

MUSCLE AND NERVE

- ◆ unique to animals
- ◆ conduct electricity (controlled fashion)
- ◆ allow for movement

Molecular Basis of Muscle Function

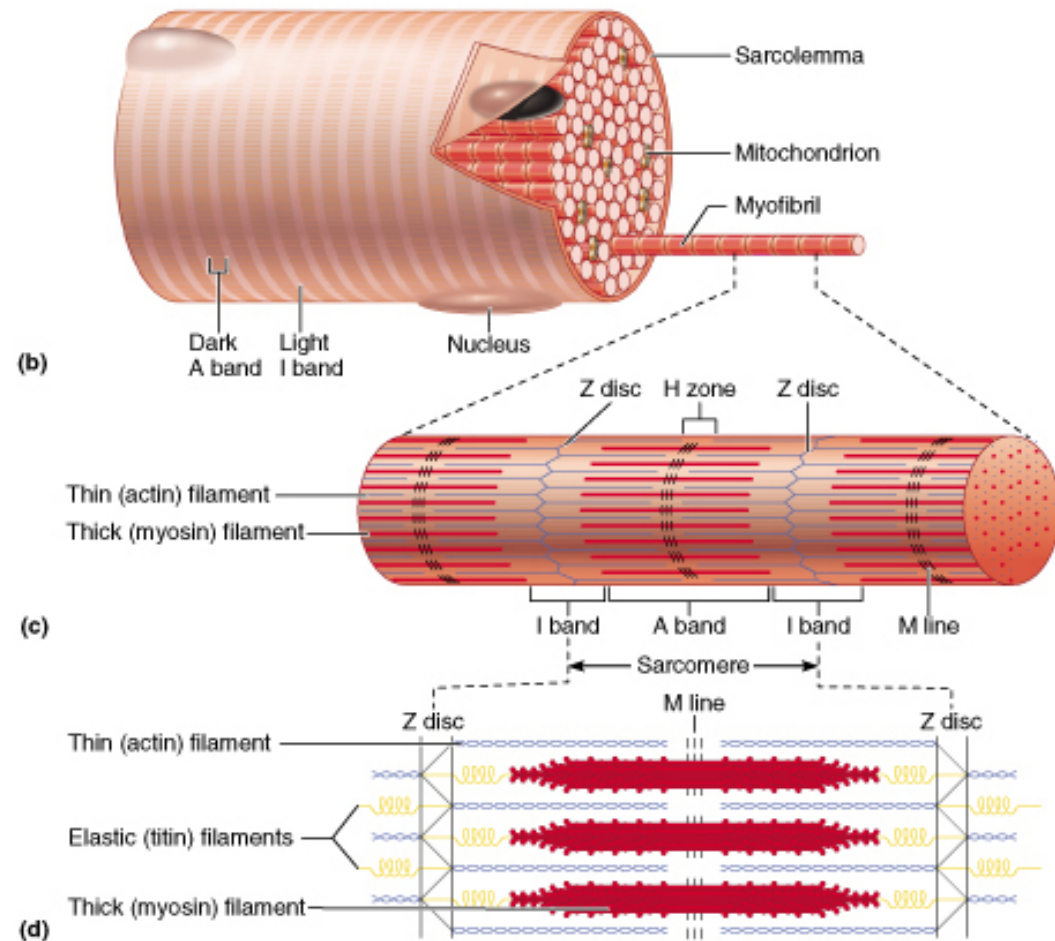
❖ Actin-Myosin model (board)

EXPLAINS:

- MUSCLE SHORTENING
- MUSCLE FORCE GENERATION OR “CONTRACTION”

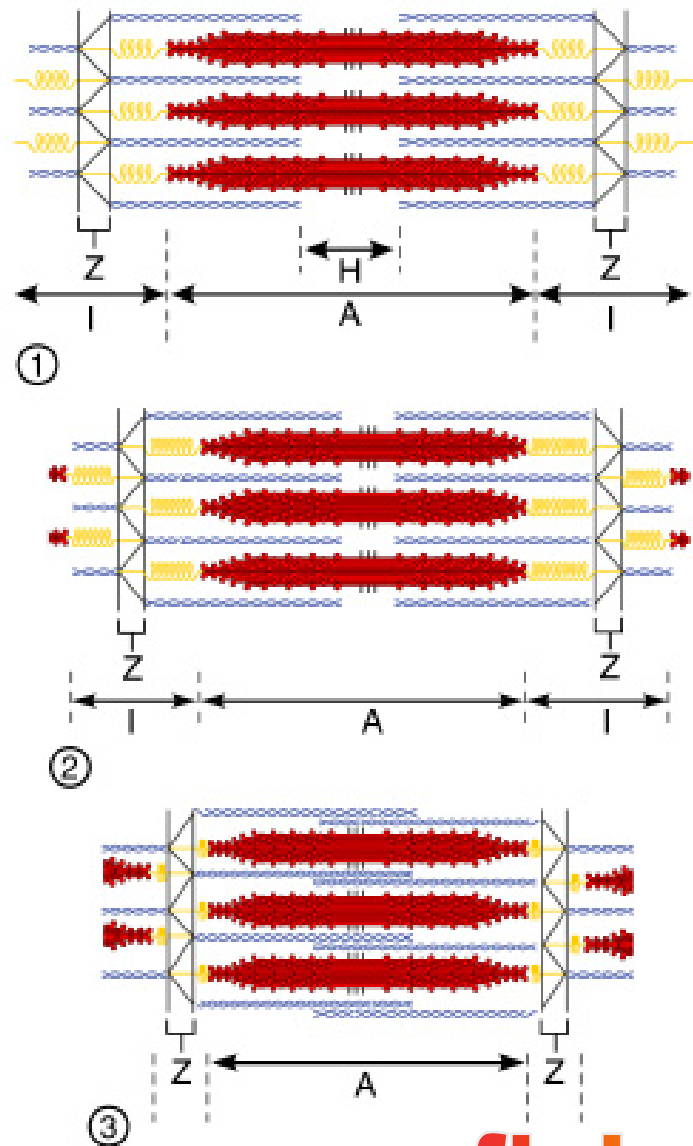
Mechanics of Contraction

- ◆ Muscle cell is unit
- ◆ Role of *actin/myosin*
- ◆ *Action potential or depolarization of membrane makes cell “contract”*
- ◆ (*motor neuron action potential stimulates muscle membrane depolarization*)



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Visualizing muscle contraction



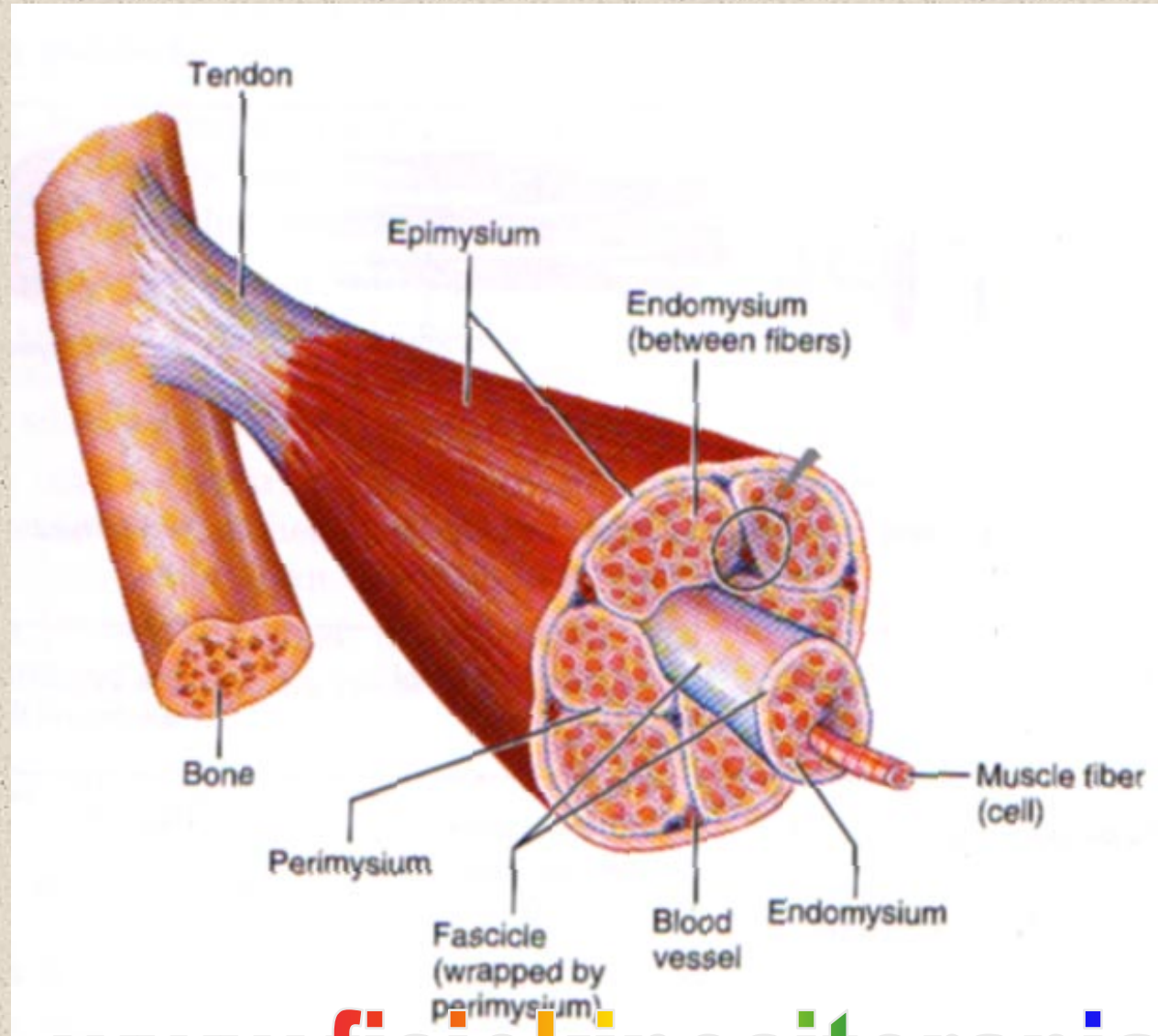
How actin-
myosin
complex
(*sarcomere*)
shorten muscle

10.7

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From Actin-Myosin to Whole Muscle



M & M,
Fig. 4.17
for muscle
types

Skeletal Muscle Tissue

(each skeletal muscle is an organ)

◆ Cells

- Long and cylindrical, in bundles
- Multinucleate
- Obvious Striations

◆ Skeletal Muscles-Voluntary

◆ Connective Tissue Components:

- Endomysium-between fibers
- Perimysium-surrounds bundles
- Epimysium-surround whole muscle
- Attached to bones, fascia, skin
- Origin & Insertion

Smooth Muscle Tissue

◆ Cells

- ◆ Single cells, uninucleate
- ◆ No striations

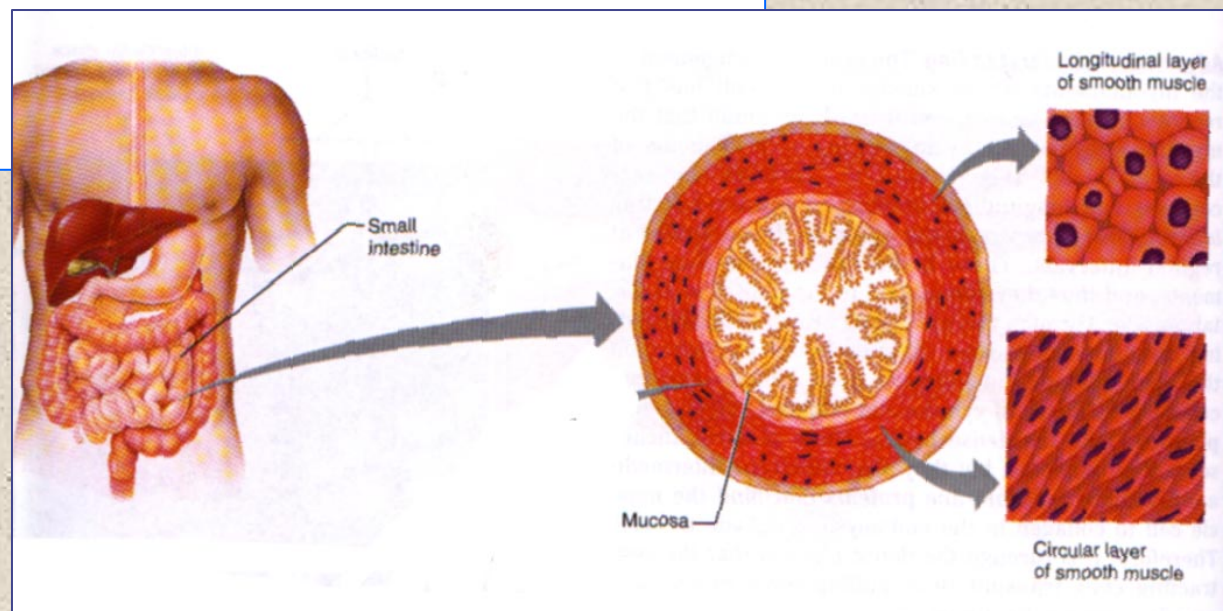
◆ Smooth Muscle-Involuntary

- ◆ 2 layers-opposite orientation (peristalsis)

◆ Surrounds hollow organs, blood vessels

◆ Connective Tissue Component

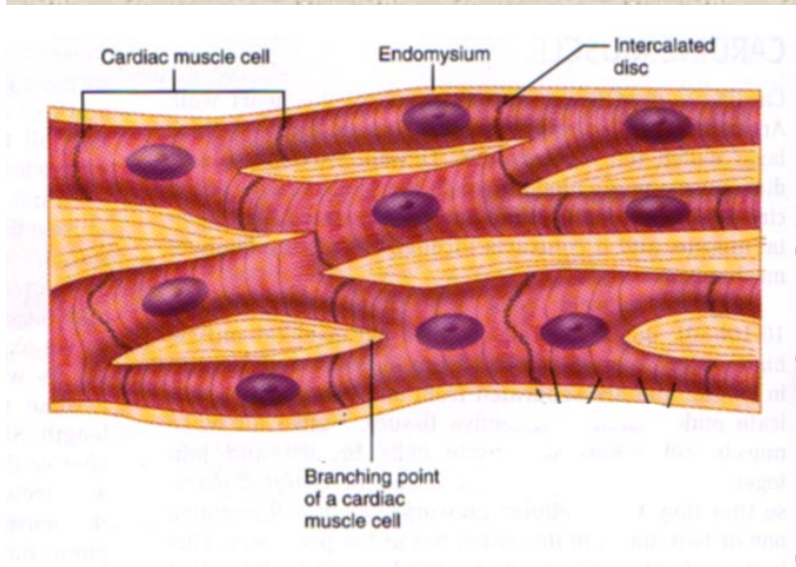
- ◆ Endomysium: surrounds cells



Cardiac Muscle

◆ Cells

- Branching, chains of cells
- Single or Binucleated
- Striations
- Connected by **Intercalated discs**



◆ Cardiac Muscle-Involuntary

◆ Myocardium-heart muscle

- Pumps blood through vessels

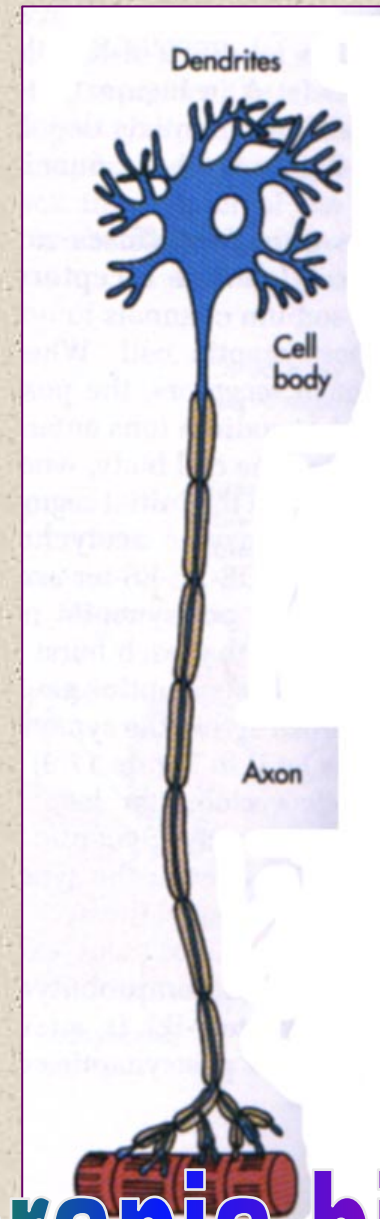
◆ Connective Tissue Component

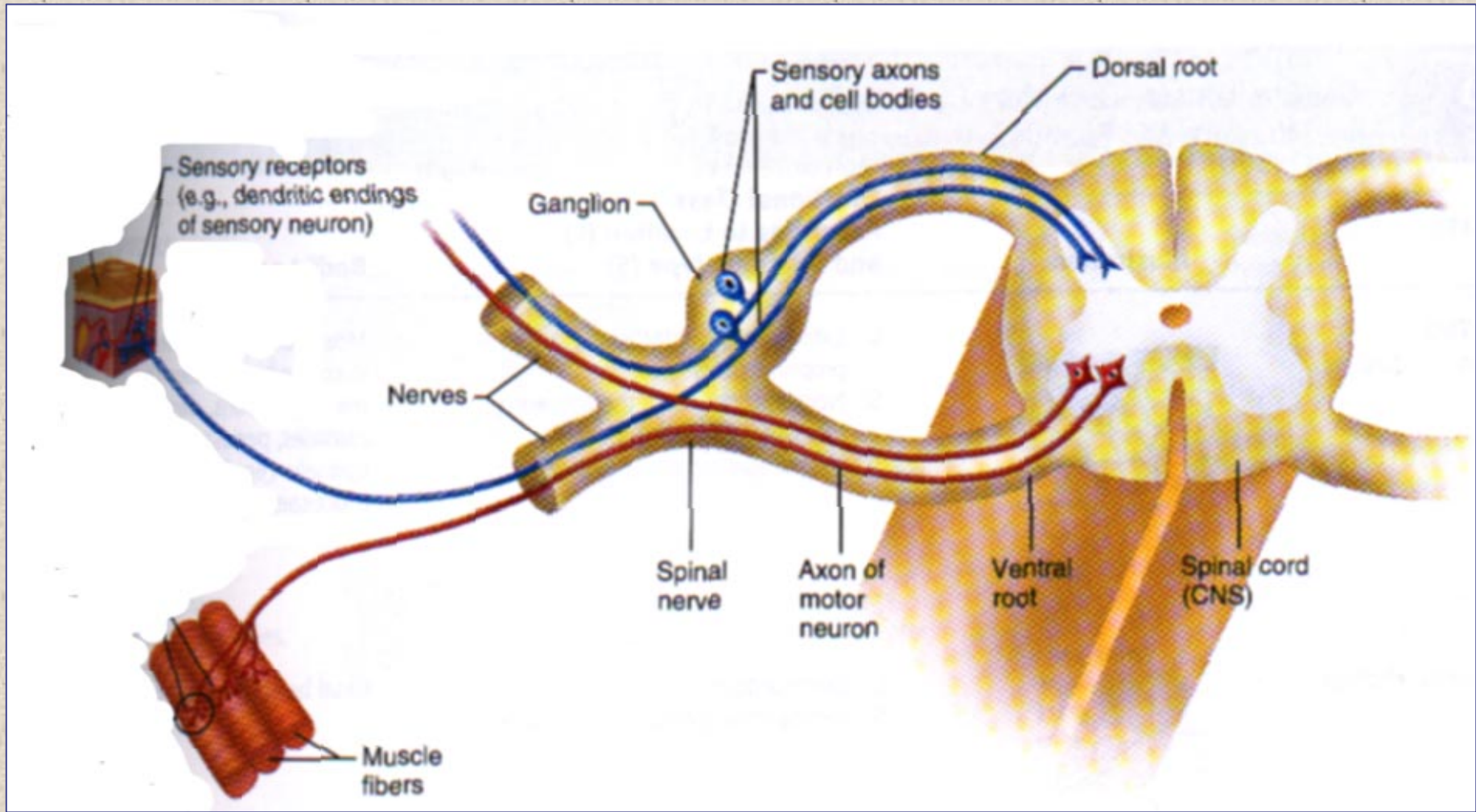
- Endomysium: surrounding cells

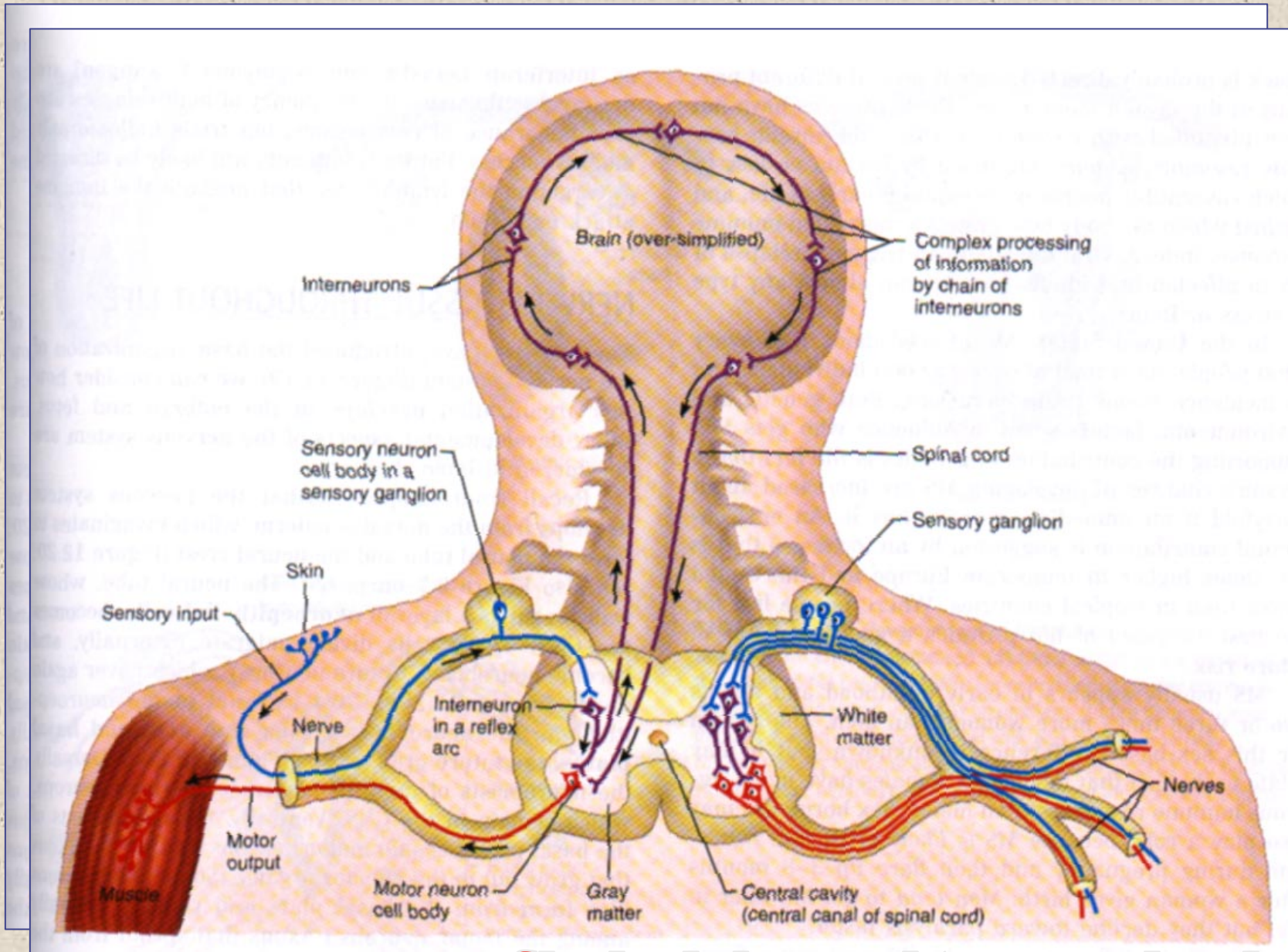
NERVOUS TISSUE

- ◆ Neurons are biggest cells in body
- ◆ Two basic types
 - motor
 - sensory
- ◆ Messages travel by membrane depolarization
- ◆ Schwann cells are insulation in peripheral nerves (none in CNS)

[Thought game: trip from sensory input (e.g., hot stove) to motor response (e.g., pull back hand)]







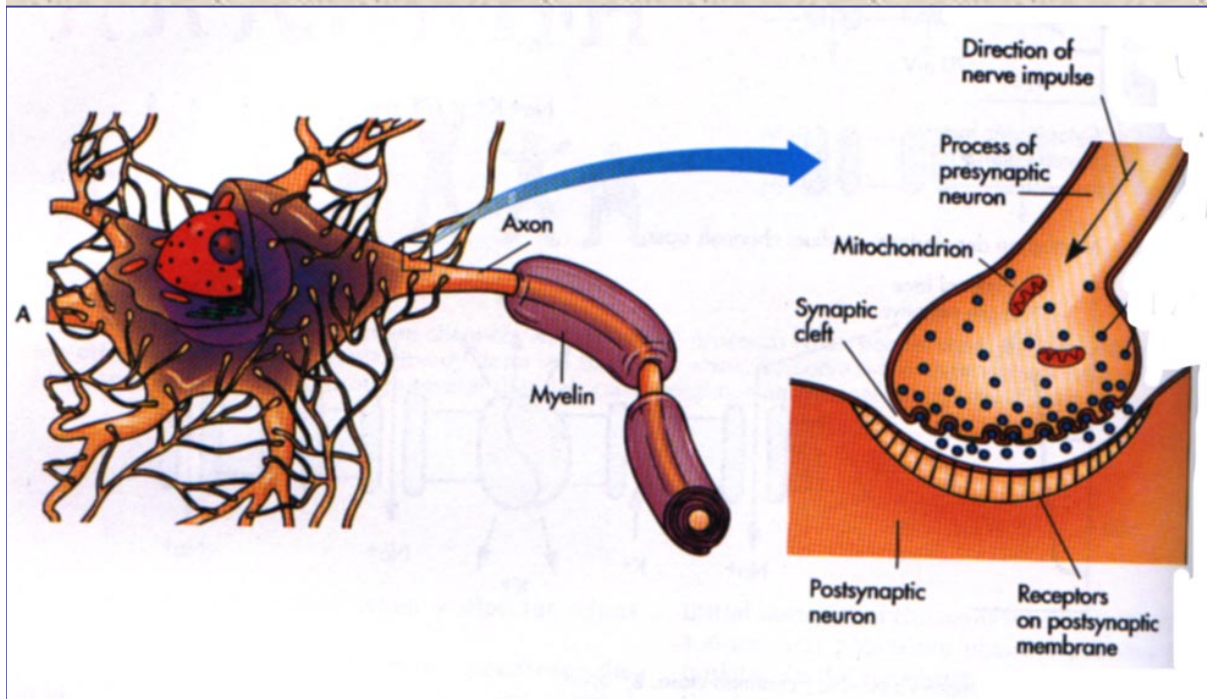
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NEURONAL JUNCTIONS

Neuron-neuron or neuron-muscle

◆ NEURO-MUSCULAR JUNCTION

Where neuron transmits signal to muscle to generate action potential



◆ **SYNAPSE:** cell junction where neurons communicate