NOT patentable, Process of Obtaining a Patent, Duration of Patents, Rights of Patentee, Limitation of rights, Infringement andEnforcement.*
4. *Copyrights: Meaning of Copyright, Copyright Vs. Moral rights, Copyrighteligibility,TermofCopyright,RegistrationofCopyright, Infringement andRemedies*
5. *Trademark: Meaning of Trademark, Criteria for trademark, Procedure for Trademark Registration, Term of protection, Infringement andRemedies.*
6. *Industrial Designs: Meaning of Industrial Designs, Rights in Industrial Designs: Nature, Acquisition and duration ofrights.*
7. *Trade Secrets: Meaning of Trade Secrets, Need to protectTrade secrets, Criteria of Protection, Procedure for registration, Infringement.*
8. *Commercialization of IPR: Traditional IP and Evolving IP, Assignment, Licensing, Cross License, Patent Pool, Negotiations, Defensive Publications, TechnicalDisclosures, Patent Pooling, Patent Trolling, Brand Management, Brand and Pricing Strategies.*

d.

STEMCELLANDGENETHERAPY

- Principlesofongoing experimentsonstemcelltherapyfornervoussystemdisorderssuchasfoetalbraintissuetransplantsinparkinsonism,intrathecalmarrowtransplantsinMND,MS,Spinaltrauma,myoblasts infusiontherapyindystrophies

NEUROEPIDEMIOLOGICALSTUDIESANDCLINICALTRIALS

The students of the DM course will be trained in conducting sound neuroepidemiological studieson regionally and nationally important neurological conditions as well as on diseases of scientificandresearch interesttothe department.

EVIDENCEBASEDMEDICINEINNEUROLOGY

- Principlesofevidencebasedmedicine
- Understandingthedifferentlevelsofevidence
- Formulatingaresearchquestion,searchtherelevantevidenceandits criticalappraisal
- Evidencebasedmanagementof variousneurologicaldisorders

ALLIEDSPECIALITIES

Clinical Neurophysiology

- Technicalaspectsof EEG andVEEGrecording

- ormalawakeandsleepEEGinadults andchildren
- Benignepileptiformvariants
- Commonfocalandgeneralizedepileptiformabnormalities
- Commonictalpatterns
- EEGinICU
- EEGinbraindeath
- Technicalaspectsandprinciplesof EMG,NCS,repetitivestimulation
- Abnormalities in common nerve entrapments, peripheral neuropathies; motor neurondisease; disordersofneuromuscularjunction;muscledisease
- Principlesandapplicationsofevokedpotentials

Neuroendocrinology

- Clinicalfeaturesandinvestigationsinendocrinedisorders
- Emergencymanagementofdisorders
- Relationshipswithneurologicaldisorders
- Steroidtherapyanditscomplications

Neurootology

- Appliedanatomyandphysiologyofhearingandbalance
- Historyandexaminationtechniquesincludingvestibularmanoeuvres
- Conditionsaffectingthevestibulocochlearsystem
- Clinicalevaluationofvertigo

Neuropsychiatry

- Understandingofcommonpsychiatricdisordersincludinglearningdisability,pervasivedevelopmentaldisorders,andattentiondeficithyperactivitydisorders
- Neurological features which may have psychiatric causes including medicallyunexplainedsymptoms,conversion disorder,somatisation
- Evaluationandmanagementofpsychiatricsymptomsinneurologicaldisorders

Neuropsychology

- Understanding of neuroanatomical and neurophysiological basis of memory, attention,languageandperception
- Understand the value and limitations of neuropsychological interventions such asCognitiveBehaviouralTherapy
- Understand mini-mental state examination and basic neuropsychological tests employedbyClinicalPsychologistssuch as e.g.NART,WAIS

Neuroradiology

- Request,interpretandutiliseneuro-radiologicalinvestigationsappropriately
- Explainthenature,risksandbenefitsof neuroradiologicalinvestigations
- Basicaspects,utilityandinterpretationsofroutinetestsincludingCTscan,cranialangiography, MRscan,spinalangiography,catheterangiography,diagnostic/interventional myelography, carotid and transcranial ultrasound, other specialinvestigationse.g.PET,SPECT

Neurosurgery

- Understandtheroleofneurosurgeryinthemanagementofheadinjury,raisedintracranialpressure,intracranialhaemorrhageandischaemicstroke,aneurysm,vascular malformation and tumours, spinal cord and root disorder and peripheral nervelesions
- Understand the purpose, limitations, process and complications of biopsy procedures(brain,muscle,nerve)
- Understandingoftheprinciplesofgeneralandspecificrisksandcomplicationsofneurosurgicalinterventions

Neurorehabilitation

- Understandthedifferencebetweenpathology,impairment,activity&participation
- Understandthepotentialandlimitationsofneurorehabilitation
- Understandthesocialperspective,relevantsocialworklegislationandavailabilityofcare inthecommunity

Neurourology

- Understandnormalcontrolof micturitionandsexualfunction
- Differentialdiagnosisofcausesof disorderedmicturitionanderectiledysfunction
- Understandhypo-andhyper-sexuality
- Understandtreatmentstrategiesfordisordersofmicturitionandsexualfunction

4. TRAINING

Responsibility for the organization and delivery ofneurology training will rest with the Head oftheDepartmentofNeurologyandotherseniorfacultymembersofthedepartment.Eachcandidate will have clinical postings for two years during the first andthird years oftraining.Eachcandidatewillbepostedinneurophysiology section forsix months forthehandsontraining in EEG and VEEG reporting, nerve conductions studies, electromyography and evokedpotential studies.Similarly candidates will be posted forone monthin allied specialties ofneurosurgery, neuroradiology, neuropsychology and neuropathology. All trainees will have onemonth of posting at one of the other prominent neurology departments in the country as perhis/herchoice.

TeachingandLearningMethods

Thecurriculumandtrainingwillbedeliveredthroughavarietyofmethodsandlearningexperiences. Trainees will learn clinical skills from practice and through hands on training whilemanaging patients on outdoor and inpatient departments. There will be a balance of differentmodesoflearningfromformalteachingprogrammestoexperientiallearning‘onthejob’.Thiswill includefollowing:

Learning with Peers: Students will come in contact with their peers having varied levels ofexperienceandwillbeencouragedto learnfromseniorcolleagues.Traineeswillbeencouragedto create local forums for peer learning opportunities. These include trainee led journal clubs,discussion of cases and participation in regional or departmental grand round presentations**Work-based Experiential Learning:** This will include active participation in neurology clinicsincluding specialty clinics. After initial induction, trainees will review patients in outpatient clinics,under direct supervision. The degree of responsibility will increase with increasing levels ofcompetency. Trainees will assess ‘new’ and ‘review’ patients and present their findings toconsultants. It is expected that trainees will complete the equivalence of 2-3 outpatient clinicsperweek(max4perweek)throughoutthefulltrainingprogram.Twoofthesewillbegeneral

neurology clinics and the remainders will be specialty clinics. Trainees will also be responsiblefor the management of in patients admitted under their care under direct supervisions fromconsultants.Theywilllearnbyevaluatingthepatientsadmittedinwards,planningtheirmanagement and accompanying consultants on rounds. This will also include day-to-day reviewof the patient, note keeping, and the initial management of the acutely ill patient with referral toand liaison with clinical colleagues as necessary. They will be encouraged for critical and clinicalbased reading. They will also be encouraged to learn through discussion with clinicians in otherdisciplines and while seeing patients referred from other specialities. Trainees will also learn,undersupervision,reportingEEGsandVEEGsandconductingandinterpretingevokedpotentialstudies,nerve conductionandelectromyographystudies.

Formal Postgraduate Teaching: This will include department based teaching sessions andattendingregional,nationaland internationalmeetings.Thiswill include:

- Casepresentations:Twiceaweek
- Journalclubs:Onceaweek
- Researchandauditprojects:Onceinthreemonths
- Lecturesandsmallgroup teaching:Once aweek
- GrandRounds;Once aweek
- Clinicalskillsdemonstrationsandteaching:Onceaweek
- Criticalappraisalandevidencebasedmedicineandjournalclubs:Onceaweek
- Jointspecialtymeetings:Onceaweek

Table1.Proposedteaching programandtimetable

Day	Teachingprogram	Time	Presenter
Monday	**JournalClub/Neuroradiology**	**3-4 pm**	**Neurology/Medicine/Neurosurgery/RadiologyResidents**
Tuesday	**CasePresentation**	**3-4 pm**	**Neurology,ResidentsMedicine Residents**

Wednesday	**Didacticlectures**	**3-4 pm**	**Dr.SanjayPrakash Dr.ChatarbhujRathore**
Thursday	**Seminars**	**3-4**	**NeurologyResidents**

		pm	**MedicineResidents**
Friday	**Clinicalmeeting**	**3-4 pm**	**Neurology ResidentsMedicine Residents**
Saturday	**GrandRound**	**9-11am**	**Alldepartments**

IndependentSelf-DirectedLearning: Thiswillbe donethroughvarietyofwayssuchas,

• Reading,includingweb-basedmaterial

• Maintenance of personal portfolio (self-assessment, reflective learning, personaldevelopmentplan)

• Auditandresearchprojects

• Readingjournals

• Achievingpersonallearninggoalsbeyondtheessentialcorecurriculum

Research

Trainees will have to undertake at least two research projects with an aim of publishing in perreviewedjournals.Theyareexpectedtounderstandthebasicaspectsofresearchmethodologies, fundamentals of case control and cohort studies and learn the art of criticallyappraisingresearch articles.

5. ASSESSMENT

Periodicevaluationoftrainingandinternalassessment

A student who is registered for DM neurology course will undergo summative as wellasformative assessment. Day to day evaluation will be done and would be recorded in thelogbook.Followingstructured internalevaluation willalso bedone.

During the course of three years, the department will conduct two tests. Both of them will beannual, one at the end of first year and other at the end of second year. The test may includethe written papers, clinical examination and viva-voce. Records and marks obtained in suchtests will be maintained by the head of the department and will be sent to the University whencalled for. Results of all evaluations will be entered into log book and departmental file forodocumentation purpose. Main purpose of periodic examination and accountability is to ensureand assess clinical expertise of students with practical and communication skills and

balancebroaderconceptofdiagnostic andtherapeuticchallenges.

ExternalEvaluation

An external evaluationwillbe carried outatthe completion ofthree yearsoftraining.This will include evaluation oftheoretical and practical knowledge a comprehensiveevaluation process consisting of theory papers, practical examinations and viva voce.The external examination will be conducted as per the rules laid down by the universityand will be in the presence of two external examiners. The relative distribution of marksandexamination schemewill be asunder:

TheoryExamination:(400 Marks)

Paper numbe r	Topics	Marks	Time
I	Neurology I: Basic sciences as applied toneurology with special emphasis on neuroanatomyandneurophysiology	100	3 Hours
II	NeurologyII:ClinicalNeurology	100	3 Hours
III	Neurology III: Diagnostic Neurology and alliedspecialities	100	3 Hours
IV	NeurologyIV:Generalneurologywithrecentad vances in neurology	100	3 Hours

Note:Thedistributionoftopics ineachpaperisarbitrary.Theremaybeoverlappingofrelevanttopics inquestion papers

EachPaper shallhave5 Questions;allwillbecompulsory.

Question-1:LongQuestion(1)	20marks
Question-2:LongQuestion(1)	20marks
Question-3:LongQuestion(1)	20marks
Question-4:Short Notes—(2)	20marks
Question-5:Shortnotes-–(4)	20marks

Practical Examination:(400Marks+200marksforvivavoce)=600marksDuration:Minimum 2days

Exercise number	Description	Marks	Time	Assessment
1	Longcase(1)	200	120 min	AllFour examiners
2	Shortcase(2)	200 (100 each)	30 minutes foreach case	AllFour examiners
3	VivavoceIncludi ngspecimen, EEGrecordings, muscle biopsiesandneu roradiology Tableviva	200	60minutes	AllFour examiners