NeuroTrace Academy Study Guide

Category: Medical Terminology
Topic: Neurological Disorders
Style: Comparison-based, exam-oriented, mechanism-focused

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1. Core Principles (Must Know)

Neurological Disorder Classification

- **Location matters:** Central nervous system (CNS) vs Peripheral nervous system (PNS)
- **Mechanism matters:** Inflammation (-itis) vs Degeneration vs Genetic
- **Progression matters:** Progressive vs Non-progressive
- **First symptom matters:** Movement vs Memory vs Both

Key Principle

- **Accurate classification requires understanding location, mechanism, progression, and first symptom**

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2. Degenerative Dementias (High-Yield Comparison)

Parkinson Disease vs Alzheimer Disease

Parkinson Disease

- **What degenerates:** Dopamine-producing neurons in substantia nigra
- **First symptom:** Movement disorder (tremor, rigidity, bradykinesia)
- **Core features:**
  - Resting tremor ("pill-rolling")
  - Bradykinesia (slowness)
  - Rigidity
  - Postural instability (later)
- **Cognition:** Dementia may occur LATE, not primary feature
- **Progression:** Gradual, progressive
- **EEG:** Usually normal early; mild diffuse slowing late
- 🔑 **Key:** Movement FIRST, memory later

Alzheimer Disease

- **What degenerates:** Cortical neurons (especially hippocampus & temporal lobes)
- **First symptom:** Memory loss
- **Core features:**
  - Progressive memory loss FIRST
  - Language impairment
  - Visuospatial dysfunction
  - Personality changes
- **Cognition:** Memory loss is PRIMARY and DOMINANT
- **Progression:** Slow, relentless, smooth decline
- **EEG:** Diffuse slowing, worsening over time; loss of normal PDR late
- 🔑 **Key:** Memory FIRST, movement not primary

🔑 **Exam Trap:** First symptom is the CRITICAL discriminator - movement = Parkinson, memory = Alzheimer

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Huntington Disease

- **What degenerates:** Basal ganglia (caudate nucleus)
- **Genetics:** Autosomal dominant
- **Onset:** 30-50 years (young adult)
- **Core features (classic triad):**
    1. Chorea (involuntary movements)
    2. Psychiatric symptoms (depression, impulsivity)
    3. Dementia
- **Progression:** Unavoidable, fatal
- **EEG:** Non-specific; may show diffuse slowing later
- 🔑 **Key:** Young adult + movement + dementia + family history = Huntington

🔑 **Exam Trap:** Age + movement + dementia distinguishes from Alzheimer (older, memory first)

Vascular Dementia

- **Cause:** Multiple strokes / chronic ischemia
- **First symptom:** Executive dysfunction or focal neurological deficits
- **Key hallmark:** STEPWISE deterioration (worsens after each stroke)
- **Symptoms:**
    - Executive dysfunction
    - Focal neurological deficits
    - Memory less prominent early
- **Progression:** Sudden declines, then plateaus (not smooth)
- **EEG:** Focal or diffuse slowing depending on infarct location
- 🔑 **Key:** Stepwise decline (not smooth) = vascular dementia

🔑 **Exam Trap:** Progression pattern is key - stepwise = vascular, smooth = Alzheimer

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3. Infectious/Post-Infectious Dementias

Creutzfeldt-Jakob Disease (CJD)

- **Type:** Prion disease
- **Progression:** RAPIDLY progressive (weeks to months)
- **Features:**
    - Rapidly progressive dementia
    - Myoclonus
    - Fatal within months
- **EEG:** Periodic sharp wave complexes (VERY HIGH YIELD - highly specific)
- 🔑 **Key:** Rapid progression + periodic EEG = CJD

🔑 **Exam Trap:** Speed + EEG pattern - rapid + periodic sharp waves = CJD

HIV-Associated Dementia

- **Type:** Subcortical dementia
- **Features:**
    - Slowed thinking
    - Poor concentration
    - Subcortical pattern

- **EEG:** Diffuse slowing
- 🔑 **Key:** Subcortical (slowed cognition) vs cortical (memory loss)

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4. Inflammation Disorders

Encephalitis vs Meningitis

Encephalitis

- **Location:** Brain tissue itself
- **Definition:** Inflammation of the brain, usually viral
- **Symptoms:**
  - Fever, headache
  - Hallucinations
  - May progress to paralysis, coma
- **EEG:** Diffuse slowing ± epileptiform discharges
- 🔑 **Key:** Brain tissue inflammation

Meningitis

- **Location:** Meningeal coverings
- **Definition:** Inflammation of the meninges, usually infectious
- **Types:**
  - Viral: Milder
  - Bacterial: Life-threatening
- **EEG:** May show diffuse slowing
- 🔑 **Key:** Meningeal coverings inflammation

🔑 **Exam Trap:** Brain vs coverings - encephalitis = brain tissue, meningitis = coverings

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5. Peripheral Nervous System Disorders

Guillain-Barré Syndrome

- **Location:** Peripheral nervous system
- **Mechanism:** Immune-mediated demyelination
- **Presentation:**
  - Rapidly ascending weakness
  - Absent reflexes
  - Often post-infectious (respiratory infection)
- **EEG:** Normal (peripheral disorder, not cortical)
- 🔑 **Key:** Peripheral + ascending + post-infection + normal EEG

🔑 **Exam Trap:** Normal EEG because it's peripheral, not central nervous system

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Bell's Palsy

- **Location:** Facial nerve (CN VII)
- **Mechanism:** Idiopathic inflammation
- **Presentation:**
  - Usually one-sided (unilateral)
  - Temporary facial paralysis
  - Idiopathic (unknown cause)

- **EEG:** Normal (peripheral nerve)
- 🔑 **Key:** Unilateral + temporary + idiopathic + facial = Bell's palsy

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Saturday Night Palsy

- **Location:** Radial nerve (usually)
- **Mechanism:** Compression neuropathy
- **Presentation:**
  - Temporary arm paralysis
  - Extended pressure on nerve in armpit
- **EEG:** Normal (peripheral nerve)
- 🔑 **Key:** Armpit compression + temporary + radial nerve

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6. Motor Neuron & Muscle Disorders

ALS (Amyotrophic Lateral Sclerosis)

- **Also known as:** Lou Gehrig's disease
- **Location:** Upper and lower motor neurons
- **Mechanism:** Degeneration (not inflammation)
- **Features:**
  - Progressive weakness
  - UMN + LMN degeneration
  - Cognition usually preserved
- **EEG:** Normal (motor neuron disease, not cortical)
- 🔑 **Key:** Motor neurons + normal EEG + progressive

Cerebral Palsy

- **Location:** Brain (early injury)
- **Mechanism:** Early brain damage in development
- **Presentation:**
  - Motor impairment
  - Abnormal posture
  - Poor coordination
  - Since infancy
- **Progression:** NON-PROGRESSIVE (symptoms don't worsen)
- **EEG:** Often abnormal background
- 🔑 **Key:** Early injury + non-progressive = cerebral palsy

🔑 **Exam Trap:** Non-progressive distinguishes from muscular dystrophy (progressive)

Duchenne vs Becker Muscular Dystrophy

Duchenne Muscular Dystrophy

- **Genetics:** X-linked (boys affected)
- **Onset:** Early (age 3-5)
- **Progression:** Severe, rapid
- **Outcome:** Loss of ambulation by adolescence
- 🔑 **Key:** Early + severe

Becker Muscular Dystrophy

- **Genetics:** X-linked (boys affected)
- **Onset:** Later (adolescence/young adult)
- **Progression:** Milder, slower
- **Outcome:** Ambulation preserved longer
- 🔑 **Key:** Later + milder

🔑 **Exam Trap:** Same gene, different severity - onset + progression distinguish them

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7. Other Neurological Disorders

Epilepsy

- **Definition:** Disorder of the nervous system in which abnormal electrical activity in the brain causes recurrent seizures
- **Key points:**
  - Recurrent unprovoked seizures
  - EEG is central to diagnosis (shows epileptiform discharges)
  - Structural brain damage not always required
- **EEG:** Epileptiform discharges (diagnostic)

Hydrocephalus

- **Definition:** Excess cerebrospinal fluid within the brain ventricles
- **Features:**
  - Increased intracranial pressure
  - Enlarged head in infants (bulging fontanelles)
  - Does NOT resolve spontaneously
- **EEG:** May show slowing if severe

Narcolepsy

- **Definition:** Disorder causing excessive daytime sleepiness and frequent, uncontrollable episodes of falling asleep
- **Key feature:** Onset of sleep may be directly into REM sleep (REM intrusion)
- **Distinction:**
  - **Insomnia:** Difficulty sleeping
  - **Sleep apnea:** Breathing cessation
- 🔑 **Key:** Excessive daytime sleep + REM intrusion = narcolepsy

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Genetic Disorders

- **Definition:** Disorder caused partly or completely by a defect in the patient's genes which carry hereditary information
- **Can be:**
  - Inherited from parents
  - New mutations
- **Examples:** Down's syndrome, Huntington disease, Duchenne muscular dystrophy

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Neural Tube Defects

- **Definition:** Problems in development of spinal cord and brain in an embryo
- **Examples:**
  - **Spina bifida:** Spine fails to enclose spinal cord

    - **Anencephaly:** Brain fails to develop (fatal)
- 🔑 **Key:** Embryologic defects, NOT adult conditions

Anencephaly vs Microcephaly

Anencephaly

- **Definition:** Fatal birth defect with absence of portion of skull and brain
- **Outcome:** Fatal (incompatible with life)
- 🔑 **Key:** No brain = fatal

Microcephaly

- **Definition:** Birth defect with abnormally small head
- **Outcome:** May have developmental delays but NOT always fatal
- 🔑 **Key:** Small head vs no brain = different severity

Reye's Syndrome

- **Definition:** Rare disorder mainly affecting those under age 15
- **Features:**
    - Brain and liver damage
    - Following viral infection (chickenpox, flu)
    - May be linked to aspirin use
- 🔑 **Key:** Child + aspirin + viral infection = Reye's syndrome

🔑 **Exam Trap:** AVOID aspirin in children with viral illness

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Migraine

- **Definition:** Severe headache usually accompanied by vision problems and/or nausea and vomiting
- **Key feature:** Typically recurs (episodic pattern)
- **Features:**
    - Visual aura
    - Nausea/vomiting
    - Recurrent episodes
- 🔑 **Key:** Recurrent + aura + nausea = migraine

Radiculopathy vs Myelopathy

Radiculopathy

- **Location:** Nerve roots
- **Definition:** Disease of the nerve roots
- **Causes:** Disk prolapse, arthritis, osteophytes
- 🔑 **Key:** Nerve roots

Myelopathy

- **Location:** Spinal cord
- **Definition:** Disease of the spinal cord
- 🔑 **Key:** Spinal cord

🔑 **Exam Trap:** Roots vs cord - radiculopathy = roots, myelopathy = cord

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Median Nerve

- **Location:** Runs down arm to hand
- **Functions:**
  - Motor: Controls muscle movement in forearm and hand
  - Sensory: Conveys sensation to part of hand, thumb, and index finger
- 🔑 **Key:** Thumb + index finger = median nerve

Meningocele

- **Definition:** Protrusion of meninges through an opening in the skull or spinal cord due to genetic defect
- **Key point:** Meninges ONLY (no spinal cord)
- **Distinction:**
  - **Myelomeningocele:** Meninges + spinal cord (more severe)
  - **Myelocele:** Spinal cord only
- 🔑 **Key:** Meninges only = meningocele

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8. High-Yield Exam Discrimination Table

Disorder	First Symptom	Progression	EEG	Key Feature
Parkinson	Movement	Gradual	Normal early	Tremor, rigidity
Alzheimer	Memory	Smooth decline	Diffuse slowing	Memory first
Huntington	Movement + psych	Gradual	Non-specific	Young adult + chorea
Vascular dementia	Executive/focal	Stepwise	Focal slowing	Stepwise decline
CJD	Rapid dementia	Weeks-months	Periodic sharp waves	Rapid + periodic EEG
Guillain-Barré	Ascending weakness	Rapid	Normal	Peripheral, post-infection
ALS	Progressive weakness	Gradual	Normal	Motor neurons
Cerebral palsy	Motor impairment	Non-progressive	Often abnormal	Early injury, stable

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9. ABRET Exam Pearls

Critical Distinctions

1. **Parkinson vs Alzheimer:** Movement first vs memory first
2. **Vascular vs Alzheimer dementia:** Stepwise vs smooth decline
3. **Encephalitis vs Meningitis:** Brain tissue vs coverings
4. **Guillain-Barré vs ALS:** Peripheral (normal EEG) vs motor neurons (normal EEG)
5. **Cerebral palsy vs Muscular dystrophy:** Non-progressive vs progressive

Common Exam Traps

- Mixing Parkinson and Alzheimer based on age alone (first symptom is key)
- Confusing stepwise (vascular) with smooth (Alzheimer) progression
- Thinking all dementias show identical EEG patterns (CJD has periodic sharp waves)
- Assuming peripheral disorders show abnormal EEG (they don't - normal EEG)

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10. Quick Reference Summary

Must-Know First Symptoms

- **Parkinson:** Movement (tremor, rigidity, bradykinesia)
- **Alzheimer:** Memory loss
- **Huntington:** Movement + psychiatric (young adult)
- **Vascular dementia:** Executive/focal (stepwise)

Must-Know EEG Patterns

- **CJD:** Periodic sharp wave complexes (highly specific)
- **Alzheimer:** Diffuse slowing
- **Parkinson:** Normal early
- **Guillain-Barré:** Normal (peripheral)
- **ALS:** Normal (motor neurons)

Must-Know Progression Patterns

- **Vascular dementia:** Stepwise (after strokes)
- **Alzheimer:** Smooth gradual decline
- **CJD:** Rapid (weeks-months)
- **Cerebral palsy:** Non-progressive

Next Steps:

- Memorize first symptoms (movement vs memory)
- Learn progression patterns (stepwise vs smooth)
- Understand EEG patterns (normal vs abnormal, specific patterns)
- Practice discrimination between similar disorders