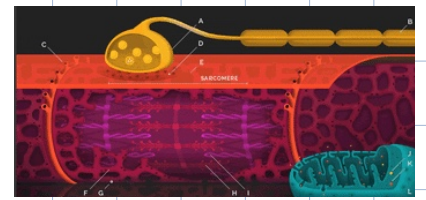
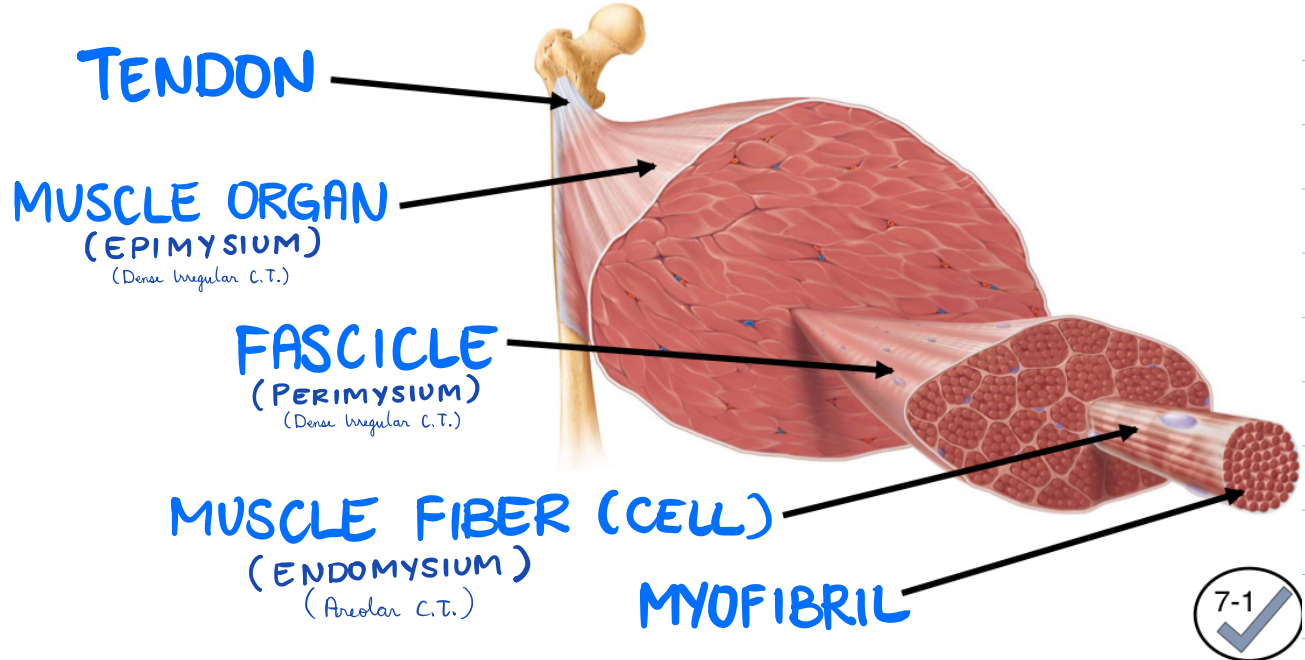


MUSCLE TISSUE

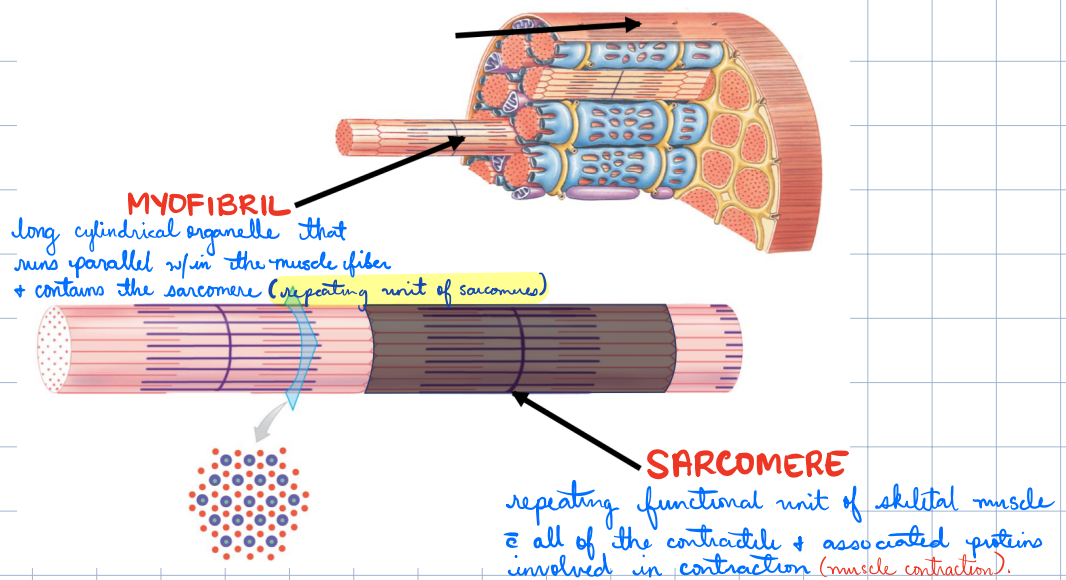


GROSS ANATOMY OF A MUSCLE ORGAN

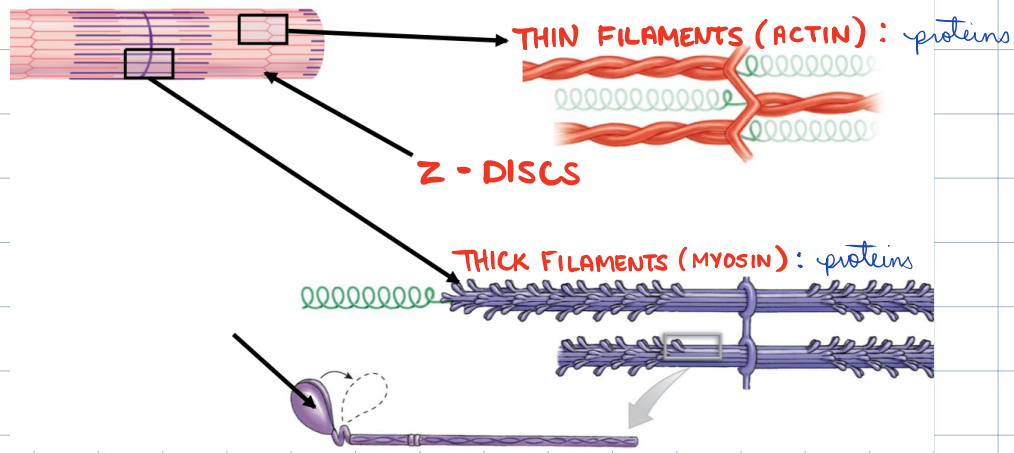
T
MO
F
MF
M



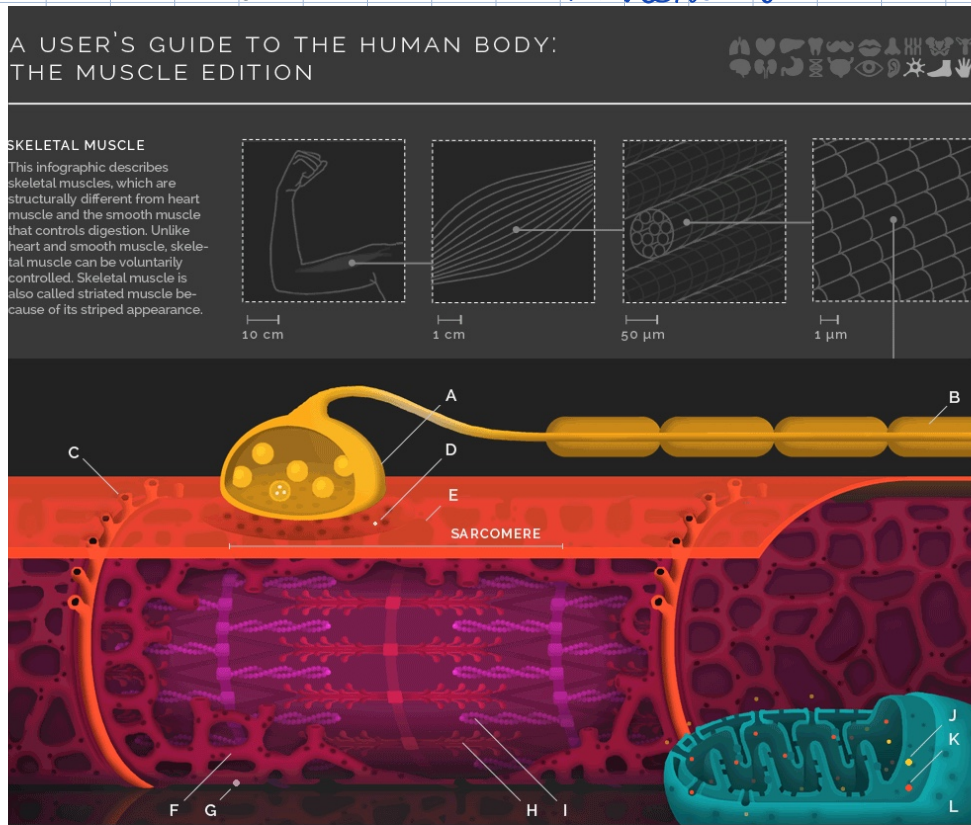
MICROSCOPIC ANATOMY OF A MUSCLE CELL



PARTS OF SARCOMERE



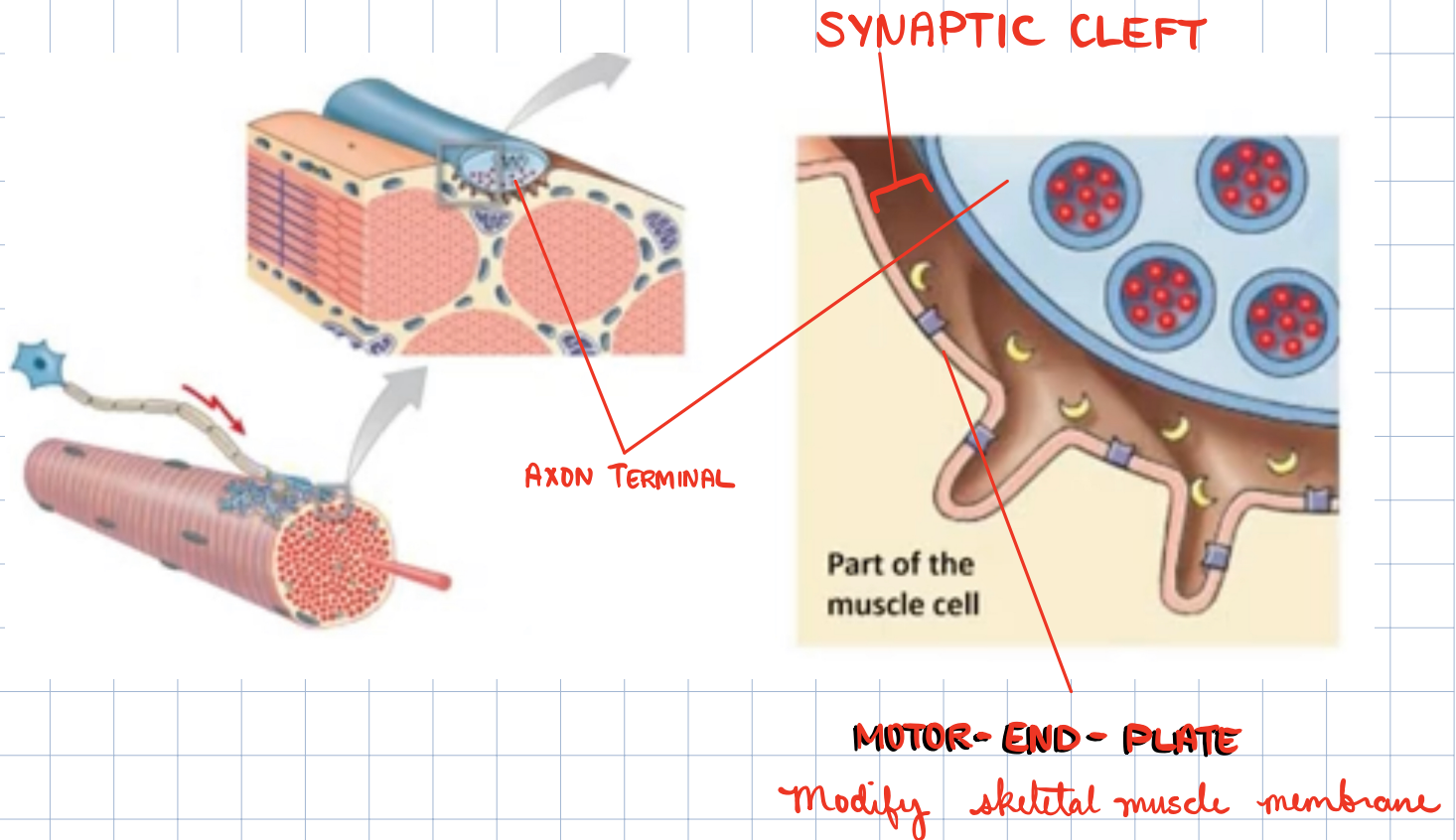
MUSCLE CONTRACTION shortens the muscle cell.



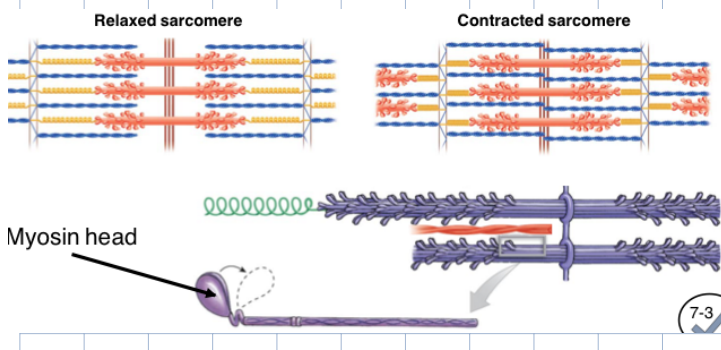
- * neuron excites the skeletal muscle cell + muscle cells shorten
- * All or nothing: all the myofibril shortens

* When skeletal muscle gets excited, it contracts because of the neuron's electricity

NEUROMUSCULAR JUNCTION Synapse between the axon terminal of a motor neuron and the section of the membrane of a muscle fiber \bar{c} receptors for the acetylcholine release by the terminal. * Neuron communicates \bar{c} muscle cells to contract.



SLIDING FILAMENT THEORY filaments slide to the center. Sarcomere shortens in length.



Myosin head pulls thin filaments towards the center of sarcomere

MOTOR UNITS 1 neuron that can control multiple muscle fibers/cells.

SMALL MOTOR UNITS VS LARGE MOTOR UNITS

- ▶ 1 neuron: 10s of muscle cells
- ▶ Weak force output
- ▶ Fine motor control

Ex: type on keyboard



- ▶ 1 neuron: 1000s of muscle cells
- ▶ Strong force output
- ▶ Bulk motor control

Ex: kicking a ball.



MUSCLE TISSUES OF THE BODY



SKELETAL: Attached to bone.
(some facial muscle to skin).

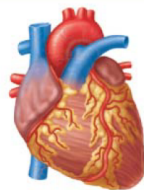
SARCOMERE?: Sarcomere

VOL/INVOL?: Vol.

GAP JUNCTION?: No

SPEED OF CONTRACTION: Slow to fast

TIME UNTIL FATIGUE: Short



CARDIAC: walls of ♥

SARCOMERE?: Sarcomere

VOL/INVOL?: Invol.

GAP JUNCTION?: Yes

SPEED OF CONTRACTION: Slow

TIME UNTIL FATIGUE: Very long



SMOOTH: walls of hollow organs (stomach, resp Tubules, B.V., uterus).

SARCOMERE?: No

VOL/INVOL?: Invol.

GAP JUNCTION?: Some

SPEED OF CONTRACTION: Very Slow

TIME UNTIL FATIGUE: Long

MUSCULAR SYSTEM

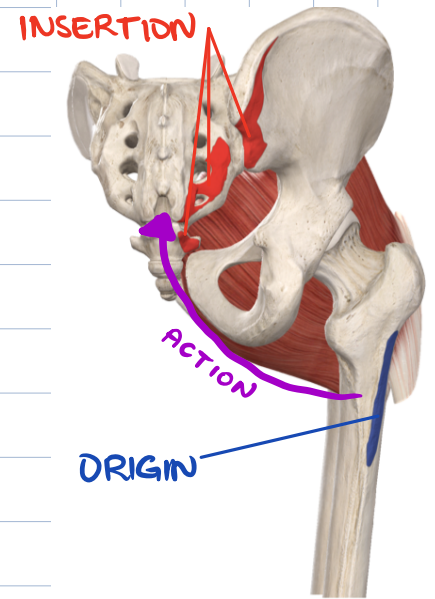
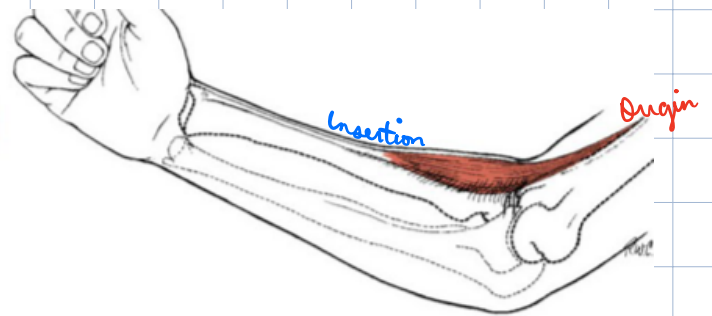
MUSCLE ATTACHMENTS AND FUNCTIONS

ORIGIN: muscle attachment that doesn't move during muscle contraction

INSERTION: muscle attachment that moves during muscle contraction

ACTION: Body motion created during muscle contraction.

Brachioradialis Muscle



* Pull origin towards the insertion.

ACTION: thigh extension, lateral rotation of thigh.

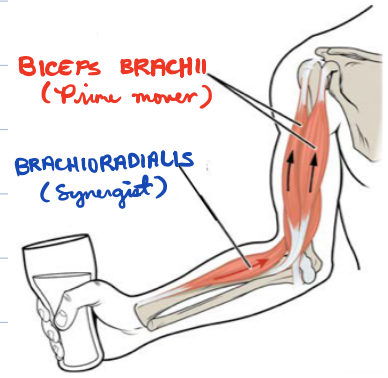
FUNCTIONAL ROLES OF MUSCLES

PRIME MOVER (AGONIST): Creates body motion

SYNERGIST: helps in body motion

FIXATOR: Prevents the origin from moving.

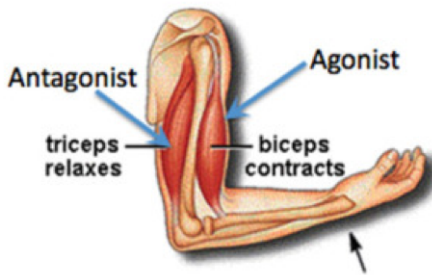
ANTAGONIST: Opposite body motion of prime mover.
(happens after body motion).



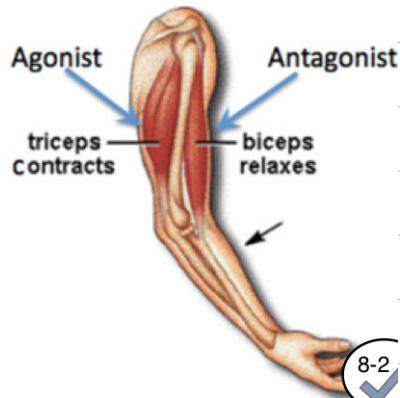
Agonist and antagonist muscles work in opposite ways

Given a certain body motion

... like forearm flexion



...like forearm extension

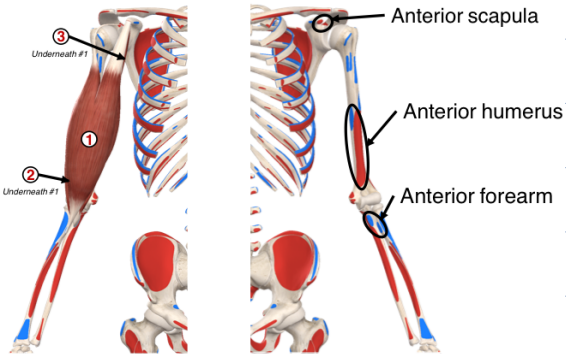


Generally, agonist & antagonist are in opposite sides of the body compartment

MUSCLE COMPARTMENTS

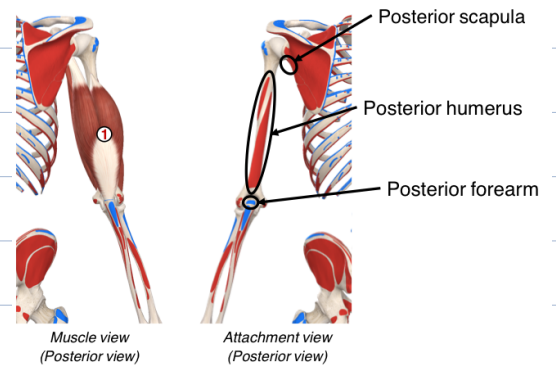
ARM COMPARTMENT

ANTERIOR (FLEXORS)



ACTIONS: FOREARM FLEXION
ARM FLEXION

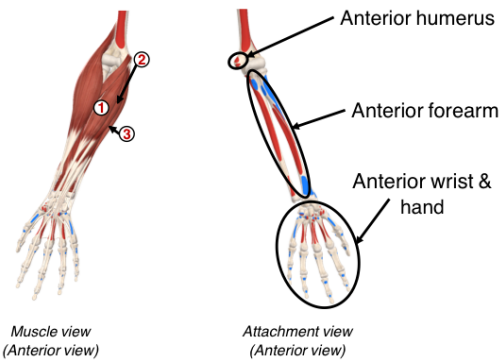
POSTERIOR (EXTENSORS)



ACTIONS: FOREARM EXTENSION
ARM EXTENSION

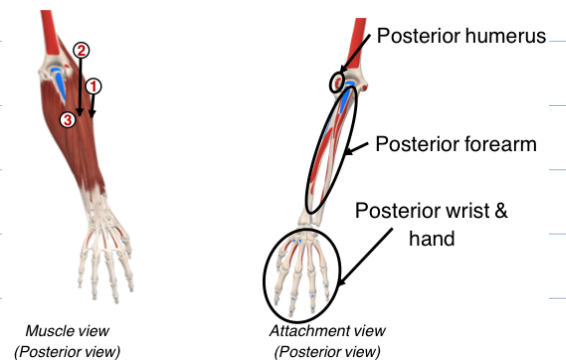
FOREARM COMPARTMENT

ANTERIOR (FLEXORS)



ACTIONS: HAND FLEXION
FINGER FLEXION

POSTERIOR (EXTENSORS)



ACTIONS: HAND EXTENSION
FINGER EXTENSION

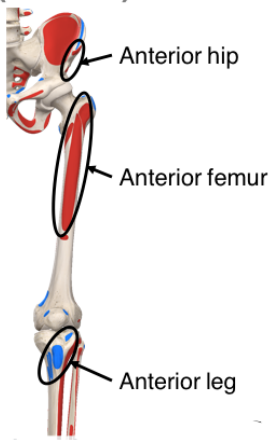
THIGH COMPARTMENT

ANTERIOR (FLEXORS)

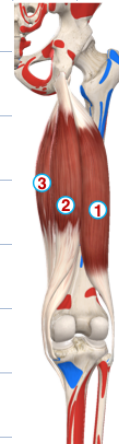
POSTERIOR (EXTENSORS)



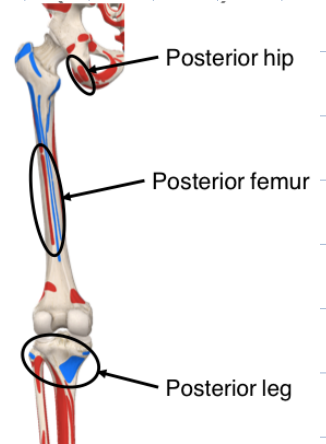
Muscle view
(Anterior view)



Attachment view
(Anterior view)



Muscle view
(Posterior view)



Attachment view
(Posterior view)

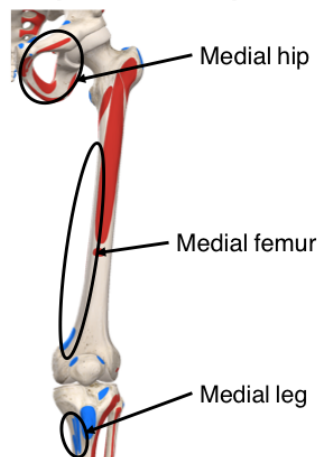
ACTIONS: LEG EXTENSION
THIGH FLEXION
TORSO FLEXION

ACTIONS: LEG FLEXION
THIGH EXTENSION

MEDIAL (ADDUCTORS)



Muscle view
(Anterior view)



Attachment view
(Anterior view)

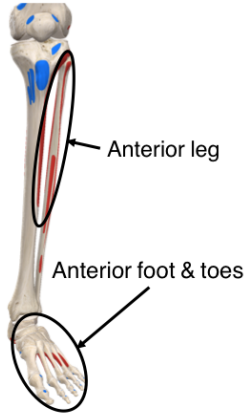
ACTIONS: THIGH ADDUCTION

LEG COMPARTMENT

ANTERIOR (FLEXORS)



Muscle view
(Anterior view)



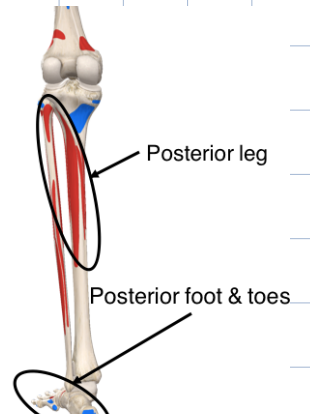
Attachment view
(Anterior view)

ACTIONS: FOOT DORSIFLEXION
TOE EXTENSION

POSTERIOR (EXTENSORS)



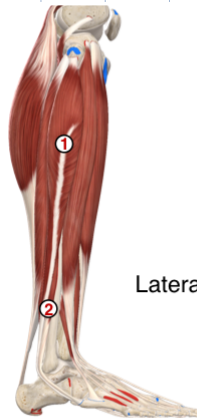
Muscle view
(Posterior view)



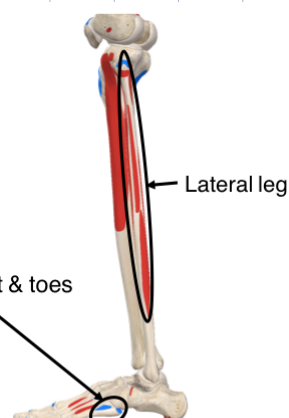
Attachment view
(Posterior view)

ACTIONS: FOOT PLANTAR FLEXION
TOE FLEXION

LATERAL (EVERTORS)



Muscle view
(Lateral view)



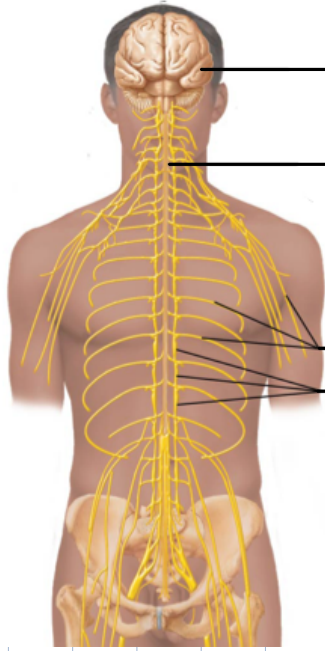
Attachment view
(Lateral view)

ACTIONS: FOOT EVERSION

NERVOUS SYSTEM & TISSUE

NERVOUS SYSTEM DIVISION

STRUCTURAL/ANATOMICALLY



BRAIN

SPINAL
CORD

NERVES
GANGLIA

CNS: Process + relay info
(cannot regenerate).

PNS: Send info / commands from/to
the CNS. (can regenerate)

FUNCTIONAL DIVISION

SOMATIC N.S.

Related to CONSCIOUSNESS.
(conscious sensation / commands).

Ex: Someone touched you
Seeing something
Walking
Writing

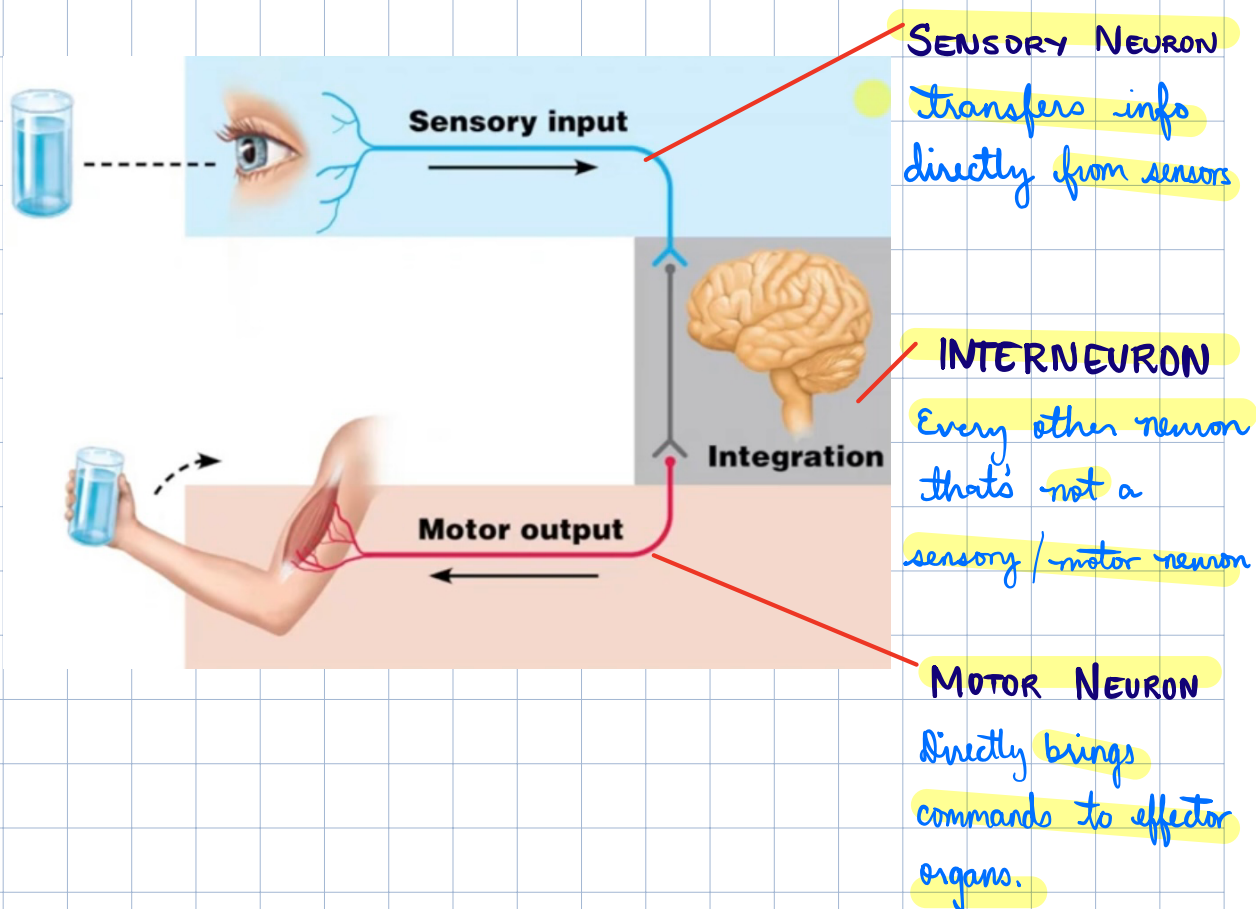
AUTONOMIC N.S.

Related to AUTOMATIC
(involuntary sensation / commands)

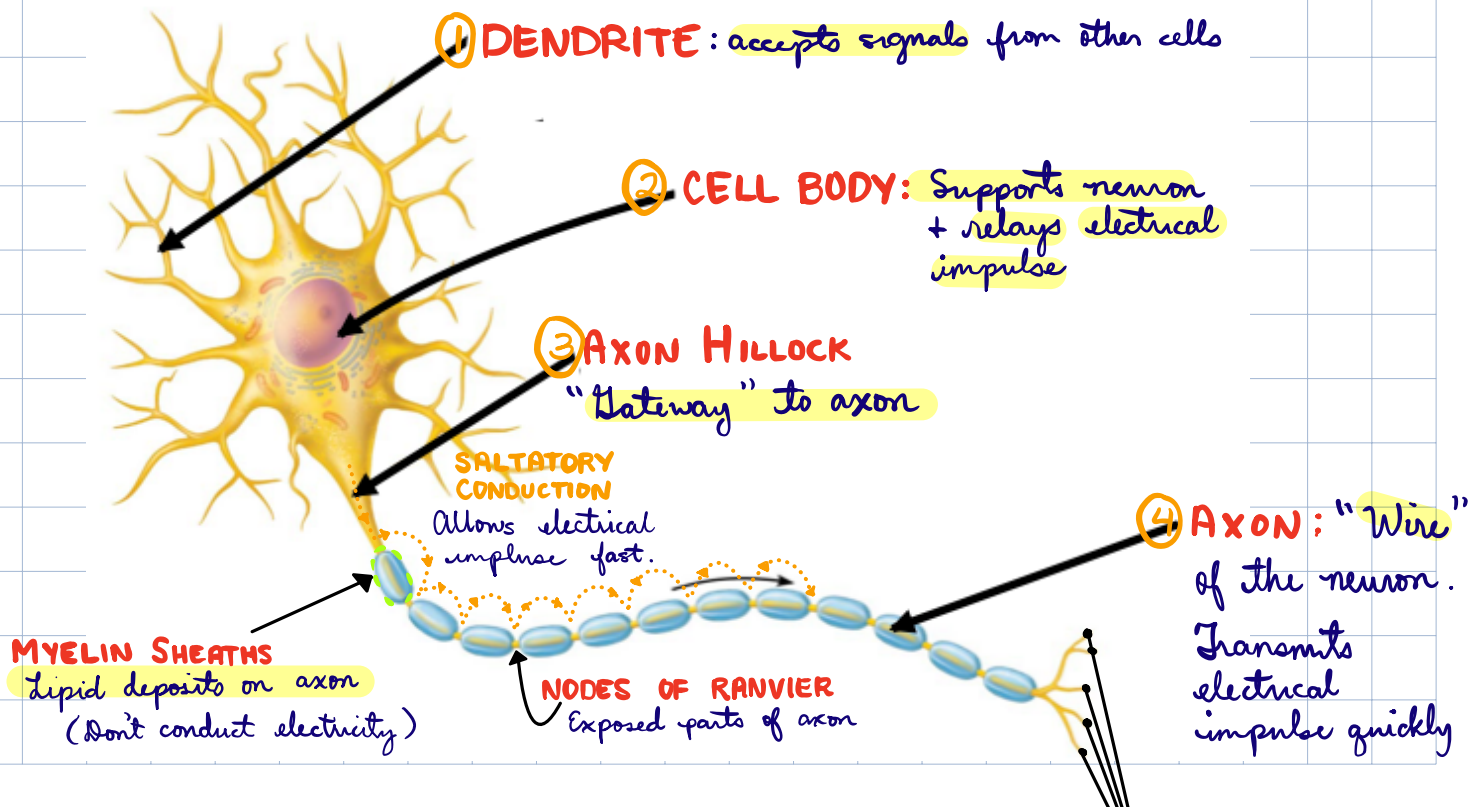
Ex: heart rate
digestion
body detecting BP or O₂

NEURONS

3 FUNCTIONAL CLASSIFICATION



NEURON STRUCTURE



AXON TERMINAL

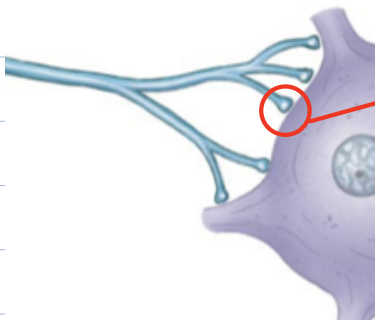
Synapse = other cells.
(part of neuromuscular junction).

SALTATORY CONDUCTION: allows electrical impulse to travel fast!

- ▶ STRUCTURES THAT ALLOWS IT TO HAPPEN: **Alternating patterns of MYELIN SHEATH + NODES OF RANVIER**

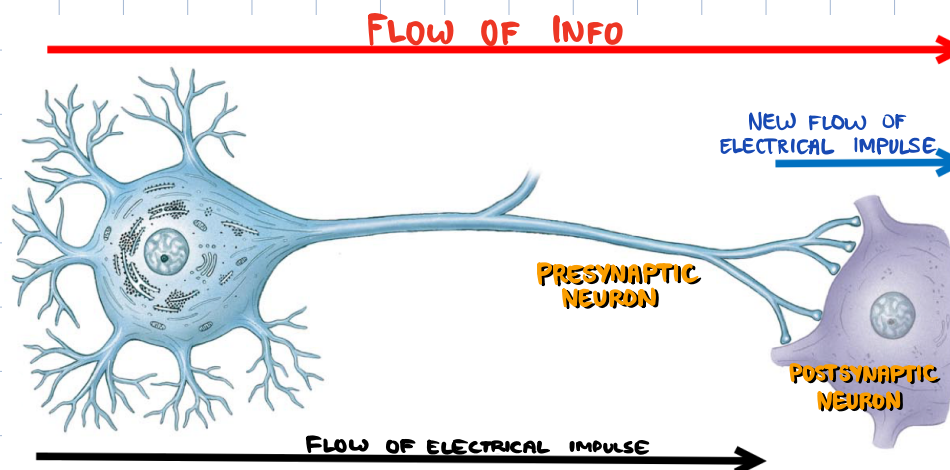
MYELINATED VS UNMYELINATED

SYNAPSES + NEURON COMMUNICATION



SYNAPSE: Connection b/w axon terminal + dendrite (site for **NEUROTRANSMITTERS**)

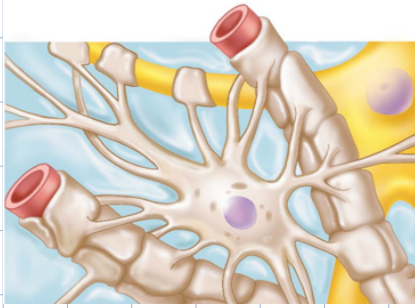
↳ Chemical released by end of axon terminal to the space then synapses



INFO FLOW ORDER

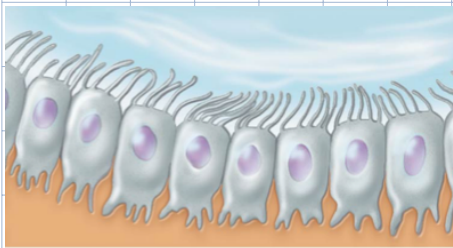
- 1 PRESYNAPTIC DENDRITES
- 2 PRESYNAPTIC CELL BODY
- 3 PRESYNAPTIC AXON HILLOCK
- 4 PRESYNAPTIC AXON
- 5 PRESYNAPTIC AXON TERMINAL
- 6 POSTSYNAPTIC DENDRITES
- 7 POSTSYNAPTIC CELL BODY
- 8 POSTSYNAPTIC AXON HILLOCK
- 9 POSTSYNAPTIC AXON
- 10 POSTSYNAPTIC AXON TERMINAL

NEUROGLIAL CELLS: variety of cells that provide a framework of tissue that supports the neurons + their activities.



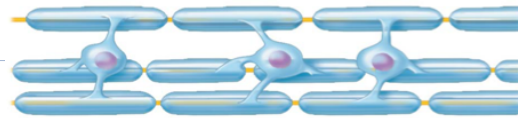
ASTROCYTES (CNS)

- Create blood-brain barrier
- Regulate water-tissue content
- Form structural networks
- Regulate neurotransmitters



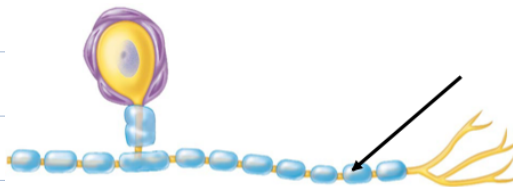
EPENDYMAL (CNS)

- Makes CSF



OLIGODENDROCYTES (CNS)

- Creates myelin sheaths in CNS.



SCHWANN (PNS)

- Creates myelin sheath in PNS