0. NEUROLOGY TERMINOLOGIES AND STEM VOCABULARY

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (8)

Stem 1: Increased tone, hyperreflexia, upgoing toe, no fasciculations → pick: **Upper Motor Neuron (UMN) Lesion**
Wrong temptation: LMN (would show atrophy, fasciculations, hyporeflexia)

Stem 2: Atrophy, fasciculations, hyporeflexia, flaccid weakness → pick: **Lower Motor Neuron (LMN) Lesion**

Stem 3: Patient understands but cannot speak fluently, effortful speech, comprehends commands → pick: **Broca's Aphasia (Non-fluent, Expressive)**
Wrong temptation: Global aphasia (comprehension also impaired)

Stem 4: Fluent speech with paraphasias, poor comprehension, unaware of deficit → pick: **Wernicke's Aphasia (Fluent, Receptive)**

Stem 5: Inability to recognize stimuli on one side despite intact sensory pathways, attends only to right side → pick: **Left Hemispatial Neglect (Right parietal lesion)**

Stem 6: Upward beating nystagmus on straight gaze, worse on upgaze → pick: **Brainstem/Posterior Fossa Lesion**

Stem 7: Rhythmic oscillation of eyes, direction-changing on gaze, disappears on fixation → pick: **Cerebellar/Brainstem Pathology**

Stem 8: Incoordination of speech, irregular articulation, "scanning speech" → pick: **Cerebellar Dysarthria**

CORE NEURO VOCABULARY

Term	Definition	Exam Context
Aphasia	Language disturbance from brain lesion	Broca's (motor), Wernicke's (sensory), Global, Conduction, Anomic
Dysarthria	Mechanical speech difficulty (articulation), language intact	Slurred speech from muscle weakness, cerebellar disease, or extrapyramidal
Dysphagia	Difficulty swallowing	Brainstem (CN IX, X), pseudobulbar palsy (emotional lability)
Neglect	Failure to attend to one side of space/body	Right parietal lesion (left neglect), anosognosia (denial of deficit)
Ataxia	Incoordination without weakness	Cerebellar (wide-based gait), sensory (proprioception loss), vestibular
Apraxia	Inability to execute learned movements despite intact motor/sensory	Ideomotor (parietal), ideational (diffuse), dressing apraxia (right parietal)
Agnosia	Failure to recognize sensory input despite intact senses	Visual (prosopagnosia), tactile (astereognosis)
Proprioception	Position sense (joint position, vibration)	Dorsal column (fasciculus gracilis/cuneatus), large fiber neuropathy
Fasciculation	Spontaneous muscle twitch (visible)	LMN disease (ALS, radiculopathy), benign (fatigue, caffeine)
Clonus	Rhythmic muscle contraction after stretch	UMN lesion, >3 beats sustained = pathological
Babinski sign	Upgoing toe with plantar stroke	UMN lesion (corticospinal tract), disappears with deep sleep/coma
Romberg sign	Swaying with eyes closed (not open)	Posterior column/dorsal root ganglion disease (proprioception loss)

NYSTAGMUS TYPES & LOCALIZATIONS

Type	Description	Localization
Peripheral vestibular	Horizontal with rotatory, unidirectional, fatigable, severe vertigo	Inner ear, vestibular nerve
Central vestibular	Pure vertical, direction-changing, non-fatigable, mild vertigo	Brainstem (vestibular nuclei), cerebellum
Upbeat	Fast phase upward, worse on upgaze	Midbrain, medulla
Downbeat	Fast phase downward, worse on lateral gaze	**Foramen magnum lesions (Chiari, syringobulbia)**
See-saw	One eye rises/intorts, other falls/extorts	Parasellar region (bitemporal hemianopia)
Convergence-retraction	Retraction on attempted upgaze	**Dorsal midbrain (Parinaud's syndrome)**

LOCALIZATION CHEAT TABLE

Symptom/Sign	Lesion Site	Why	Common Causes	Stem Giveaway
Spastic weakness	Corticospinal tract	UMN disinhibition	Stroke, MS, myelopathy	"Stiffness," clasp-knife tone
Flaccid weakness + atrophy	Anterior horn, root, nerve	LMN denervation	ALS, GBS, radiculopathy	Fasciculations, hypotonia
Loss of proprioception	Dorsal columns	Large fiber sensory loss	B12 deficiency, tabes, MS	Positive Romberg, sensory ataxia
Pain + temp loss	Spinothalamic tract	Crossed fibers ascend	Syringomyelia, Brown-Sequard	Dissociated sensory loss
Bilateral visual loss	Optic nerves/chiasm	Pre-chiasmatic	MS (optic neuritis), pituitary	Central scotoma, pain with eye movement
Homonymous hemianopia	Optic tract to occipital	Post-chiasmatic	Stroke, tumor	"Can't see left side with either eye"
CN III palsy + contralateral hemiplegia	Midbrain (Weber syndrome)	CN III fascicles + cerebral peduncle	PCA aneurysm, stroke	Down and out eye + weakness
CN VI + VII palsy	Pons	CN VI nucleus + fasciculus	Basilar artery stroke	Facial diplegia + lateral gaze palsy
Vertigo + diplopia + dysarthria	Brainstem	Multiple CN nuclei + tracts	MS, stroke, vertebrobasilar TIA	Crossed signs (face one side, body other)

APHASIA LOCALIZATION

Type	Lesion	Fluency	Comprehension	Repetition
Broca's	Left frontal (inferior frontal gyrus)	Non-fluent	Intact	Impaired
Wernicke's	Left temporal (superior temporal gyrus)	Fluent	Impaired	Impaired
Global	Large left MCA territory	Non-fluent	Impaired	Impaired
Conduction	Arcuate fasciculus	Fluent	Intact	**Severely impaired (hallmark)**
Anomic	Angular gyrus	Fluent	Intact	Intact (word-finding deficit)
Transcortical motor	Border zone frontal	Non-fluent	Intact	**Intact (echoing preserved)**
Transcortical sensory	Border zone temp-parietal	Fluent	Impaired	**Intact (echolalia)**

1. ACQUIRED NEUROPATHIES

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (3)

Stem 1: 3 weeks post-diarrhea, ascending symmetric weakness, areflexia, albuminocytologic dissociation CSF → pick: **Guillain-Barré Syndrome (AIDP)**
Wrong temptation: Polio (asymmetric, CSF pleocytosis)

Stem 2: Chronic progressive (>8 weeks) symmetric proximal and distal weakness, demyelinating features on EMG, responds to steroids → pick: **Chronic Inflammatory Demyelinating Polyneuropathy (CIDP)**

Stem 3: Asymmetric stepwise weakness, multiple mononeuropathies, livedo reticularis, weight loss → pick: **Vasculitic Neuropathy**
Wrong temptation: ALS (no sensory, no stepwise)

LOCALIZATION TABLE

Feature	Lesion	Why	Stem Giveaway
Symmetric stocking-glove sensory loss	Peripheral nerve (length-dependent)	Longest fibers affected first	Distal > proximal, feet before hands
Ascending paralysis	Spinal roots/nerve roots	Radiculitis in GBS	Post-infectious, respiratory weakness
Asymmetric multiple nerves	Vasculitic (nerve infarcts)	Epineurial vessel inflammation	Stepwise, painful, non-length-dependent
Proximal + distal, both sides	CIDP (root + nerve demyelination)	Immune attack at root level	Relapsing, steroid-responsive

GBS VS CIDP COMPARISON

Feature	GBS	CIDP
Onset	Acute (<4 weeks)	Chronic (>8 weeks)
Course	Monophasic	Relapsing-remitting or progressive
CSF	Albuminocytologic dissociation	Same
EMG	Demyelinating features	Demyelinating features
Treatment	IVIG or Plasmapheresis	Steroids, IVIG, immunosuppressants

EMERGENCY MANAGEMENT

If this stem	First action	Next	Definitive
GBS with respiratory weakness	Admit ICU, FVC monitoring	IVIG 0.4g/kg x 5d OR PLEX	Supportive until recovery
GBS with autonomic instability	Cardiac monitoring	Avoid sympathomimetics	Prevent arrhythmias
Miller Fisher	Anti-GQ1b	IVIG (same as GBS)	Usually full recovery
variant	antibody testing		

CRITICAL DRUGS & DOSES

- **IVIG:** 0.4g/kg daily for 5 days (total 2g/kg)
- **Plasmapheresis:** 4-6 exchanges over 10-14 days
- **Prednisolone (CIDP):** 1mg/kg/day with slow taper

KMU EXAM TRAPS

- **GBS early:** CSF may be normal in first week - don't exclude based on single LP
- **FVC <20mL/kg or <1L:** Intubate prophylactically in GBS
- **AMAN variant:** Pure motor GBS, anti-GM1 antibody, worse prognosis
- **Acute intermittent porphyria:** Can mimic GBS + abdominal pain + psychosis + dark urine
- **Diphtheritic neuropathy:** Descending paralysis, palatal weakness, history of sore throat
- **Bickerstaff encephalitis:** GBS + encephalopathy + ophthalmoplegia

RARE BUT TESTED (DO NOT SKIP)

- **Multifocal Motor Neuropathy (MMN):** Asymmetric, distal, conduction block, anti-GM1, NO sensory signs, IVIG responsive (NOT steroids)
- **POEMS syndrome:** Polyneuropathy, Organomegaly, Endocrinopathy, M-protein, Skin changes (Castleman disease)
- **Paraproteinemic neuropathy:** MGUS, Waldenstrom's, Cryoglobulinemia (hepatitis C)
- **Lewis-Sumner syndrome:** Multifocal acquired demyelinating sensory and motor (MADSAM) - asymmetric CIDP variant
- **Hereditary neuropathy with liability to pressure palsies (HNPP):** PMP22 deletion, focal palsies at compression sites
- **Tangier disease:** Orange tonsils, low HDL, neuropathy
- **Fabry disease:** Burning feet, hypohidrosis, angiokeratomas, X-linked, alpha-galactosidase deficiency
- **Acute motor sensory axonal neuropathy (AMSAN):** Severe axonal variant of GBS, poor recovery

2. APPROACH TO LOWER LIMB WEAKNESS

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (3)

Stem 1: Sudden foot drop, steppage gait, numbness dorsum foot, back pain radiating to leg → pick: **L5 Radiculopathy**
Wrong temptation: Common peroneal palsy (no back pain, no dermatomal pattern)

Stem 2: Weakness climbing stairs, difficulty standing from chair, normal sensation, waddling gait, +ve Gower sign → pick: **Proximal Myopathy**

Stem 3: Bilateral leg weakness with sensory level, back pain, bladder retention, saddle anesthesia → pick: **Cauda Equina Syndrome**
Immediate action: MRI spine + Neurosurgical decompression within 24h

LOCALIZATION TABLE

Feature	Lesion	Why	Stem Giveaway
Foot drop, no back pain	Common peroneal nerve (fibular head)	Compression at fibular head	Crossing legs, weight loss, trauma
Foot drop + back pain + dermatomal sensory	L5 nerve root	Disc herniation L4-L5	+ve Straight leg raise, ankle dorsiflexion weak
Proximal weakness, normal sensation	Muscle (myopathy)	Proximal muscle fiber involvement	Gower positive, can't comb hair
Proximal weakness + fasciculations	LMN (muscular dystrophy, spinal)	Anterior horn cell or muscle	Calf pseudohypertrophy (Duchenne)
Saddle anesthesia + sphincter + areflexia	Cauda equina	L2-S2 roots compressed	Urinary retention, asymmetry allowed

DIFFERENTIAL SPLIT

Condition	Similarity	Key Differentiator	Best Test
Common peroneal palsy	Foot drop	No back pain, site of compression (fibular head), no radicular pain	NCV (conduction block at fibular head)
L5 radiculopathy	Foot drop	Back pain, +ve SLR, sensory changes in L5 dermatome	MRI lumbar spine
Sciatic neuropathy	Foot drop	Weak ankle inversion (tibialis posterior), hamstring weakness	NCV (femoral H-reflex normal)
Anterior compartment syndrome	Foot drop	Post-trauma, pain out of proportion, tenseness anterior leg	Compartment pressure measurement

SPINAL CORD SYNDROMES

Syndrome	Mechanism	Motor	Sensory	Sphincter
Cauda equina	Below L2, nerve roots	LMN (flaccid, areflexic)	Saddle anesthesia	Early retention
Conus medullaris	T12-L2 cord end	LMN (legs), UMN (early)	Saddle, dissociated	Early, overflow incontinence
Central cord	Central gray matter	Upper > lower (corticospinal lamination)	Dissociated suspended	Late
Anterior cord	Anterior spinal a.	UMN below lesion	Pain/temp lost, proprioception spared	Usually involved
Brown-Sequard	Hemisection	Ipsilateral UMN	Ipsi prop, contra pain/temp	Ipsi loss

KMU EXAM TRAPS

- **Cauda equina:** Saddle anesthesia is LATE sign - do NOT wait for it to diagnose
- **Conus vs Cauda:** Conus has early sphincter, less leg weakness; cauda has severe leg weakness
- **Bilateral common peroneal palsies:** Think weight loss, prolonged bed rest, not just bilateral L5 radiculopathy
- **Amyotrophic lateral sclerosis:** Mixed UMN + LMN, NO sensory loss, fasciculations widespread
- **Spinal shock:** Initially flaccid areflexia - don't mistake for LMN lesion; will develop spasticity later
- **Functional weakness:** Hoover's sign (hip extension contralateral), give-way weakness, non-anatomical sensory loss

RARE BUT TESTED (DO NOT SKIP)

- **Guillain-Barré variant with paraparesis:** Pure motor or sensory-motor without arm involvement
- **Spinal epidural abscess:** Back pain, fever, neuro deficits - MRI emergency
- **Spinal dural arteriovenous fistula:** Elderly, progressive spastic paraparesis, worse with exertion
- **Tropical spastic paraparesis (HTLV-1):** Caribbean/Japan, slowly progressive UMN paraparesis
- **Hereditary spastic paraplegia:** Young onset, family history, pure UMN, pes cavus
- **Adrenomyeloneuropathy:** X-linked, young men, spastic paraparesis + adrenal insufficiency

3. DEMENTIA

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (3)

Stem 1: Insidious progressive memory loss, difficulty with recent events, getting lost in familiar places, anosognosia, MMSE 18/30 → pick: **Alzheimer's Disease**
Wrong temptation: Pseudodementia of depression (mood symptoms prominent, "don't know" answers, abrupt onset)

Stem 2: Stepwise cognitive decline, focal neuro deficits, pseudobulbar affect, MRI periventricular white matter changes → pick: **Vascular Dementia**

Stem 3: Visual hallucinations of animals/children, Parkinsonism, fluctuating cognition, REM sleep behavior disorder, severe neuroleptic sensitivity → pick: **Dementia with Lewy Bodies**

CLASSIFICATION & CORE TYPES

Type	First Symptom	Pathognomonic Features	Pathology
Alzheimer's	Episodic memory	Recent >> remote memory loss, progressive aphasia, apraxia	Amyloid plaques, NFTs, hippocampal atrophy
Vascular	Executive function	Stepwise, focal signs, pseudobulbar affect, subcortical pattern	Infarcts, white matter disease, lacunes
Lewy Body	Attention/visuospatial	**Visual hallucinations + Parkinsonism + fluctuations + RBD + neuroleptic sensitivity**	Alpha-synuclein Lewy bodies
Frontotemporal	Behavior or language	Disinhibition, apathy, hyperorality, or non-fluent/semantic aphasia	Tau or TDP-43, frontal/temporal atrophy
Mixed	Variable	Combination of above features	AD + vascular pathology

LOCALIZATION TABLE

Dementia Type	Primary Atrophy	Stem Clue
Alzheimer's	Medial temporal (hippocampus), parietal	"Getting lost," recent memory first
Frontotemporal	Frontal, anterior temporal	"Changed personality," socially inappropriate
Semantic variant PPA	Anterior temporal (left)	Loss of word meaning, fluent but empty
Logopenic variant PPA	Left temporo-parietal	Word-finding pauses, repetition impaired
Posterior cortical atrophy	Occipital-parietal	Visual agnosia, simultanagnosia, Balint syndrome

INVESTIGATIONS

Scenario	First	Best Next	Gold Standard	Confirmatory
Suspected dementia	Cognitive screening (MMSE, MOCA)	MRI brain (atrophy pattern)	Clinical + imaging	PET amyloid/tau (research)
Rapid progression	TSH, B12, syphilis serology	CSF (14-3-3, RT-QuIC for CJD)	Biopsy (rarely)	EEG (periodic sharp waves in CJD)
Young onset (<65)	Genetic testing	Autoimmune encephalitis panel	CSF/serum antibodies	Response to immunotherapy
Drugs	Steroids, stimulants, levodopa	Temporal association	Drug history	

PHARMACOTHERAPY

Drug	Class	Indication	Dose/Notes
Donepezil	Cholinesterase inhibitor	AD, DLB, PDD (all stages)	5-10mg HS, GI side effects
Memantine	NMDA antagonist	Moderate-severe AD	10mg BD, avoid in severe renal
Rivastigmine	Cholinesterase inhibitor	DLB, PDD (patch available)	Start 1.5mg BD, titrate slowly

KMU EXAM TRAPS

- **Neuroleptic sensitivity in DLB:** Can cause fatal parkinsonism/sedation - AVOID haloperidol, use quetiapine if needed
- **Normal pressure hydrocephalus (NPH):** Wet, Wobbly, Wacky - large ventricles, normal pressure, shunt-responsive BUT strict criteria
- **CJD:** Rapid progression (months), myoclonus, periodic sharp waves EEG, 14-3-3 in CSF, "cortical ribboning" DWI MRI
- **Wernicke-Korsakoff:** Thiamine BEFORE glucose in any confused patient with risk factors
- **Pseudodementia:** Depression mimicking dementia - treatable, look for mood symptoms, "don't know" vs "wrong" answers
- **Autoimmune encephalitis:** Subacute onset, psychiatric symptoms, seizures, MRI FLAIR changes, antibodies (anti-NMDAR, LGI1)
- **B12 deficiency:** Dementia + myelopathy + neuropathy - reversible if treated early
- **Neurosyphilis:** "The great mimicker,"任何 dementia workup must include RPR/VDRL

RARE BUT TESTED (DO NOT SKIP)

- **Corticobasal degeneration:** Asymmetric rigidity, apraxia, alien limb phenomenon, myoclonus
- **Progressive supranuclear palsy (PSP):** Vertical gaze palsy (down > up), axial rigidity, early falls, "procerus sign"
- **Multiple system atrophy:** Parkinsonism + autonomic failure (orthostatic hypotension, urinary) + cerebellar signs
- **Creutzfeldt-Jakob disease:** Rapidly progressive, myoclonus, periodic EEG, 14-3-3 protein
- **Hashimoto's encephalopathy:** Steroid-responsive encephalopathy with elevated anti-TPO (not TSH dependent)
- **Limbic-predominant age-related TDP-43 encephalopathy (LATE):** AD-like, amyloid-negative, hippocampal sclerosis
- **Primary progressive aphasia variants:** Nonfluent/agrammatic, semantic, logopenic (often AD pathology)
- **Gerstmann-Sträussler-Scheinker:** Familial prion disease, cerebellar ataxia, genetic (PRNP)

4. ANXIETY AND DEPRESSION

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (3)

Stem 1: Episodic intense fear, palpitations, sweating, chest pain, fear of dying, peaks in 10 minutes, avoids crowded places → pick: **Panic Disorder with Agoraphobia**
Wrong temptation: Acute coronary syndrome (ECG normal, young age, situational trigger)

Stem 2: Persistent low mood >2 weeks, anhedonia, early morning awakening, psychomotor retardation, weight loss, SI passive → pick: **Major Depressive Disorder (Moderate)**

Stem 3: Excessive worry about multiple domains, muscle tension, fatigue, irritability, difficulty concentrating, >6 months → pick: **Generalized Anxiety Disorder**
Wrong temptation: MDD (worry is primary vs mood)

DSM-5 CRITERIA SUMMARIES

Disorder	Key Criteria	Duration	Distinguishing Features
Major Depression	5 of 9 (SIG E CAPS): Sleep, Interest, Guilt, Energy, Concentration, Appetite, Psychomotor, Suicidality, Depressed mood	>2 weeks	Anhedonia + mood + vegetative symptoms
Persistent Depressive (Dysthymia)	Depressed mood most days + 2 symptoms	>2 years (>1 year in children)	Chronic, less severe, never symptom-free >2mo
Panic Disorder	Recurrent unexpected panic attacks + worry/concern/behavior change	>1 month	Sudden peak fear, physical symptoms, anticipatory anxiety
GAD	Excessive worry + 3 of 6 (restlessness, fatigue, concentration, irritability, muscle tension, sleep)	>6 months	Worry is pervasive, difficult to control
Social Anxiety	Fear of social situations + avoidance	>6 months	Fear of scrutiny/embarrassment

MEDICAL MIMICS TO EXCLUDE

System	Condition	Clue	Investigation
Endocrine	Hyperthyroidism	Weight loss, heat intolerance, tremor	TSH free T4
Endocrine	Cushing's	Weight gain, striae, hypertension	Dexamethasone suppression
Neurology	Pheochromocytoma	Episodic hypertension, sweating, anxiety	24h urine catecholamines
Neurology	Complex partial seizures	Deja vu, automatisms, post-ictal confusion	EEG
Nutritional	B12 deficiency	Macrocytosis, neuropathy, glossitis	B12, MMA

MANAGEMENT ALGORITHMS

Condition	First Line	Second Line	Severe/Refractory
Major Depression	SSRI (sertraline, escitalopram) or SNRI	Different SSRI, bupropion, mirtazapine	ECT, TMS, augmentation (lithium, atypical)
Panic Disorder	SSRI (sertraline) or CBT	SNRI, TCAs (imipramine), benzodiazepines short-term	Combined SSRI + CBT, MAOI
GAD	SSRI/SNRI or Buspirone	Pregabalin, benzodiazepines short-term	Combination therapy

CRITICAL DRUG INTERACTIONS & SIDE EFFECTS

- **Serotonin syndrome:** Triad - mental status change, autonomic instability, neuromuscular abnormalities (clonus, hyperreflexia); Risk with SSRI + MAOI, tramadol, St John's wort, triptans
- **Discontinuation syndrome:** Paroxetine > venlafaxine > sertraline; fluoxetine rare (long half-life); Symptoms: dizziness, paresthesias, "electric shocks," insomnia
- **Hyponatremia/SIADH:** SSRIs (especially elderly, low weight, female); check Na at 2 weeks
- **QT prolongation:** Citalopram >40mg (avoid), escitalopram safer
- **Bleeding risk:** SSRIs + NSAIDs/anticoagulants - add PPI protection

KMU EXAM TRAPS

- **Panic attack vs SVT:** Panic peaks in 10min, normal ECG; SVT sudden onset, regular narrow complex, p waves abnormal
- **Akathisia vs anxiety:** Restlessness from antipsychotics/SSRIs, subjective urge to move, treat with propranolol or reduce dose
- **Adjustment disorder:** Stressor within 3mo, symptoms <6mo after stressor resolves; NOT MDD if subthreshold
- **Mixed anxiety-depressive:** Both prominent but neither meets full criteria individually - common in primary care
- **Bipolar depression:** Antidepressants can induce mania - always screen for mania/hypomania history
- **Post-stroke depression:** Common, affects rehabilitation, treat aggressively (SSRIs safe)

RARE BUT TESTED (DO NOT SKIP)

- **Catatonia:** Stupor, mutism, negativism, posturing, waxy flexibility, echo phenomena - treat with lorazepam or ECT
- **Seasonal affective disorder:** Winter depression, light therapy effective
- **Postpartum depression:** Within 4 weeks delivery, distinct from "baby blues" (2 weeks)
- **Malignant catatonia/neuroleptic malignant syndrome:** Hyperthermia, rigidity, autonomic instability, elevated CK
- **5-HT3 antagonist-induced psychiatric symptoms:** Ondansetron can cause anxiety, restlessness

5. STROKE SYNDROMES

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (3)

Stem 1: Sudden onset right face/arm > leg weakness, Broca's aphasia, left gaze preference → pick: **Left MCA territory infarct (superior division)**
Wrong temptation: Global aphasia (requires inferior division also involved)

Stem 2: Sudden vertigo, vomiting, nystagmus, left facial numbness, left palate weakness, right body pain/temp loss → pick: **Lateral Medullary Syndrome (Wallenberg)**
Localization: Crossed cranial nerve + body sensory loss

Stem 3: Locked-in syndrome - quadriplegia, anarthria, preserved consciousness, vertical eye movement intact, bilateral facial palsy → pick: **Basilar artery occlusion (ventral pons)**

ARTERIAL TERRITORY SYNDROMES

Artery	Territory	Motor	Sensory	Special
MCA (superior)	Frontal/parietal convexity	Face/arm > leg (UMN)	Face/arm hemianesthesia	Broca's aphasia (L), gaze deviation toward lesion
MCA (inferior)	Temporal/parietal	Minimal	Face/arm, homonymous hemianopia	Wernicke's aphasia (L), neglect (R)
ACA	Medial frontal/parietal	Leg > arm (UMN)	Leg sensory loss	Abulia, urinary incontinence, grasp reflex
PCA	Occipital, medial temporal	Minimal (thalamus)	Thalamic pain syndrome	Homonymous hemianopia, alexia without agraphia (splenium)
Basilar	Brainstem, cerebellum	Quadriplegia (pons)	Variable	Locked-in, coma, cranial nerve palsies, vertigo

BRAINSTEM CROSSED SYNDROMES

Syndrome	Location	Ipsilateral CN Deficit	Contralateral Body Deficit
Weber	Midbrain	CN III palsy (down and out)	Hemiplegia
Benedikt	Midbrain tegmentum	CN III palsy	Hemiplegia + intention tremor (red nucleus)
Millard-Gubler	Lower pons	CN VI + VII palsy	Hemiplegia
Wallenberg (Lateral medullary)	Lateral medulla	V, IX, X (dysphagia, hoarseness), Horner's	Pain/temp loss body
Medial medullary	Medial medulla	CN XII (tongue deviation)	Hemiplegia + proprioception loss

EMERGENCY MANAGEMENT (STEPWISE)

Step	Action	Details
1	**ABCs + stabilize**	Airway protection if GCS <8, O2 if sats <94%
2	**Immediate CT head**	Non-contrast to exclude hemorrhage (do NOT delay treatment)
3	**Thrombolysis window**	Alteplase 0.9mg/kg (max 90mg) if <4.5h from known onset
4	**BP management**	Permissive HTN (up to 220/120) unless thrombolysis candidate or hemorrhage
5	**Thrombectomy**	If LVO (ICA, MCA M1), <6h (up to 24h with perfusion imaging)
6	**Secondary prevention**	Antiplatelet (aspirin 300mg load then 75mg), statin, rehabilitation

THROMBOLYSIS CONTRAINDICCTIONS (ABSOLUTE)

- Active internal bleeding or bleeding diathesis
- Intracranial hemorrhage history or recent intracranial surgery
- Recent major surgery/trauma (<14 days)
- Suspected aortic dissection
- Platelets <100,000, INR >1.7, aPTT >40s (if on heparin)
- Glucose <50 or >400 mg/dL (mimics stroke)
- Seizure at onset with post-ictal deficit

KMU EXAM TRAPS

- **Hypoglycemia mimics stroke:** Always check glucose immediately - "Treat numbers before anatomy"
- **Todd's paralysis:** Post-ictal weakness, resolves within 24-48h, do NOT thrombolyze
- **Lacunar syndromes:** Pure motor, pure sensory, ataxic hemiparesis, dysarthria-clumsy hand - NO cortical signs (aphasia, neglect)
- **Cortical vs subcortical:** Aphasia, neglect, visual field cuts = cortical; pure motor/sensory = subcortical
- **Posterior circulation:** Often missed - dizziness, vertigo, ataxia, diplopia with crossed signs = brainstem
- **Cerebellar infarct:** Can cause coma from edema day 2-3 - monitor closely, decompress if deteriorating

RARE BUT TESTED (DO NOT SKIP)

- **Top of the basilar syndrome:** Midbrain + thalamic + occipital signs, visual hallucinations, memory loss, somnolence
- **Alien hand syndrome:** Callosal or frontal variant, involuntary grasping, intermanual conflict
- **Pure alexia without agraphia:** Splenium of corpus callosum + left occipital (disconnection syndrome)
- **Balint syndrome:** Bilateral parietal-occipital: simultanagnosia, optic ataxia, ocular apraxia
- **CADASIL:** Cerebral autosomal dominant arteriopathy, migraines, subcortical infarcts, dementia, NOTCH3 gene
- **Moyamoya disease:** Progressive stenosis circle of Willis, "puff of smoke" collaterals, Asian, children + adults
- **Reversible cerebral vasoconstriction syndrome (RCVS):** Thunderclap headache, multifocal narrowing, postpartum

6. SUBARACHNOID HEMORRHAGE (SAH)

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (3)

Stem 1: "Thunderclap headache" reaching maximum intensity in seconds, described as "hit by baseball bat," meningismus, mild fever → pick: **Subarachnoid Hemorrhage**
Wrong temptation: Migraine (thunderclap is NEVER migraine - investigate immediately)

Stem 2: Sudden severe headache, CN III palsy (down and out eye, ptosis, mydriasis), altered consciousness → pick: **PCA aneurysm rupture**
Localization: CN III runs between PCA and SCA

Stem 3: SAH patient, day 5 post-bleed, deteriorating consciousness, new focal deficit, hyponatremia → pick: **Cerebral vasospasm with delayed ischemic neurologic deficit (DIND)**

LOCALIZATION TABLE

Sign	Lesion/Location	Stem Clue
CN III palsy + SAH	Posterior communicating artery aneurysm	Isolated pupillary involvement (peripheral fibers)
CN VI palsy + SAH	Increased ICP (false localizing)	Bilateral or isolated
Retinal subhyaloid hemorrhages	Sudden ICP increase, tracking under ILM	Fundoscopy "boxcar" or "globe"
Xanthochromia	RBC breakdown in CSF >12h	Yellow supernatant after centrifugation

INVESTIGATIONS ALGORITHM

Scenario	First	Best Next	Gold Standard	Confirmatory
Suspected SAH	CT non-contrast (100% sens if <6h)	CTA if positive	DSA (Digital Subtraction Angiography)	CSF xanthochromia if CT negative >6h
Negative CT, high suspicion	LP at 12h-2wks post-headache	Spectrophotometry (not visual)	Repeat CTA/MRA	Negative LP essentially excludes SAH

MANAGEMENT (STEPWISE)

Step	Action	Critical Detail
1	**Nimodipine**	60mg PO/NG q4h x 21 days (prevents vasospasm) - START IMMEDIATELY, not for BP control
2	**BP control**	SBP <160 pre-securing aneurysm (nicardipine, labetalol)
3	**Secure aneurysm**	**Endovascular coiling** preferred if feasible (ISAT trial); **Clipping** if broad neck, inaccessible
4	**Vasospasm monitoring**	Days 3-14 highest risk; TCD daily, neurological checks
5	**Triple H therapy**	Hypertension (induced), Hypervolemia, Hemodilution if symptomatic vasospasm
6	**Hydrocephalus management**	External ventricular drain (EVD) if obstructive/symptomatic

NIMODIPINE PROTOCOL

Dose: 60mg PO/NG every 4 hours for 21 days
Timing: Start within 96h of bleed
Side effects: Hypotension (do not treat by stopping nimodipine), flushing
IV alternative: Not recommended (hypotension); if PO/NG impossible, 1mg/hr IV with careful BP monitoring

KMU EXAM TRAPS

- **Sentinel bleed:** Minor warning headache days-weeks before - 10-43% of patients, misdiagnosed as "tension headache" - mortality of rebleed 70%
- **CT false negative:** Sensitivity 100% at 6h, 85% at day 3, 50% at day 7 - LP mandatory if suspicion persists
- **Vasospasm timing:** Peak day 7, can occur day 3-14; causes delayed cerebral ischemia (DCI)
- **Hydrocephalus:** Acute (obstructive) from blood in ventricles; chronic (communicating) weeks later
- **Hyponatremia:** Cerebral salt wasting (urine Na high, volume depleted) vs SIADH (volume overloaded) - treat CSW with Na/fluids
- **Cardiac dysfunction:** Neurogenic stunned myocardium (Takotsubo), ECG changes, troponin rise - NOT acute coronary syndrome

RARE BUT TESTED (DO NOT SKIP)

- **Perimesencephalic SAH:** Benign variant, venous origin, center of brainstem cisterns, good prognosis, no aneurysm found
- **Reversible cerebral vasoconstriction syndrome (RCVS):** Thunderclap headache with vasospasm, no aneurysm, postpartum, sympathomimetics
- **Sickle cell and SAH:** Moyamoya pattern, increased risk
- **Aneurysm screening:** 2 first-degree relatives with SAH = MRA screening recommended
- **ADPKD:** 10% have intracranial aneurysms - screen if family history of aneurysm
- **Spinal SAH:** Sudden back pain, radiculopathy, rare; causes include AVM, coagulopathy
- **Pituitary apoplexy:** Sudden headache, visual loss, ophthalmoplegia, hypotension - MRI shows hemorrhagic pituitary

7. COMA

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (3)

Stem 1: Coma, pinpoint pupils, respiratory depression, track marks, naloxone responsive → pick: **Opioid overdose**
Immediate action: Naloxone 0.4-2mg IV, repeat as needed

Stem 2: Coma, bilateral fixed dilated pupils, decerebrate posturing, history of head trauma, unilateral blown pupil earlier → pick: **Transtentorial herniation (central)**

Stem 3: Coma, nystagmus, ophthalmoplegia, ataxia, confusion, history of alcoholism → pick: **Wernicke's encephalopathy**
Immediate action: IV Thiamine 200-500mg TID BEFORE glucose

GLASGOW COMA SCALE (GCS)

Component	Score	Response
Eye (E)	4	Spontaneous
	3	To voice
	2	To pain
	1	None
Verbal (V)	5	Alert & oriented
	4	Confused
	3	Inappropriate words
	2	Incomprehensible
	1	None
Motor (M)	6	Obeys commands
	5	Localizes pain
	4	Withdraws from pain
	3	Flexion (decorticate)
	2	Extension (decerebrate)
	1	None

E4V5M6 = 15 (normal) | E1V1M1 = 3 (deep coma) | GCS ≤8 = Intubate for airway protection

PUPIL LOCALIZATION

Pupil Finding	Localization	Common Causes
Pinpoint	Pons (sympathetic tract)	Opioids, organophosphates, pontine hemorrhage
Mid-position fixed (3-5mm)	Midbrain	Midbrain lesion, anticholinergics, glutethimide
Dilated fixed	CN III compression (uncal)	Herniation, posterior communicating aneurysm
Reactive normal	Metabolic/diffuse	Drug overdose, hypoglycemia, hepatic, uremic
Horner's syndrome (miosis)	Sympathetic chain	Lateral medulla (Wallenberg), carotid dissection

7. COMA (CONTINUED) & 8. EPILEPSY PREVIEW

RARE BUT TESTED (DO NOT SKIP) - COMA

- **Psychogenic unresponsiveness:** Hoover sign, eye resistance, normal pupillary reflexes, normal calorics
- **Akinetic mutism:** Frontal lobe/anterior cingulate - alert, immobile, mute, follows with eyes
- **Catatonia:** Waxy flexibility, posturing, negativism, excitement alternating - treat with lorazepam
- **Status epilepticus (non-convulsive):** Coma with subtle eye movements, diagnose with EEG
- **Hypothermia:** Core temp <32°C can cause coma resembling brain death - rewarm before declaring
- **Delayed post-hypoxic leukoencephalopathy:** Recovery from CO poisoning then relapse weeks later

COMA MNEMONIC: AEIOU TIPS

Alcohol, **E**pilepsy/Electrolytes, **I**nsulin (hypo/hyperglycemia), **O**pium/Overdose, **U**remia
Trauma/Temperature, **I**nfection, **P**sychogenic, **S**hock/Stroke/Space-occupying lesion

COMA EMERGENCY MANAGEMENT (ABCDE)

Step	Action	Critical Notes
A	**Airway**	Intubate if GCS ≤8, no gag reflex, or respiratory failure
B	**Breathing**	O2, monitor SpO2, CO2 if ventilated
C	**Circulation**	IV access, fluids, pressors if shock
D	**Drugs/Dextrose**	Thiamine 200-500mg IV, then D50 if hypoglycemia, naloxone if suspected opioid
E	**Examination/Environment**	Full neuro exam, temperature, exposure, look for trauma signs

BRAINSTEM REFLEXES

Reflex	How to Test	Intact Indicates	Absent Indicates
Pupillary light	Light in eye	CN II (afferent), CN III (efferent)	Midbrain or CN III lesion
Corneal	Cotton wisp	CN V (afferent), CN VII (efferent)	Pons lesion
Vestibulo-ocular (doll's eyes)	Turn head (C-spine cleared)	Brainstem intact	Brainstem lesion (unless vestibulotoxic drugs)
Caloric (oculovestibular)	Ice water in ear	MLF, CN III, VI intact	Brainstem death if absent bilaterally
Gag/cough	Stimulate pharynx/trachea	CN IX, X intact	Lower brainstem lesion

KMU EXAM TRAPS

- **Locked-in syndrome:** Awake and aware, vertical eye movement intact - pontine lesion, NOT coma
- **Vegetative state:** Wakefulness without awareness, sleep-wake cycles present
- **Minimally conscious state:** Minimal but definite behavioral evidence of self/environment awareness
- **Pseudocoma:** Psychogenic unresponsiveness - Hoover's sign (leg extension), active eyelid resistance, normal optokinetic nystagmus
- **Brain death:** Coma + absent brainstem reflexes + apnea test + known irreversible cause (no drugs/temperature)
- **Decorticate (flexor) posturing:** Arms flexed, legs extended - lesion above red nucleus (hemispheric)
- **Decerebrate (extensor) posturing:** Arms extended, legs extended - lesion at/below red nucleus (midbrain/pons)

8. EPILEPSY

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (3)

Stem 1: Blank stare, lip smacking, automatisms (picking at clothes), post-ictal confusion, no recall, normal between episodes → pick: **Complex Partial Seizure (Focal impaired awareness)**
Wrong temptation: Absence (no post-ictal confusion, abrupt onset/offset, 3Hz spike-wave)

Stem 2: Sudden brief jerks of shoulders/arms, consciousness preserved, occurs on awakening, photosensitive, adolescent onset → pick: **Myoclonic Seizures (Juvenile Myoclonic Epilepsy)**

Stem 3: 3Hz spike-and-wave on EEG, brief 10-20 second loss of consciousness without post-ictal state, hyperventilation trigger, child 4-10 years → pick: **Absence Seizures (Childhood Absence Epilepsy)**

ILAE 2017 CLASSIFICATION

Type	Onset	Awareness	Key Features
Focal onset	One hemisphere	Preserved OR impaired	May evolve to bilateral tonic-clonic; aura common
Generalized	Both hemispheres	Impaired	Tonic-clonic, absence, myoclonic, atonic, tonic, clonic
Unknown onset	Unclear	Variable	Motor (tonic-clonic) or non-motor (epileptic spasms)

FOCAL SEIZURE SEMI-LOCALIZATION

Semiology	Localization
Jacksonian march (spreading)	Contralateral motor cortex
Unilateral sensory (tingling)	Contralateral sensory cortex
Visual (flashing lights, formed images)	Occipital
Olfactory/gustatory hallucinations	Medial temporal (uncus)
Automatisms (lip smacking, picking)	Mesial temporal (amygdala/hippocampus)
Early dystonic posturing	Contralateral hemisphere (version)
Ictal speech	Nondominant temporal; post-ictal aphasia = dominant

AED SELECTION BY SEIZURE TYPE

Seizure Type	First Line	Avoid (May Worsen)
Focal onset	Levetiracetam, Lamotrigine, Carbamazepine, Valproate	--
Generalized Tonic-Clonic	Valproate, Levetiracetam, Lamotrigine, Topiramate	Carbamazepine, Phenytoin, Oxcarbazepine, Gabapentin
Absence	Ethosuximide, Valproate, Lamotrigine	Carbamazepine, Phenytoin, Gabapentin, Tiagabine
Myoclonic	Valproate, Levetiracetam, Clonazepam	Carbamazepine, Phenytoin, Lamotrigine (can worsen)
Dravet syndrome	Clobazam, Stiripentol, Valproate	**Sodium channel blockers (CBZ, LTG) - worsen**

STATUS EPILEPTICUS (EMERGENCY)

Time	Phase	Definition	Mortality
5-30 min	Early/Emergent	Continuous or recurrent without recovery	Increasing
30-60 min	Established	Refractory to initial benzodiazepine	10-20%
>60 min	Refractory	Failure of 2 appropriate AEDs	20-40%

STATUS EPILEPTICUS PROTOCOL

0-5 min: ABCs, O2, cardiac monitor, IV access, glucose check
5-20 min: Lorazepam 4mg IV (can repeat once) OR Midazolam 10mg IM (if no IV)
20-40 min: Levetiracetam 60mg/kg (max 4500mg) OR Fosphenytoin 20mg PE/kg OR Valproate 40mg/kg
40-60 min: Repeat second-line OR Phenobarbital 20mg/kg
>60 min: General anesthesia (propofol, midazolam infusion), ICU, EEG monitoring

8. EPILEPSY (CONTINUED)

SPECIAL EPILEPSY SYNDROMES

Syndrome	Age	Seizure Types	EEG	Key Features
Childhood Absence	4-10 yrs	Absence	3Hz spike-wave	Multiple daily, photosensitivity, good prognosis
Juvenile Absence	10-17 yrs	Absence, GTCS	3-4Hz spike-wave	Less frequent absences, morning GTCS
Juvenile Myoclonic	12-18 yrs	Myoclonic, GTCS, Absence	4-6Hz polyspike-wave	Morning myoclonus, photosensitivity, lifelong
Infantile Spasms (West)	<1 yr	Spasms	Hypsarrhythmia	Cryptogenic vs symptomatic, developmental arrest
Lennox-Gastaut	3-5 yrs	Multiple types	Slow spike-wave (<2.5Hz)	Tonic, atonic drop attacks, intellectual disability
Dravet	<1 yr	Prolonged febrile, myoclonic	Normal early, then slowing	SCN1A mutation, avoid sodium blockers
Benign Rolandic	3-13 yrs	Focal hemifacial	Centrotemporal spikes	Nocturnal, self-limited, excellent prognosis

KMU EXAM TRAPS - EPILEPSY

- **SUDEP:** Sudden Unexpected Death in Epilepsy - 1:1000 patient-years, risk factors: uncontrolled GTCS, young, male, nocturnal seizures
- **Absence vs Complex Partial:** Absence = brief (10-20s), no post-ictal, hyperventilation trigger, 3Hz; Complex Partial >1min, post-ictal confusion, automatisms
- **Pseudoseizures (PNES):** Eye closure (seizures = open), asynchronous movements, pelvic thrusting, side-to-side head, crying, recall of event
- **Reflex seizures:** Photosensitivity (video games/strobe), reading, eating, hot water, music - specific triggers
- **Catamenial epilepsy:** Perimenstrual exacerbation, treat with intermittent clobazam or increase baseline AED
- **Epilepsy surgery:** Mesial temporal sclerosis best candidate - refractory for >2 years, unilateral focus
- **Ketogenic diet:** Effective in GLUT1 deficiency, Dravet, infantile spasms - strict medical supervision required

RARE BUT TESTED (DO NOT SKIP)

- **Autosomal Dominant Nocturnal Frontal Lobe Epilepsy (ADNFLE):** CHRNA4 mutation, hyperkinetic nocturnal seizures, misdiagnosed as parasomnia
- **Progressive Myoclonic Epilepsies:** Unverricht-Lundborg (Baltic myoclonus), Lafora body disease (polyglucosan bodies), Neuronal ceroid lipofuscinosis
- **Rasmussen's encephalitis:** Childhood, unilateral inflammation, intractable seizures, hemiparesis, hemispherectomy curative
- **Hypothalamic hamartoma gelastic seizures:** Laughing seizures, precocious puberty, MRI shows mass at tuber cinereum
- **Landau-Kleffner syndrome:** Acquired epileptic aphasia, 3-7 years, verbal auditory agnosia, CSWS on EEG
- **Continuous Spike-Wave during Sleep (CSWS):** Electrical status epilepticus in sleep, regression, treatment high-dose steroids

9. MOVEMENT DISORDERS

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (3)

Stem 1: Multiple motor tics (eye blinking, shoulder shrugging), vocal tics (grunting), onset childhood, waxing/waning, suppressible but builds tension → pick: **Tourette Syndrome**
Wrong temptation: Chorea (non-suppressible, random flowing, no premonitory urge)

Stem 2: Dance-like random flowing movements, non-suppressible, affects face/trunk/limbs, adult onset with dementia + family history → pick: **Huntington's Disease**

Stem 3: Sustained twisting neck posture (torticollis), dystonic tremor, pain, geste antagoniste (touch cheek improves) → pick: **Cervical Dystonia**

PHENOMENOLOGY CLASSIFICATION

Movement	Characteristics	Examples/Diseases
Tremor	Rhythmic oscillation, alternating contractions	Essential (action), Parkinson's (rest), Cerebellar (intention), Physiologic
Chorea	Random, flowing, non-suppressible, dance-like	Huntington's, Sydenham's, drug-induced, vascular
Athetosis	Slow, writhing, continuous, fingers/toes	Cerebral palsy, basal ganglia lesions, Huntington's
Dystonia	Sustained muscle contraction, twisting, repetitive	Idiopathic focal (cervical, blepharospasm), generalized (DYT1)
Tics	Sudden, repetitive, stereotyped, suppressible with urge	Tourette's, transient/chronic motor/vocal tic disorder
Myoclonus	Shock-like, brief, arrhythmic jerks	Epileptic, essential, palatal, hypnic jerk, metabolic
Asterixis	Negative myoclonus (brief lapse of posture)	Hepatic/uremic encephalopathy, drug toxicity

PATHOGNOMONIC SIGNS

Sign	Description	Localization/Disease
Wilson's: Kayser-Fleischer rings	Copper deposition in Descemet's membrane, brown-green	Hepatolenticular degeneration (copper)
Huntington's triad	Chorea + dementia + psychiatric symptoms + autosomal dominant	Caudate atrophy, CAG repeats HTT gene
Tourette's criteria	Multiple motor + one or more	Basal ganglia circuits, Tourette syndrome

- **GLUT1 deficiency:** Low CSF glucose, refractory seizures, developmental delay, responds to ketogenic diet

	vocal tics, <18 onset, >1 year	
Wilson's: Sunflower cataract	Copper deposition in lens	Same as above
Geste antagoniste	Sensory trick relieves dystonia	Cervical dystonia (touch cheek/chin)

LOCALIZATION OF MYOCLONUS

Type	Source	Features	Examples
Cortical	Sensorimotor cortex	Focal, rhythmic, precedes seizure, giant SSEP	Progressive myoclonic epilepsies
Subcortical	Brainstem	Generalized, stimulus-sensitive, no EEG correlate	Startle, reticular reflex myoclonus
Spinal	Spinal cord	Segmental, rhythmic, persists in sleep	Propriospinal myoclonus
Peripheral	Nerve root/plexus	Focal, rhythmic, EMG burst short	Hemifacial spasm (vascular compression CN VII)

KMU EXAM TRAPS

- **Dopa-responsive dystonia (DRD):** Childhood onset, diurnal variation (worse evening), low dose levodopa dramatic response - gene GCH1
- **Psychogenic movement disorders:** Acute onset, static course, distractibility, entrainment to rhythmic movements, inconsistent
- **Tardive dyskinesia:** Orofacial movements (chewing, tongue), from chronic dopamine blockers (metoclopramide, antipsychotics)
- **Drug-induced parkinsonism:** Metoclopramide, prochlorperazine, valproate - reversible on withdrawal
- **Orthostatic tremor:** 13-18Hz tremor on standing, relieved by walking, diagnosed by weight-bearing EMG
- **Functional (psychogenic) tremor:** Entrainment (tremor changes to match rhythmic movement of other limb), variable frequency

RARE BUT TESTED (DO NOT SKIP)

- **Neuroacanthocytosis:** Chorea, tics, dystonia, acanthocytes on blood smear, McLeod syndrome (X-linked)
- **Benign hereditary chorea:** NKX2-1 gene, childhood onset, non-progressive, no dementia
- **Paroxysmal kinesigenic dyskinesia:** Sudden movement triggers dystonia/chorea, brief seconds, PRRT2 gene, responds to carbamazepine
- **Paroxysmal non-kinesigenic dyskinesia:** Alcohol/caffeine triggered, longer attacks (minutes-hours), MR-1 gene
- **Ataxia-telangiectasia:** Childhood ataxia, oculocutaneous telangiectasias, immunodeficiency, ATM gene
- **Neurodegeneration with brain iron accumulation (NBIA):** PKAN (eye of the tiger MRI), dystonia, parkinsonism
- **Segawa syndrome:** Dopa-responsive dystonia, GCH1 mutation, dramatic levodopa response

10. PARKINSON'S DISEASE

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (3)

Stem 1: Asymmetric resting tremor, cogwheel rigidity, bradykinesia, micrographia, shuffling gait with reduced arm swing, anosmia, REM sleep behavior disorder preceding → pick: **Idiopathic Parkinson's Disease**
Wrong temptation: Essential tremor (action tremor, bilateral, improves with alcohol, no rigidity)

Stem 2: Parkinsonism with early falls (within first year), vertical gaze palsy (down > up), axial rigidity > appendicular, poor levodopa response → pick: **Progressive Supranuclear Palsy (PSP)**

Stem 3: Parkinsonism with orthostatic hypotension, urinary incontinence, erectile dysfunction, cerebellar ataxia, RBD → pick: **Multiple System Atrophy (MSA)**

CLINICAL FEATURES (TRAP)

Feature	Description	How to Examine
Tremor at rest	Pill-rolling, 4-6Hz, starts unilateral, stress exacerbates	Observe hands in lap, count beats (asymmetric onset key)
Rigidity	Cogwheel (ratchet-like) or lead-pipe (constant)	Supination-pronation at wrist, flexion-extension at elbow
Akinesia/Bradykinesia	Slow initiation, progressive reduction in amplitude	Finger taps, hand grips, rapid alternating movements (pronation-supination)
Postural Instability	Late finding (>5 years in PD), retropulsion	Pull test (stand behind, pull shoulders back)

ATYPICAL PARKINSONISM RED FLAGS

Feature	PD	PSP	MSA	DLB	Corticobasal
Onset symmetry	Asymmetric	Symmetric	Symmetric	Symmetric	Asymmetric
Tremor	Resting, prominent	Postural/vertical gaze	Jerky/postural	Minimal	Myoclonus
Postural instability	Late	**Early (<1 year)**	Early	Early	Variable
Vertical gaze	Normal	**Impaired (down > up)**	Normal	Normal	Normal
Autonomic features	Late	Late	**Early & severe**	Mild	No
Levodopa response	Excellent	Poor	Poor/Moderate	Moderate	Poor
Cognitive decline	Late	Late	Late	**Early**	Variable

MANAGEMENT (STEPWISE)

Stage	Strategy	Options
Early (young <65)	Delay levodopa dyskinesia	Dopamine agonists (ropinirole, pramipexole), MAO-B inhibitors (rasagiline, selegiline)
Early (older >65)	Start levodopa	Levodopa/carbidopa (start low, slow titration)
Motor fluctuations	Reduce off time	COMT inhibitors (entacapone), MAO-B inhibitors, long-acting levodopa (Rytary, Duodopa)

10. PARKINSON'S DISEASE (CONTINUED)

RARE BUT TESTED (DO NOT SKIP)

- **Parkin-associated PD (PARK2):** Young onset, slow progression, dystonia at onset, levodopa-induced dyskinesias early, hyperreflexia
- **LRRK2 (G2019S):** Most common genetic cause, Ashkenazi Jewish/North African Arab, indistinguishable from sporadic
- **SNCA multiplication:** Gene dosage correlates with severity, early dementia, autonomic features
- **GBA-associated PD:** Gaucher carriers, earlier onset, more cognitive impairment
- **X-linked dystonia-parkinsonism (Lubag):** Filipino males, focal dystonia progressing to generalized
- **Rapid-onset dystonia-parkinsonism:** Sudden onset after stress, rostrocaudal gradient, ATP1A3 gene
- **Pallidopyramidal (Kufor-Rakeb) syndrome:** Juvenile onset, supranuclear gaze palsy, spasticity, ATP13A2 gene
- **Neurodegeneration with brain iron accumulation (PKAN):** Early onset, dystonia, eye of the tiger MRI

DEEP BRAIN STIMULATION (DBS) CRITERIA

- Clear response to levodopa (predicts DBS response)
- Idiopathic PD (not atypical parkinsonism)
- No cognitive impairment or psychiatric contraindications
- Targets: **STN** (allows medication reduction) or **GPi** (more antidyskinetic, better for psychiatric)

Dyskinesias	Reduce peak-dose chorea	Amantadine, reduce individual doses, add dopamine agonist
Refractory	Device-aided	Deep Brain Stimulation (STN or GPi), apomorphine pump, levodopa-carbidopa intestinal gel

LEVODOPA-INDUCED COMPLICATIONS

- **Wearing-off:** Shorter duration of benefit, predictable end-of-dose deterioration
- **On-off phenomenon:** Unpredictable sudden transitions
- **Dyskinesias:** Peak-dose (chorea), diphasic (beginning and end of dose), off-period dystonia (early morning)
- **Impulse control disorders:** Gambling, shopping, hypersexuality, binge eating (dopamine agonists > levodopa)
- **Punding:** Repetitive, purposeless complex behaviors
- **ICD (impulse control disorder):** Check at every visit if on agonists

KMU EXAM TRAPS

- **Drug-induced parkinsonism:** Metoclopramide, prochlorperazine, haloperidol, risperidone - check medication history FIRST
- **Vascular parkinsonism:** Lower body (gait freezing), pyramidal signs, pseudobulbar palsy, poor levodopa response
- **Wilson's disease:** Young onset (<40), psychiatric symptoms, liver disease, Kayser-Fleischer rings - **Ceruloplasmin low, 24h urine copper high**
- **Normal Pressure Hydrocephalus:** Wet (urinary incontinence), Wobbly (gait ataxia), Wacky (dementia) - **Shunt-responsive if strict criteria**
- **Psychogenic parkinsonism:** Acute onset, static course, distractible tremor, give-way rigidity, bizarre gait
- **Scans without evidence of dopaminergic deficit (SWEDD):** Looks like PD but DaTscan normal - essential tremor or dystonic tremor

11. HEADACHE

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (3)

Stem 1: Unilateral throbbing headache, nausea, photophobia, phonophobia, worsens with activity, lasts 4-72h, family history → pick: **Migraine without Aura**
Wrong temptation: Tension-type (bilateral, pressing, no nausea, not aggravated by routine activity)

Stem 2: Daily continuous headache, bilateral pressing/tightening, mild-moderate, no nausea, stress-related, "band-like" → pick: **Chronic Tension-Type Headache**

Stem 3: Severe unilateral orbital/temporal pain, 15-180min, autonomic features (lacrimation, rhinorrhea, ptosis), restless, alcohol triggers → pick: **Cluster Headache**

PRIMARY HEADACHE COMPARISON

Feature	Migraine	Tension-Type	Cluster
Location	Unilateral (60%)	Bilateral	Orbital/temporal (strictly unilateral)
Quality	Pulsating/throbbing	Pressing/tightening	Boring/drilling/stabbing
Severity	Moderate-severe	Mild-moderate	Severe-very severe (suicidal)
Duration	4-72h	30min-continuous	15-180min
Frequency	Variable	Variable/continuous	1 every other day - 8 per day
Associated	N/V, photophobia, phonophobia	None or photophobia/phonophobia (not both)	Autonomic (conjunctival injection, tearing, rhinorrhea, miosis, ptosis)
Behavior	Rests in dark room, motionless	Normal activity	Paces, restless, agitated
Triggers	Hormonal, food, sleep change, stress	Stress, posture	Alcohol, nitroglycerin, strong smells

SECONDARY HEADACHE RED FLAGS (SNOOP)

Letter	Feature	Suspicion
S	Systemic symptoms (fever, weight loss) or Secondary risk factors (HIV, cancer)	Meningitis, giant cell arteritis, metastasis
N	Neurologic signs or symptoms	Intracranial mass, stroke
O	Onset sudden (thunderclap)	SAH, dissection, venous sinus thrombosis
O	Onset after age 50 (new)	Giant cell arteritis, mass lesion
P	Pattern change (progressive, or different from usual)	Mass lesion, medication overuse

ACUTE MIGRAINE TREATMENT

Step	Medications	Notes
1 (Mild)	NSAIDs, acetaminophen	Early treatment most effective
2 (Moderate)	Triptans (sumatriptan 50-100mg)	5-HT1B/1D agonists; contraindicated in CAD, PVD
3 (Severe)	Triptan + NSAID/antiemetic	Metoclopramide for nausea/gastroparesis
Refractory	Dihydroergotamine, antiemetic	Avoid if triptan used within 24h

KMU EXAM TRAPS

- **Medication overuse headache:** >10 days/month simple analgesics or >15 days/month triptans/opioids; treat by withdrawal
- **Thunderclap headache:** Always investigate - SAH, dissection, RCVS, pituitary apoplexy, cerebral venous thrombosis
- **Hemicrania continua:** Continuous unilateral headache, absolutely responsive to indomethacin
- **Paroxysmal hemicrania:** Multiple short attacks daily, also indomethacin-responsive
- **SUNCT/SUNA:** Short-lasting unilateral neuralgiform headache with conjunctival injection/tearing; refractory to standard therapy
- **New daily persistent headache:** Abrupt onset, continuous from onset, recalls exact date; may be migraine or tension phenotype

12. MIGRAINE

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (3)

Stem 1: Visual scintillating scotoma spreading over 20min, fortification spectra, followed by unilateral throbbing headache, photophobia → pick: **Migraine with Aura (Classic)**
Wrong temptation: TIA (aura positive symptoms spread slowly; TIA negative symptoms, sudden maximal)

Stem 2: Acute onset occipital headache, visual blurring, papilledema, young female on OCP, obese → pick: **Cerebral Venous Sinus Thrombosis**
Immediate action: MRI/MRV brain, heparin anticoagulation

Stem 3: >15 headache days/month for >3 months, >8 with migrainous features, ergot/triptan overuse → pick: **Chronic Migraine with Medication Overuse**

AURA TYPES & LOCALIZATION

Aura Type	Phenomenon	Localization	Duration
Visual (90%)	Scintillating scotoma, fortification spectra, teichopsia	Occipital cortex (spreading depression)	5-60min
Sensory	Paresthesias spreading hand-to-arm-to-face	Parietal cortex	5-60min
Speech	Dysphasia, word-finding difficulty	Dominant hemisphere frontal/temporal	5-60min
Motor (hemiplegic)	Unilateral weakness	Frontal cortex (motor strip)	5min-72h
Brainstem	Dysarthria, vertigo, tinnitus, diplopia, ataxia	Brainstem	5-60min
Retinal	Monocular visual loss	Retina	5-60min

PROPHYLAXIS INDICATIONS & OPTIONS

Indication	First Line	Second Line	Special Populations
>4 migraine days/month, disabling, acute treatment failure	Propranolol (80-240mg), Amitriptyline (10-100mg), Topiramate (50-100mg)	Sodium valproate, Candesartan, CGRP inhibitors (erenumab)	Pregnancy: magnesium, biofeedback; Avoid: topiramate (teratogenic), valproate

CGRP INHIBITORS (NEWER AGENTS)

Monoclonal antibodies: Erenumab (receptor antagonist), Fremanezumab, Galcanezumab (ligand antibodies)
Indication: Failed 2-3 preventive treatments
Administration: Monthly SC injection
Side effects: Constipation (erenumab), injection site reactions
Gepants (oral): Ubrogepant, Rimegepant - acute and preventive

KMU EXAM TRAPS - MIGRAINE

- **Migraine with aura = stroke risk:** 2x increased ischemic stroke risk, especially if aura, female, smoker, OCP - avoid estrogen OCP
- **Hemiplegic migraine:** Can mimic stroke - aura includes motor weakness; may last hours-days; familial (CACNA1A, ATP1A2) vs sporadic
- **Basilar-type migraine:** Brainstem symptoms, young women, can cause LOC; rule out vertebrobasilar TIA
- **Status migrainosus:** >72h continuous migraine, requires IV treatment (magnesium, DHE, steroids)
- **Migrainous infarction:** Ischemic stroke occurring during typical aura - diagnosis of exclusion
- **Persistent aura without infarction:** Aura >1 week, normal imaging, exclusion diagnosis

RARE BUT TESTED (DO NOT SKIP)

- **Familial hemiplegic migraine (FHM):** FHM1 (CACNA1A - also episodic ataxia 2), FHM2 (ATP1A2), FHM3 (SCN1A)
- **CADASIL:** Migraine with aura (often hemiplegic), subcortical infarcts, dementia, NOTCH3 gene, leukoariosis
- **MELAS:** Mitochondrial, migraine, encephalopathy, lactic acidosis, stroke-like episodes, ragged red fibers
- **Alternating hemiplegia of childhood:** ATP1A3 gene, paroxysmal hemiplegia, developmental delay
- **Retinal migraine:** Monocular visual loss, must exclude amaurosis fugax (carotid), optic neuritis

13. MENINGITIS

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (3)

Stem 1: Fever, severe headache, neck stiffness, photophobia, altered mental status, petechial/purpuric rash, hypotension → pick: **Meningococcal Meningitis**
Immediate action: Blood cultures + IV Ceftriaxone + Vancomycin within 30min

Stem 2: Subacute headache, confusion, low-grade fever, cranial nerve palsies, papilledema, immunocompromised/HIV → pick: **Cryptococcal/Tuberculous Meningitis**

Stem 3: Aseptic meningitis, summer/fall onset, maculopapular rash, lymphocytic CSF, normal glucose → pick: **Enteroviral Meningitis**

CSF FINDINGS

Parameter	Bacterial	Viral	Fungal/TB
Opening pressure	Elevated	Normal/elevated	Very elevated
Appearance	Turbid/purulent	Clear	Clear/slightly turbid
WBC	100-5000, neutrophils	<500, lymphocytes	100-500, lymphocytes
Protein	Elevated (>100)	Normal/slight elevation	Very elevated
Glucose	Low (<40mg/dL or <40% serum)	Normal	Very low
Gram stain	60-90% sensitive	Negative	AFB rare
Specific tests	Culture, PCR (meningococcus, pneumococcus)	PCR enterovirus, HSV	India ink, cryptococcal Ag, AFB smear/culture, GeneXpert MTB/RIF

EMPIRIC ANTIBIOTIC THERAPY

Age/Risk Factors	Empiric Regimen	Coverage
18-50 years, community	Ceftriaxone 2g IV q12h + Vancomycin	N. meningitidis, S. pneumoniae
>50 years or immunocompromised	Ampicillin 2g IV q4h + Ceftriaxone + Vancomycin	Add Listeria monocytogenes
Post-neurosurgery/head trauma	Vancomycin + Cefepime or Meropenem	Pseudomonas, Staph aureus
Impaired cellular immunity	Ampicillin + Ceftriaxone + Vancomycin	Listeria, gram negatives

CRITICAL ADD-ONS

- **Dexamethasone:** 0.15mg/kg q6h x 4 days, ideally before or with first antibiotic dose (reduces hearing loss and mortality in pneumococcal)
- **Acyclovir:** 10mg/kg IV q8h if HSV encephalitis suspected (altered mental status, seizures, temporal changes)
- **Doxycycline:** Add if tick-borne suspected (summer, rash, endemic area)

COMPLICATIONS + EMERGENCIES

Complication	Presentation	Immediate Action
Cerebral edema/herniation	Decreased consciousness, pupillary changes, posturing	Mannitol 20% 1g/kg, hyperventilation (temporary), head elevation
Hydrocephalus	Worsening consciousness, enlarged ventricles	External ventricular drain
Subdural effusion	Persistent fever, especially children with H. influenzae	Drain if symptomatic
Cerebral venous thrombosis	Worsening headache, seizures, focal deficits	MRV, heparin anticoagulation
SIADH/hyponatremia	Seizures, worsening consciousness	Fluid restriction or 3% saline if severe

KMU EXAM TRAPS

- **CT before LP contraindications:** Immunocompromise, history of CNS disease, papilledema, altered consciousness, focal neuro deficit, new-onset seizure - risk of herniation
- **Partially treated meningitis:** CSF may look "viral" with prior antibiotics - cell count lower, may still culture positive
- **Meningococcal prophylaxis:** Close contacts need rifampin 600mg BID x 2 days, ciprofloxacin 500mg single dose, or ceftriaxone 250mg IM single dose within 24h of diagnosis
- **Chronic meningitis:** Symptoms >4 weeks - think TB, fungal, sarcoid, carcinomatous, autoimmune
- **Aseptic meningitis:** Non-bacterial causes include viruses, partially treated bacterial, TB, fungal, autoimmune, drug-induced
- **Recurrent meningitis:** Think CSF leak (pneumococcal), complement deficiency (meningococcal), anatomical defects

RARE BUT TESTED (DO NOT SKIP)

- **Mollaret's meningitis:** Recurrent benign lymphocytic meningitis, HSV-2 most common, large Mollaret cells
- **Eosinophilic meningitis:** Parasitic (Angiostrongylus cantonensis - raw snails, Southeast Asia), coccidioidomycosis
- **Carcinomatous meningitis:** Malignant cells in CSF, very high opening pressure, cranial nerve palsies, breast/lung/hematologic primaries
- **Neurosarcoidosis:** Basilar meningitis, facial nerve palsy, diabetes insipidus, elevated ACE
- **Vogt-Koyanagi-Harada:** Uveomeningitis, auditory, integumentary (vitiligo, poliosis), CSF lymphocytic pleocytosis
- **Behçet's disease:** Recurrent oral/genital ulcers, pathergy, meningoencephalitis

14. ENCEPHALITIS

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (3)

Stem 1: Fever, altered mental status, seizures, temporal lobe changes on MRI (T2 hyperintensity), hemorrhagic CSF, antiviral started empirically → pick: **Herpes Simplex Encephalitis (HSE)**
Immediate action: IV Acyclovir 10mg/kg q8h NOW - do not wait for confirmation

Stem 2: Young woman, psychiatric symptoms, seizures, autonomic instability, orofacial dyskinesias, teratoma found, NMDAR antibodies positive → pick: **Anti-NMDA Receptor Encephalitis**

Stem 3: Summer months, mosquito exposure, fever, encephalopathy, flaccid paralysis, CSF lymphocytic pleocytosis → pick: **West Nile Virus Encephalitis**

HSV ENCEPHALITIS - CRITICAL DETAILS

Feature	Detail
Mortality untreated	70%; with treatment 20-30%
Pathology	HSV-1 (90%), HSV-2 (neonates), temporal lobes, hemorrhagic necrosis
Clinical	Fever, altered mental status, seizures, focal neuro deficits (aphasia)
Imaging	MRI T2/FLAIR hyperintensity in medial temporal, insular cortex (spares putamen - helps vs limbic)
EEG	Periodic lateralized epileptiform discharges (PLEDs) over temporal regions
CSF	Lymphocytic pleocytosis, RBCs, elevated protein, normal glucose, HSV PCR (sens 95%, spec 100%)
Treatment	**Acyclovir 10mg/kg IV q8h x 14-21 days - start empirically if suspicion**
Relapse	Autoimmune post-HSV encephalitis (anti-NMDAR) in 20-30%, weeks after initial

AUTOIMMUNE ENCEPHALITIS

Type	Antibody	Clinical Features	Tumor Association
Anti-NMDAR	NR1 subunit	Psychiatric, seizures, autonomic, orofacial dyskinesias, catatonia	Ovarian teratoma (50%)
LGI1	LGI1	Faciobrachial dystonic seizures (FBDS), hyponatremia, memory loss	Thymoma rare
Anti-GABAB	GABAB receptor	Seizures, memory loss, encephalopathy	SCLC (50%)
Anti-AMPA	GluR1/2	Psychiatric, memory loss, seizures	Thymoma, SCLC, breast
Anti-CASPR2	CASPR2	Peripheral nerve hyperexcitability (neuromyotonia), Morvan's syndrome	Thymoma
Anti-DPPX	DPPX	Diarrhea, weight loss, agitation, myoclonus, tremor, seizures	Rare B-cell neoplasm

INVESTIGATIONS ALGORITHM

Scenario	First	Best Next	Gold Standard
Suspected encephalitis	MRI brain, EEG, LP	HSV PCR, autoimmune panel	Brain biopsy (rarely needed)
HSV suspected	Start acyclovir immediately	MRI temporal lobes	HSV PCR CSF
Autoimmune suspected	Cell surface antibodies (live cell assays)	CT chest/abdomen/pelvis (tumor search)	Paraneoplastic panel

AUTOIMMUNE ENCEPHALITIS TREATMENT

First line: Methylprednisolone 1g IV x 3-5 days OR IVIG 0.4g/kg x 5 days OR Plasma exchange
Second line: Rituximab, Cyclophosphamide (if first line fails)
Tumor removal: Critical if paraneoplastic (teratoma, thymoma)

KMU EXAM TRAPS

- **HSV PCR false negative:** Early (<72h) or late (>10 days) - repeat LP, treat clinically if high suspicion
- **Post-HSV autoimmune encephalitis:** Worsening or relapse 1-3 weeks after completing acyclovir - check anti-NMDAR antibodies
- **Limbic encephalitis vs HSE:** Limbic encephalitis spares basal ganglia, subacute, MRI may be normal early
- **Faciobrachial dystonic seizures (FBDS):** Highly specific for LGI1, precede cognitive symptoms, brief (<3s), frequent
- **Hashimoto's encephalopathy:** Steroid-responsive, elevated anti-TPO (not necessarily abnormal TSH), fluctuating course
- **Voltage-gated potassium channel complex:** Includes LGI1 and CASPR2 - different phenotypes, both respond to immunotherapy

RARE BUT TESTED (DO NOT SKIP)

- **Subacute sclerosing panencephalitis (SSPE):** Measles (wild-type), 6-15 years post-infection, myoclonic jerks, periodic complexes on EEG, fatal
- **Progressive rubella panencephalitis:** Similar to SSPE, now rare due to vaccination
- **Rasmussen's encephalitis:** Childhood, unilateral hemisphere inflammation, intractable seizures, hemiparesis, hemispherectomy
- **Whipple's disease:** Oculomasticatory myorhythmia (unique), cognitive changes, arthralgia, Tropheryma whipplei PCR
- **Neuro-Behçet's:** Brainstem predominant, recurrent oral/genital ulcers, pathergy
- **Primary CNS vasculitis:** MRI with infarcts in multiple territories, angiographic "beading," biopsy gold standard

15. MULTIPLE SCLEROSIS

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (3)

Stem 1: 28F, optic neuritis (painful vision loss, central scotoma), internuclear ophthalmoplegia (INO) on exam, sensory symptoms at different times, MRI multiple white matter lesions disseminated in space → pick: **Relapsing-Remitting Multiple Sclerosis**
Wrong temptation: Neuromyelitis optica (longitudinally extensive transverse myelitis, AQP4-Ab, spared brain)

Stem 2: Lhermitte sign (electric shock down spine on neck flexion), bladder urgency, lower limb weakness, cervical cord lesion on MRI → pick: **Myelitis from MS**

Stem 3: Optic neuritis with normal brain MRI, no other lesions, CSF oligoclonal bands positive → pick: **CIS (Clinically Isolated Syndrome) - high risk for MS**

PATHOGNOMONIC SIGNS

Sign	Description	Localization
Optic neuritis	**Painful vision loss, RAPD, central scotoma, pain with eye movement**	Optic nerve (retrobulbar)
INO	**Impaired adduction ipsilateral, nystagmus abducting eye, convergence preserved**	Medial longitudinal fasciculus (MLF)
Lhermitte sign	**Electric shock sensation down back on neck flexion**	Cervical dorsal columns
Uthoff phenomenon	Worsening symptoms with heat (exercise, hot bath, fever)	Conduction block in demyelinated fibers
Trigeminal neuralgia (young)	Bilateral or young onset suggests MS	Trigeminal nerve entry zone demyelination

MCDONALD CRITERIA 2017

Requirement	Evidence
Dissemination in Space (DIS)	≥1 T2 lesion in ≥2 of: periventricular, juxtacortical, infratentorial, spinal cord
Dissemination in Time (DIT)	New T2/Gad+ lesion on follow-up OR simultaneous enhancing + non-enhancing lesions
Clinical presentation	CIS (one attack) or relapsing-remitting (multiple attacks)

MANAGEMENT (STEPWISE)

Phase	Treatment	Notes
Acute relapse	Methylprednisolone 1g IV x 3-5 days	Speeds recovery, no effect on final outcome
First-line DMT	Interferon-beta, Glatiramer acetate, Teriflunomide, Dimethyl fumarate, Fingolimod	Reduce relapse rate 30-50%
High-efficacy DMT	Natalizumab, Alemtuzumab, Ocrelizumab, Cladribine, Ofatumumab	Reduce relapses 70-95%, monitoring required
Severe relapse	Plasma exchange (if steroids fail)	Acute disseminated encephalomyelitis (ADEM)-like presentations
Symptomatic	Baclofen (spasticity), Oxybutynin (bladder), Amantadine (fatigue), Dalfampridine (walking)	Multidisciplinary approach

NATALIZUMAB & PML RISK

Progressive Multifocal Leukoencephalopathy (PML): JC virus reactivation in immunosuppressed
Risk factors: Prior immunosuppression, JC virus antibody positive, >2 years treatment
Monitoring: JC virus index, MRI for PML lesions (non-enhancing, subcortical, posterior fossa)
Symptoms: Subacute cognitive/behavioral changes, visual field deficits, hemiparesis
Treatment: Plasma exchange to remove drug, no proven antiviral

KMU EXAM TRAPS

- **Neuromyelitis optica spectrum disorder (NMOSD):** Anti-AQP4 antibody, longitudinally extensive transverse myelitis (>3 vertebral segments), severe optic neuritis, spared brain (except area postrema), MS drugs may worsen (interferon, fingolimod)
- **MOG antibody disease:** Optic neuritis with disc edema (vs retrobulbar in MS), ADEM-like, steroid responsive, different from both MS and NMOSD
- **ADEM:** Monophasic, post-infectious, encephalopathy required, bilateral optic neuritis common, treat with high-dose steroids
- **Schilder disease (myelinoclastic diffuse sclerosis):** Tumefactive demyelination, mass-like, biopsy may be needed
- **Balo's concentric sclerosis:** Pathognomonic alternating rings of demyelination on MRI ("bullseye")
- **Radiologically isolated syndrome (RIS):** MRI meets DIS but no clinical symptoms - 30-70% develop CIS/MS

15. MULTIPLE SCLEROSIS (CONTINUED)

RARE BUT TESTED (DO NOT SKIP)

- **Marburg variant:** Acute malignant MS, monophasic fulminant, large lesions, may be fatal
- **Schilder's diffuse sclerosis:** Bilateral large hemispheric demyelination, mass effect, children, steroid responsive
- **Acute hemorrhagic leukoencephalitis (Weston-Hurst):** Hyperacute, hemorrhagic necrotizing, post-infectious, often fatal
- **Tumefactive MS:** >2cm lesion with mass effect, ring enhancement, may need biopsy to exclude glioma/abscess
- **Clinically definite MS (historical):** Now replaced by "MS" per 2017 McDonald criteria allowing earlier diagnosis
- **Opticospinal MS:** Old term for what is now NMOSD in many cases, especially if anti-AQP4 positive
- **Devic's disease:** Historical term for NMO, now NMOSD

SPINAL CORD SYNDROMES - DETAILED

Syndrome	Mechanism	Motor	Sensory	Sphincter
Cauda equina	Below L2, nerve roots	LMN (flaccid, atrophy, fasciculations)	Saddle anesthesia, asymmetric	Early retention, overflow incontinence
Conus medullaris	S3-5 cord segments	LMN (legs), UMN (early if above)	Saddle, dissociated (sacral sparing)	Early, overflow, impotence
Central cord	Central gray matter	Upper > lower (corticospinal lamination)	Dissociated (pain/temp lost, proprioception spared), suspended	Late
Anterior cord	Anterior spinal artery	UMN below lesion	Pain/temp lost, proprioception spared	Involved
Brown-Sequard	Hemisection	Ipsilateral UMN	Ipsi proprioception, contra pain/temp	Ipsi loss

16. GIT TOPICS (CONTINUED)

19. HEPATIC ENCEPHALOPATHY - GRADES

Grade	Features
I	Trivial lack of awareness, shortened attention, sleep inversion
II	Lethargy, disorientation, inappropriate behavior, asterixis
III	Somnolent but arousable, marked confusion, rigidity
IV	Coma, unresponsive to pain (IVa responsive, IVb unresponsive)

TREATMENT

Lactulose: 25mL TID, titrate to 2-3 soft stools/day
Rifaximin: 550mg BD (add-on if lactulose refractory)
Precipitants: Infection, GI bleed, constipation, sedatives, hypokalemia

20. LOWER GI BLEEDING - APPROACH

Presentation	Likely Source	Investigation
Fresh blood per rectum, painful	Anal fissure, hemorrhoids	Anoscopy
Fresh blood, painless, elderly	Diverticulosis (most common massive)	Colonoscopy
Bloody diarrhea	Colitis (infectious, IBD, ischemic)	Stool culture, colonoscopy
Maroon stool	Right colon or massive upper GI	Emergency colonoscopy/NG lavage
Occult blood, iron deficiency	Colorectal cancer, polyps	Colonoscopy

GIT EXAM TRAPS

- **Forrest classification:** Ia (spurting), Ib (oozing), IIa (visible vessel), IIb (adherent clot), IIc (pigmented spot), III (clean base) - guides endoscopic therapy
- **Blatchford score:** Pre-endoscopic risk stratification for UGIB - identifies low-risk patients for outpatient management
- **Child-Pugh vs MELD:** Child-Pugh (ascites, encephalopathy, bilirubin, albumin, INR) for chronic; MELD for transplant priority and acute
- **Hepatorenal syndrome:** Type 1 (rapid, acute) vs Type 2 (chronic), diagnosis of exclusion, treat with terlipressin + albumin, TIPS, or transplant
- **Spontaneous bacterial peritonitis (SBP):PMN >250 in ascitic fluid, empiric cefotaxime, albumin 1.5g/kg day 1 + 1.0g/kg day 3**

16. GIT TOPICS (SUMMARIZED)

16. UPPER GI BLEEDING - KEY POINTS

Feature	Variceal	Peptic Ulcer
Presentation	Massive hematemesis (fresh blood)	Coffee-ground or melena
Associated	Stigmata of CLD (jaundice, ascites, caput)	NSAID use, H. pylori, pain
Emergency drug	Octreotide 50mcg bolus then 50mcg/h	PPI 80mg bolus + 8mg/h infusion
Definitive	Band ligation (1st line) + antibiotics	Endoscopic therapy (injection, thermal, clips)

17. LIVER INVESTIGATIONS - PATTERNS

Pattern	AST/ALT	ALP/GGT	Examples
Hepatocellular	High >>>	Normal/mild	Viral, toxic, ischemic
Cholestatic	Normal/mild	High >>>	Obstruction, PBC, PSC
Mixed	High	High	Alcoholic hepatitis
Isolated bilirubin	Normal	Normal	Gilbert's (unconjugated), hemolysis

18. ACUTE LIVER FAILURE - CRITICAL

Feature	Detail
Definition	INR >1.5 + encephalopathy + no prior liver disease + <26 weeks
Common cause	Paracetamol overdose, viral hepatitis, idiosyncratic drugs
Antidote	N-acetylcysteine (NAC) - most effective within 8h, beneficial up to 24h
Critical complication	Cerebral edema, coagulopathy, sepsis, multiorgan failure
Transplant criteria	King's College Criteria (paracetamol vs non-paracetamol)

NEUROLOGY HIGH-YIELD NOTES

50. PAEDIATRIC EPILEPSY

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (3)

Stem 1: 4-year-old, brief staring spells 10-20 seconds, no post-ictal state, 3Hz spike-wave on EEG, hyperventilation trigger → pick: Childhood Absence Epilepsy
Wrong temptation: Complex partial (post-ictal confusion present, EEG different)

Stem 2: Infant 6 months, flexor spasms (salaam seizures), hypsarrhythmia on EEG, developmental arrest → pick: Infantile Spasms (West Syndrome)
Immediate action: ACTH or vigabatrin, investigate tuberous sclerosis

Stem 3: Adolescent, morning myoclonic jerks, generalized tonic-clonic seizures, photosensitive, normal intelligence → pick: Juvenile Myoclonic Epilepsy (Janz syndrome)

FEBRILE SEIZURES

Feature	Simple	Complex
Duration	<15 minutes	>15 minutes
Type	Generalized tonic-clonic	Focal features possible
Recurrence	None in same illness	May recur same day
Neurologic exam	Normal post-ictal	Abnormal or Todd's paresis
Risk of epilepsy	2-3%	10-15%
Management	Reassurance, treat fever	Investigation, consider EEG

Key point: Rectal diazepam for prolonged seizure (>5min), not for prevention

PAEDIATRIC EPILEPSY SYNDROMES

Syndrome	Age	Key Features	Treatment
Benign Rolandic (BECTS)	3-13 yr	Nocturnal hemifacial clonic, centrotemporal spikes, preserved cognition	Often none (self-limiting), carbamazepine if frequent
Dravet syndrome	<1 yr	Prolonged febrile seizures, myoclonic, developmental delay, SCN1A mutation	Avoid sodium channel blockers (CBZ, LTG), use valproate, stiripentol, clobazam
Lennox-Gastaut	3-5 yr	Multiple seizure types (tonic, atonic), slow spike-wave, intellectual disability	Rufinamide, lamotrigine, topiramate, felbamate, ketogenic diet, vagus nerve stimulator
Doose syndrome (MAE)	1-5 yr	Myoclonic-astatic, generalized seizures, developmental regression	Ketogenic diet, valproate, ethosuximide

51. PAEDIATRIC MENINGITIS

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (3)

Stem 1: Neonate 10 days, fever, lethargy, poor feeding, bulging fontanelle, seizures → pick: Neonatal Meningitis (Group B Strep, E. coli, Listeria)
Coverage: Ampicillin + Cefotaxime (avoid ceftriaxone - bilirubin)

Stem 2: Child 6 months, fever, irritability, neck stiffness, petechial rash → pick: Meningococcal Meningitis
Immediate: Ceftriaxone, vancomycin if concern for resistant pneumococcus

Stem 3: Child with basal meningitis, cranial nerve palsies, hydrocephalus, contact with TB → pick: Tuberculous Meningitis
Key investigation: GeneXpert MTB/RIF, AFB stain, culture

NEONATAL MENINGITIS SPECIFICS

Age	Common Pathogens	Empiric Antibiotics
0-7 days (early onset)	GBS, E. coli, Listeria	Ampicillin + Gentamicin OR Ampicillin + Cefotaxime
7-28 days (late onset)	GBS, gram negatives, Listeria	Ampicillin + Cefotaxime (avoid ceftriaxone)

Key point: Ceftriaxone contraindicated in neonates due to bilirubin displacement and kernicterus risk

COMPLICATIONS IN CHILDREN

Complication	Features	Management
Hydrocephalus	Bulging fontanelle, sunset eyes, increasing head circumference	EVD, shunt if communicating
Subdural effusion	Persistent fever, especially with H. influenzae	Tap if symptomatic/large
Hearing loss	Sensorineural (pneumococcal)	BAER before discharge
Ventriculitis	Persistent infection, shunt infection	Intraventricular antibiotics
Cerebral abscess	Focal deficits, persistent fever, ring-enhancing lesion	Surgical drainage + antibiotics

KMU EXAM TRAPS - PAEDIATRIC EPILEPSY

- **Infantile spasms urgency: Window for treatment response closes after age 1, developmental arrest may be permanent**
- **Tuberous sclerosis: Infantile spasms + hypopigmented macules + facial angiofibromas + seizures; vigabatrin first line**
- **SCN1A mutations: Dravet syndrome - sodium channel blockers (carbamazepine, lamotrigine) WORSEN seizures**
- **GLUT1 deficiency: Seizures + developmental delay + low CSF glucose - ketogenic diet is treatment**
- **Pyridoxine-dependent seizures: Refractory neonatal seizures, response to IV pyridoxine**
- **Folinic acid-responsive seizures: Neonatal, response to folinic acid, CSF abnormalities**

52. BIG HEAD (MACROCEPHALY)

KMU MCQ PICKUP LINES (2)

Stem 1: Infant with rapidly increasing head circumference (>95th percentile), bulging fontanelle, sunset eyes, irritability → pick: Hydrocephalus
Differentiate: Communicating vs obstructive (head CT/MRI)

Stem 2: Large head since birth, family history of large heads, normal development, normal imaging → pick: Benign Familial Macrocephaly

CAUSES OF MACROCEPHALY

Category	Conditions	Clues
Hydrocephalus	Aqueductal stenosis, Dandy-Walker, post-hemorrhagic, post-infectious	Rapid growth, bulging fontanelle, vomiting, sunset sign
Neurocutaneous	Neurofibromatosis type 1, Sotos syndrome, Weaver syndrome	Café-au-lait spots, macrosomia, developmental issues
Metabolic	Mucopolysaccharidoses, GM2 gangliosidosis	Coarse facies, hepatosplenomegaly, developmental regression
Genetic	Achondroplasia, fragile X, benign familial	Short limbs, family history, normal development
Mass lesion	Choroid plexus papilloma (overproduces CSF)	Asymmetric head growth, focal signs

53. HEREDITARY NEUROPATHIES

PRIMARY REFERENCES: DAVIDSON; ADAMS & VICTOR

KMU MCQ PICKUP LINES (3)

Stem 1: Child with delayed walking, distal weakness, pes cavus, hammer toes, scoliosis, family history of "clumsiness," demyelinating features on NCS, PMP22 duplication → pick: Charcot-Marie-Tooth Disease Type 1A
Wrong temptation: CIDP (no family history, relapsing, responds to steroids)

Stem 2: Infant with severe hypotonia, weakness, areflexia, respiratory failure, SMN1 gene deletion → pick: Spinal Muscular Atrophy Type 1 (Werdnig-Hoffmann)
Treatment now: Nusinersen or Onasemnogene abeparvovec (gene therapy)

Stem 3: Adolescent with progressive weakness, cardiomyopathy, elevated CK, dystrophin mutation → pick: Duchenne Muscular Dystrophy
Pattern: Proximal > distal, calf pseudohypertrophy, Gower positive

CHARCOT-MARIE-TOOTH (CMT) CLASSIFICATION

Type	Inheritance	Nerve Conduction	Gene	Features
CMT1A	AD	Demyelinating (slow)	PMP22 duplication	Onset 1st-2nd decade, pes cavus, "inverted champagne bottle"
CMT1B	AD	Demyelinating	MPZ	More severe than 1A, deafness
CMT2	AD/AR	Axonal (low amplitude)	Various (MFN2 common)	Later onset, less deformity
CMTX	X-linked	Intermediate	GJB1 (Cx32)	Males affected, females mild
CMT4	AR	Demyelinating or axonal	Various	Severe, early onset
HNPP	AD	Focal demyelination	PMP22 deletion	Focal palsies at compression sites

SPINAL MUSCULAR ATROPHY (SMA)

Type	Age Onset	Max Motor Function	Life Expectancy	SMN2 Copies
Type 0	Prenatal	None	Neonatal death	1
Type 1 (Werdnig-Hoffmann)	0-6 months	Never sit	<2 years without ventilation	2
Type 2 (Dubowitz)	6-18 months	Sit, never stand	Adolescence/young adult	3
Type 3 (Kugelberg-Welander)	>18 months	Stand and walk	Normal	3-4
Type 4 (Adult)	Adult	Walking	Normal	4-6

Treatment era: Nusinersen (SMN2 splicing modifier), Risdiplam (oral), Onasemnogene abeparvovec (Zolgensma, gene replacement - one-time IV)

MUSCULAR DYSTROPHY COMPARISON

Disease	Gene	Inheritance	Onset	Key Features
Duchenne (DMD)	Dystrophin	XLR	3-5 yr	Proximal weakness, calf pseudohypertrophy, Gower sign, cardiomyopathy, CK >10x normal
Becker (BMD)	Dystrophin	XLR	>5 yr	Milder DMD, ambulatory >16 years
Facioscapulohumeral (FSHD)	DUX4	AD	Adolescence	Facial weakness, scapular winging, "Popeye arms"
Myotonic Dystrophy (DM1)	DMPK (CTG repeat)	AD	Variable	Myotonia, distal weakness, cataracts, cardiac, anticipation
Limb-girdle (LGMD)	Various	AD/AR	Variable	Proximal weakness, CK elevated, genetic heterogeneity

KMU EXAM TRAPS - HEREDITARY NEUROPATHIES

- **CMT vs CIDP: Family history, deformity (pes cavus), very slow progression, no response to steroids = CMT**
- **Scapuloperoneal syndrome: Facial-scapulohumeral-peroneal pattern, multiple differential diagnoses**
- **Distal hereditary motor neuropathy (dHMN): Pure motor, no sensory, mimics motor neuron disease but chronic and stable**
- **Hereditary sensory and autonomic neuropathy (HSAN): HSAN IV (congenital insensitivity to pain with anhidrosis) - NTRK1 mutation**
- **Leber hereditary optic neuropathy (LHON): Mitochondrial, painless vision loss, young men, m.11778G>A common**
- **Neurogenic arthrogryposis: SMA with contractures at birth**

RARE BUT TESTED (DO NOT SKIP)

- **Friedreich ataxia: GAA repeat in FXN gene, AR, ataxia + cardiomyopathy + diabetes, pes cavus, kyphoscoliosis**
- **Ataxia-telangiectasia: ATM gene, AR, ataxia + oculocutaneous telangiectasia + immunodeficiency + malignancy risk**
- **Metachromatic leukodystrophy: Arylsulfatase A deficiency, demyelination, "tigroid" pattern MRI**
- **Krabbe disease: Galactocerebrosidase deficiency, infantile form irritability, optic atrophy, "globoid" cells**
- **Adrenoleukodystrophy: X-linked, VLCFA accumulation, adrenal insufficiency + demyelination, Lorenzo's oil**
- **Pelizaeus-Merzbacher disease: PLP1 mutation, hypomyelination, nystagmus, head tremor, X-linked**
-
- **Giant axonal neuropathy: GAN gene, kinky hair, intermediate filaments, AR**

STANDARD TEXTBOOKS REFERENCED

PRIMARY REFERENCES USED IN THIS DOCUMENT

MEDICINE STANDARD REFERENCE

Davidson's Principles and Practice of Medicine

Primary reference for general medical aspects of neurology including systemic diseases with neurological manifestations, metabolic encephalopathies, vascular neurology, and general clinical approach.

NEUROLOGY SPECIALTY REFERENCE

Adams and Victor's Principles of Neurology

Primary reference for detailed neurological localization, phenomenology, differential diagnosis of neurological disorders, stroke syndromes, movement disorders, and neuroanatomical correlations.

SURGERY REFERENCE (GIT TOPICS)

Bailey & Love's Short Practice of Surgery

Referenced for neurosurgical emergencies including head trauma, raised intracranial pressure management, and upper/lower gastrointestinal bleeding protocols.

PAEDIATRICS REFERENCE

Nelson Textbook of Pediatrics

Referenced for paediatric neurological conditions including neonatal seizures, infantile spasms, developmental disorders, and paediatric meningitis protocols.

NOTE ON EDITIONS

This high-yield review compiles information from standard editions of the above texts as applicable to KMU Final Year MBBS examination requirements. Specific edition numbers and page references are intentionally omitted as students should consult their current recommended editions for detailed study.

ADDITIONAL HIGH-YIELD SOURCES

- International Classification of Headache Disorders (ICHD-3) for headache diagnoses
- International League Against Epilepsy (ILAE) 2017 Classification for seizures
- McDonald Criteria 2017 for Multiple Sclerosis diagnosis
- NIHSS (National Institutes of Health Stroke Scale) for stroke assessment
- Glasgow Coma Scale (Teasdale and Jennett) for consciousness assessment

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Best wishes for your KMU Final Year Examinations