The Neuron: The Basic Unit of Communication

Neuron: The nerve cells that are the basic units of the nervous system; these cells receive, integrate, and transmit information in the nervous system. Neurons operate through electrical impulses, communicate with other neurons through chemical signals and form neural networks (page 48).

Figure 2.1

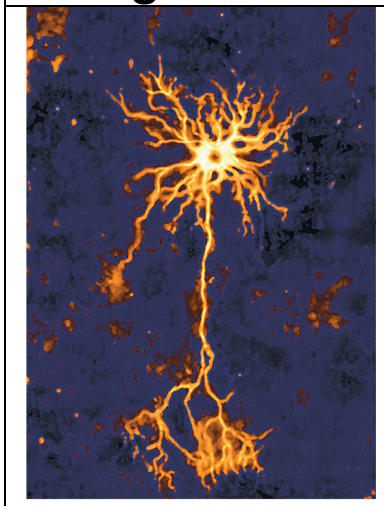

FIGURE 2.2

James Cavallini/Science Source
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Figure 2.2 (page 50): Neuron Structure

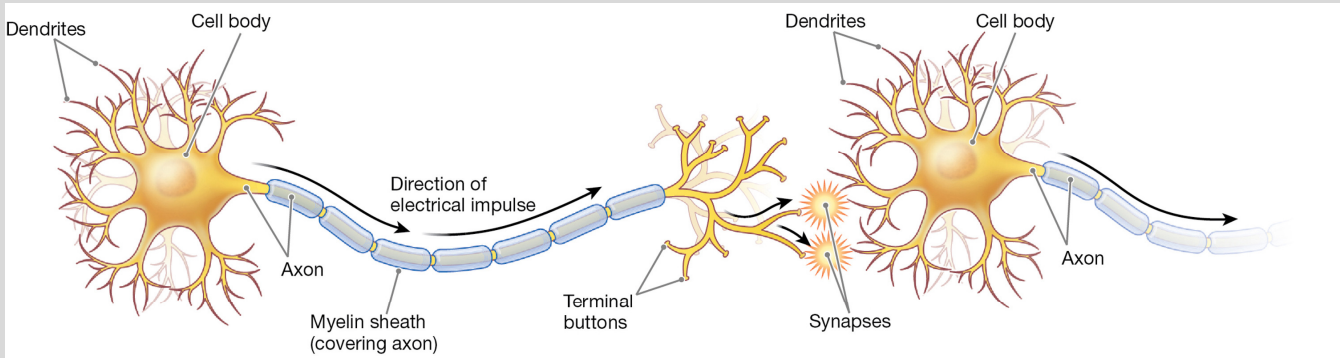

FIGURE 2.3

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There are approximately 100 billion neurons in the brain. (100 billion = $10x10^{11}$ = 100,000,000,000). The synaptic gap (the space between synapses) is about 5/1,000,000 of an inch.

How do these neurons communicate with each other?

Figure 2.5, page 51

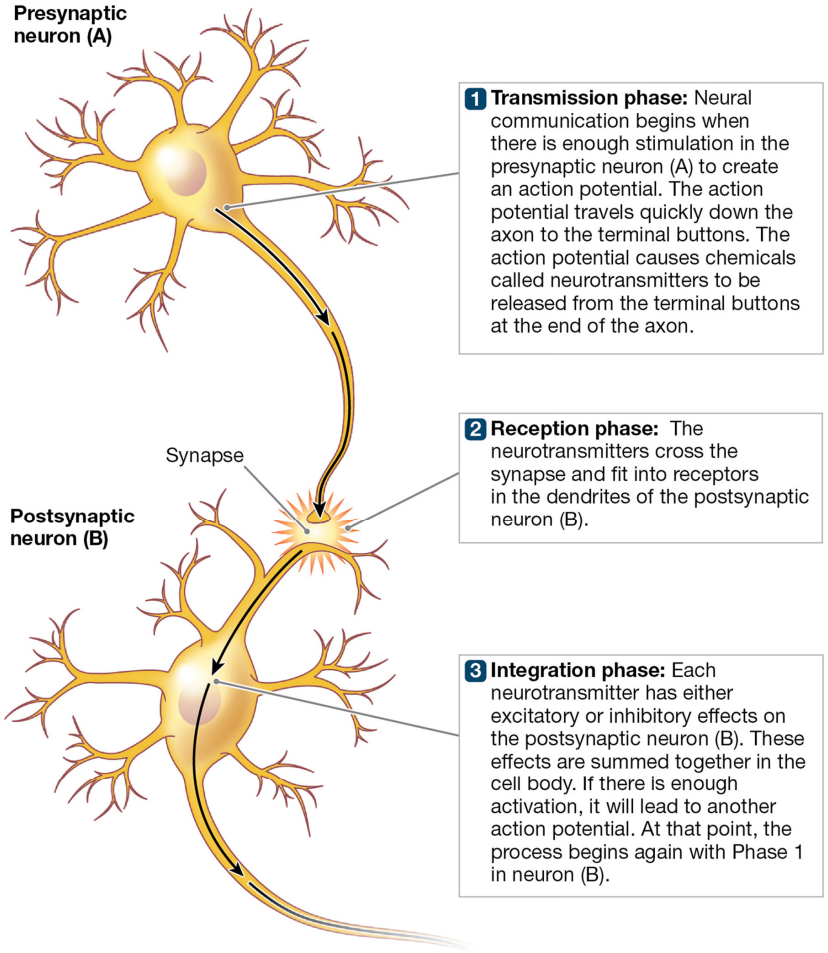

FIGURE 2.5

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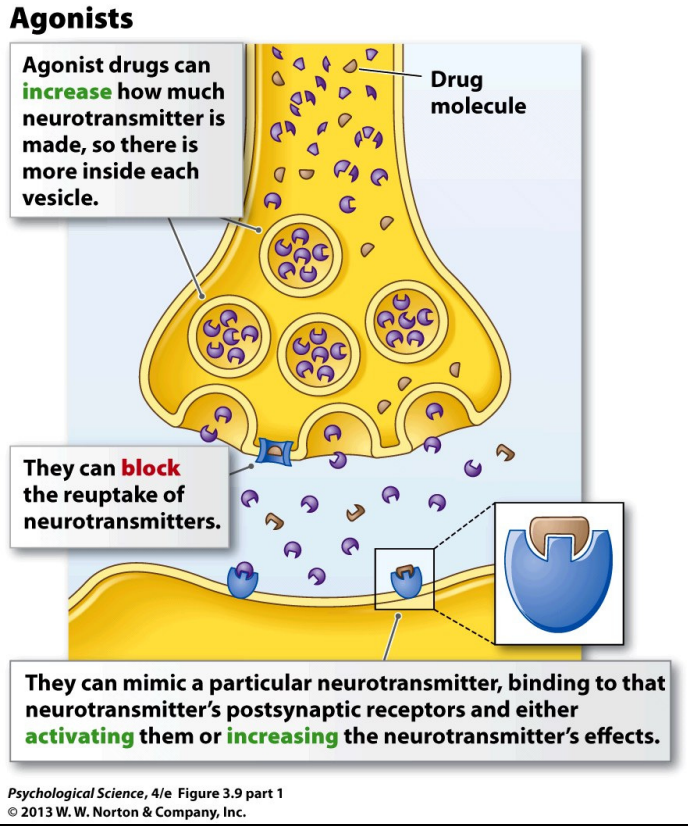
Communication Between Neurons

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 presynaptic neuron.

Drugs Alter How Neurotransmitters Function

Agonists	Antagonists
Drugs that enhance the actions of neurotransmitters.	Drugs that inhibit the actions of neurotransmitters.



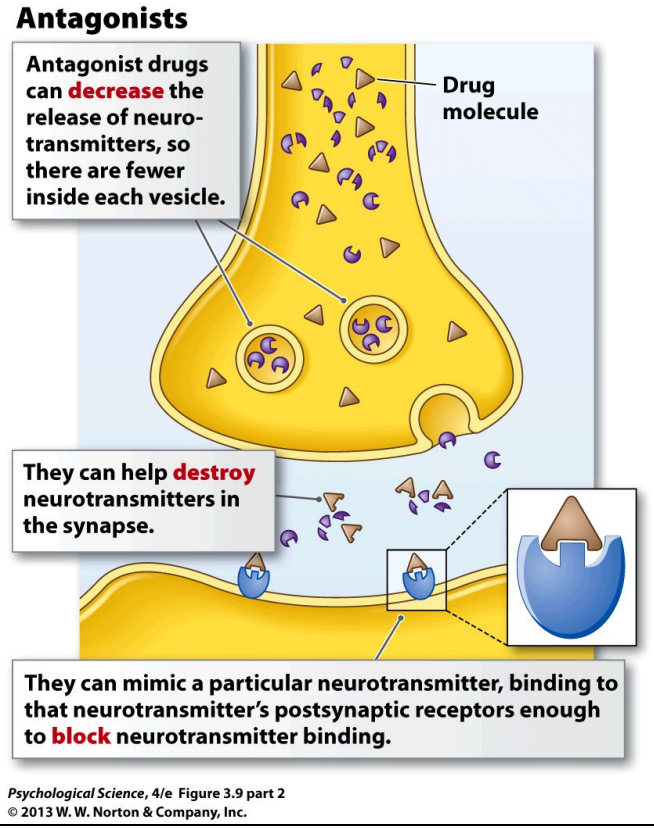


image source: Gazzaniga, Heatherton, Halpern, Psychological Science (2013).

Drugs Alter How Neurotransmitters Function

Drugs can interfering with normal functioning of neurotransmitters in the synapse in many ways 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 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

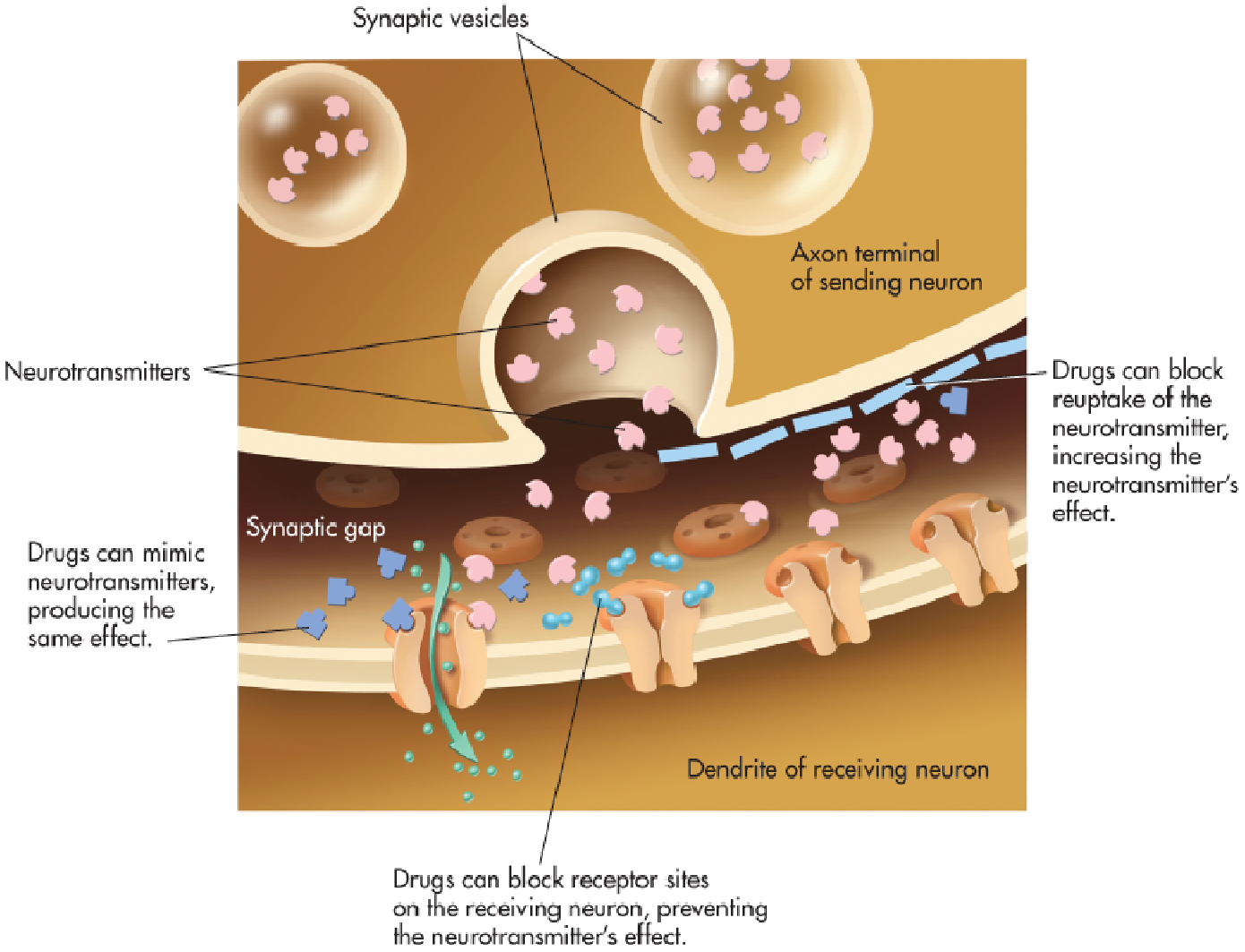


Figure 2.7
Hockenbury/Nolan, *Psychology*, 8e, © 2018 Worth Publishers

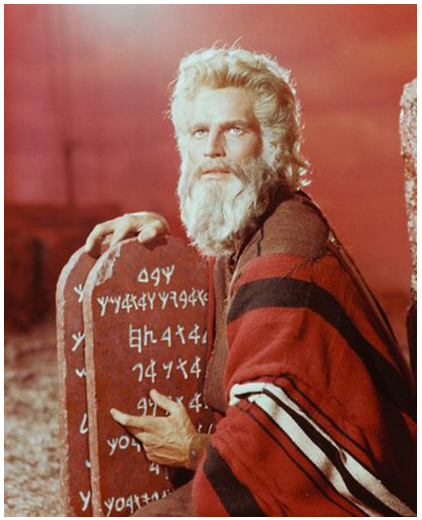
Neurotransmitters

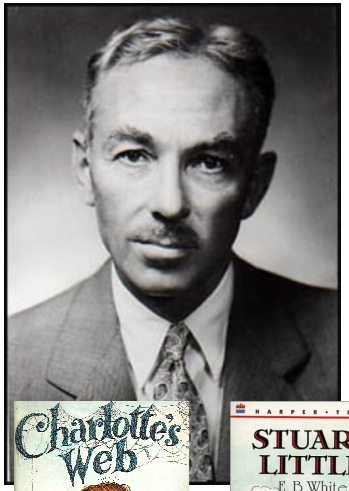
The main neurotransmitters

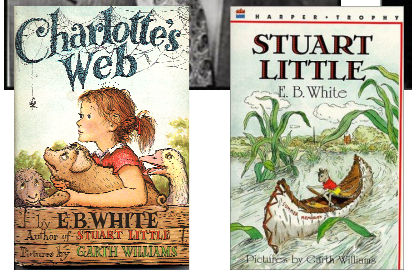
- **S**erotonin
- **N**orepinephrine (also known as noradrenaline)
- **A**cetylcholine (ACh)
- **G**ABA (gamma aminobutyric acid)
- **G**lutamate
- **E**ndorphins
- **D**opamine

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

Who has / had Alzheimer's Disease?







Who has / had Parkinson's Disease?