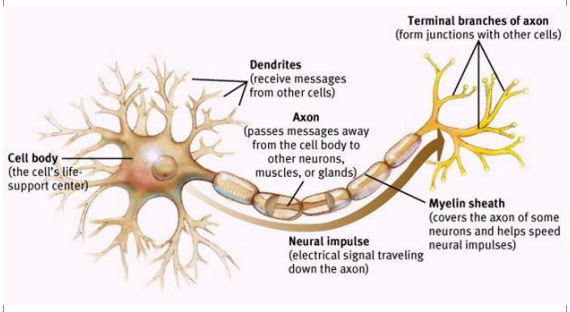
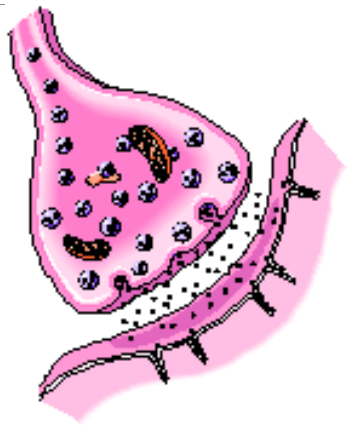
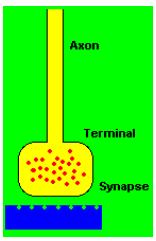


Synapse

1. Presynaptic Terminal Button
2. Postsynaptic Membrane
3. Vesicles
4. Synaptic Cleft
5. Neurotransmitters
6. Receptor Sites



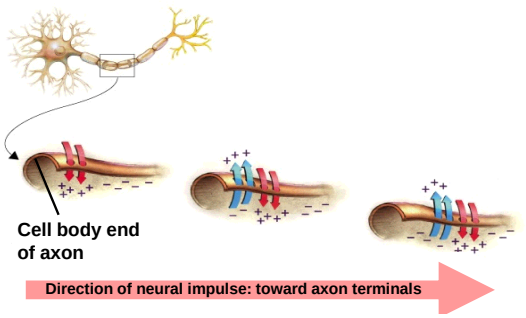
For communication between neurons to occur, an electrical impulse must first travel down an axon to the synaptic terminal.

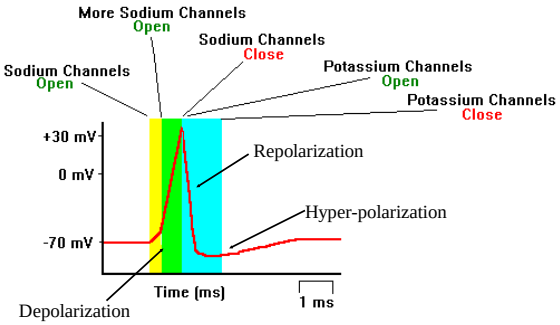


The electrical impulse will trigger the migration of vesicles toward the presynaptic membrane.

The vesicle membrane will fuse with the presynaptic membrane releasing the neurotransmitters into the synaptic cleft.

Neural Communication





Action Potential

Steps in Neurotransmission

1. Action potential travels down axon to presynaptic terminal
2. Vesicles fuse to terminal membrane and release neurotransmitter
3. Neurotransmitter crosses synaptic space
4. It binds to receptor site and alters charge of postsynaptic membrane

Effects of Neurotransmitters

- Excitatory
  - Membrane becomes depolarized (More positively charged)
  - Makes it *more* likely that an action potential will occur
- Inhibitory
  - Membrane becomes hyperpolarized (more negatively charged
  - Makes it *less* likely an action potential will occur

Steps in Neurotransmission

5. The reaction of postynaptic membrane dislodges neurotransmitter from the receptor.
6. Neurotransmitter is deactivated.
   1. Diffuses away.
   2. Enzymes metabolize it (MAO).
   3. It is reuptaken into presynaptic terminal.

Types of Neurotransmitters

- Acetylcholine (ACh):
- found through out the central nervous system, autonomic nervous system, and all neuromuscular junctions.
- Excitatory
- Involved in muscle action, attention, learning, and memory
- Too much: spasms
- Too little: paralysis

Types of Neurotransmitters

- Dopamine:
- Inhibitory
- Produced by neurons located in a region of the brain called the substantia nigra.
- Involved in pleasure, movement, attention, and learning.
- Degeneration of dopamine-producing neurons has been linked with Parkinson's Disease. Too much dopamine is implicated in schizophrenia.
- Destroyed by MAO

Types of Neurotransmitters

- Serotonin:
- Found in the brain and spinal cord.
- Inhibitory
- Plays a role in the regulation of mood and is control of eating, sleep and arousal. Has also been implicated in the regulation of pain and dreaming.
- Destroyed by MAO
- SSRI's (Prozac, Zoloft)

Types of Neurotransmitters

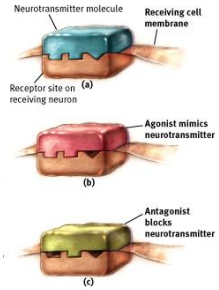
- Norepinephrine
- Found in the nervous system
- Excitatory
- Affects arousal, mood, memory, and learning, and hypothalamic functions (hunger, thirst, anxiety, fear, sex)
- Destroyed by MAO

Types of Neurotransmitters

- GABA (gamma-amino-butyric acid).
- Found through out the brain and spinal cord, in very high concentrations compared to other Neurotransmitters.
- Inhibitory
- Is the major inhibitory neurotransmitter in the brain. Abnormal levels of GABA have been linked to eating and sleeping disorders.

Drugs and the Brain

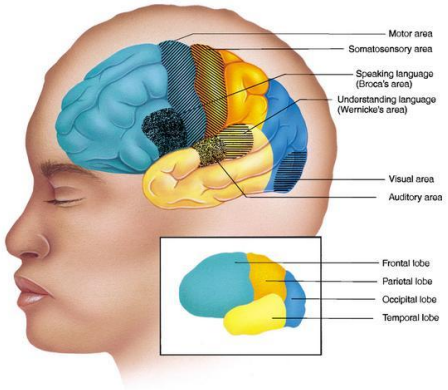
- Agonists
  - Binds with receptor site and mimics neurotransmitter
- Antagonists
  - Blocks the receptor site
- Reuptake Inhibitors
- MAO-Inhibitors



Drugs and the Brain

- Alcohol: GABA Agonist
  - Binds with GABA receptors (increases the inhibitory action of GABA)
  - Shows affinity for the reticular formation
    - Responsible for maintaining general arousal & consciousness
  - Effects in Cerebral Cortex include:
    - Mild euphoria, loss of discrimination, judgment, and concentration
    - Loss of fine motor functioning, and mood changes
  - High doses depress respiratory functions in the Medulla and can result in death by suffocation
- Alcohol is in the same class as Barbiturates (sedatives, tranquilizers, anesthetics)

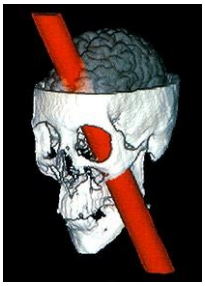
Cerebral Cortex



Phineas P. Gage

- On Sept. 13, 1848 an explosion blew a tamping iron through his head.
- The tamping iron was 3 feet 7 inches long and weighed 13 ½ pounds.
- He suffered damage to his left frontal lobe.

Damage to Frontal Lobe



- Phineas recovered all his major functions
- The only major impairment from this injury was changes to his personality
- He became fitful, grossly profane, impatient, obstinate, and indecisive.

MRI Scan