Nervous System

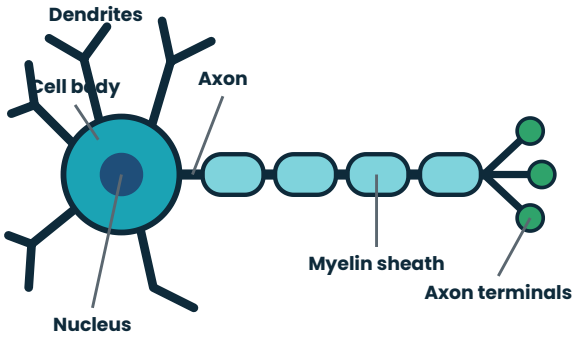
Study Sheet · Learn It with Prof. Melanie



1 Organization

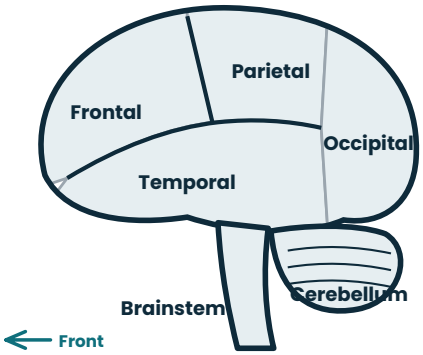
- **CNS:** brain and spinal cord
- **PNS:** 12 pairs of cranial nerves, 31 pairs of spinal nerves
- **Afferent** (sensory) arrive at CNS · **Efferent** (motor) exit
- **Somatic:** voluntary skeletal muscle
- **Autonomic:** involuntary; sympathetic (fight or flight) and parasympathetic (rest and digest)

2 The Neuron



Myelin: Schwann cells (PNS), oligodendrocytes (CNS).
Synapse: neurotransmitters cross the gap.

3 The Brain



4 Brain Functions

Frontal	Movement, reasoning, personality, speech (Broca's)
Parietal	Touch, pain, temperature, position
Temporal	Hearing, memory, language (Wernicke's)
Occipital	Vision
Cerebellum	Balance, coordination
Brainstem	Breathing, heart rate, BP (medulla)
Thalamus	Sensory relay
Hypothalamus	Temperature, hunger, thirst; pituitary

Each side of the brain controls the **opposite** side of the body.

5 Protecting the CNS

- **Meninges (DAP):** dura, arachnoid, pia
- **CSF:** made by choroid plexus; cushions the CNS
- Spinal cord ends about **L1–L2**; lumbar puncture at L3–L4 or L4–L5
- **Blood-brain barrier** limits what enters the brain

6 Autonomic System

	Sympathetic	Parasympathetic
Heart rate	Up	Down
Pupils	Dilate	Constrict
Airways	Open	Narrow
Digestion	Slows	Speeds up

7 Neuron Parts and Support Cells

Part	Job	Part	Job
Dendrites	Receive signals	**Axon terminals**	Release neurotransmitters
Cell body	Holds the nucleus	**Synapse**	Gap between neurons
Axon	Carries signal away	**Neuroglia**	Astrocytes, microglia, Schwann cells
Myelin sheath	Speeds the signal	**Neurotransmitters**	Acetylcholine, dopamine, serotonin, GABA

White matter = myelinated axons · **Gray matter** = mostly cell bodies and dendrites

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8 Key Cranial Nerves

I Olfactory	Smell
II Optic	Vision
V Trigeminal	Face sensation, chewing
VII Facial	Facial expression (Bell's palsy)
VIII Vestibulocochlear	Hearing, balance
X Vagus	Heart, lungs, digestion

9 Stroke: BE FAST

- **B**alance loss
- **E**yes: vision changes
- **F**ace drooping
- **A**rm weakness
- **S**peech difficulty
- **T**ime to call 911; note when symptoms began

Ischemic (blocked vessel) is most common; TIA is a warning sign.

10 Disorders

Disorder	Key facts	Disorder	Key facts
Epilepsy	Recurrent seizures; EEG helps	**Meningitis**	Fever, headache, stiff neck
Parkinson's	Low dopamine; tremor, slow movement	**Bell's palsy**	CN VII; one-sided facial droop
Alzheimer's	Most common dementia	**Concussion**	Mild brain injury
Multiple sclerosis	Autoimmune; CNS myelin damage	**Neuropathy**	Hands and feet; often diabetes
ALS	Motor neurons die	**Sciatica**	Pain down back of leg
Guillain-Barré	Peripheral nerves; rising weakness	**Spina bifida**	Open spinal column; folic acid helps prevent

11 Tests and Tools

Test	Purpose	Test	Purpose
EEG	Brain electrical activity	**Reflex hammer**	Deep tendon reflexes
CT / MRI	Brain and spinal images	**Tuning fork**	Vibration sense
Lumbar puncture	CSF testing	**Monofilament**	Foot sensation
EMG / nerve conduction	Muscle and nerve function	**PERRLA**	Pupil check
Glasgow Coma Scale	Level of consciousness	**Romberg**	Balance, eyes closed

12 Word Parts

Part	Meaning	Part	Meaning
neur/o	Nerve	**-plegia**	Paralysis
encephal/o	Brain	**-paresis**	Weakness
mening/o	Meninges	**-phasia**	Speech
myel/o	Spinal cord, marrow	**-esthesia**	Sensation

13 MA Skills

- **Seizure:** protect head, nothing in mouth, time it, on side as soon as safe; 911 if over 5 min
- **Lumbar puncture:** side-lying, knees to chest, or sitting leaning forward
- **Romberg:** stand close for safety

14 Quick Compare

Afferent	Sensory; arrives at CNS	**Efferent**	Motor; exits CNS
Ischemic stroke	Blocked vessel (most common)	**Hemorrhagic stroke**	Bleeding in the brain
Multiple sclerosis	CNS myelin damaged	**ALS**	Motor neurons destroyed
Hemiplegia	One side paralyzed	**Paraplegia / quadriplegia**	Lower body / all four limbs
Aphasia	Loss of speech or language	**Dysphagia**	Difficulty swallowing

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