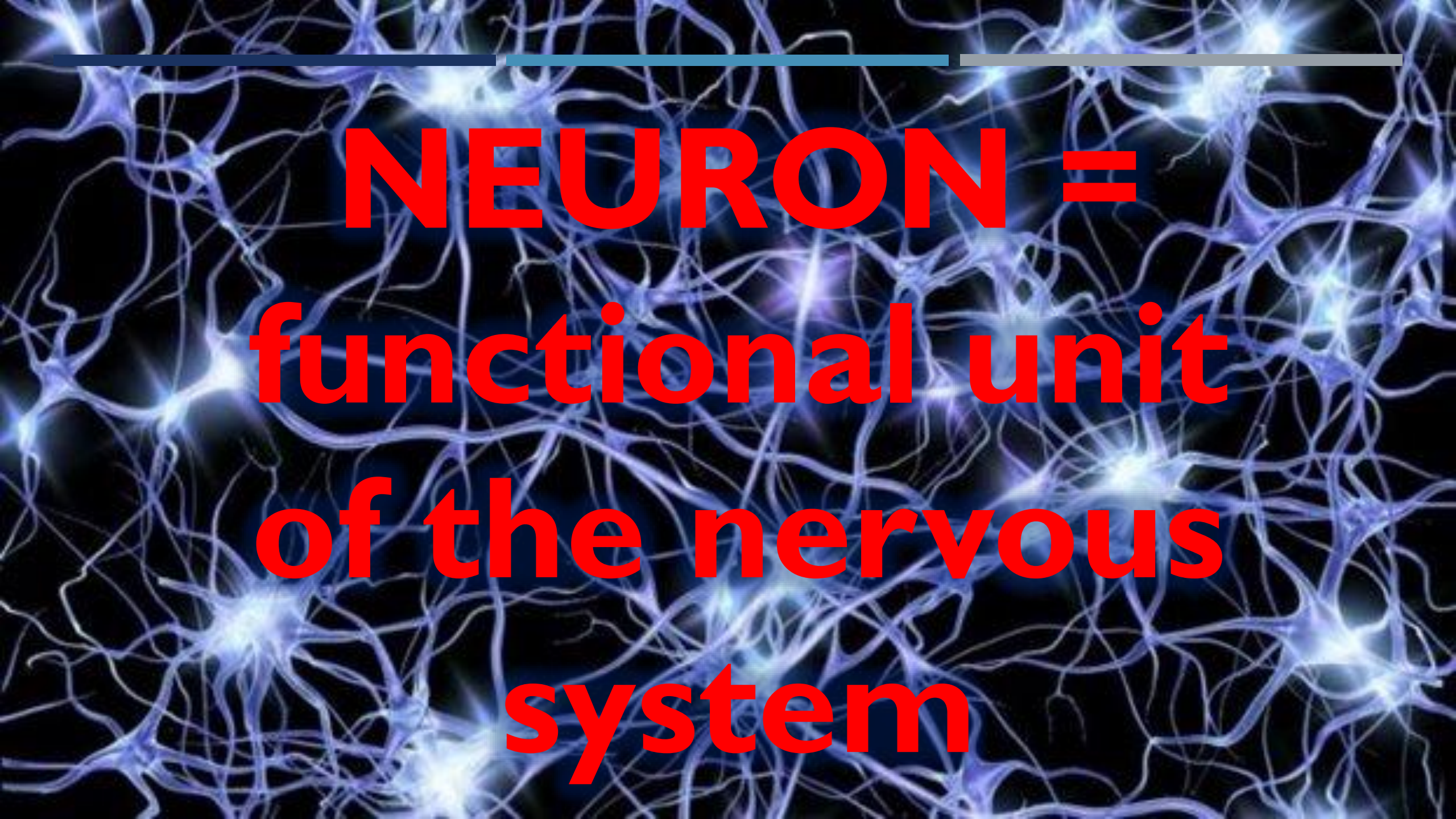
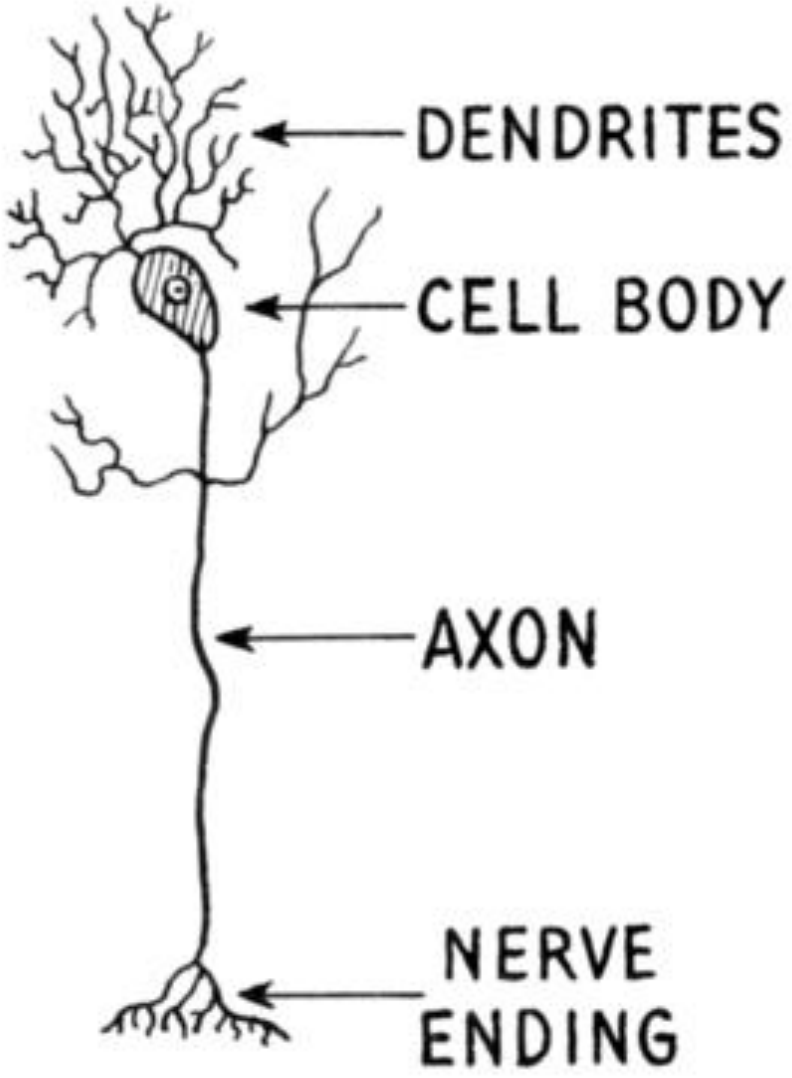
NEURONS

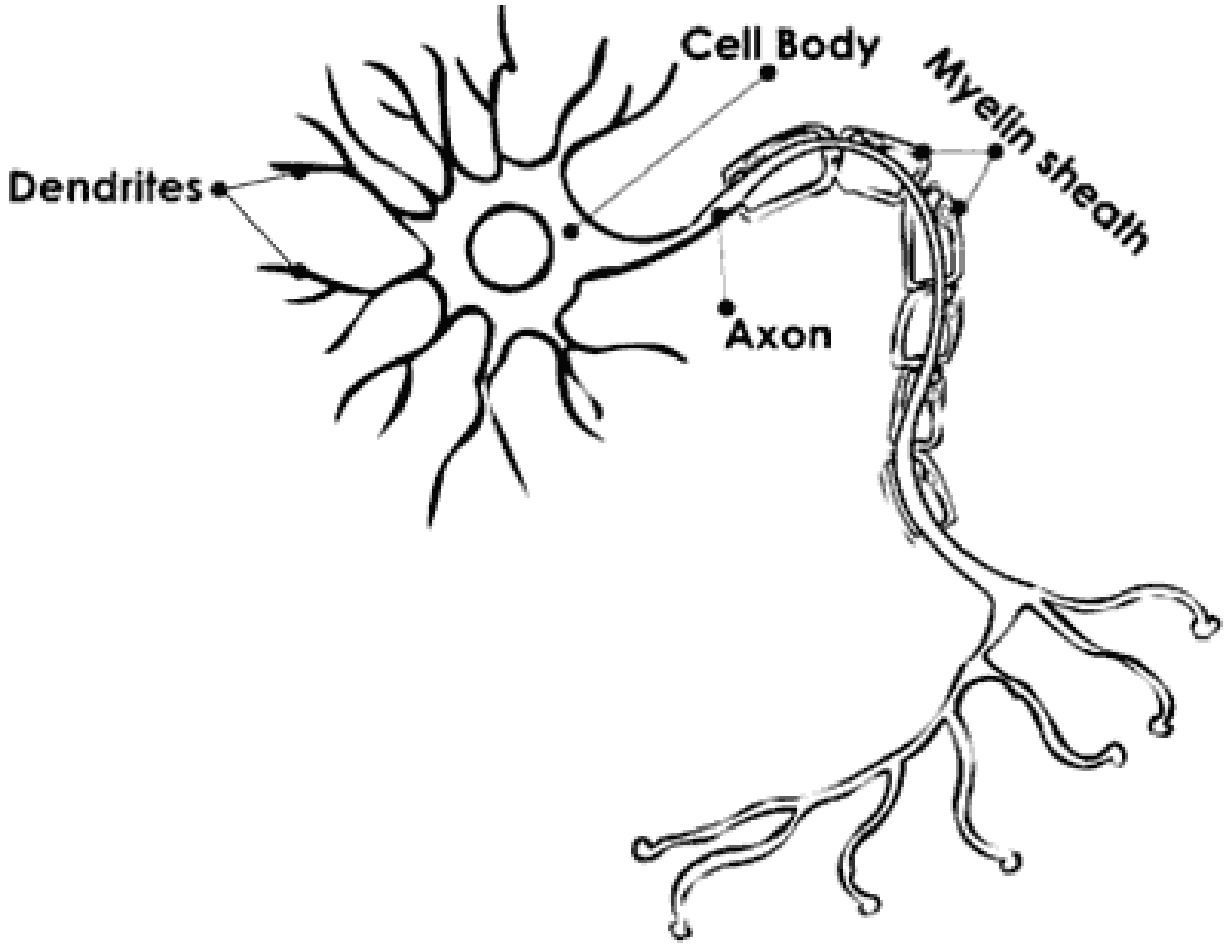
U5L6

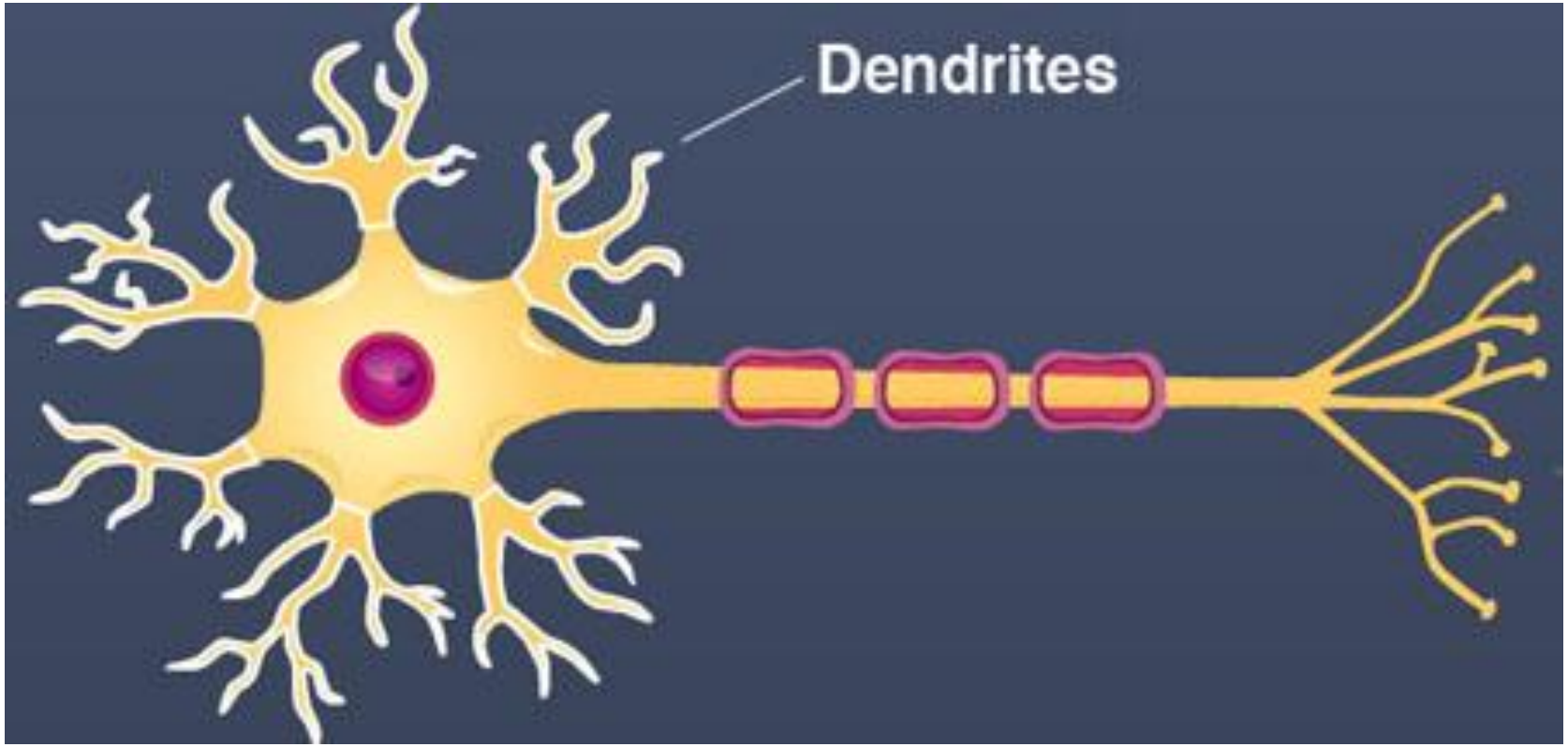

NEURON =
functional unit
of the nervous
system

Your brain is made of approximately 100 billion nerve cells, called neurons. Neurons have the amazing ability to gather and transmit electrochemical signals -- think of them like the gates and wires in a computer.

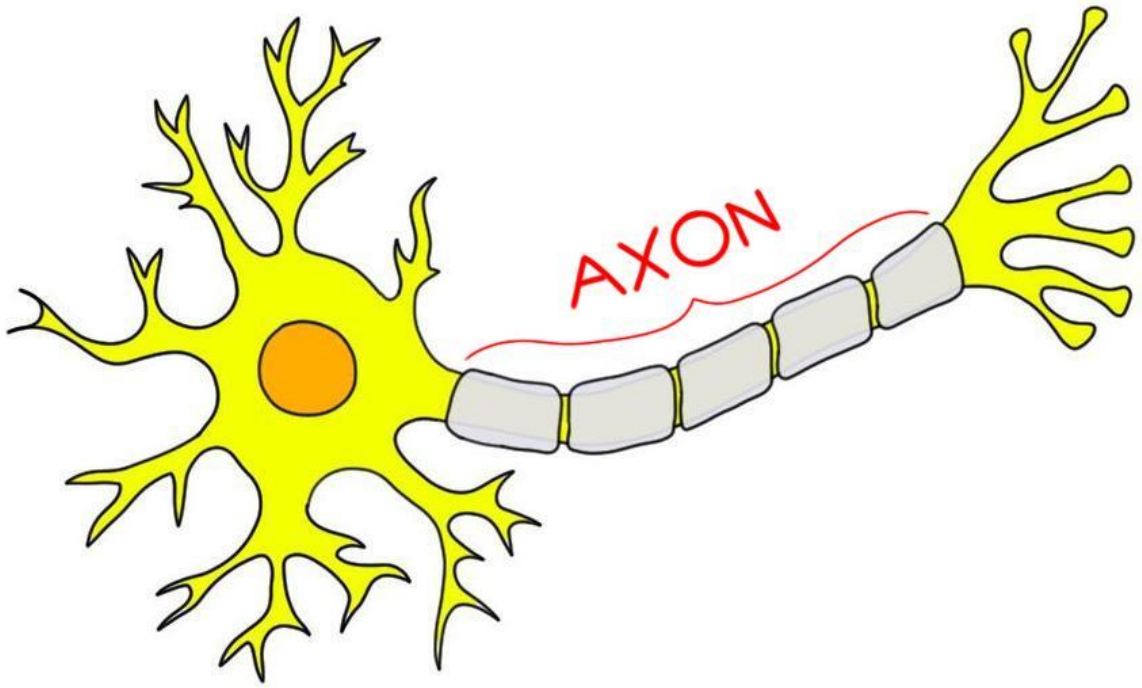
Neurons share the same characteristics and have the same makeup as other cells, but the electrochemical aspect lets them transmit signals over long distances (up to several feet or a few meters) and send messages to each other.


DENDRITES
CELL BODY
AXON
NERVE ENDING

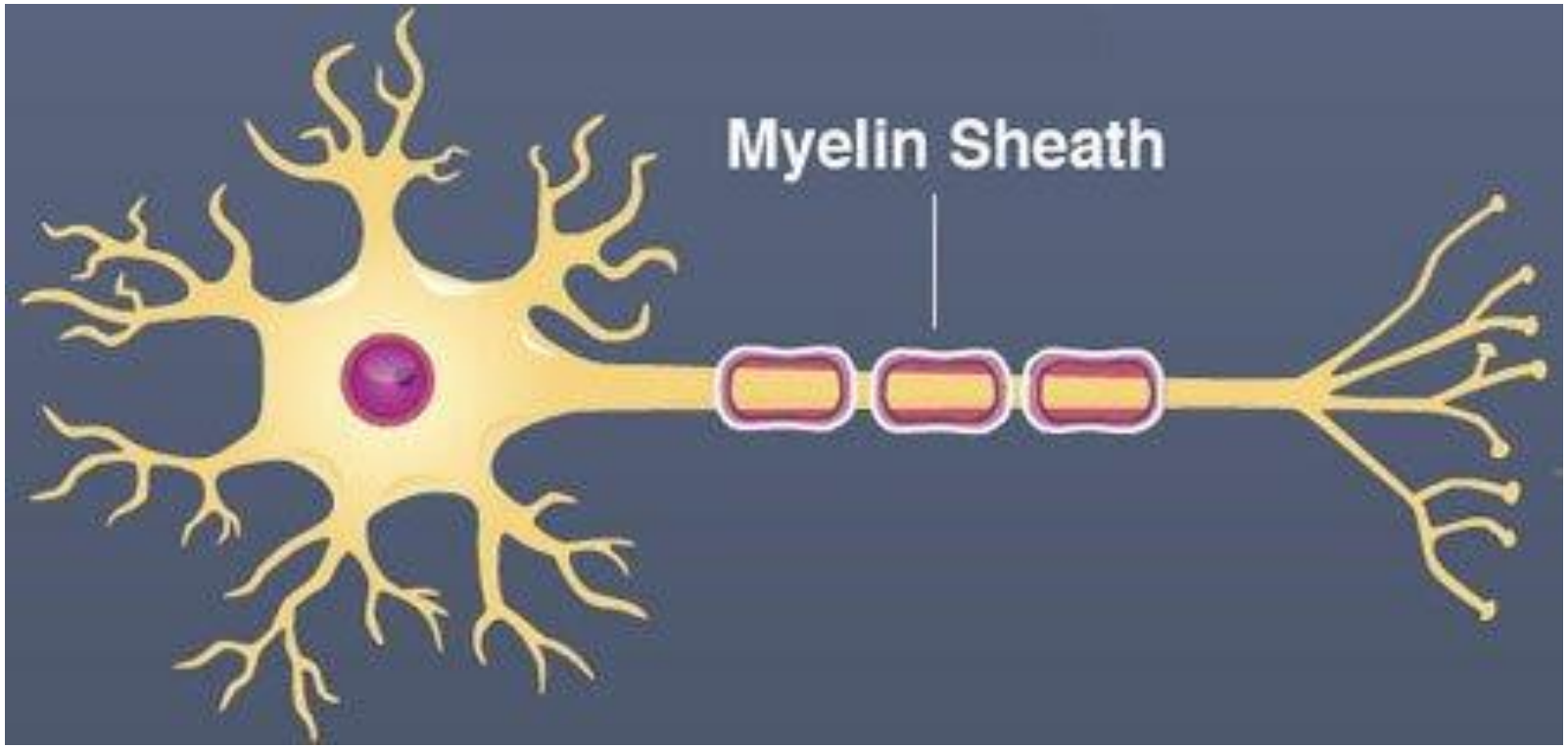

Cell Body
Myelin sheath
Dendrites
Axon



DENDRITE = carry impulses toward the cell body (receive information)

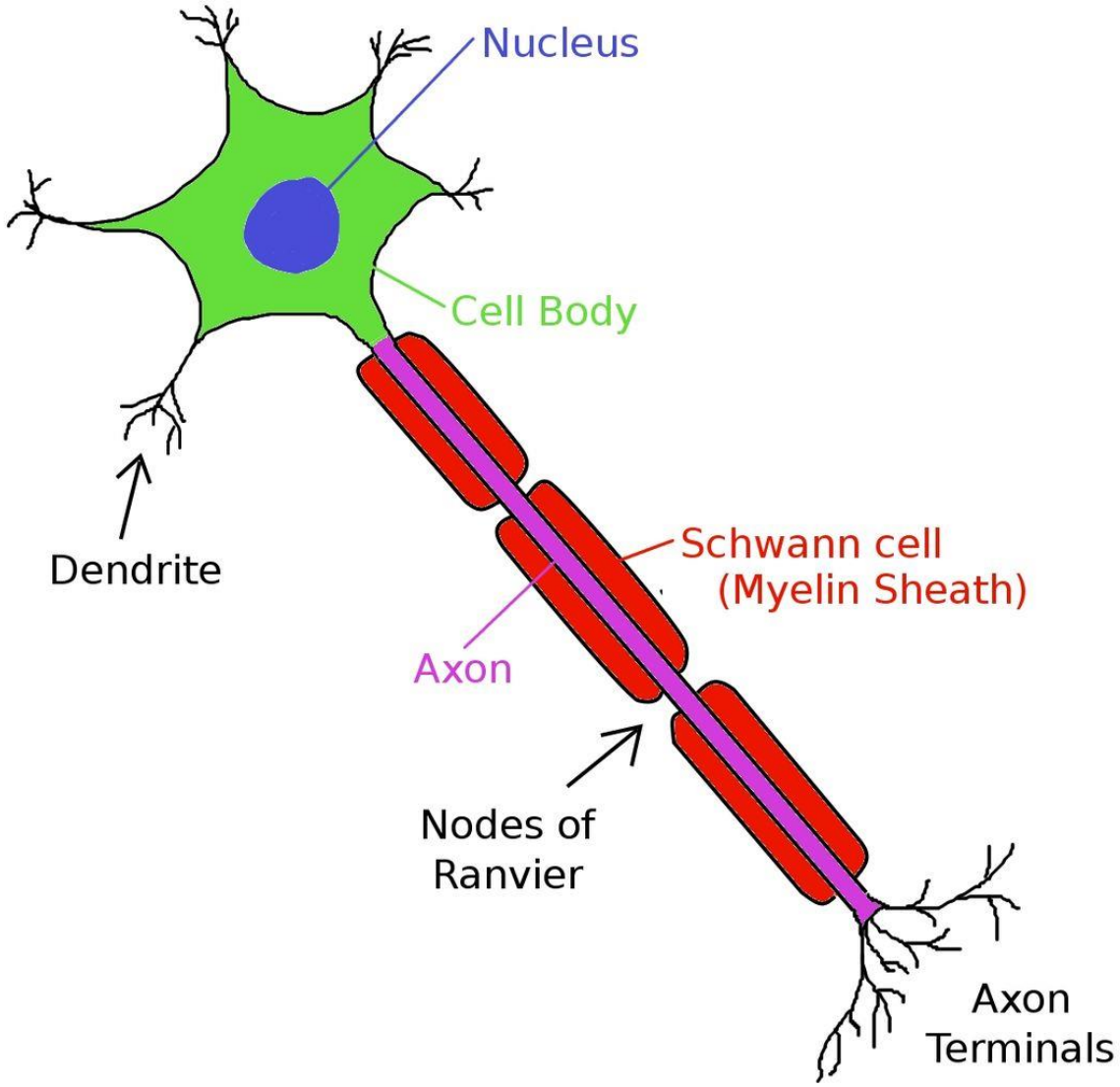


AXON = carry nerve impulses away from the dendrite & can be as long as 1 metre (so thin that 100 axons can fit in the width of 1 strand of hair!)



MYELIN SHEATH = fatty covering over the axon of a nerve cell

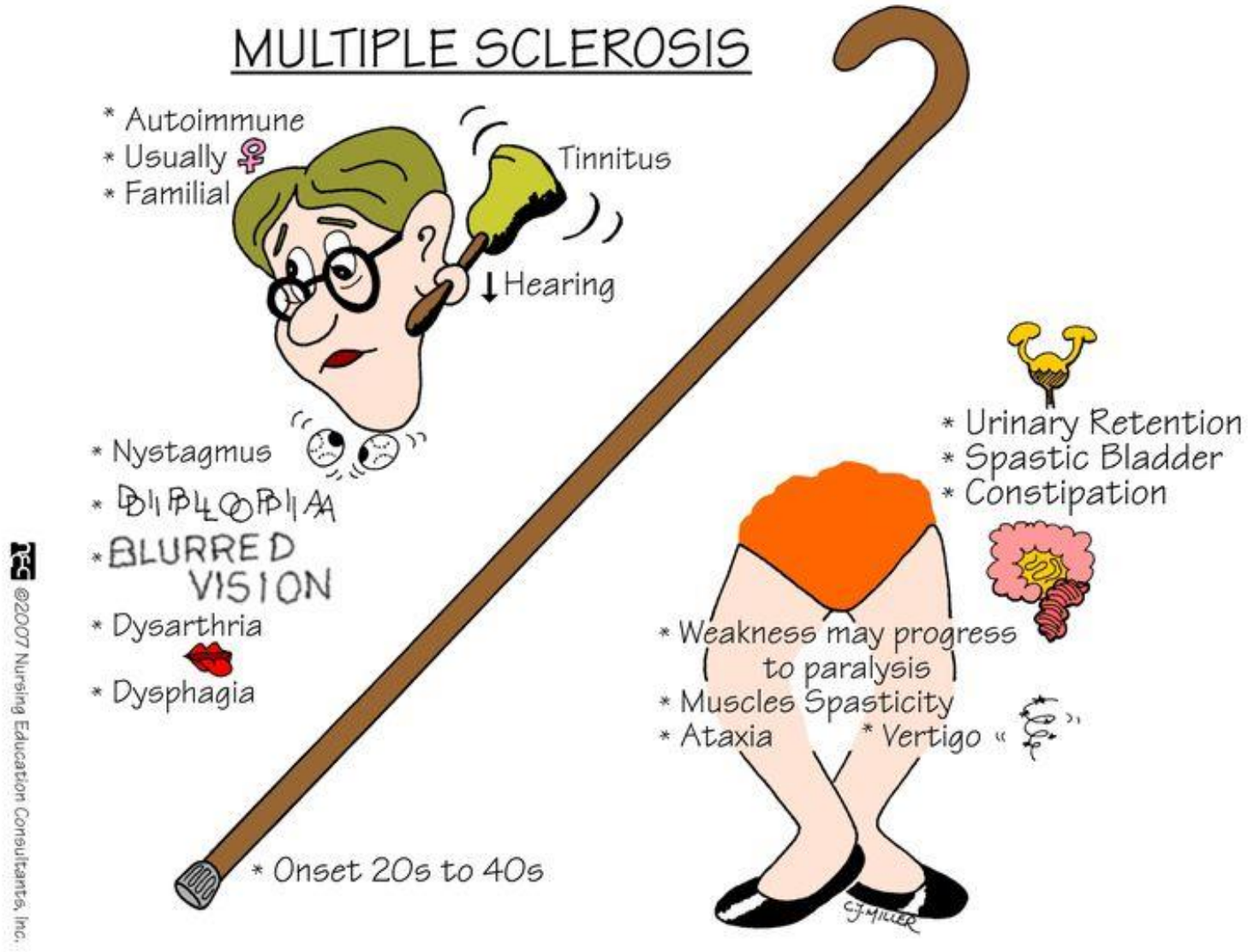
- insulation for neurons

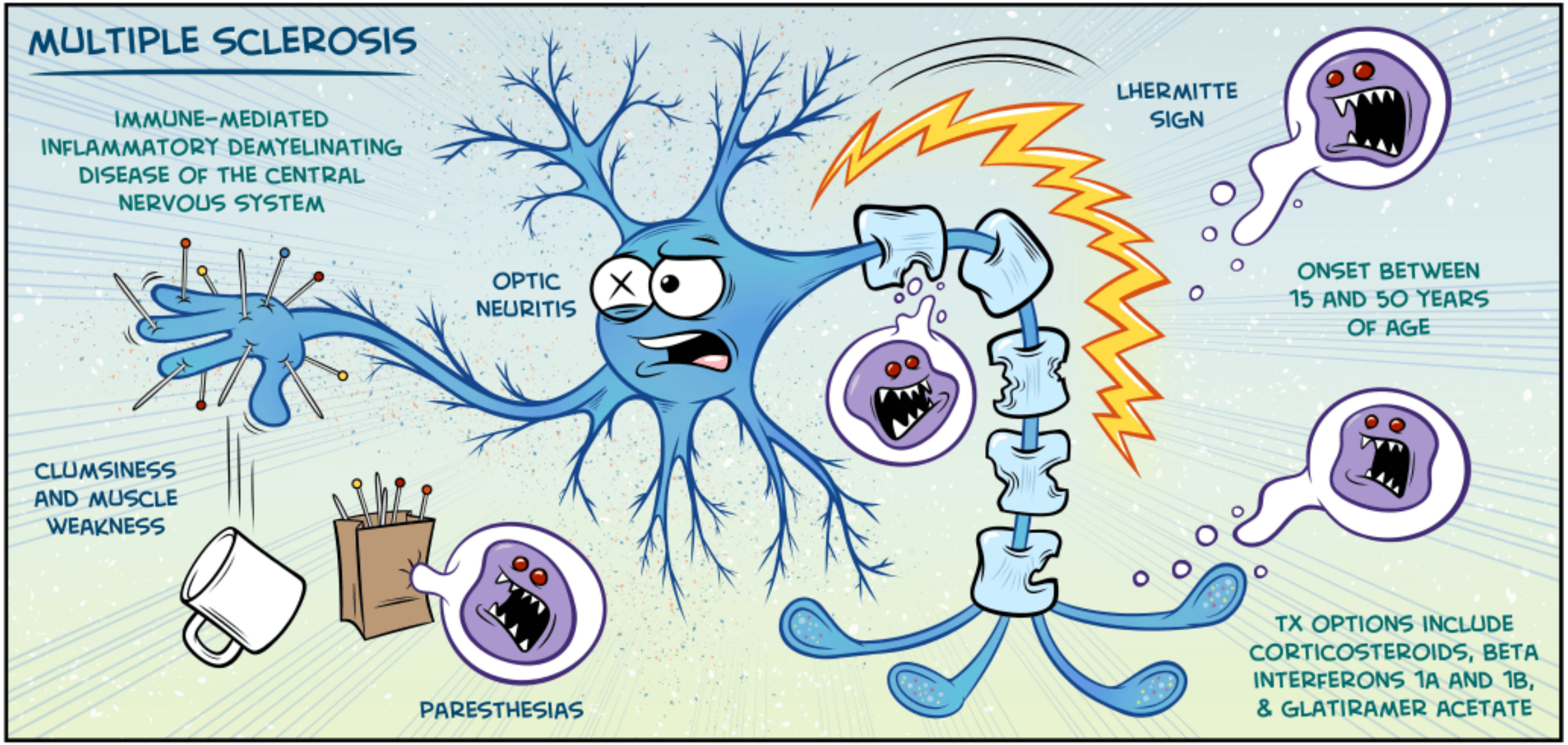


NODES OF RANVIER = regular gaps that occur between sections of myelin sheath

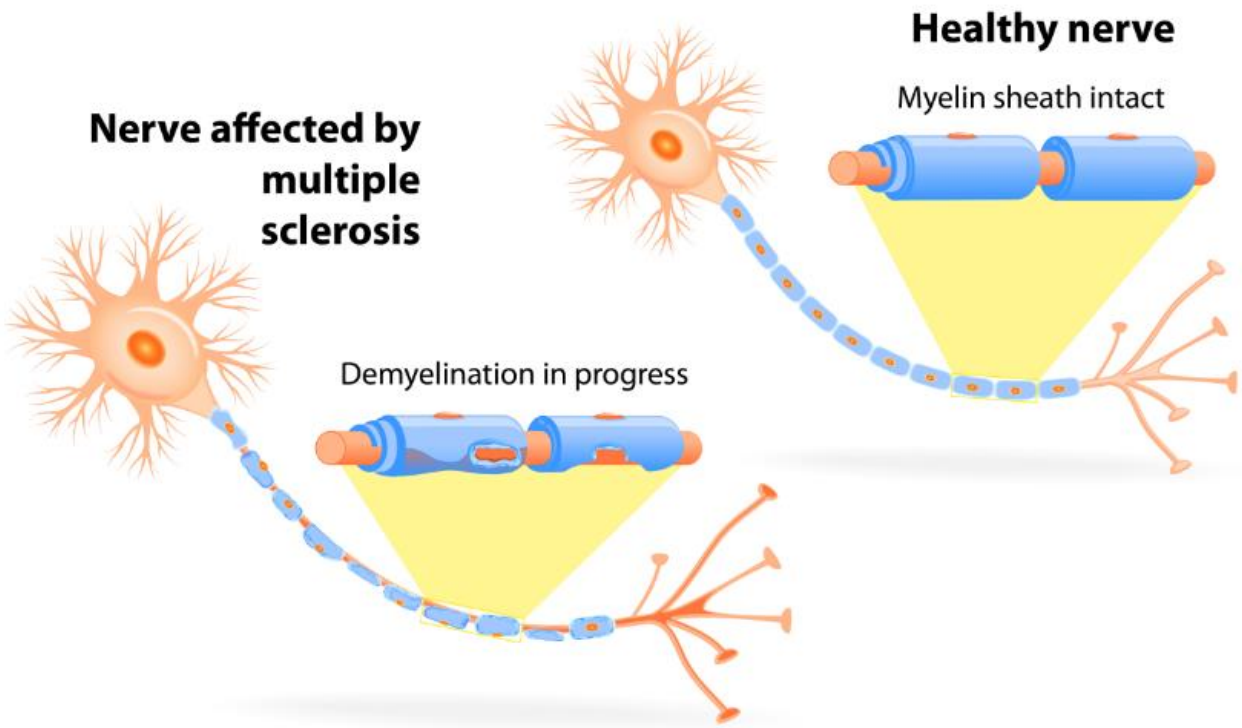
MULTIPLE SCLEROSIS (MS) =

- when the myelin sheath is destroyed
- results in a "short circuit"

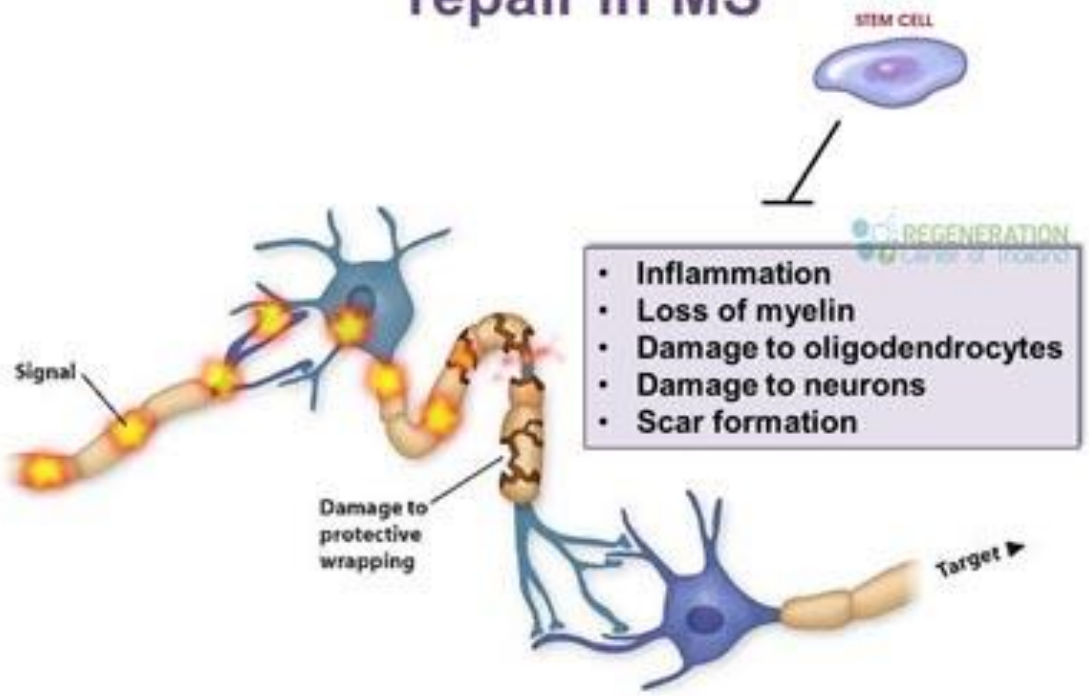




MULTIPLE SCLEROSIS



Use of stem cells to promote repair in MS



1. SENSORY NEURONS

- bring in info from your environment to the CNS to be processed

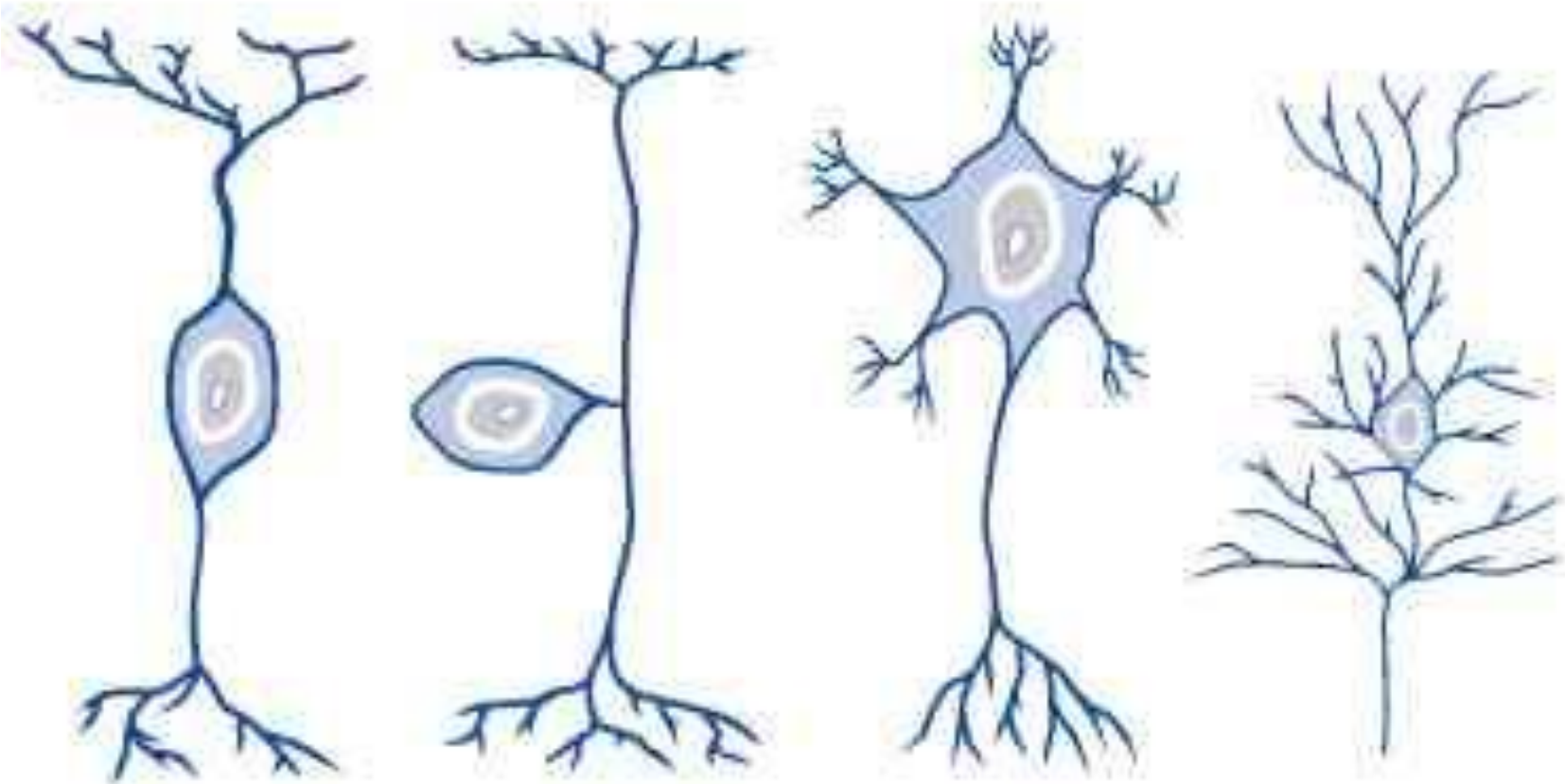
2. INTERNEURONS

- links neurons within the body
- interpret sensory info
- connects neurons to outgoing motor neurons

3. MOTOR NEURONS

- relay info to the effectors (muscle and glands) which cause something to happen

Basic Neuron Types

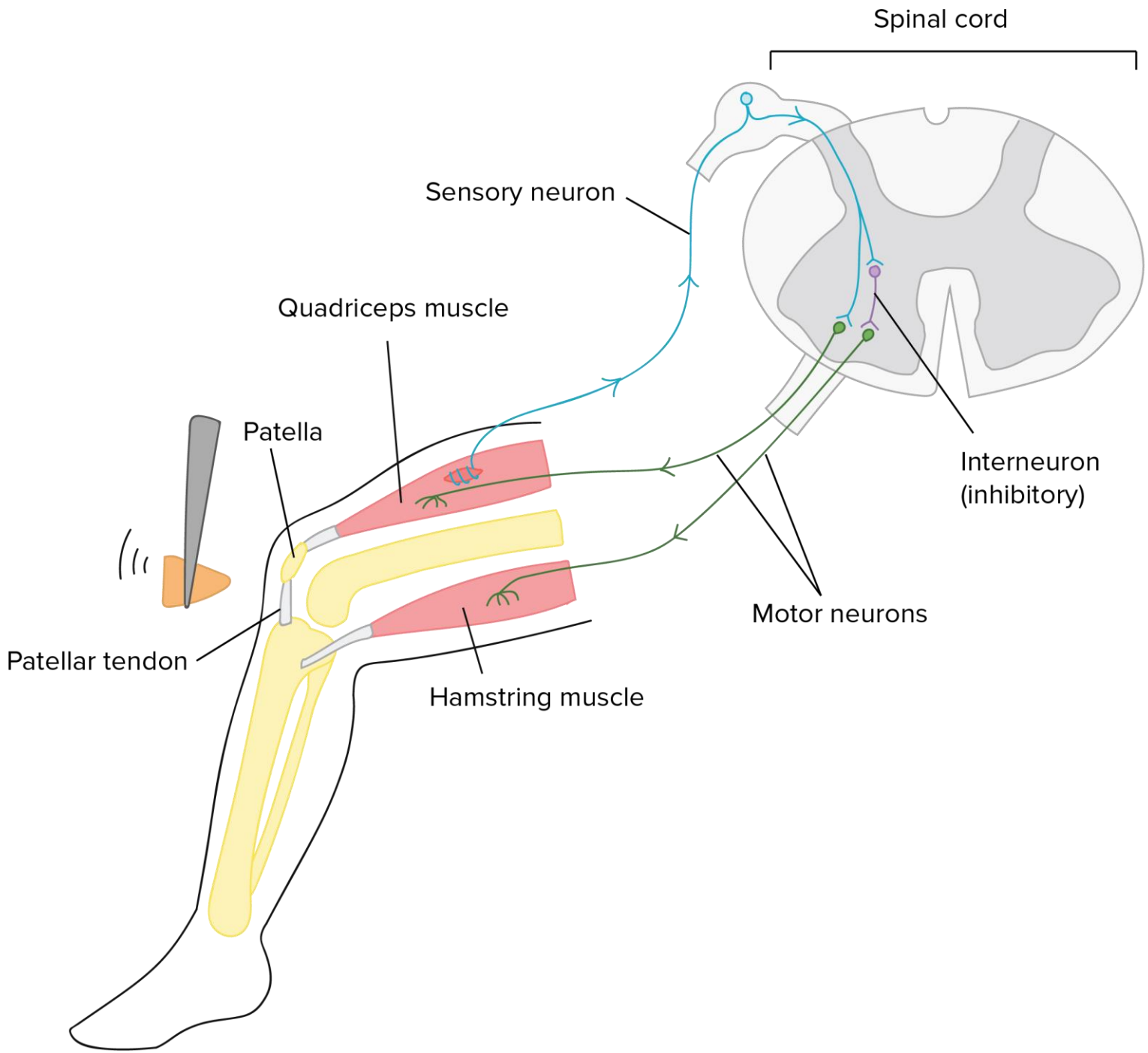


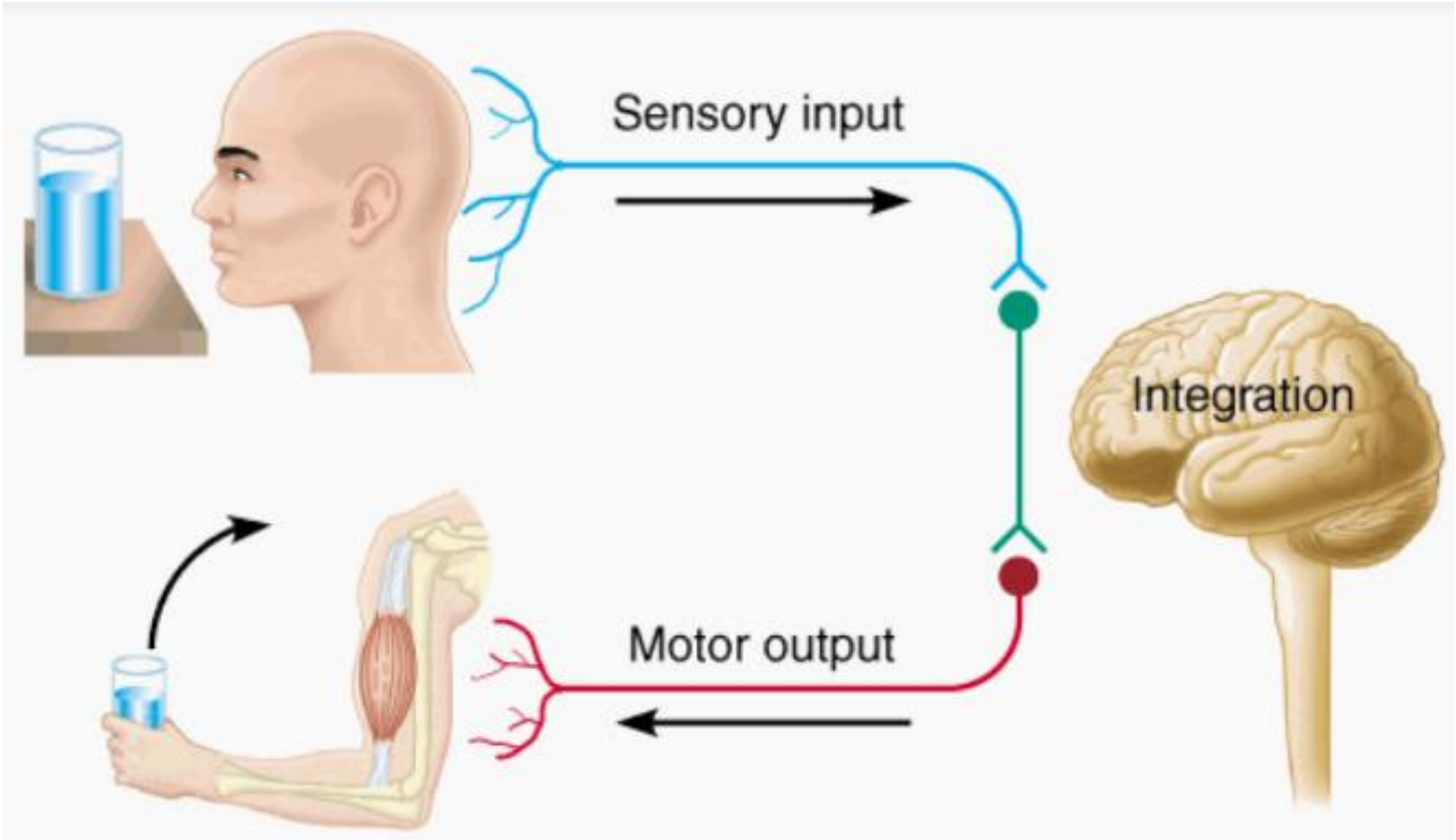
Bipolar (Interneuron)

Unipolar (Sensory Neuron)

Multipolar (Motoneuron)

Pyrimidal Cell


Spinal cord
Sensory neuron
Quadriceps muscle
Patella
Interneuron
(inhibitory)
Motor neurons
Patellar tendon
Hamstring muscle

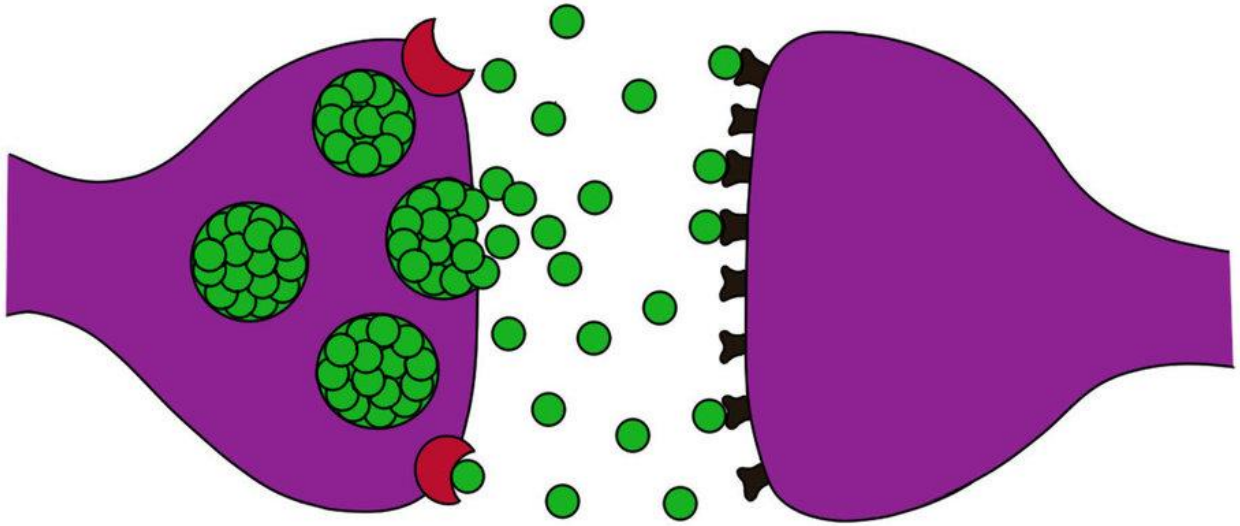

Sensory input
Integration
Motor output

THE SYNAPSE

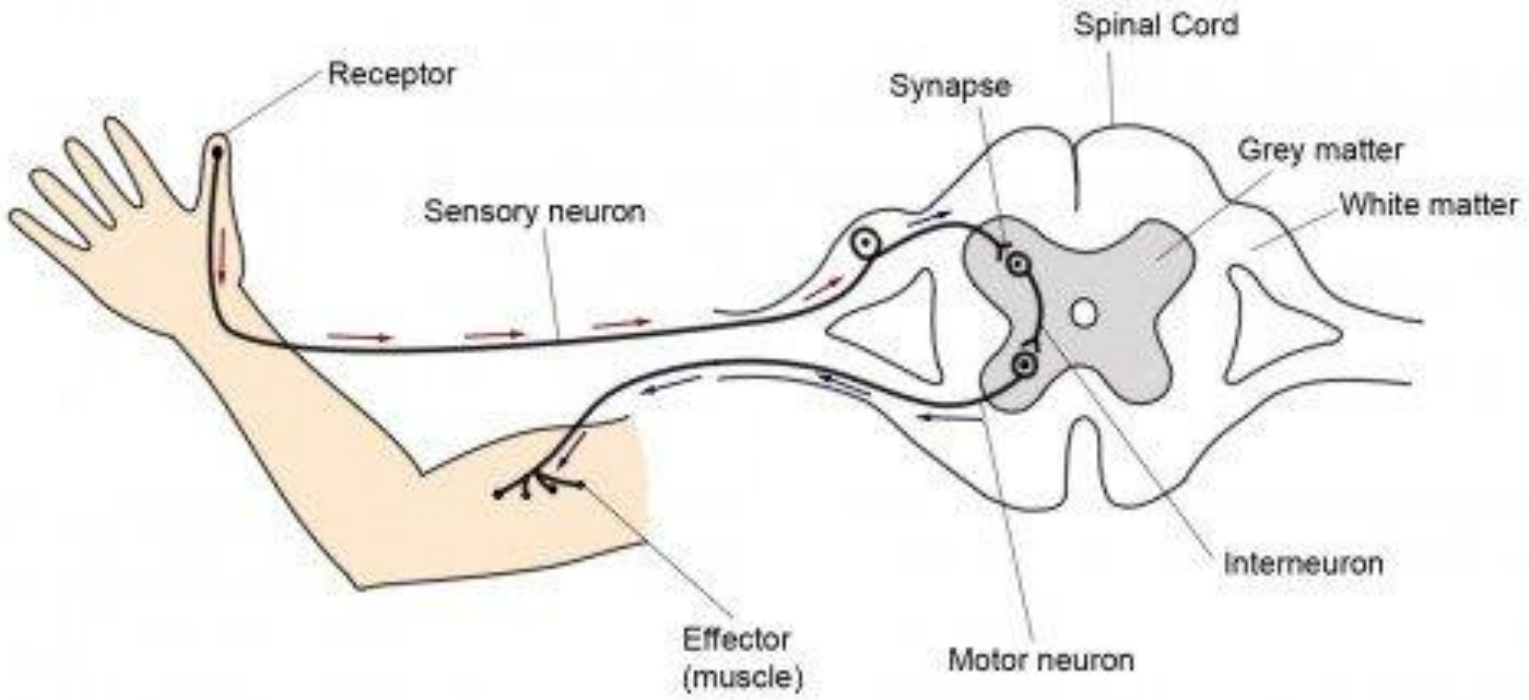
Small spaces between neurons

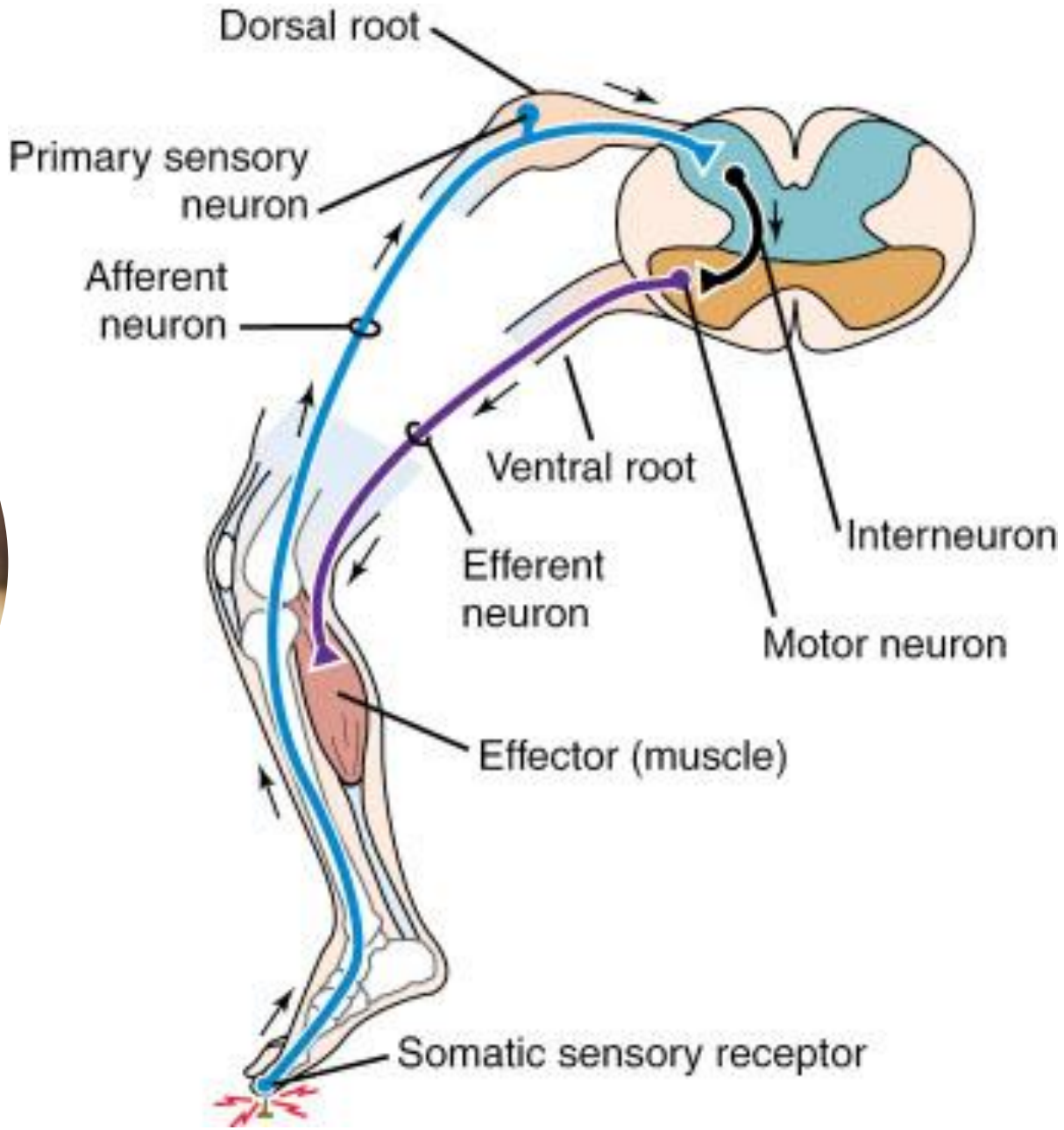
Impulses move along axon, release transmitter chemicals which slowly diffuse across the synapse

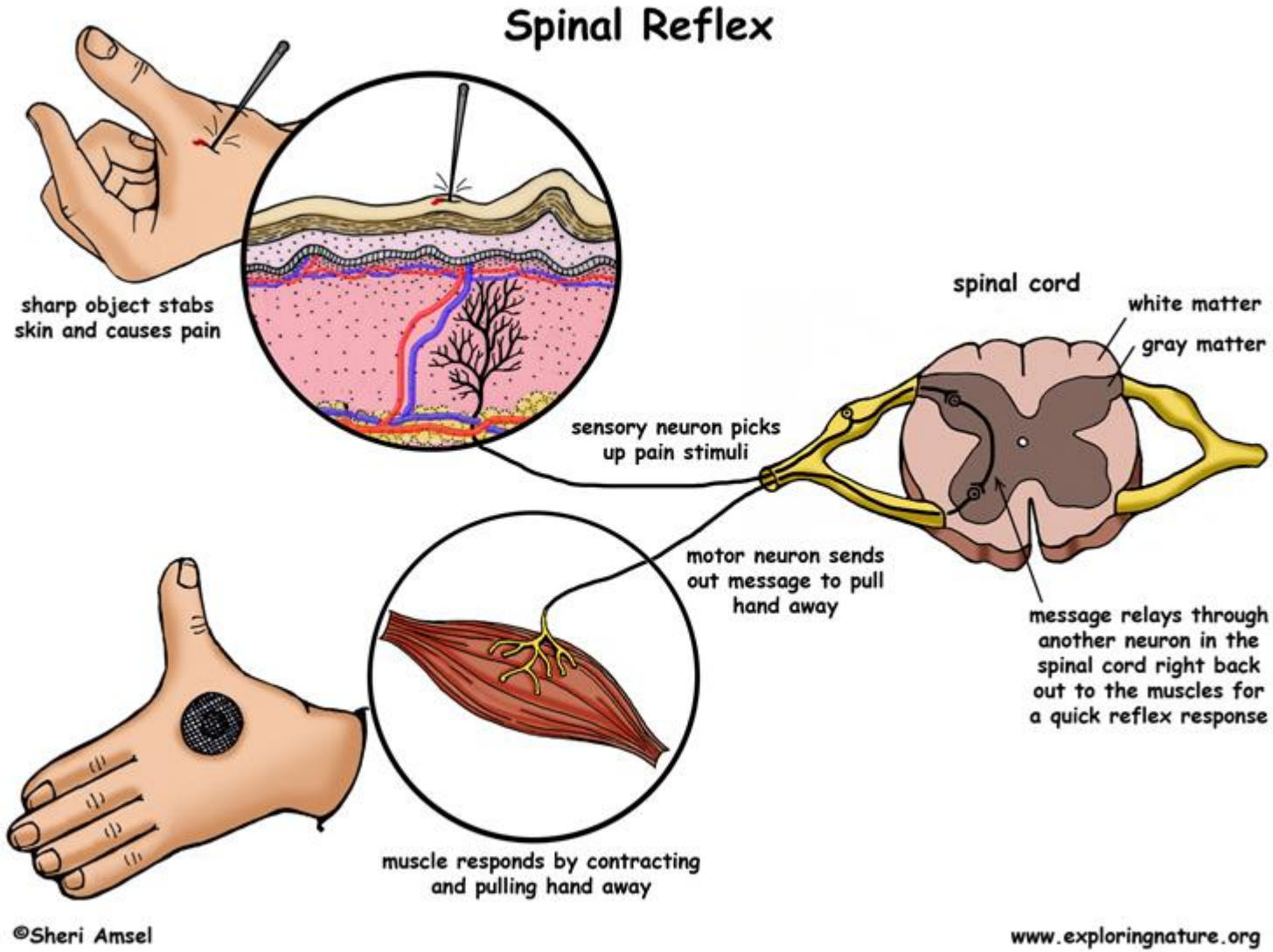
More synapses = slowe transmission



Reflex arc has few synapses (quicker reaction)




Dorsal root
Primary sensory neuron
Afferent neuron
Ventral root
Interneuron
Efferent neuron
Motor neuron
Effector (muscle)
Somatic sensory receptor


Spinal Reflex
sharp object stabs skin and causes pain
sensory neuron picks up pain stimuli
spinal cord
white matter
gray matter
motor neuron sends out message to pull hand away
message relays through another neuron in the spinal cord right back out to the muscles for a quick reflex response
muscle responds by contracting and pulling hand away
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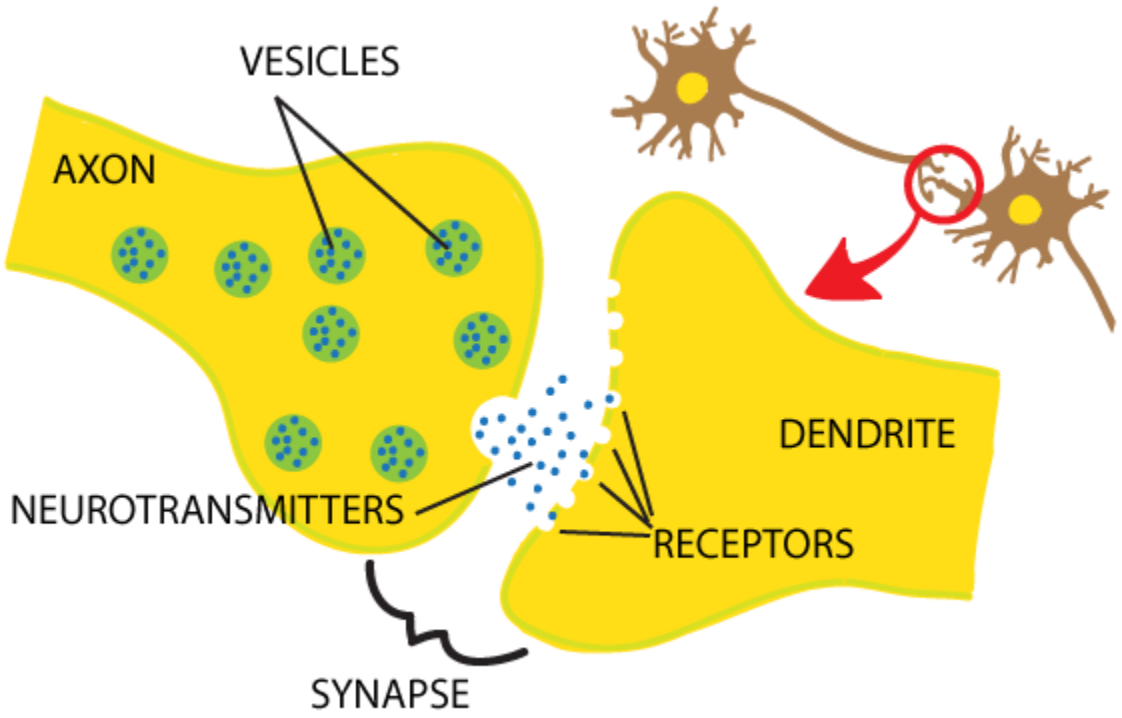
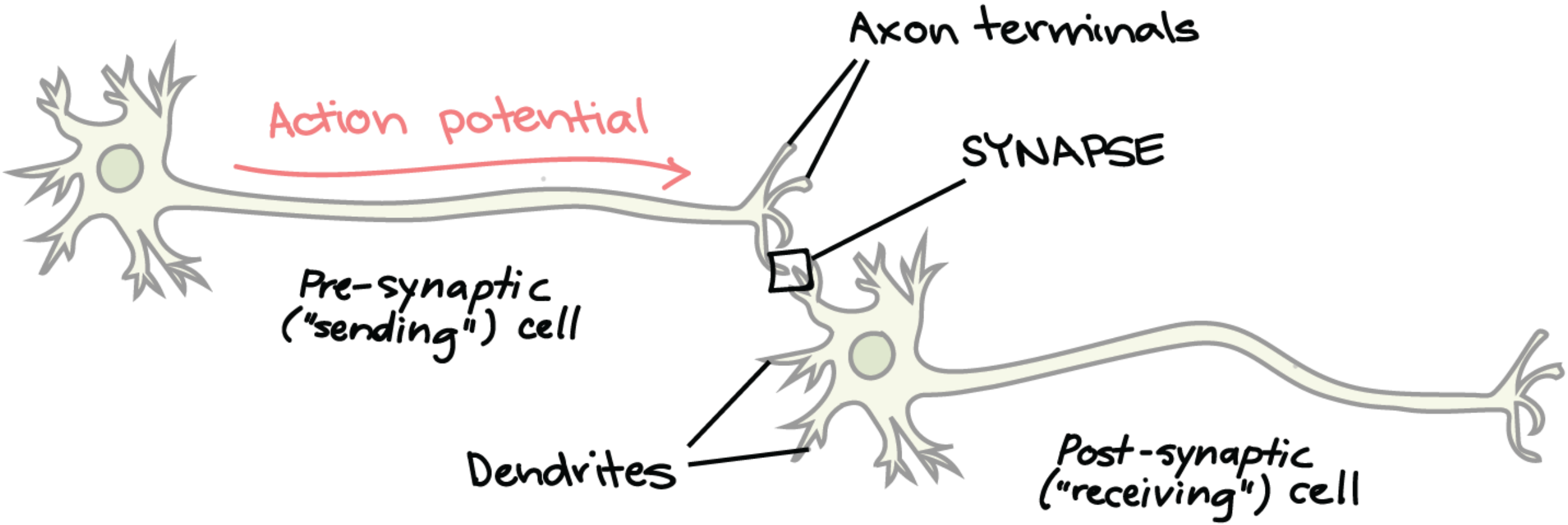


1. **ACTION POTENTIAL** - opens sodium channels

2. Sodium ions move into the cell & cause **DEPOLARIZATION** (charge reversal)

3. Electrical disturbance causes a "wave of depolarization" to move along the nerve membrane (and is followed by a wave of **REPOLARIZATION**)


Axon terminals
Action potential
SYNAPSE
Pre-synaptic ("sending") cell
Dendrites
Post-synaptic ("receiving") cell