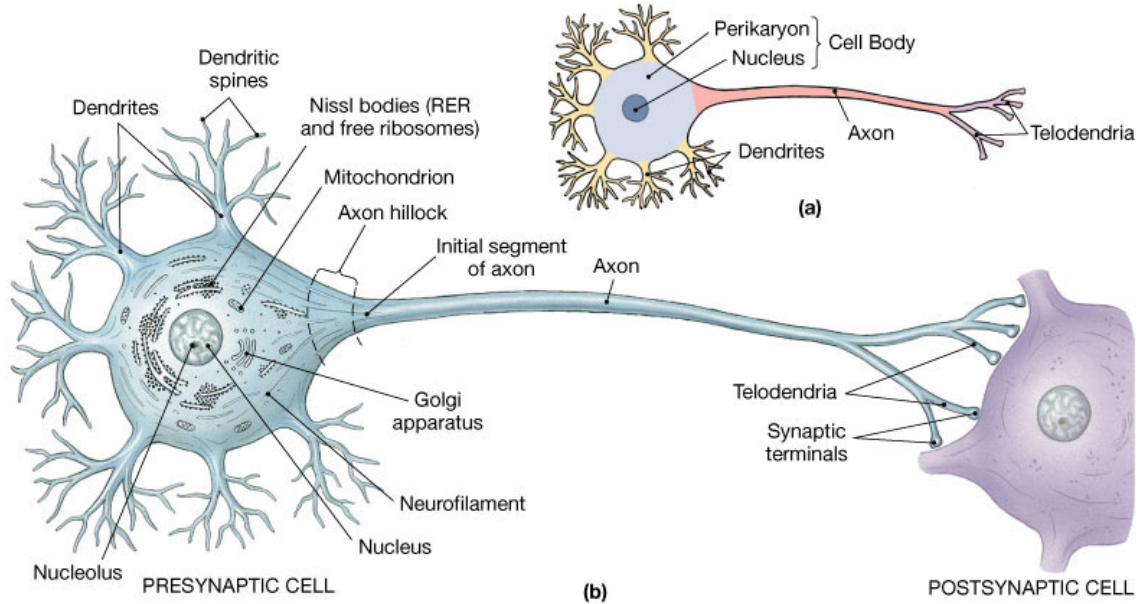


Reading Assignment: Read Chapter 13 (pages 622-660) of your text book. You may also read Chapter 7 of Dr. Hill's notes (**recommended reading online, not printing as it is long**). You may search for specific terms or topics using the Adobe Acrobat Reader search tool (binoculars).

A. Cells of the Nervous System –

1) Neurons



Dendrites –

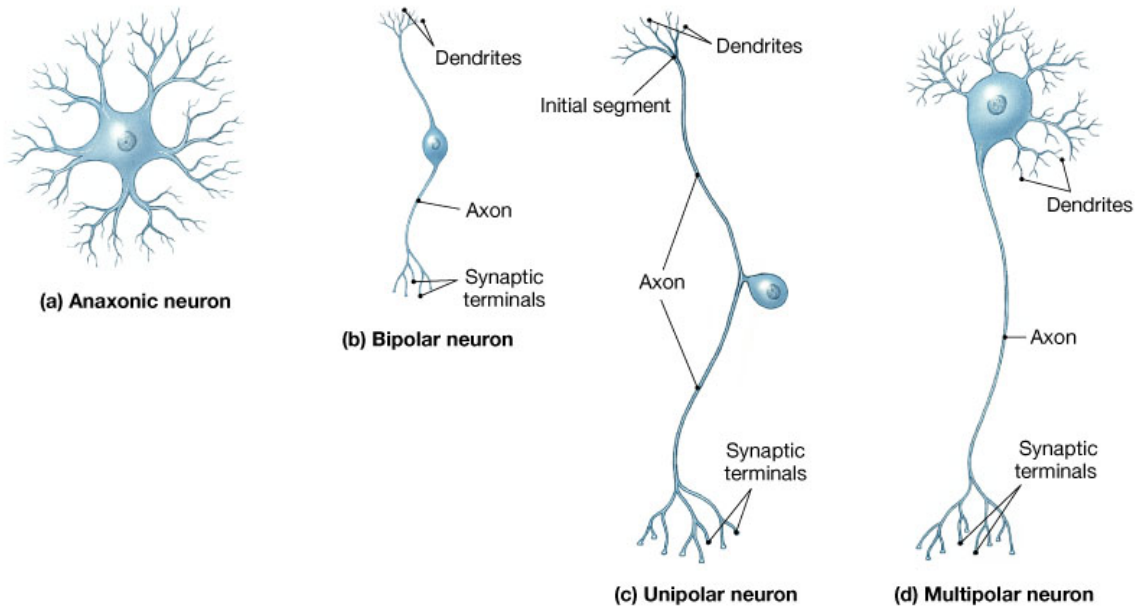
Cell Body (Soma) –

Axon –

Axon hillock –

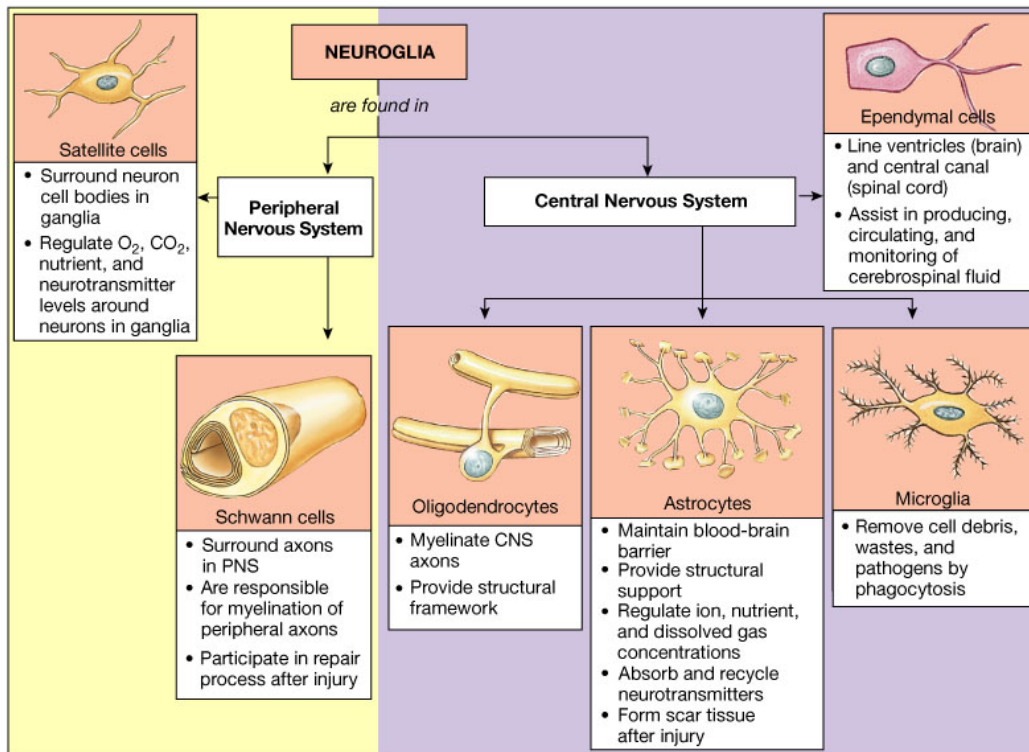
Synaptic (axon) Terminals –

Types of Neurons:



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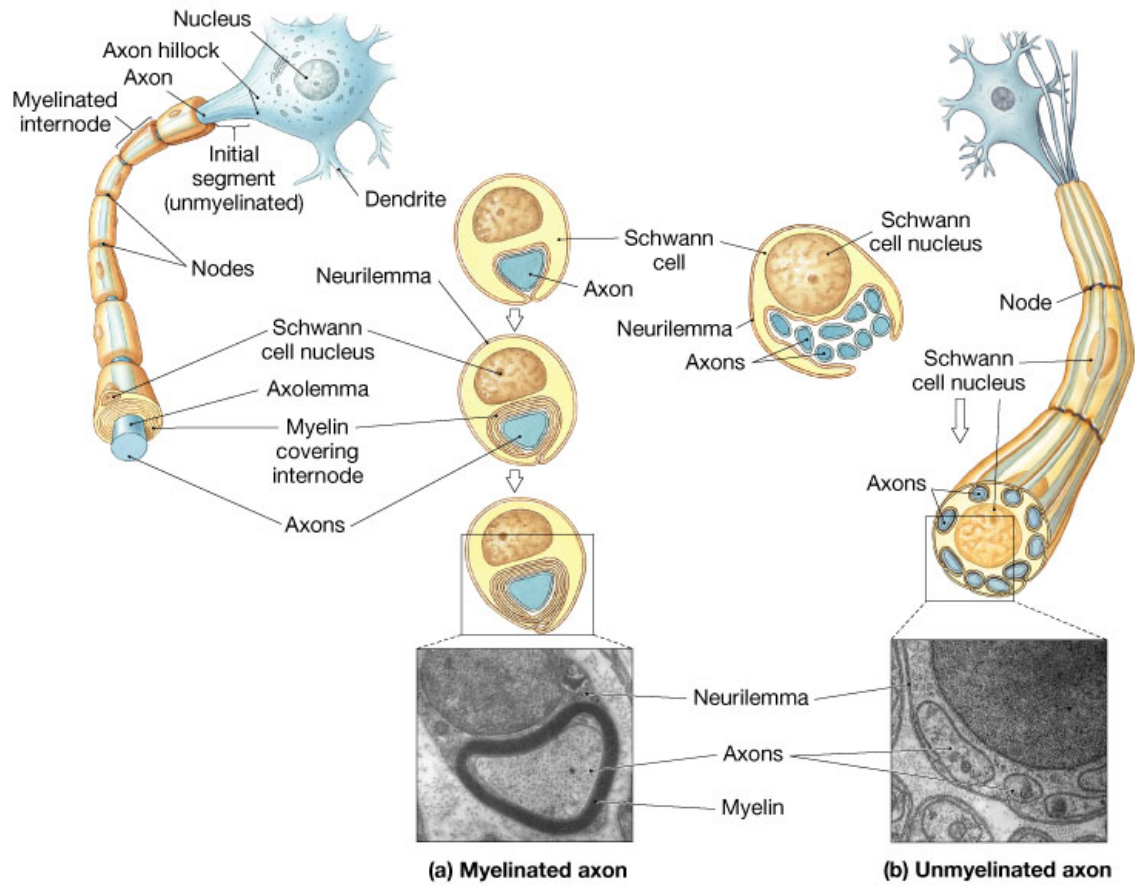
2) Neuroglia (glial cells) –



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***Myelination of Neurons –

a) Anatomy:



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Myelinated internode –

Node of Ranvier –

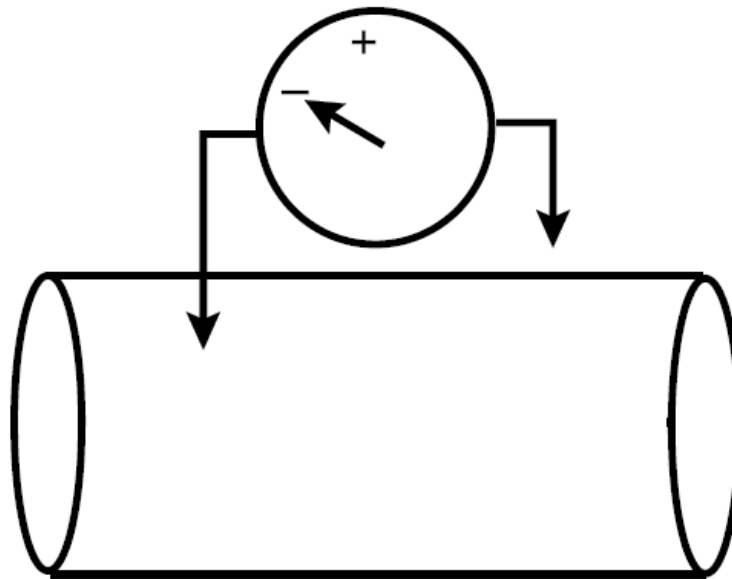
b) Functions of Myelination:

C. The Nerve Impulse

1) Excitable cells –

Membrane Potentials –

a) Measurement:



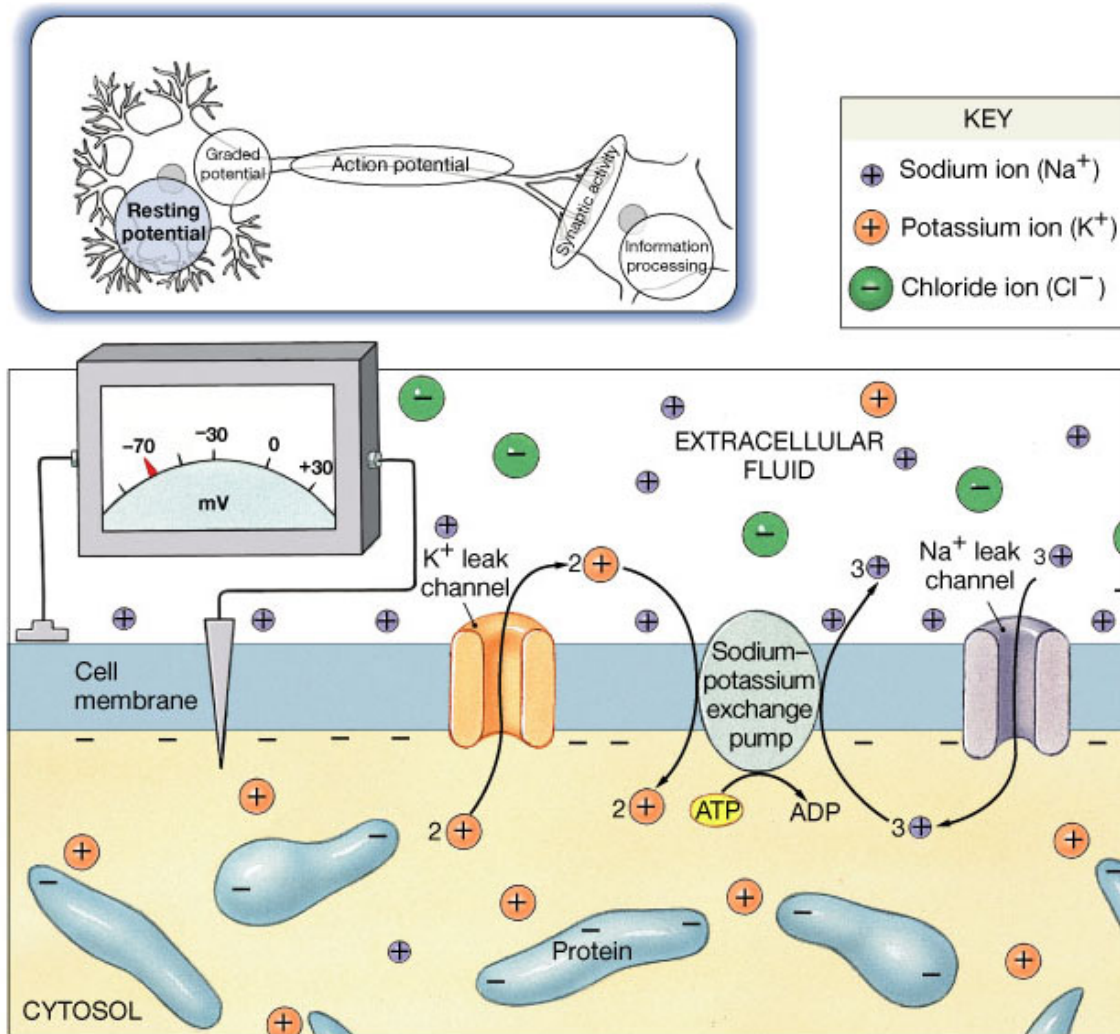
AN AXON OF A RESTING NEURON

b) Resting membrane potential (RMP)

c) Action potential (AP)

d) Graded potentials

Two Electrical States of Excitable Cells:

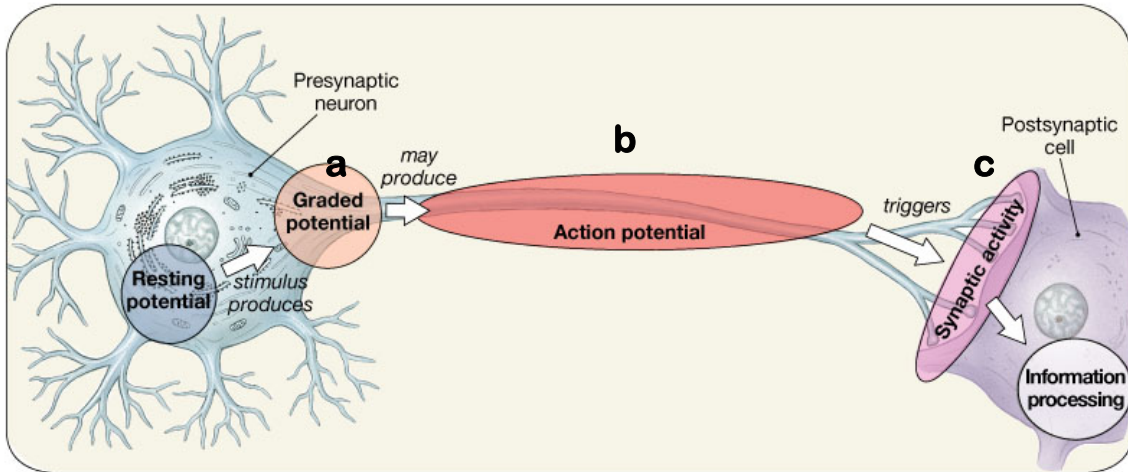


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Resting State
(Resting Membrane Potential)

Active State
(Action Potential = nerve impulse)

2) The Events of the Nerve Impulse in Neurons



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a) Integration (at axon hillock) –

Two Types of Summation:

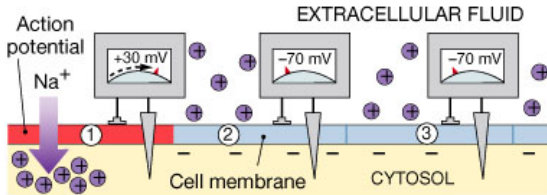
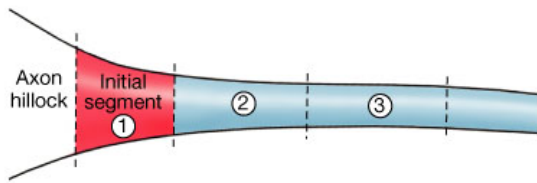
Temporal

Spatial

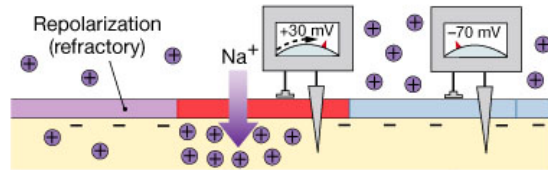
b) AP conduction (at axon) –

AP Wave –

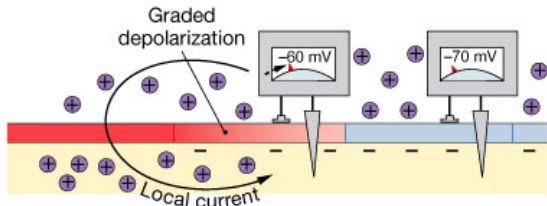
Spread of the AP wave on the axon:



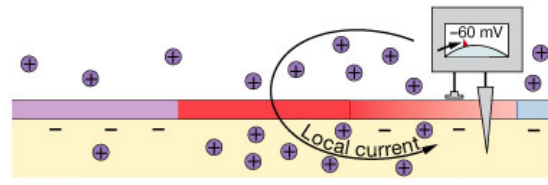
STEP 1:
As an action potential develops in the initial segment, the transmembrane potential depolarizes to +30 mV.



STEP 3:
An action potential develops at this location, and the initial segment enters the refractory period.



STEP 2:
A local current depolarizes the adjacent portion of the membrane to threshold.



STEP 4:
A local current depolarizes the adjacent portion of the membrane to threshold, and the cycle is repeated.

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c) Synaptic Transmission (at synapse) –

Table 1

SOME NEUROTRANSMITTERS, THEIR FUNCTIONS AND LOCATION OF ACTION

NEUROTRANSMITTER	FUNCTION	WHERE
Acetylcholine	+ skeletal muscle +or – to visceral effectors	CNS, PNS neuro-muscular junctions: all preganglionic & parasympathetic postganglionic fibers
Norepinephrine	+ or - based on	CNS, PNS postganglionic sympathetic neur
Dopamine	Usually +, may be - in Sympathetic ganglia	CNS, PNS some Sympathetic ganglia
Serotonin	Usually inhibitory	CNS
GABA (Gama aminobutyric acid)	Usually inhibitory	CNS
Glycine	Usually inhibitory	CNS, retina
Glutamate	Usually excitatory	CNS
Endorphins, enkephalins	Usually inhibitory	CNS pain centers

(+ excitatory neurotransmitter; - inhibitory neurotransmitter)

REVIEW QUESTIONS

1. Identify the parts of a neuron and their functions: dendrites, cell body, axon, axon hillock, axon (synaptic) terminals.
2. How is a motor neuron and sensory neuron different in appearance?
3. Briefly describe the functions of the neuroglial cells: satellite cells, schwann cells, oligodendrocytes, astrocytes, microglia, ependymal cells.
4. How are cells myelinated in the CNS? PNS? What is the advantage of myelination?
5. Define the following: excitable cell, membrane potential, resting membrane potential, action potential, graded potentials, voltage regulated ion channels, chemical regulated ion channels.
6. Briefly describe how membrane potential is measured in a general way?
7. What is different between the resting and active neuron?
8. Define: integration, EPSP, IPSP, conduction (of an AP), AP wave, and synaptic transmission.
9. On what parts of a neuron does integration occur? Conduction of an AP? Synaptic transmission?
10. What is the difference between spatial and temporal summation? Why is threshold potential the critical membrane potential that initiates the AP?
11. What is the effect of acetylcholine on skeletal muscle? On the viscera? What is the effect of norepinephrine on the viscera? Why can a neurotransmitter have one effect on a particular tissue and a different effect on another tissue? What is "botox" and what does it do?

Study Questions (p. 664-665 of text): 1-6, 8, 9, 10, 15, 17-20,

Anatessa CD-ROM: none