Achievable

USMLE STEP 1 DUMP SHEET

Neuroanatomy

Spinal tracts

Tract	Carries	Pathway	Crosses
Dorsal columns	Fine touch, vibration, proprioception	Dorsal root ganglion (DRG) → gracilis (legs, medial) or cuneatus (arms, lateral) → their nuclei → medial lemniscus → VPL → S1	Medulla
Spinothalamic	Pain, temperature	DRG → Lissauer tract → dorsal horn → crosses in anterior commissure about 2 segments up → VPL → S1	Cord
Corticospinal	Voluntary movement	Areas 4, 6 → internal capsule → peduncle → pyramids → 85—90% cross (lateral tract); 10—15% stay uncrossed (anterior tract, trunk)	Low medulla

- **Anterior spinal artery** (anterior two-thirds; reinforced by the **artery of Adamkiewicz**) infarct, as in aortic surgery: paralysis and lost pain and temperature below the lesion, dorsal columns spared. Two posterior spinal arteries supply the dorsal columns

Spinal cord

- **Ends** at L1—L2 (L3 at birth); dura to S2
- **Lumbar puncture:** L3—L4 in adults (L4—L5 in children), at the iliac crests
- **C1—C7** exit above their vertebrae; C8 between C7 and T1
- **Outflow:** sympathetic T1—L2; parasympathetic S2—S4
- **Dermatomes:** C6 thumb, C7 middle finger, C8 little finger, T4 nipple, T10 umbilicus, L5 dorsum of foot, S1 little toe and heel
- **Reflexes:** biceps C5—C6, triceps C7—C8, knee L3—L4, ankle S1

Upper vs lower motor neuron

	UMN	LMN
Tone	Spastic	Flaccid
Reflexes	Up, clonus	Down
Babinski	Positive	Negative
Atrophy	Late	Early, fasciculations

- **ALS:** UMN + LMN. **Polio, SMA:** anterior horn
- **Cauda equina:** saddle anesthesia, incontinence; emergency

Cortex and language

Motor	Precentral gyrus (4)
Sensory (S1)	Postcentral gyrus (3, 1, 2)
Visual	Calcarine sulcus (17)
Auditory	Superior temporal (41)
Broca	Inferior frontal (44, 45)
Wernicke	Superior temporal (22)

- **Broca:** nonfluent. **Wernicke:** fluent, no comprehension. **Conduction** (arcuate fasciculus): cannot repeat
- **Superior parietal (5, 7)** lesion: tactile agnosia

Cranial nerves

III	Eye muscles but SO, LR; pupil constriction	VIII	Hearing, balance
IV	Superior oblique (SO)	IX	Stylopharyngeus; parotid; taste posterior 1/3; carotid sinus
V	Face sensation; muscles of mastication	X	Pharynx, larynx; thoracoabdominal viscera; aortic arch
VI	Lateral rectus (LR)	XI	Sternocleidomastoid, trapezius
VII	Face; taste anterior 2/3; lacrimal, submandibular, sublingual	XII	Tongue; protrusion has contralateral UMN input only

Vessels, sinuses and CSF

- **Circle of Willis:** ICAs, ACAs + ACom, PCAs, PComs
- **Watershed** (ACA—MCA, PCA—MCA) after hypotension: "man in a barrel"
- **Aneurysms:** ACom 35%, ICA/PCom 30%, MCA 22%
- **Bridging veins** tear → subdural hematoma
- **Cavernous sinus:** III, IV, V1, V2 in the wall; ICA and **VI inside** (palsy first)
- **CSF:** about 150 mL, from choroid plexus to arachnoid granulations

Basal ganglia and limbic

- **Substantia nigra** dopamine loss → Parkinson disease
- **Subthalamic nucleus** lesion → hemiballismus
- **Hippocampus:** new memories; early in Alzheimer
- **Mammillary bodies:** thiamine → Wernicke-Korsakoff
- **Papez:** hippocampus → fornix → mammillary bodies → anterior thalamus → cingulate

Diencephalon

- **VPL:** body. **VPM:** face. **LGN:** vision. **MGN:** hearing
- **Supraoptic:** ADH. **Paraventricular:** oxytocin
- **Ventromedial:** satiety. **Lateral:** hunger. **Suprachiasmatic:** circadian

Brainstem

- **Midbrain:** III, IV. **Pons:** V; VI—VIII at the junction. **Medulla:** IX, X, XII (XI from the cervical cord)
- **Medial longitudinal fasciculus:** VIII to III, IV, VI (conjugate gaze)