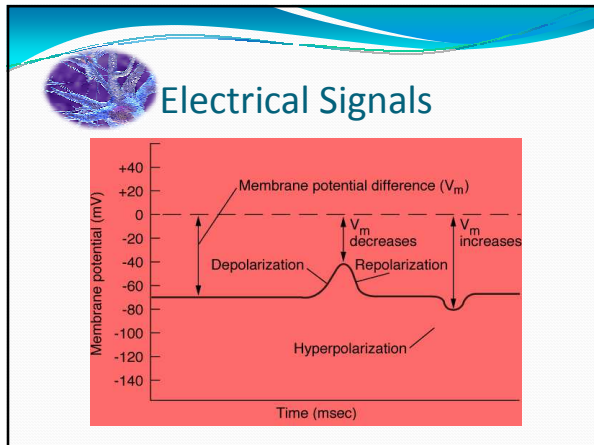


RECEPTION, INITIATION, CONDUCTION AND TRANSMISSION
OF
THE NERVE SIGNAL
Ateegh Al-Arabi, BS., MS., Ph.D

Neurotransmitter Synapse 3D Animation

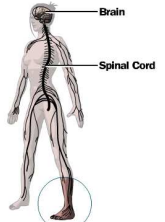


Review and Introduction



Action Potential

Introduction
Resting Potential
Depolarization
Repolarization
Return to Resting Potential
Summary of Action Potential
Zoom Out



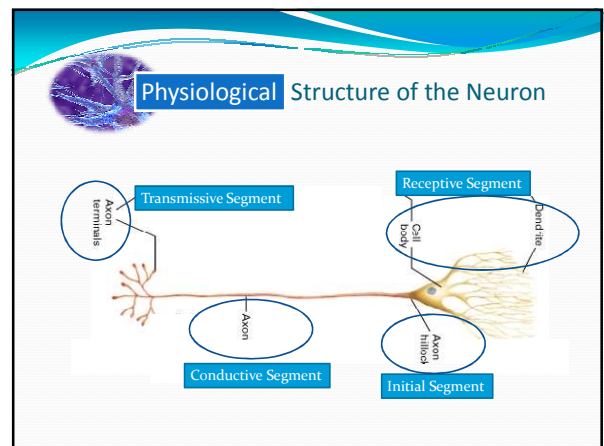
Brain
Spinal Cord

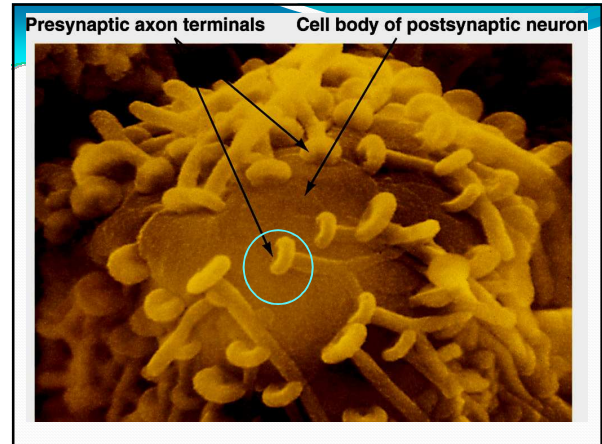
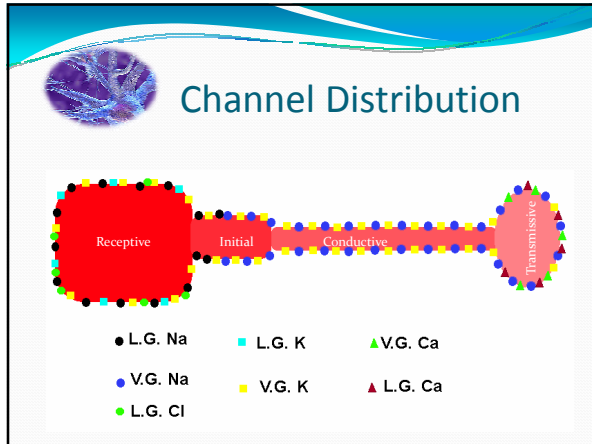
This woman is moving her foot. Her brain sends a message to certain muscles of her foot. They contract and the foot moves. What is this message? How does it travel so quickly?

Glossary Credits

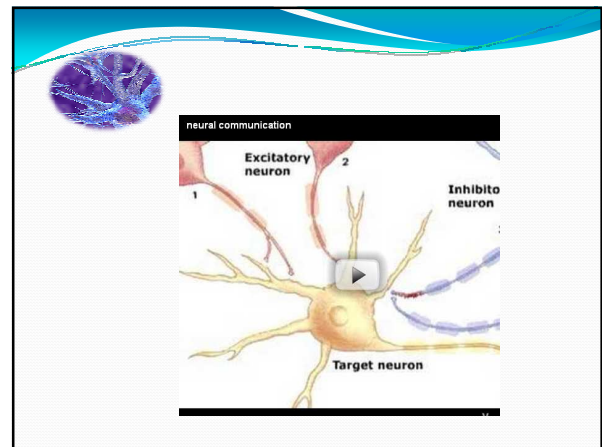
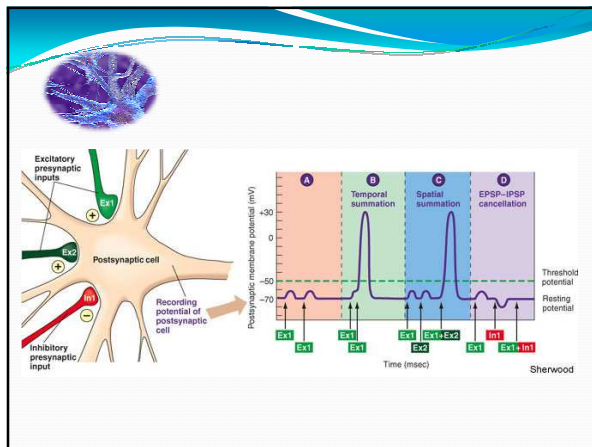
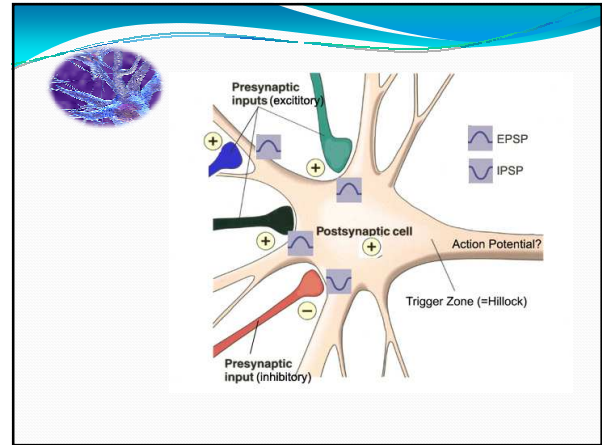
Neuronal Function

- Reception
- Initiation
- Conduction
- Transmission

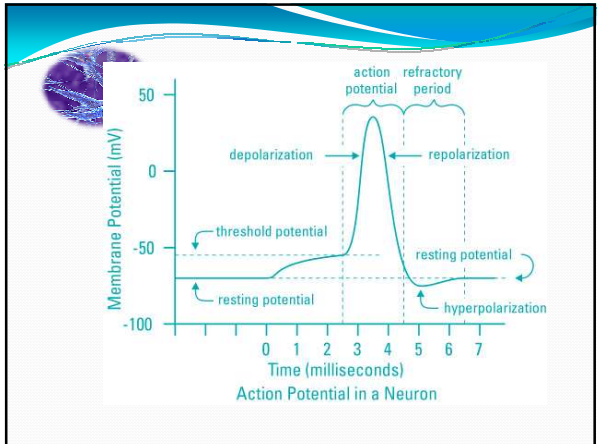




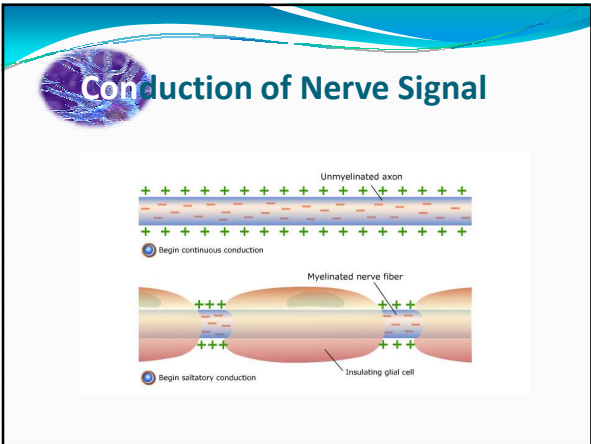
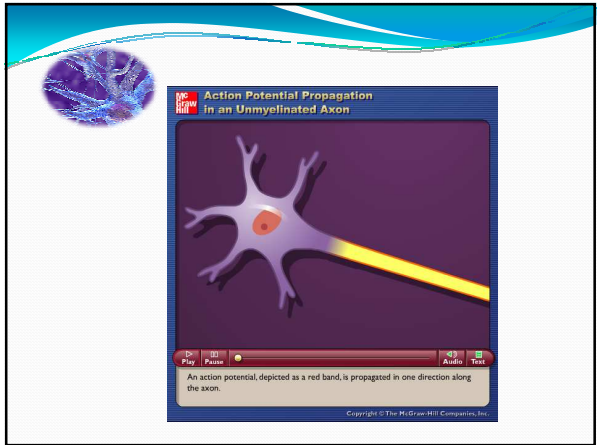
1. Reception



2. Initiation



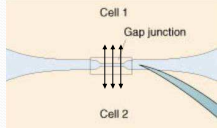
3. Conduction



4. Transmission

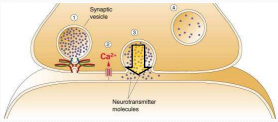
Types of Synapses

• **Electrical**



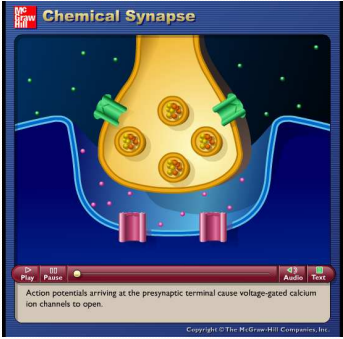
• Found in: **escape** reflex neurons (e.g. goldfish)
• Epithelial cells (gut)
• Cardiac muscle cells (heart)

• **Chemical**



• Found in: Almost all mammalian neurons

Chemical Synapse

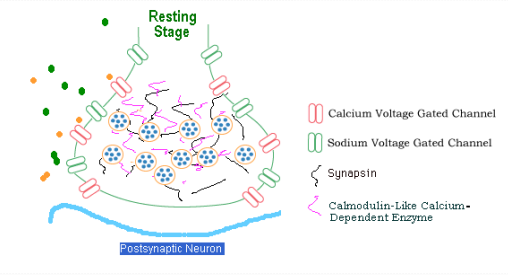


Action potentials arriving at the presynaptic terminal cause voltage-gated calcium ion channels to open.

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Property	Electrical Synapse	Chemical Synapse
Distance between Membranes	3.5 nm	20-40 nm
Cytoplasmic continuity?	Yes	No
Structural Unit(s)	Gap-junction channel	Many (vesicles, docking/fusion proteins, and postsynaptic receptors)
Transmitter	Ionic current	Chemical transmitter (can be modified using drugs)
Transmission Delay	No	Yes (usually 1-5 msec)
Transmission Direction	Can be bi-directional	Unidirectional

Chemical Synapse

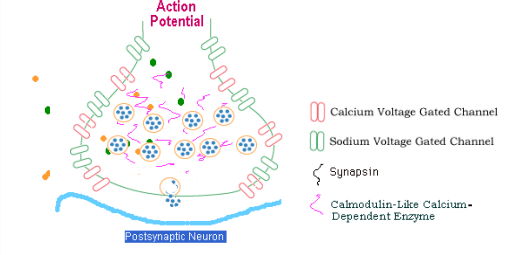


Resting Stage

- || Calcium Voltage Gated Channel
- || Sodium Voltage Gated Channel
- { Synapsin
- ~ Calmodulin-Like Calcium-Dependent Enzyme

Postsynaptic Neuron

Chemical Synapse



Action Potential

- || Calcium Voltage Gated Channel
- || Sodium Voltage Gated Channel
- { Synapsin
- ~ Calmodulin-Like Calcium-Dependent Enzyme

Postsynaptic Neuron

Presynaptic Inhibition and Facilitation

