AL MUSTAQBAL UNIVERSITY

College of Pharmacy / First Year

(L7) Nervous System Terminology

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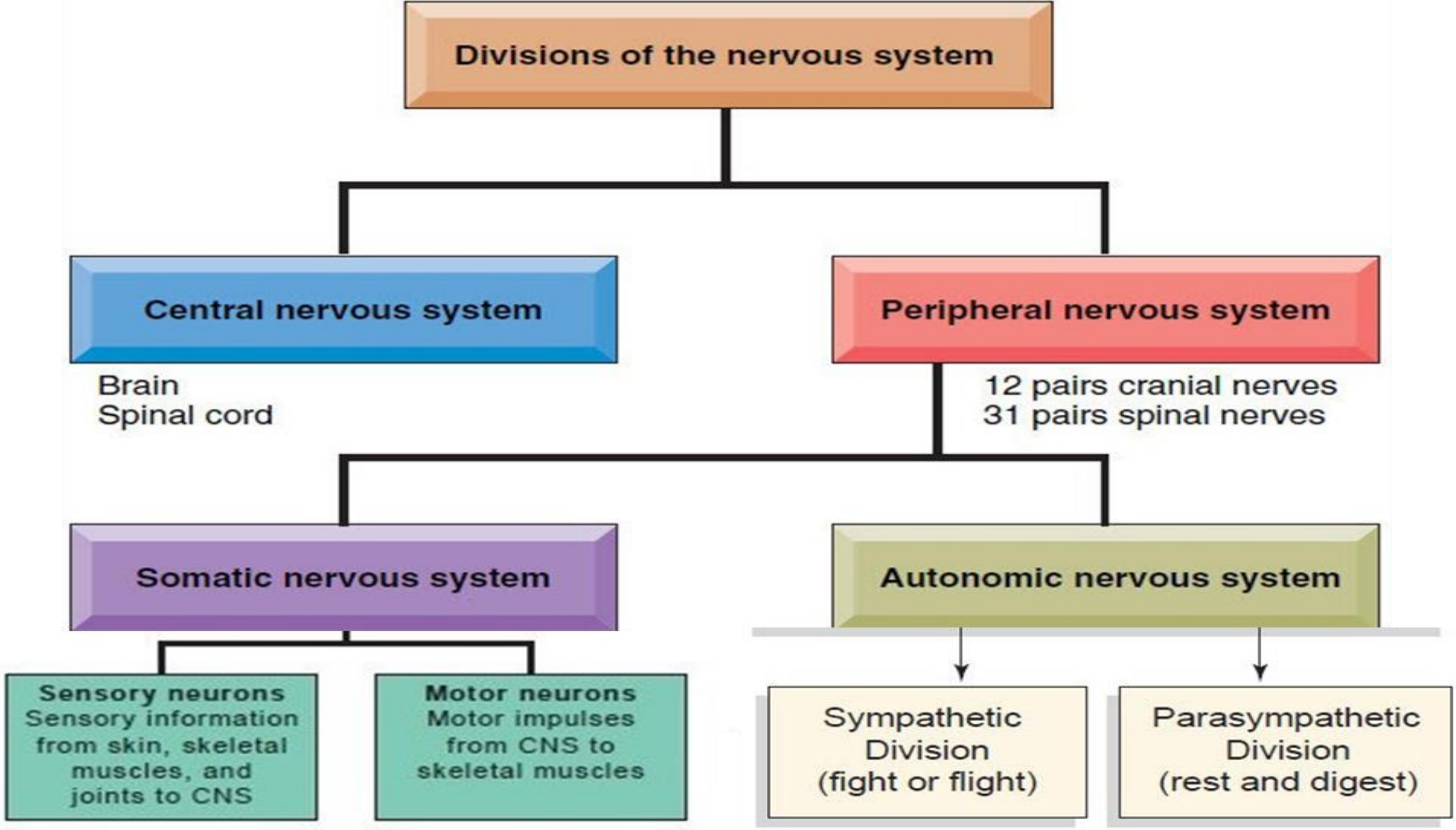
The Nervous System

Components : Brain, spinal cord, nerves, sensory receptors

I / The Central Nervous System (CNS) : consists of the **brain and the spinal cord**,

- **II/ The Peripheral Nervous System (PNS) :** the peripheral nervous system consists of **All the neural tissue outside CNS** , this includes:
  - Afferent division (sensory input)
  - Efferent division (motor output)
- **PNS** can be divided into:
  - **Somatic nervous system,**
  - **Autonomic nervous system**


Divisions of the nervous system
Central nervous system
Brain
Spinal cord
Peripheral nervous system
12 pairs cranial nerves
31 pairs spinal nerves
Somatic nervous system
Autonomic nervous system
Sensory neurons
Sensory information from skin, skeletal muscles, and joints to CNS
Motor neurons
Motor impulses from CNS to skeletal muscles
Sympathetic Division (fight or flight)
Parasympathetic Division (rest and digest)

Introduction

- The human central nervous system (CNS) contains about 10^{11} (100 billion) **neurons**.
- It also contains 10–50 times this number of **glial cells**.
- The neurons are the basic building blocks of the nervous system.

Excitability of neurons: which involves the genesis of electrical signals that enable neurons to integrate and transmit impulses.

The functional unit of the nervous system is the nerve cell **(Neuron).**

Neurons are highly specialized nerve cells , that are capable of transmitting the information in chemical and electrical form from the brain to the body and vice versa.

The nervous system contains **Glial cells** which provide support and nutrition to the system.

These cells help maintain the health of the neurons and also aid in message transmission.

There are 3 main types of neurons:

Sensory neuron (Afferent Neurons) : Detect stimuli

- Receptor AP CNS

Interneurons : Relay sensory signals to brain then return message back to motor neurons. (cells that make decision)

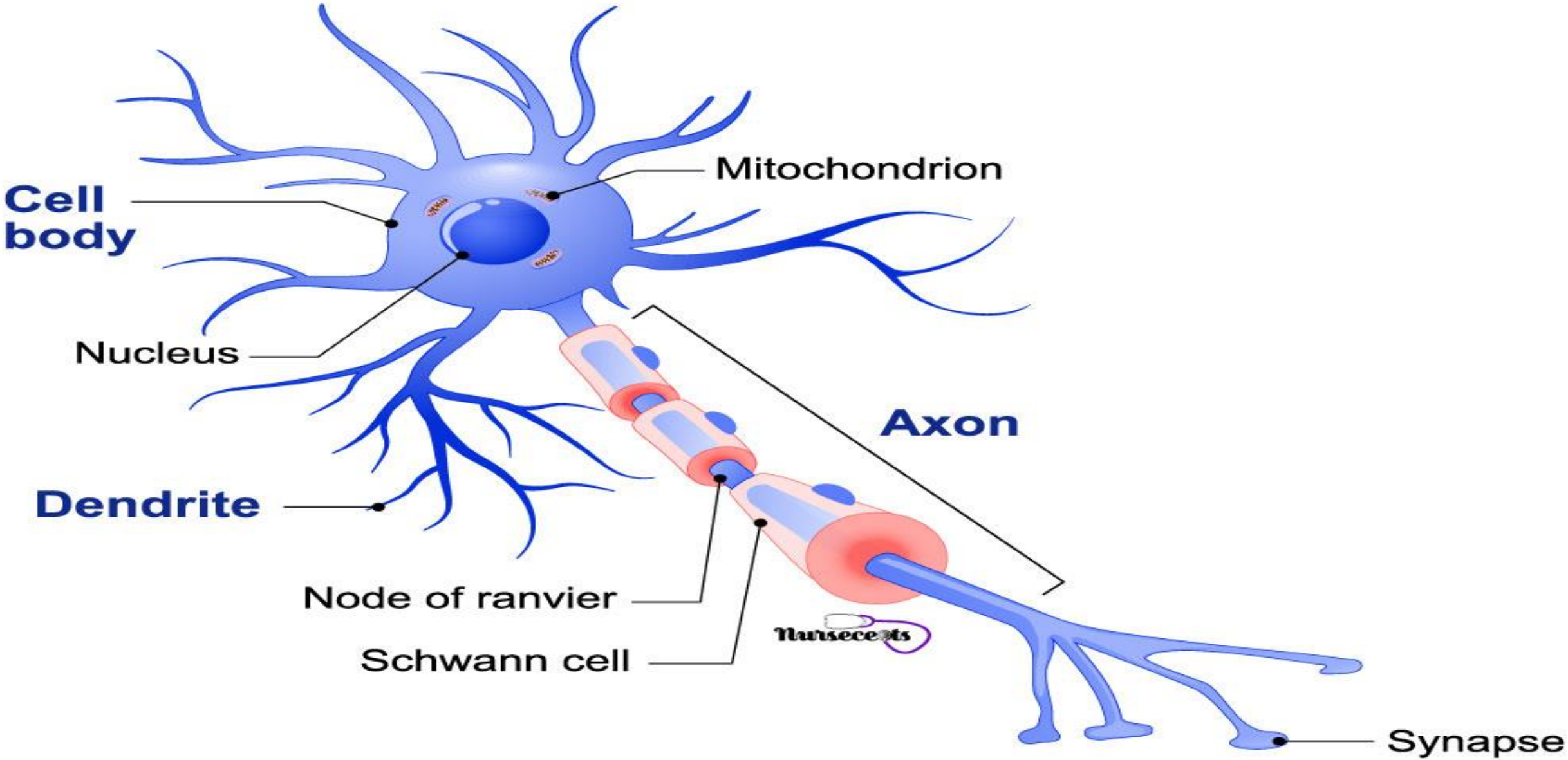
- Located entirely within the CNS
- Transmit AP from one neuron to other

Motor neuron (Efferent Neurons) : Pass message from brain to rest of body for muscle response

CNS AP Effector

- **The types of nerve fibers:**
  - **Ascending (Sensory, Afferent)**
    - Carry sensory informations from sensory neurons of body to brain
    - touch, pressure, pain, temperature
  - **Descending (Motor, Efferent)**
    - Carry motor instructions from brain to spinal cord
    - Contraction of muscles and secretion of glands
    - control precise, skilled movement = writing, maintain balance, create movement

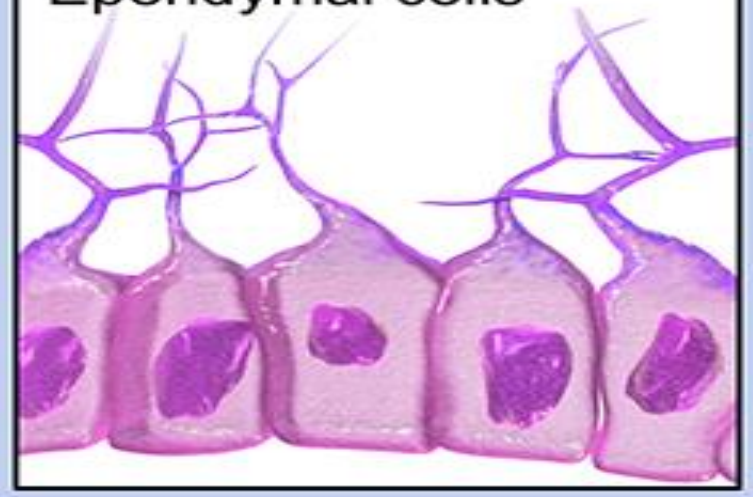
NEURON


Cell body
Mitochondrion
Nucleus
Axon
Dendrite
Node of ranvier
Schwann cell
Synapse

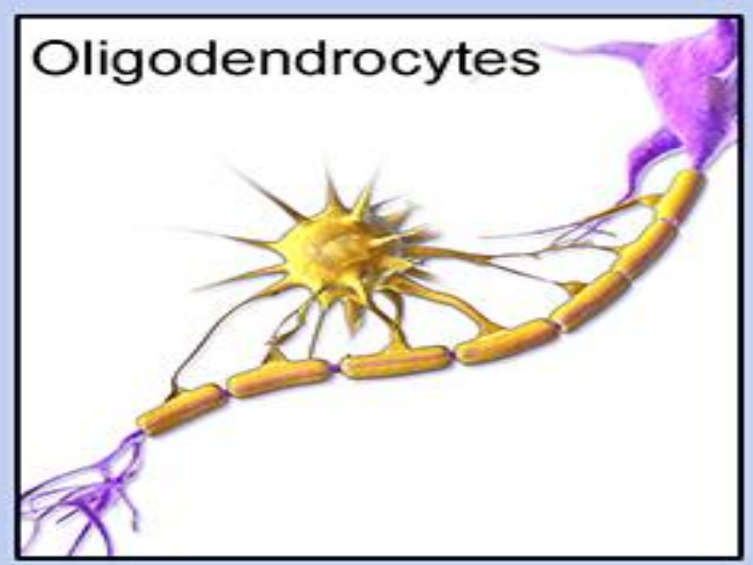
Types of Neuroglia

Central Nervous System

Ependymal cells



Oligodendrocytes

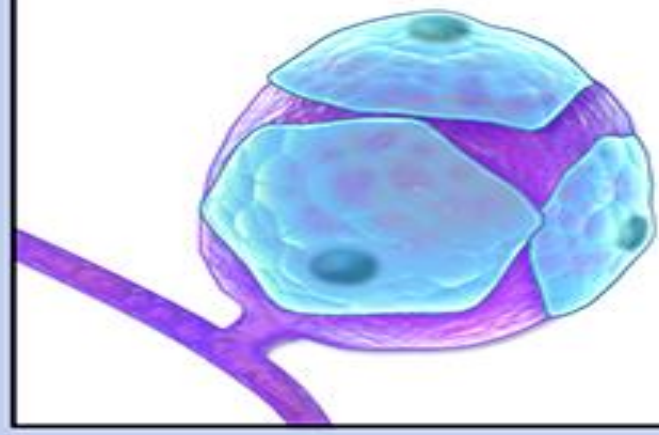


Astrocytes

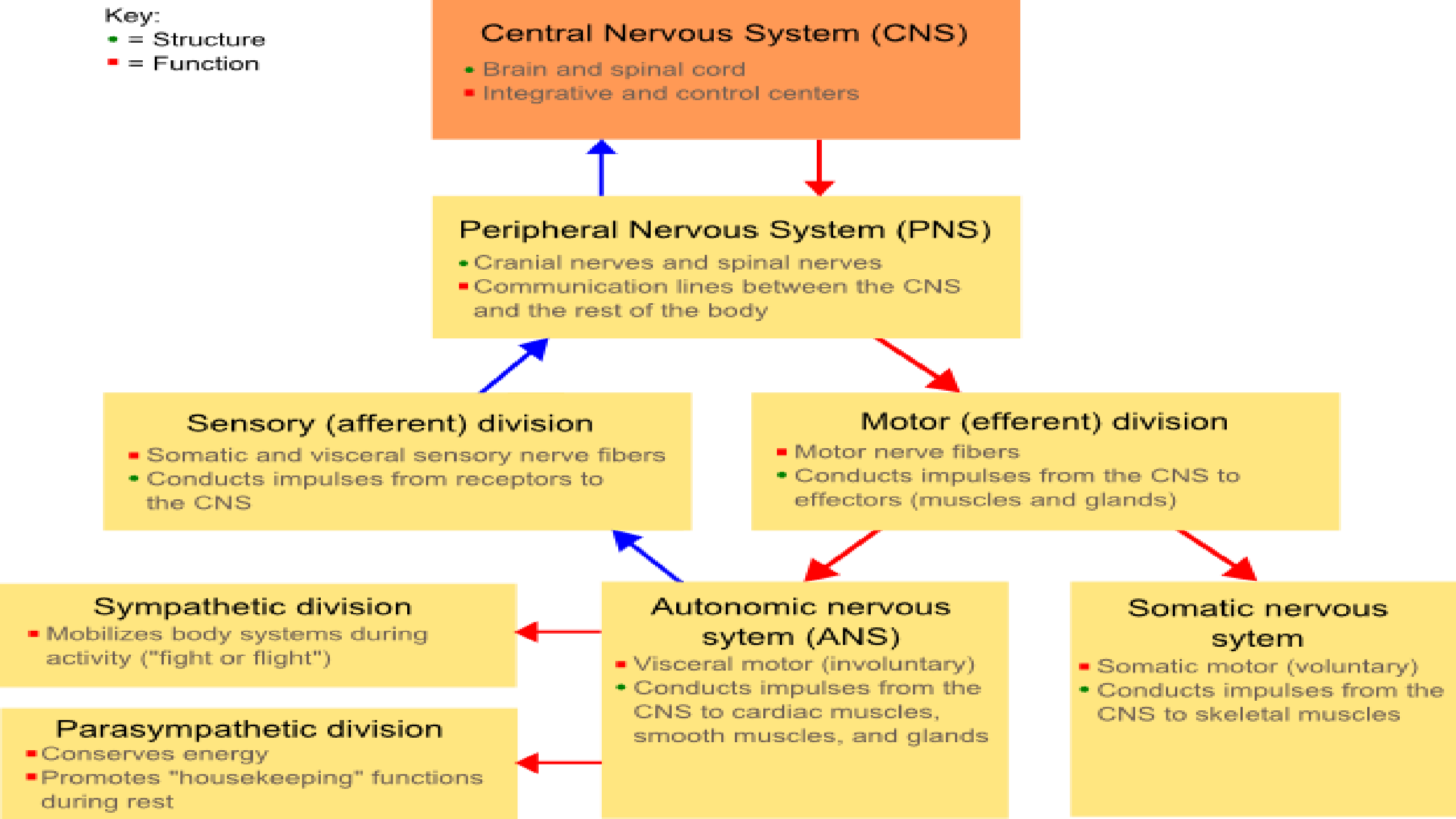
Microglia

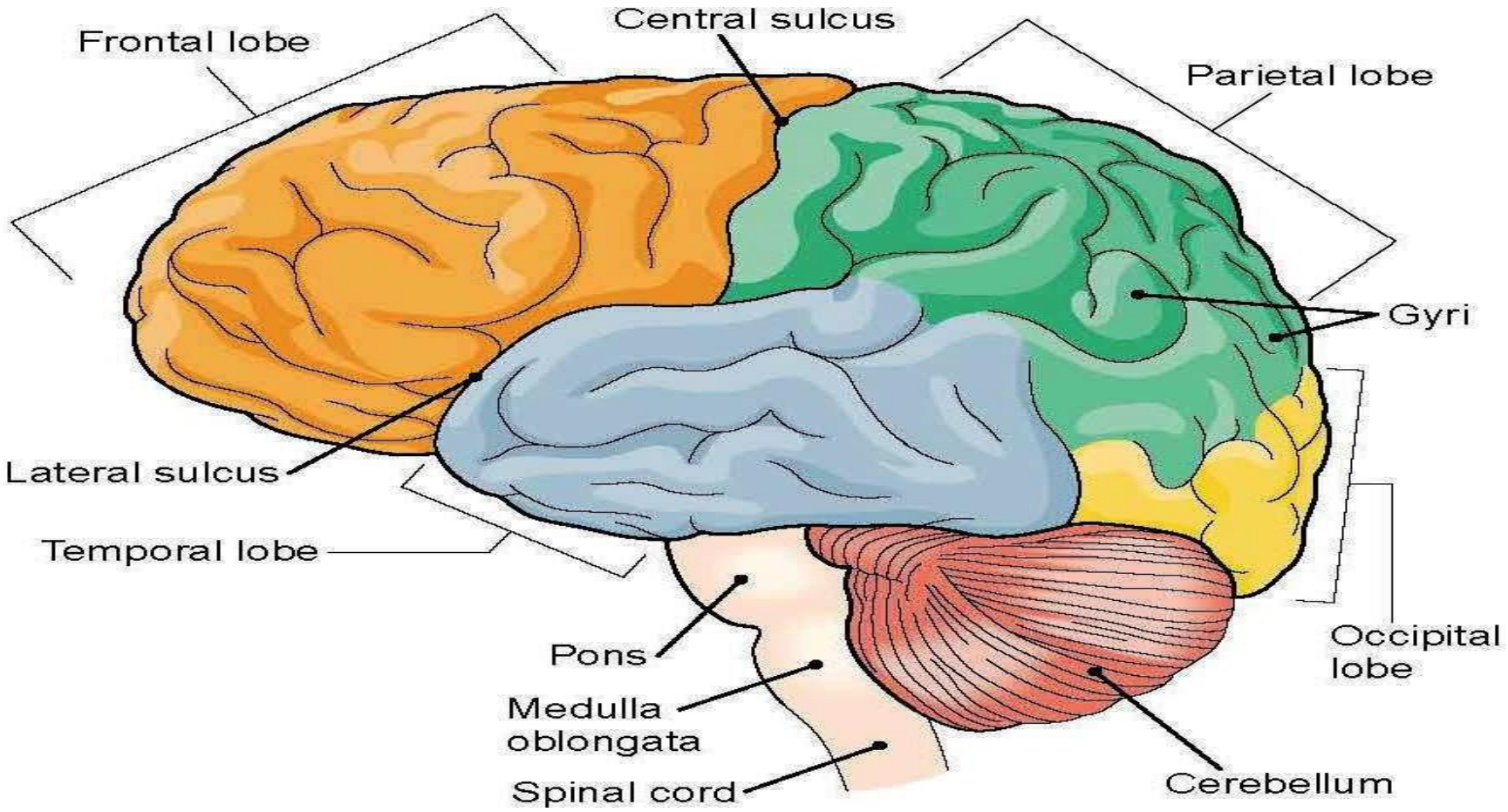
Peripheral Nervous System

Satellite cells



Schwann cells


Key:
• = Structure
▪ = Function
Central Nervous System (CNS)
• Brain and spinal cord
▪ Integrative and control centers
Peripheral Nervous System (PNS)
• Cranial nerves and spinal nerves
▪ Communication lines between the CNS and the rest of the body
Sensory (afferent) division
▪ Somatic and visceral sensory nerve fibers
• Conducts impulses from receptors to the CNS
Motor (efferent) division
▪ Motor nerve fibers
• Conducts impulses from the CNS to effectors (muscles and glands)
Sympathetic division
▪ Mobilizes body systems during activity ("fight or flight")
Parasympathetic division
▪ Conserves energy
▪ Promotes "housekeeping" functions during rest
Autonomic nervous sytem (ANS)
▪ Visceral motor (involuntary)
• Conducts impulses from the CNS to cardiac muscles, smooth muscles, and glands
Somatic nervous sytem
▪ Somatic motor (voluntary)
• Conducts impulses from the CNS to skeletal muscles



The brain (The nervous tissue contained within the cranium) **has four major divisions:**

1. Brainstem: connects the brain to the spinal cord

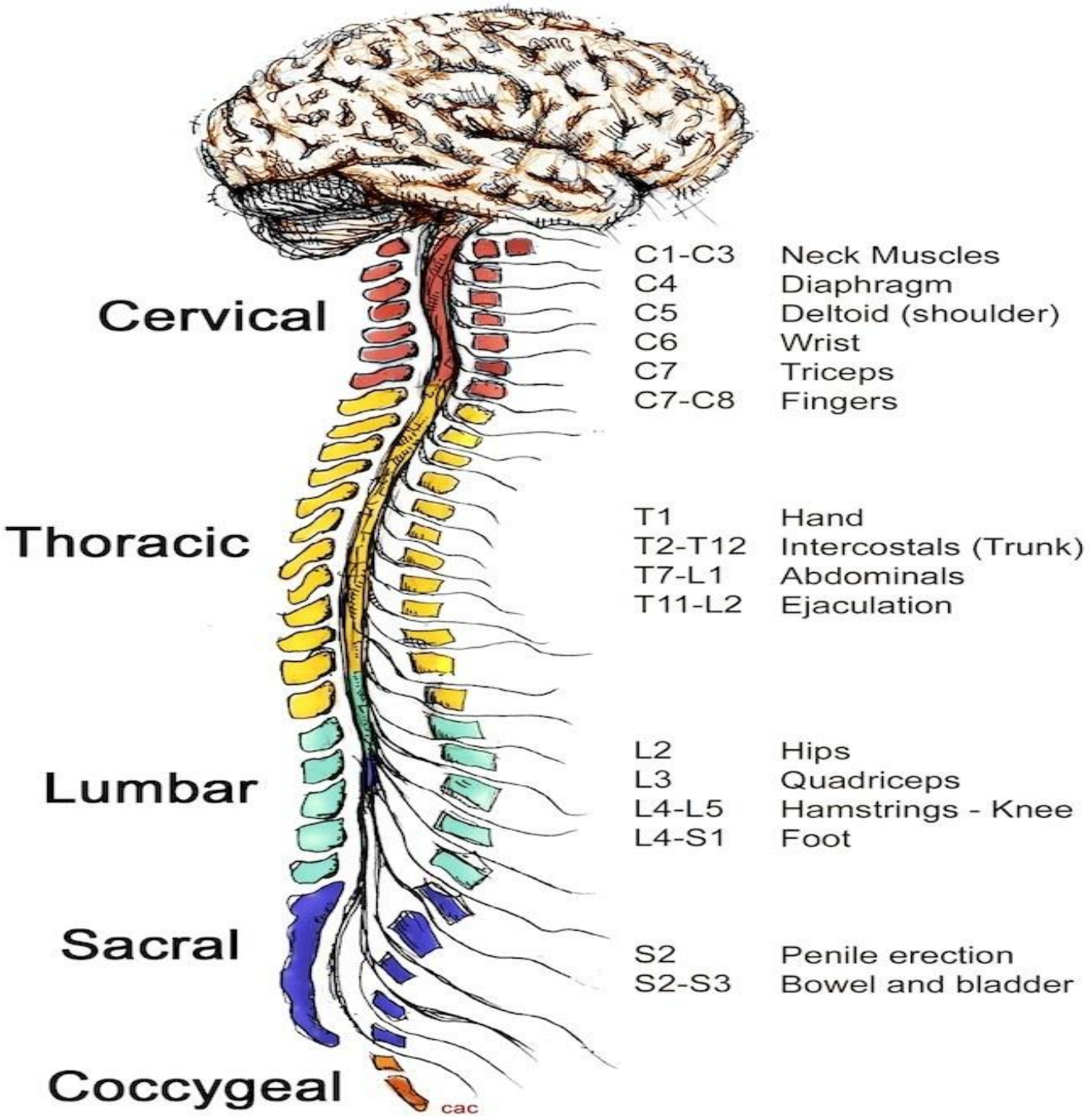
2. Cerebrum: has two hemispheres, with an outer portion called the cerebral cortex.

3. Cerebellum: coordinates musculoskeletal movement

4. Diencephalon: the deep portion of the brain

The spinal cord is the highway for communication between the body and the brain. When the spinal cord is injured, the exchange of information between the brain and other parts of the body is disrupted.

Most systems and organs of the body control just one function, but the central nervous system does many jobs at the same time. It controls all voluntary movement, such as speech and walking, and involuntary movements, such as blinking and breathing. It is also the core of our thoughts, perceptions, and emotions



Protective Structures

Since the CNS is so important, it is protected by a number of structures. First, the entire CNS is enclosed in **bone**. The brain is protected by the **skull**. The spinal cord is encased by the vertebrae that make up the **spinal column**.

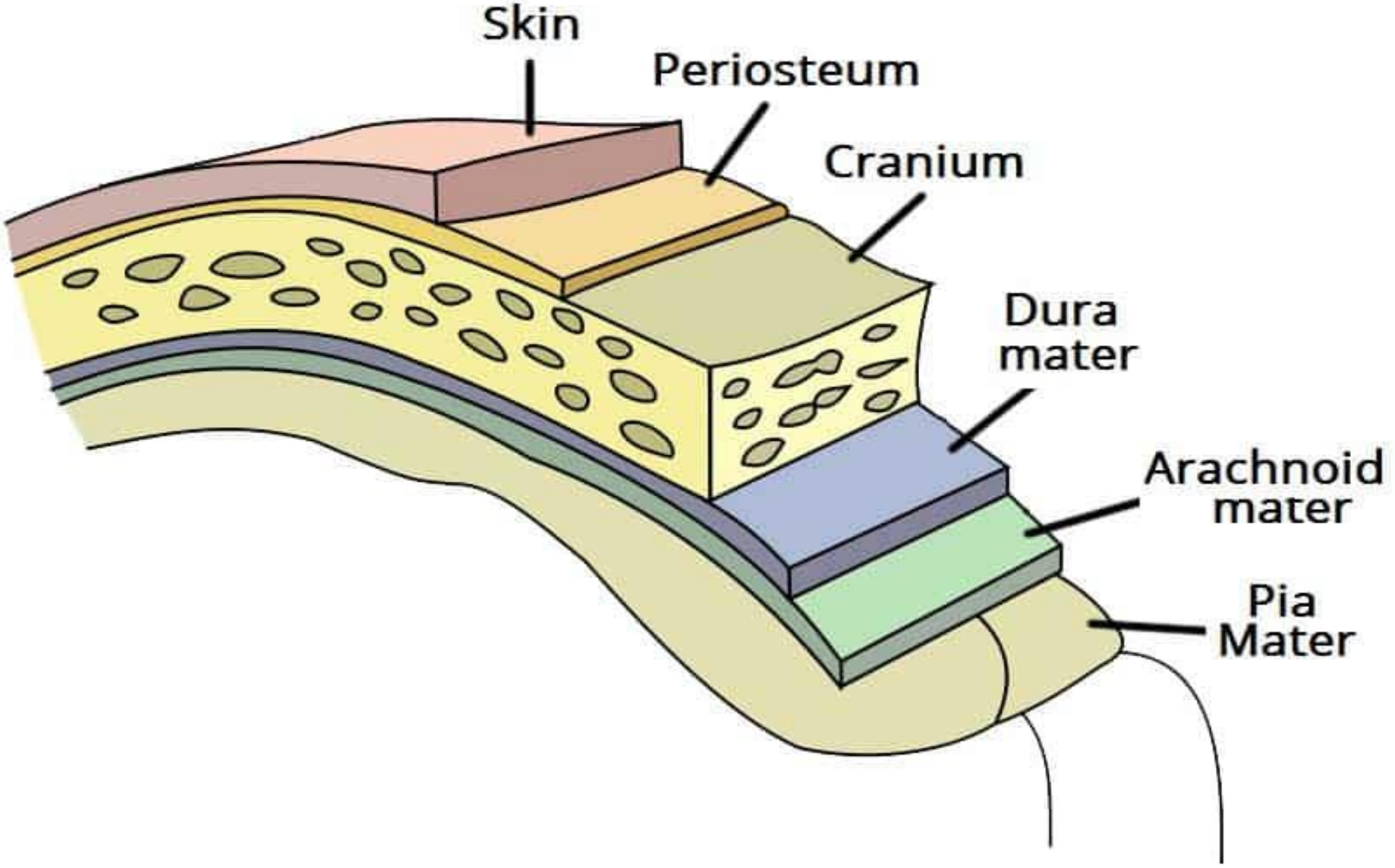
The brain and spinal cord are both covered with a protective tissue known as **meninges**. There are three layers of meninges protecting the brain and spinal cord:

Dura mater: From the Latin words meaning "hard mother," this is the top layer of the meninges found directly under the bones of the skull and vertebrae.

Arachnoid mater: The second layer of the meninges is a spider-like, transparent membrane.

Pia mater: From the Latin for "soft mother," this protective layer is the innermost layer of the meninges.

The entire CNS is also immersed in a substance known as **cerebrospinal fluid (CSF)**, which forms a chemical environment that allows nerve fibers to transmit information effectively as well as offering yet another layer of protection from potential damage.



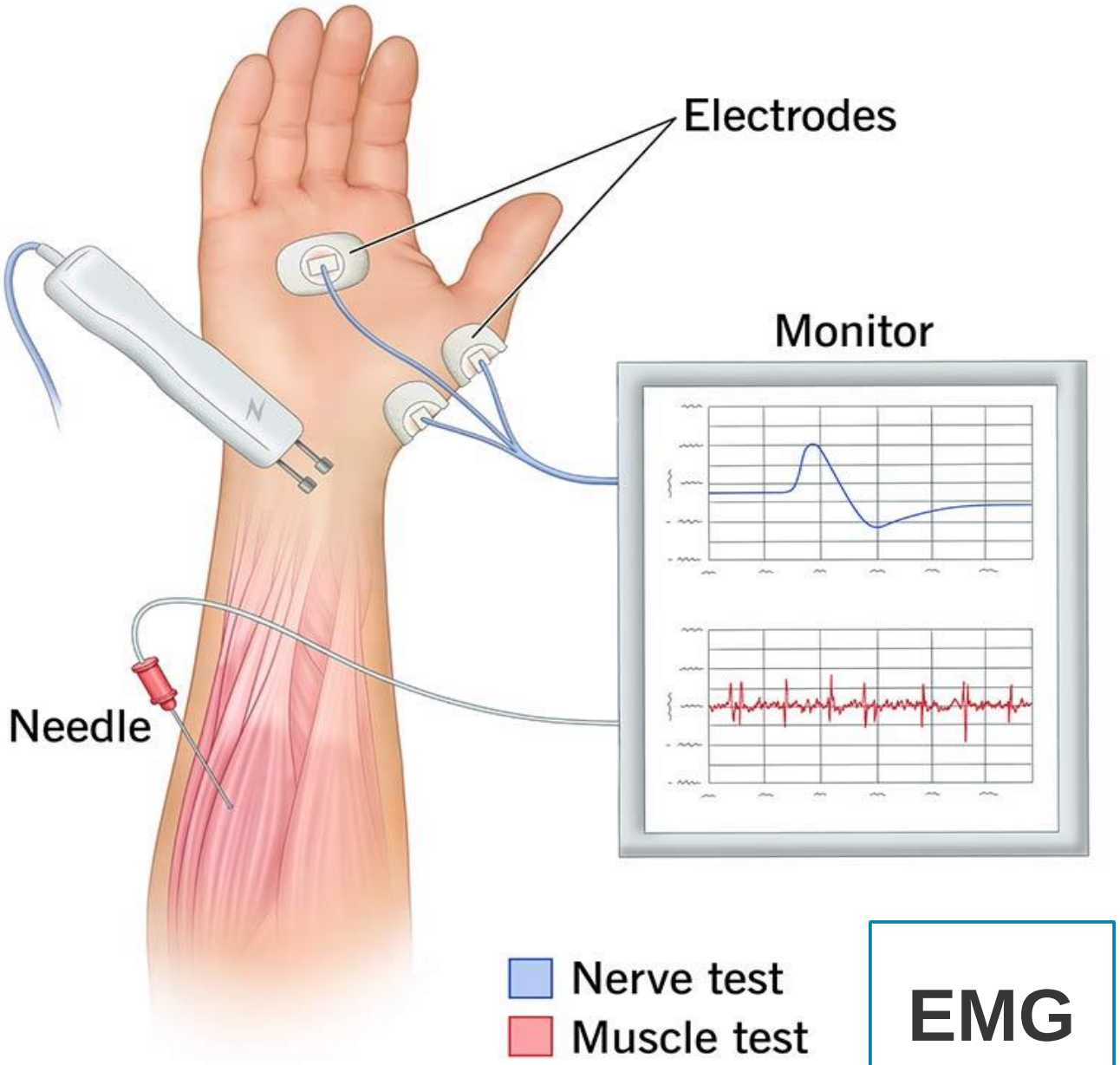
Overview of the meninges, and their relationship to the skull and brain

TERM	DEFINITION
Afferent neuron	Afferent means moving toward the center.
	Neurons receive information and transmit messages from one cell to another, throughout the body.
	Afferent neurons (also called sensory neurons or input neurons) carry impulses from the peripheral receptors (skin and sensory organs) to the central nervous system (spinal cord and the brain).
Afferent pathways (ascending pathways)	Afferent is moving toward the center.
	Pathways are routes taken.
	Afferent pathways are the routes taken from the periphery of the body to the central nervous system.
Efferent neuron	Efferent means away from the center.
	Efferent neurons (also called motor neurons or output neurons) carry and transmit impulses from the central nervous system (brain and spinal cord) to muscles and glands.
Efferent pathways (descending pathways)	Efferent means away from the center.
	Pathways are routes taken.
	Efferent pathways are the route of the nerve fibers carrying impulses away from a nerve center.

TERM	DEFINITION
Neurology	Neuro- means nerve.
	-ology is the study of.
	Neurology is a medical specialty that treats conditions related to the nervous system.
Neurologist	Neuro- means nerve.
	-logist means one who studies.
	A neurologist is a person who treats conditions related to the nervous system.
Neurosurgeon	Neuro- means nerve.
	Surgeon means a physician that treats deformities, injuries and diseases using operative procedures.
	A neurosurgeon is a physician that specializes in the nervous system and operative procedures.

TERM	DEFINITION
Electroencephalography (EEG)	Electro- refers to electrical.
	Encephalo refers to the brain.
	-graphy is the process of recording.
	During this procedure electrical activity of the brain is recorded by scalp electrodes to evaluate seizure disorders, cerebral disease, and brain death.
Electromyography (EMG)	Electro- refers to electrical.
	Myo- refers to muscle.
	-graphy is the process of recording.
	During this procedure needle electrodes are inserted to record activity associated with a nerve or skeletal muscle to detect muscle and peripheral nerve disease.
Magnetic Resonance Imaging (MRI)	Magnetic refers to lodestone.
	Resonance means to sound again.
	Imaging means image.
	An MRI is a procedure used to produce an image by the creation of a magnetic field to give detailed information about nervous system abnormalities.

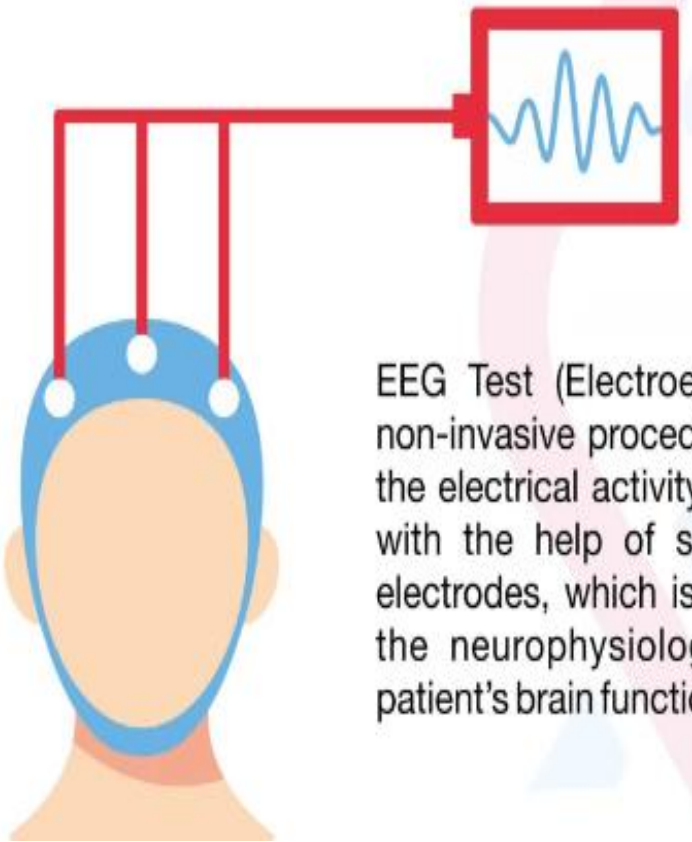
EMG (Electromyography)



EMG

What is EEG Test (Electroencephalogram)?

EEG



EEG Test (Electroencephalogram) is a non-invasive procedure used to estimate the electrical activity of a patient's brain, with the help of small metal discs or electrodes, which is further observed by the neurophysiologist to analyse the patient's brain functions.

Cerebrospinal Fluid Analysis (Lumbar puncture)	Cerebrospinal refers to the brain and spinal cord.
	For a cerebrospinal fluid analysis, cerebrospinal fluid is aspirated by needle insertion between the l3-l4 or l4- l5 intervertebral spaces. This procedure assesses for different central nervous system diseases.
Cerebral Angiography	Cerebral refers to the brain.
	Angio refers to a vessel.
	-graphy is the process of recording.
	A cerebral angiography uses serial x-rays to visualize intra and extra cranial blood vessels. This procedure is used to detect vascular lesions and tumors.
Craniectomy	Crani- refers to the skull or head.
	-ectomy refers to an excision (surgical removal or cutting out).
	A craniectomy is a surgical procedure which involves the removal of a portion of the skull.
Craniotomy	Crani refers to skull or head.
	-otomy refers to cutting into.
	A craniotomy is a surgical procedure which involves entry into the skull. This procedure is usually done to relieve intracranial pressure.

aphasia	a- (absence of); phasia (speech)	Loss of speech
anesthesia	an (without) + esthesi (sensation) + ia (condition of)	a condition of absence of sensation
encephalitis	encephal (brain) + itis (inflammation)	inflammation of the brain
hemiplegia	hemi (half) + plegia (paralysis)	paralysis of one side of the body
hemiparesis	hemi (half) + -paresis: weakness, loss of movement	weakness of one side of the body
diplopia	dipl (double) + opia (vision)	double vision
analgesia	-algesia: pain, sensitivity ia (condition of)	a condition of absence of pain
ataxia	a- (absence of); –taxia: muscle coordination	Loss of muscle coordination

Word Building with neur/o : nerve

–al	neural	pertaining to nerve
–algia	neuralgia	nerve pain
–ectomy	neurectomy	removal of nerve
–ologist	neurologist	nerve specialist
–oma	neuroma	nerve tumor
–pathy	neuropathy	nerve disease
–plasty	neuroplasty	surgical repair of nerve
poly– –itis	polyneuritis	inflammation of many nerves
–rrhaphy	neurorrhaphy	suture a nerve

Word Building with with encephal/o, meningi/o and mening/o

electr/o –gram	electroencephalogram	record of brain electricity
–itis	encephalitis	brain inflammation
–oma	meningioma	meninges tumor
–eal	meningeal	pertaining to meninges
–itis	meningitis	meninges inflammation

Word Building with myel/o

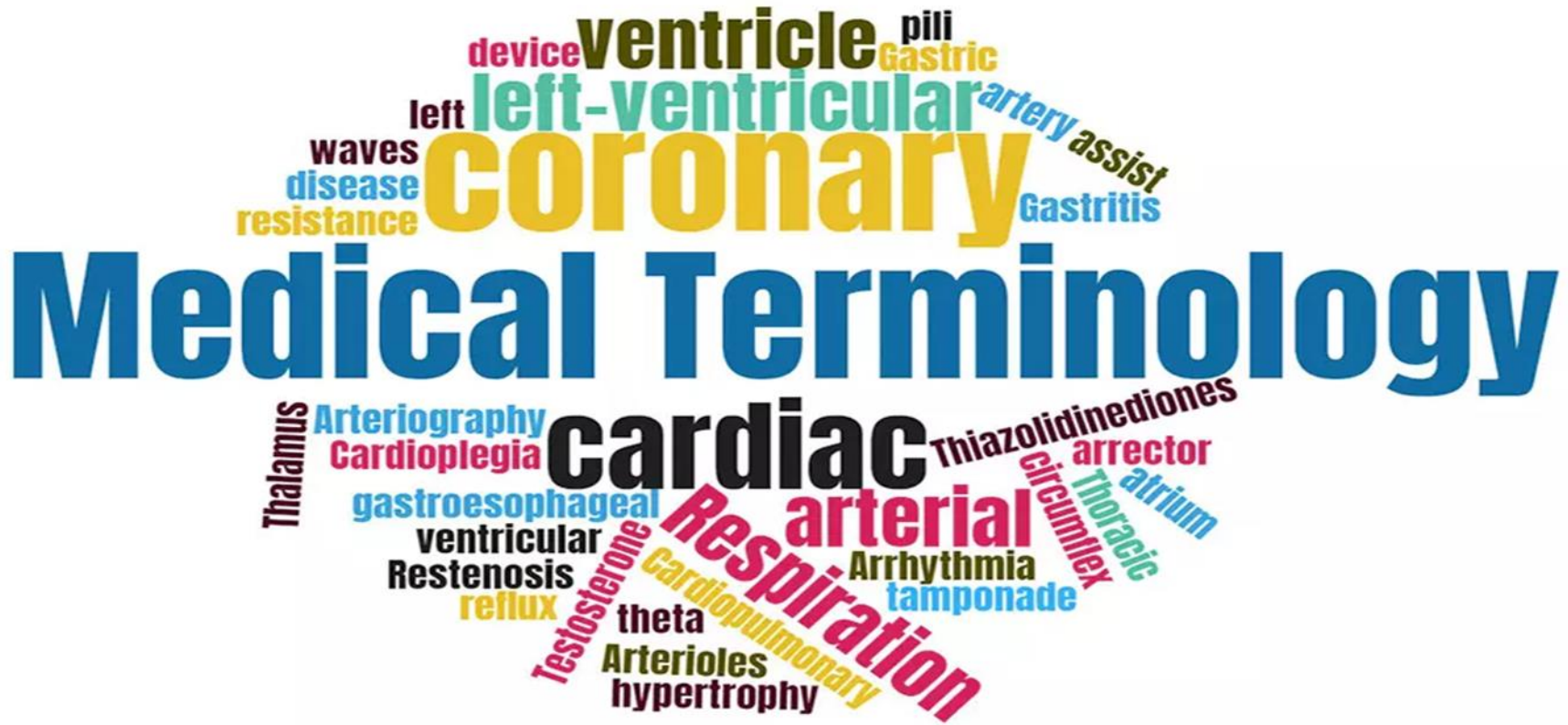
–gram	myelogram	spinal cord record
–itis	myelitis	inflammation of spinal cord

Nervous System Vocabulary

conscious	awake and aware of surroundings
unconscious	unaware of surroundings; unable to respond to stimuli
coma	state of profound unconsciousness
paresthesia	abnormal sensations such as burning or tingling
tremor	involuntary repetitive alternating movements
convulsion	alternating between strong involuntary muscle contractions and relaxations
seizure	sudden, uncontrollable onset of symptoms; such as in epileptic seizure
focal seizure	seizure in only one limb or body part
syncope	fainting

Drugs Classes	Definition	Examples (For Knowledge)
General anaesthetic agents	Drugs used to produce surgical anaesthesia	Isoflurane Halothane
Analgesic drugs (Pain killers)	Drugs used clinically for controlling pain	Opiates: Morphine, Tramadol; Others: Gabapentin
Anxiolytics and sedatives Synonyms: hypnotics, sedatives	Drugs that reduce anxiety and cause sleep	Benzodiazepines: Diazepam (Valium), Alprazolam (Xanax) , Lorazepam (Ativan)
Antiepileptic drugs Synonym: Anticonvulsants	Drugs used to reduce seizures	Carbamazepine (Tegretol), Valproate(Depakine), Clonazepam (Rivotril)
Antidepressant drugs	Drugs that alleviate the symptoms of depressive illness.	Tricyclic antidepressants TCA: Clomipramine (Anafranil), Imipramine (Tofranil),

THANK YOU!


device
ventricle
pili
Gastric
left
left-ventricular
artery
assist
waves
coronary
disease
resistance
Gastritis
Medical Terminology
Thalamus
Arteriography
Cardioplegia
cardiac
Thiazolidinediones
arrector
atrium
Thoracic
circumflex
gastroesophageal
arterial
ventricular
Respiration
Restenosis
Arrhythmia
tamponade
reflux
cardiopulmonary
Testosterone
theta
Arterioles
hypertrophy