

Neurotransmitters, biology and behavior



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Neurotransmitters, Biology and Behavior Neurotransmitters - Function and Impact on Behavior

Neurotransmitters are chemical substances that facilitate communication between neurons by conveying impulses, across the synapse which is the junction between nerve ends. Gulli and Finley (2003) define neurotransmitters as "chemicals located and released in the brain to allow an impulse from one nerve cell to pass to another nerve cell".

Neurotransmitters are produced in the cell body of neurons. They are stored in vesicles and then released as per the need to continue the journey across the synapse and to waiting receptors. Once they have served their purpose, they are deactivated by particular enzymes. Some of the identified neurotransmitters include acetylcholine, dopamine, epinephrine, norepinephrine, serotonin and gamma-amino butyric acid (GABA).

According to Brown (1994), "Neurotransmitters function primarily to communicate between nerve cells in the brain, central nervous system and autonomic nervous system" (p. 10). They may be excitatory or inhibitory in function. Acetylcholine and norepinephrine belong to the former category, while dopamine, serotonin, and GABA belong to the latter category. Thus depending on the specificity of the function being performed, neurotransmitters can set in motion appropriate biological reactions and behavior.

In the words of Giovannoli (2001), neurotransmitters "influence human behavior, attitude, perception, temperament, love, and aggression, among other things" (p. 43). Neurotransmitters have been shown to affect almost every aspect of human life. They affect mood swings, retentive skills,

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aggression, shyness, paranoia, exhilaration, sleep and even sexual activity or inactivity. They are also associated with disorders like depression, anxiety, schizophrenia, Alzheimer's and Parkinson's disease.

Dopamine - Its Effect on the Body and Connection with Disease

Dopamine's effect on the body is profound. It plays a dual role in controlling movement as well as emotions. The nigrostriatal pathway monitors movement and muscle control while the mesocorticolimbic pathway concerns itself with emotions and their regulation. Dopamine is released in both pathways to propagate smooth functioning of bodily activities. Any increase or decrease in dopamine levels may result in major disorders of the mind or body.

Dopamine is believed to be a causal factor in Parkinson's disease, which is characterized by unsteady limbs, tremors and poor muscular control. This disorder is caused by the degeneration of neurons in the nigrostriatal pathway. The mesocorticolimbic pathway on malfunctioning causes the mood disorders. Increased dopamine levels may result in schizophrenia, mania and paranoia. Decreased levels cause depression, delusions, memory loss and a predisposition for substance abuse.

The Importance of Biology in Understanding Behavior

Pinel (2003) describes Biopsychology as " the scientific study of the biology of behavior and mental processes". This field is becoming increasingly important as it has been ascertained that it is the brain with its intricate functioning that is responsible for psychological functioning. Therefore, the biological perspective is imperative in understanding behavior. Scientists and researchers in the fields of neuropsychology, psychopharmacology, and behavioral genetics are working hard to decipher the functioning of the

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brain, to unravel its mysteries and to understand and treat aberrant behavior. Research methods used in this field are groundbreaking and include "lesion methods, stimulation methods, recording methods, imaging methods, and genetic engineering techniques" (Pinel, 2003). Biopsychology is in the fledgling stage, but it has enormous scope for understanding and treating behavioral disorders.

References

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