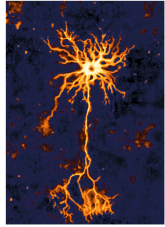


The Neuron: The Basic Unit of Communication

Neuron: A nerve cell; the basic building block of the nervous system. (page 53).



Neuron Structure (see Figure 2.2 on page 54)

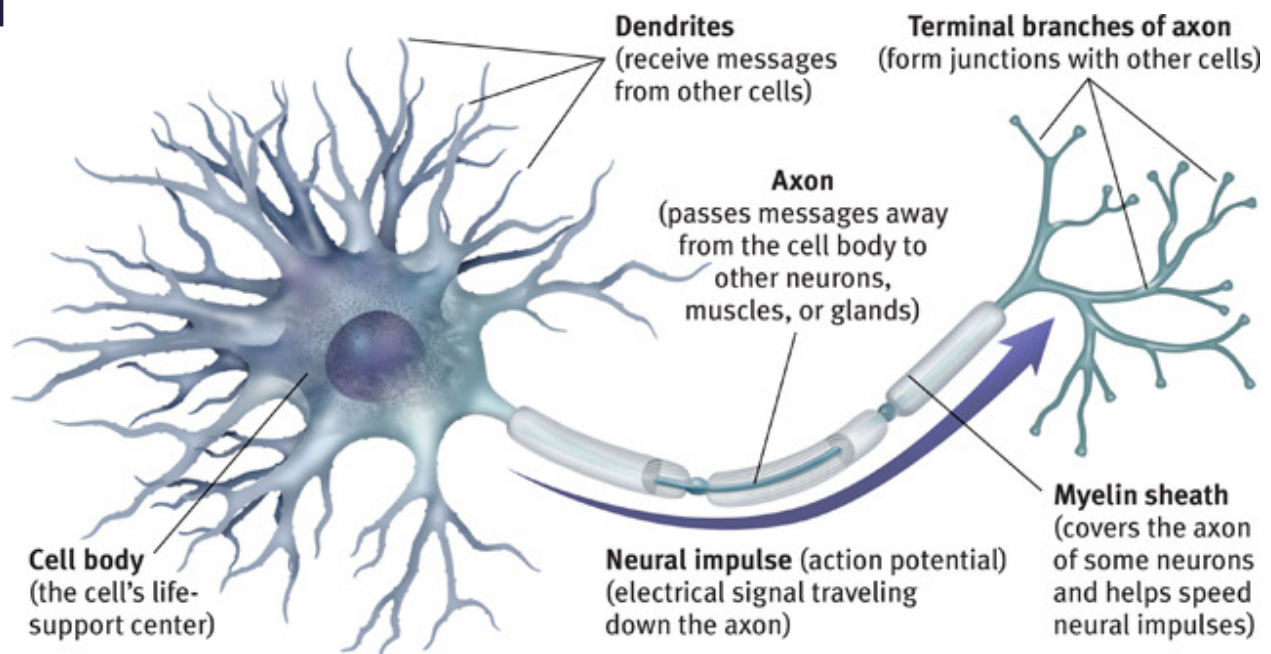


image source: Myers and DeWall, Psychology, 11th edition, 2015

There are approximately 100 billion neurons in the brain.
(100 billion = $10 \times 10^{11} = 100,000,000,000$)

How small is the synaptic gap?

- The synaptic gap (the space between synapses) is about 5/1,000,000 of an inch.

To get a feel for how small this is, make the following analogy:

1 ream of paper = 500 pages = 2 inches

2,000 reams = 1,000,000 pages = 4,000 inches or 111 yards

One football field (without the end zones) is 100 yards.

How do these neurons communicate with each other?

Figure 2.4, [page 57](#)

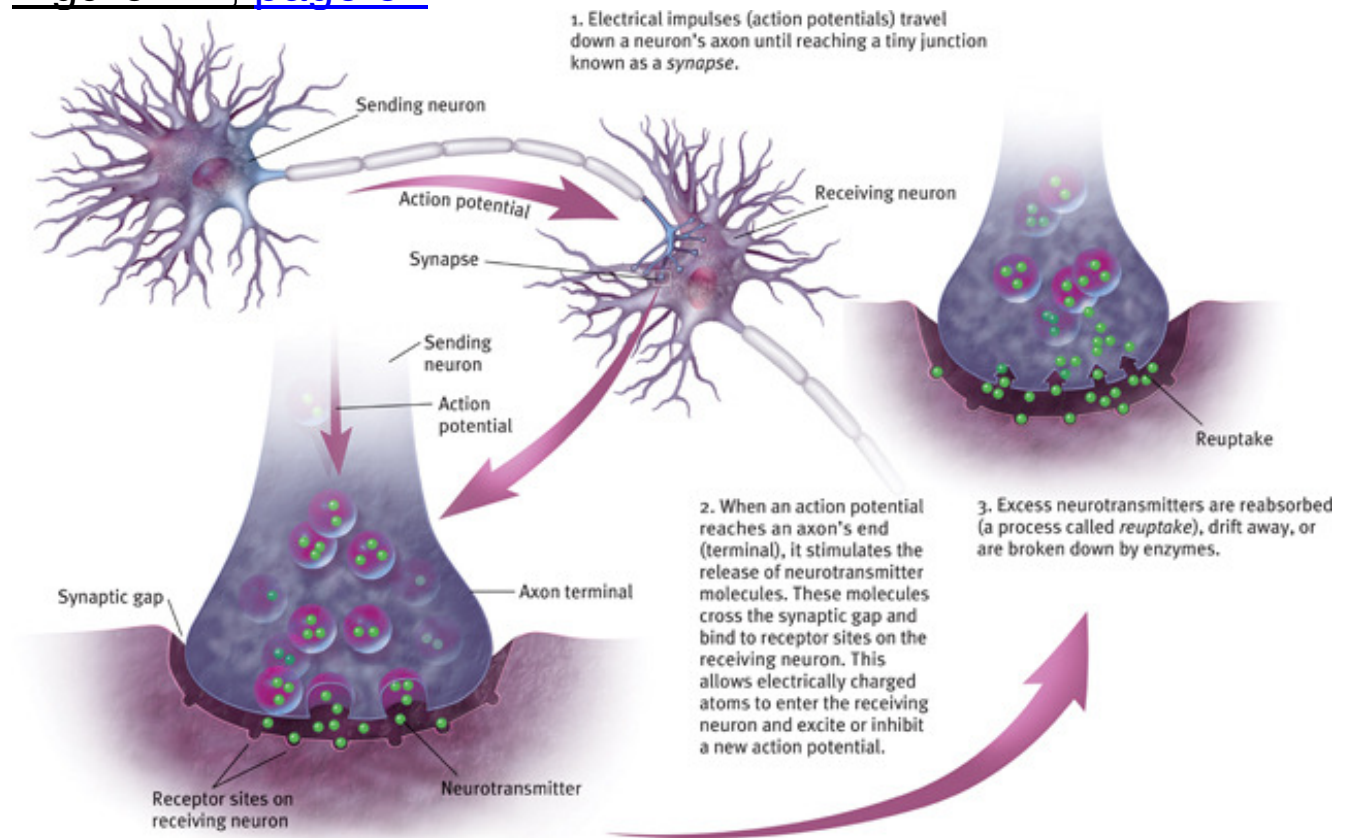


image source: Myers and DeWall, *Psychology*, 11th edition, 2015.

Communication Between Neurons

When communication has occurred, the neurotransmitters are either:

- (1) broken down by enzymes and removed from the brain.
- (2) go through a reuptake process to be reused in the presynapse.

Neurotransmitters

The main neurotransmitters

- **Serotonin**
- **Norepinephrine** (also known as noradrenaline)
- **Acetylcholine (ACh)**
- **GABA** (gamma aminobutyric acid)
- **Glutamate**
- **Dopamine**

What are the major roles of each neurotransmitters? (see handout)

How do Drugs Affect Neural Communication Between Neurons?

Many drugs, especially those that affect moods or behavior, work by interfering with normal functioning of neurotransmitters in the synapse. How this occurs depends on the drug, such as the following:

1. Drugs can mimic specific neurotransmitters.
 - Nicotine is chemically similar to acetylcholine and can occupy acetylcholine receptor sites, stimulating skeletal muscles and causing the heart to beat more rapidly.
2. Drugs can mimic or block the effects of a neurotransmitter by fitting into receptor sites and preventing the neurotransmitter from acting.
 - The drug curare produces almost instant paralysis by blocking acetylcholine receptor sites on motor neurons.
3. Drugs can affect the length of time the neurotransmitter remains in the synaptic gap, either increasing or decreasing the amount available to the postsynaptic receptor.
 - Prozac prevents the reuptake of serotonin, which increases the likelihood of synaptic communication.
4. Drugs can increase or decrease the amount of neurotransmitters released by neurons.
 - MDMA increases the release of serotonin in the brain.

How Drugs Affect the Communication Process

Agonists

Drugs that enhance the actions of neurotransmitters.

Antagonists

Drugs that inhibit the actions of neurotransmitters.

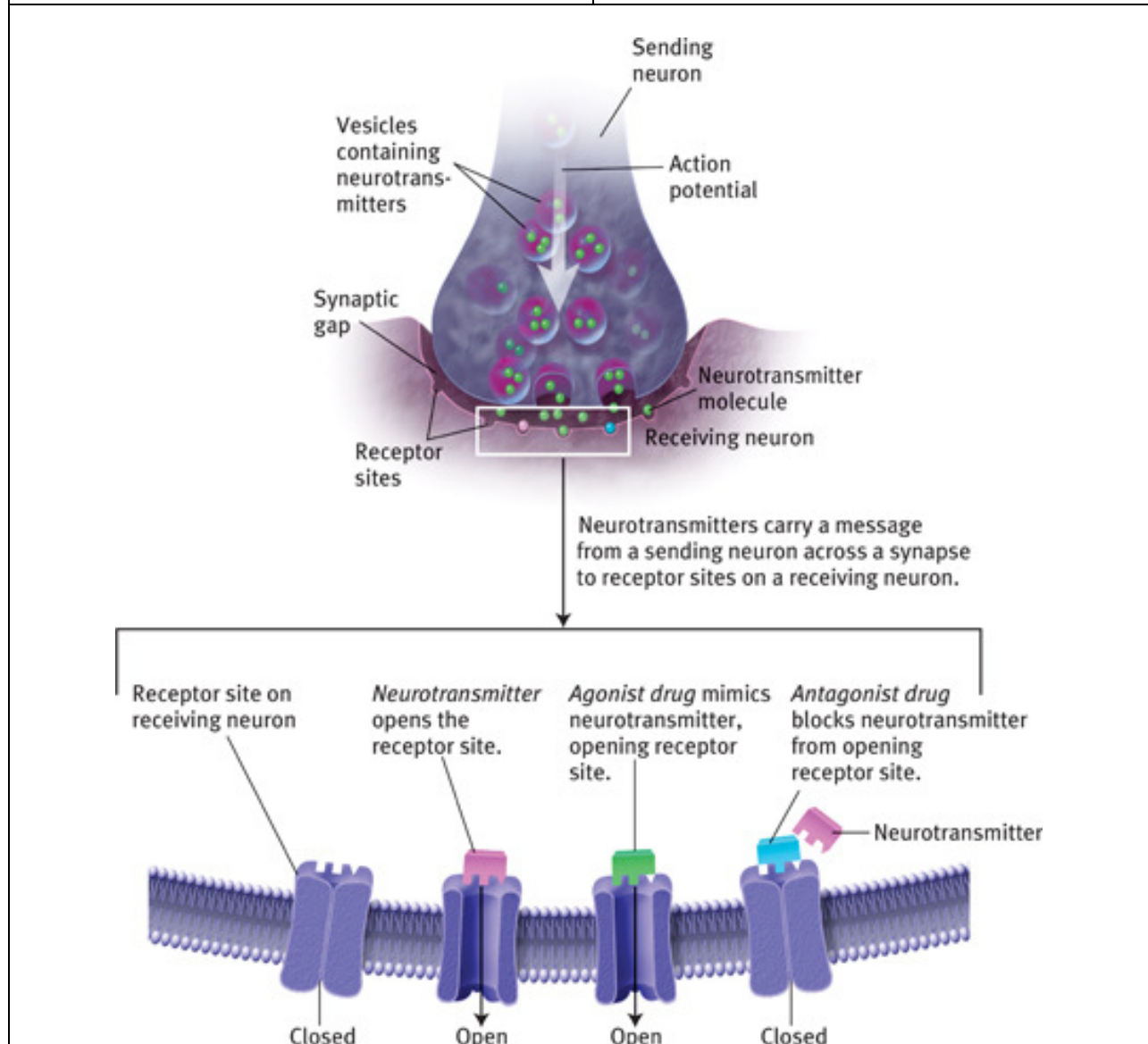


image source: Myers and DeWall, *Psychology*, 11th edition, 2015

Deficits and Surpluses of Neurotransmitters (see handout)

Who has

- Alzheimer disease (deficit of acetylcholine (ACh) in the hippocampus)?
- Parkinson's disease (deficits of dopamine in the substantia nigra)?

Alzheimer's disease:

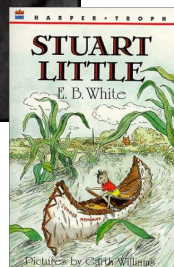
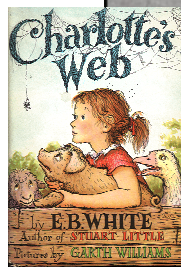
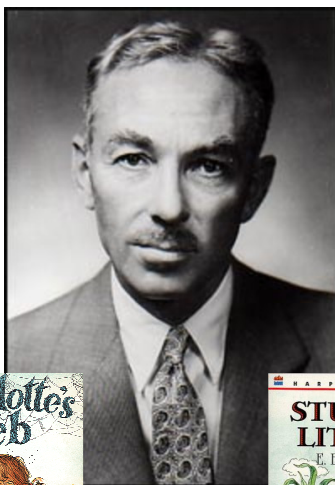
- Estimated 20 million worldwide suffer from Alzheimer, 4 million in the United States.
- It is hypothesized that high fat diets elevate the risk of Alzheimer's.

Learn more about these if you have a loved one suffering from Alzheimer. Ignorance can help foster fear of Alzheimer. Learning more can help you deal with the stress of the disease.

Alzheimer's: Time, July 17, 2000

Parkinson's: Newsweek, May 22, 2000

Who has / had Alzheimer's Disease?



Who has / had Parkinson's Disease?

