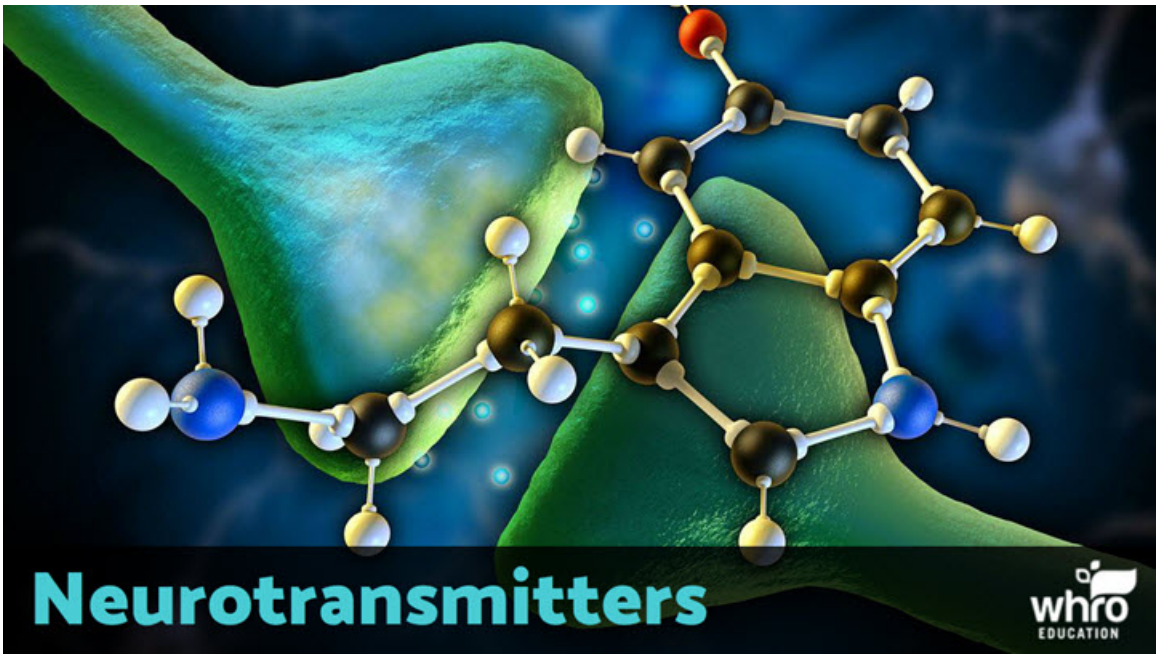
Module 2: Biological Basis of Behavior
Topic 1 Content: Neurotransmitters

Introduction



In this interactivity, you will learn about how neurotransmitters affect mood, behavior, learning, and body function.

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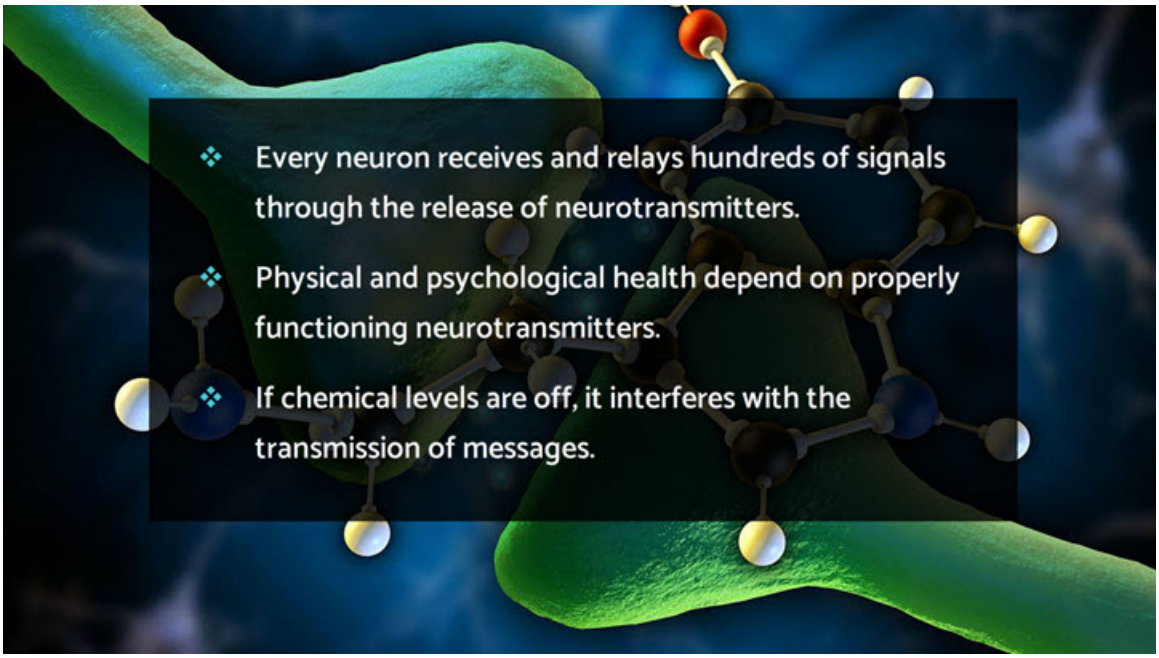
Neurotransmitters



Every neuron receives and relays hundreds of signals through the release of neurotransmitters. Physical and psychological health depend on properly functioning neurotransmitters. If chemical levels are off, it interferes with the transmission of messages, and the body and mind are affected.

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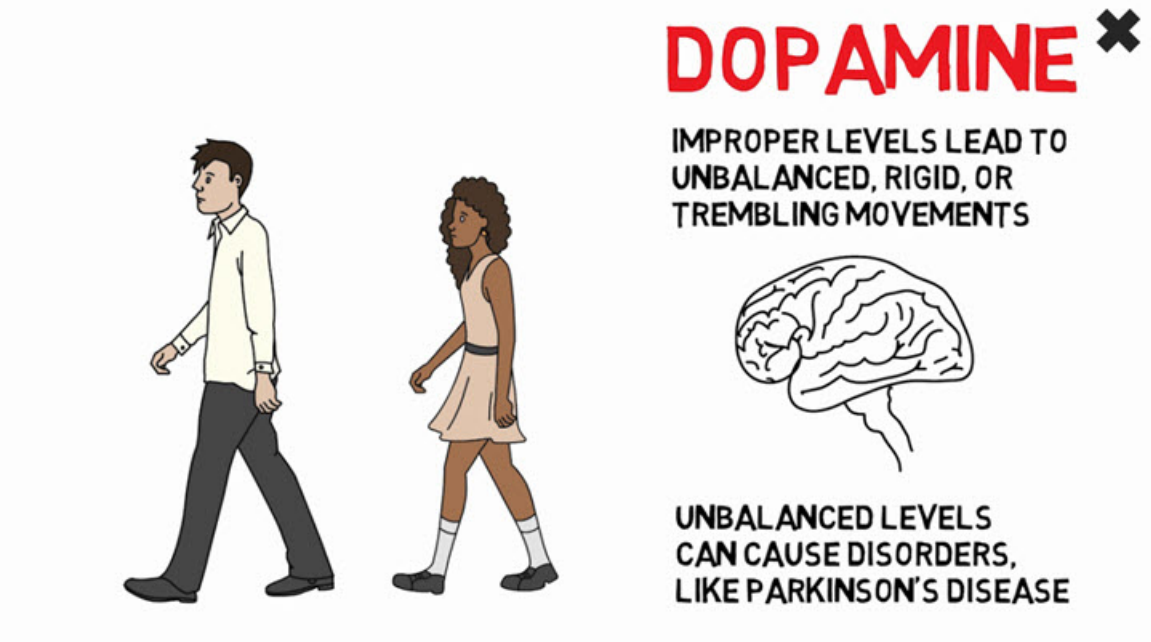
Dopamine



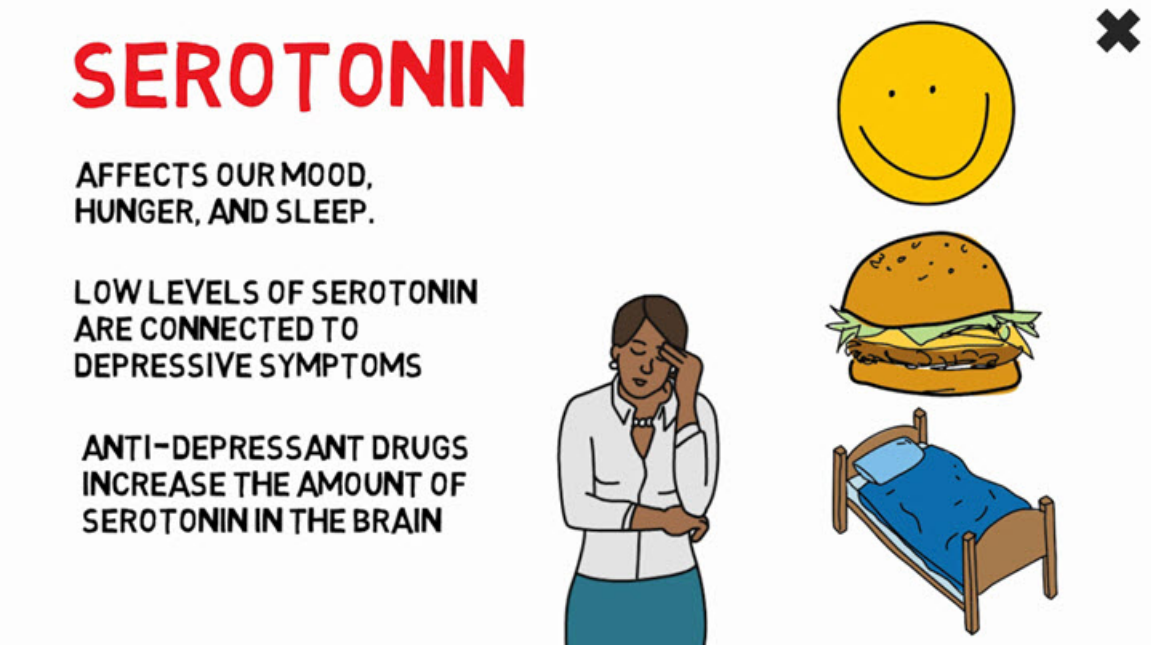
Scientists have discovered more than one hundred neurotransmitters so far. One of the most important of these chemical messengers is dopamine, which is involved in several functions, including movement. Improper levels of dopamine lead to unbalanced, rigid, or trembling movements. Imbalances of dopamine can also lead to various diseases or disorders. For example, if dopamine levels gradually decline in the brain, a person may suffer from Parkinson's disease, which has affected the actor Michael J. Fox and the boxer Muhammad Ali.

This chemical also influences learning, attention, and emotions. Proper dopamine levels allow you to concentrate so you can learn. People diagnosed with Attention Deficit Disorder, known as ADD, have insufficient dopamine levels in the frontal lobe of their brains. On the other hand, too much dopamine has been linked to the serious mental illness, schizophrenia. To help reduce the amount of delusions and hallucinations people with schizophrenia experience, anti-psychotic medication seeks to block the receptor sites for dopamine.

Dopamine also makes people feel good. The positive feeling you experience when someone compliments you occurs because of dopamine. Dopamine also allows you to enjoy the rewards of attention and satisfaction. How do you feel when you receive a text from someone you like, or when you get a good grade on an assignment? Dopamine levels impact all of these positive feelings.

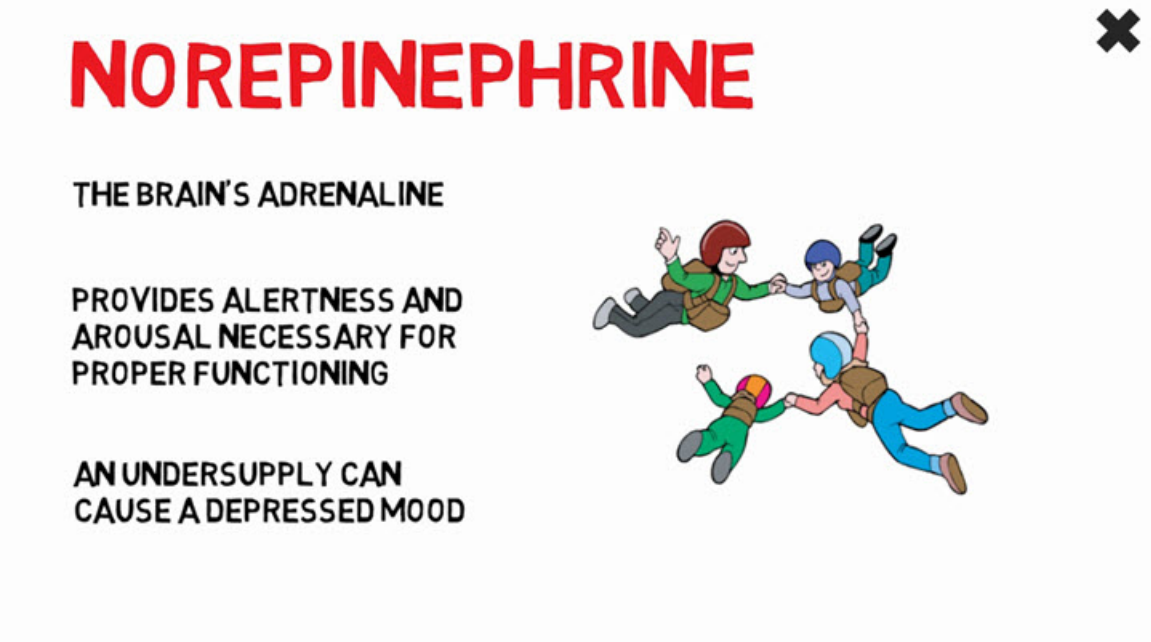
Have you ever heard the saying, “love is a drug?” That saying might not be too far off. Chemically speaking, love and infatuation are explained as the secretion of dopamine. This also explains why breaking up can be tough. People are experiencing a sudden absence of dopamine in the brain.

Serotonin



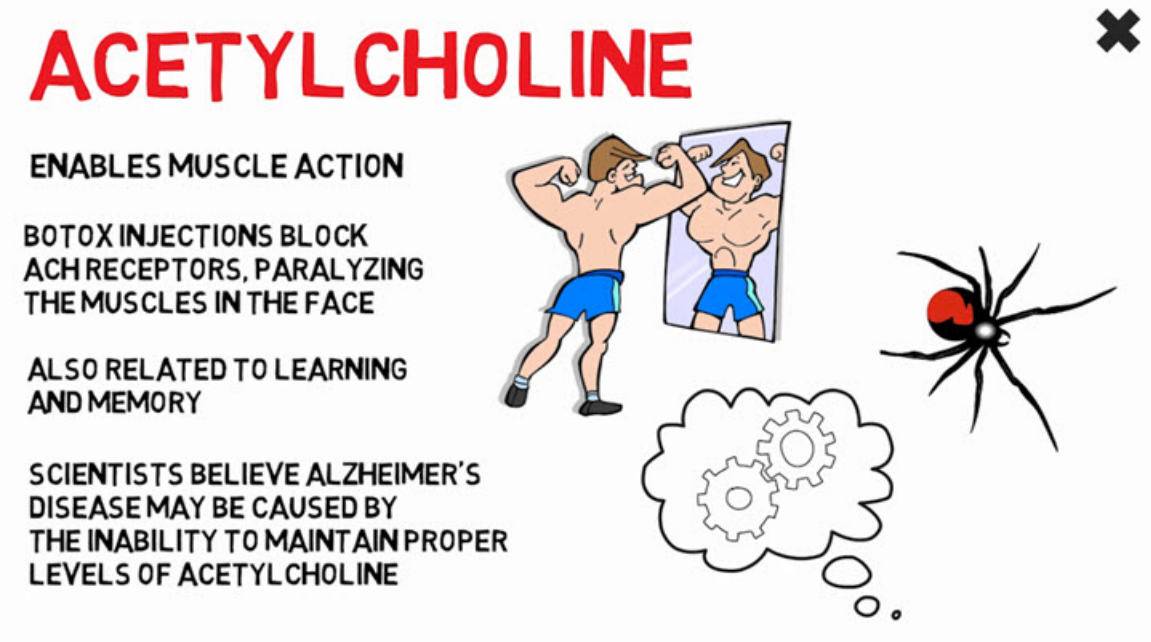
Serotonin is another extremely important neurotransmitter. It affects our mood, hunger, and sleep. Scientists also believe serotonin plays an important role in depression, because low levels of serotonin are connected to depressive symptoms. When people feel depressed, they often eat and sleep more or less than usual, and their mood becomes low and gloomy. Drugs called anti-depressants work at the neural level by increasing the amount of serotonin in the brain.

Norepinephrine



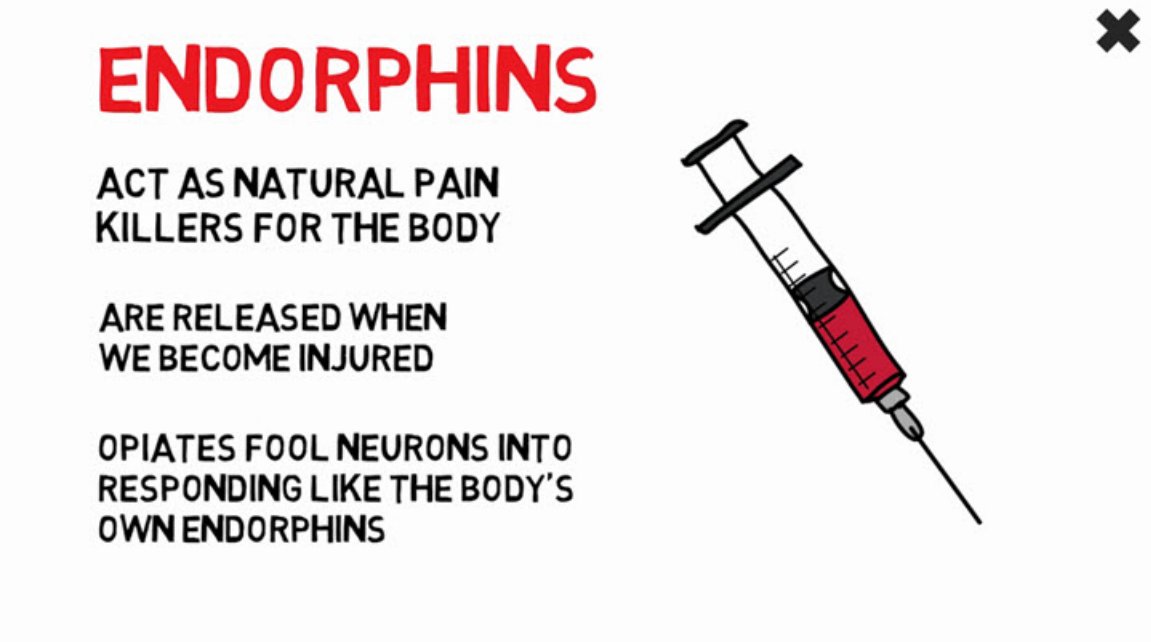
Another neurotransmitter linked to mood and alertness is called norepinephrine. This is the brain's adrenaline, which is released by the adrenal glands when the body needs more energy. In the brain, adrenaline has a similar role. The norepinephrine provides alertness and arousal necessary for proper functioning. An undersupply of this chemical can also cause a depressed mood. A low level of norepinephrine would explain the lethargy that accompanies depression.

Acetylcholine



Acetylcholine, which is often abbreviated as ACh, enables muscle action. Without this neurotransmitter, we could not move our muscles. In fact, the black widow spider's venom paralyzes victims by blocking acetylcholine receptors. When someone receives an injection of Botox, acetylcholine receptors are blocked, paralyzing the muscles in the face in an attempt to eliminate wrinkles. Acetylcholine is also related to learning and memory. When the amount of acetylcholine begins to decline, memory becomes impaired. For this reason, scientists believe Alzheimer's disease may be caused by the cells' inability to maintain proper levels of acetylcholine.

Endorphins



Endorphins are involved in pain relief and feelings of pleasure. These neurotransmitters act as the body's own natural pain killers, and are released whenever we become injured. Opiates like heroin and morphine have many chemical similarities to endorphins. These drugs actually fool neurons into responding and signaling like the body's own endorphins.