Medulla oblongata: function and location

Medulla oblongata

The medulla oblongata is a very interesting part of the brain. This very small section of the brain stem has a very large amount of responsibility in the human body. Studies concerning this section help in the understanding of many basic biological functions of the body. Some of the actions are ones that we don't even notice are happening on a day-to-day basis but are very important to human life. The medulla oblongata has many different connections with other areas of the brain, plays a key role in several functions of the body, has neurotransmitters that are involved in the functioning of this area, has diseases that can greatly affect its roles in the body.

The medulla oblongata has many connections to other areas of the brain. The medulla oblongata is the most inferior portion of the brainstem and is about three centimeters long. It slightly bulges out of the brain stem. It is located in between the pons and the spinal cord. The axons that carry sensory information to and motor instructions from the higher brain regions pass through the brainstem. It creates tracts that allow communication to pass through from certain sides of the brain. These tracts house fibers that cross each other in pyramidal region of the medulla oblongata allowing the brain to communicate with the opposite of the body. Vital nuclei located in the gray matter of the medulla oblongata are used for cranial nerves.

The medulla oblongata has many different functions in the body. These functions are being performed at all hours of the day, many of them without contribution from other sections of the brain. One main function is relaying signals between the brain and the spinal cord. The medulla helps with

coordinating very large body movements liking jogging or climbing. The medulla houses portions of the brain that control what is considered automatic homeostatic functions as well as some primitive organs (Campbell and Reece 2008).

The cardiac portion constantly sends inhibitory impulses to the heart to tell it to slow down. This portion also sends acceleratory impulses through the spinal nerves to make the heart beat faster whenever it may be necessary. The vasomotor portion sends impulses via spinal nerves through the spinal cord to muscles walls around arteries causing them to constrict. This constriction of arteries will cause blood pressure to rise. The respiratory portion houses respiratory nuclei that control the depth and rate of breathing. The medulla oblongata also plays a role in reflex responses. The capability to respond quickly to a stimulus can be very important when there is a need to survive. Reflex responses include swallowing, sneezing, vomiting, coughing, and digestion. A lot of these functions are involuntary or start off voluntary and then transform in to involuntary functions.

The activity of the medulla oblongata rely on axons that reach many areas of the cerebral cortex and the cerebellum, releasing neurotransmitters such as norepinephrine, dopamine, serotonin, and acetylcholine. When under stress, norepinephrine relays messages to the brain that control reflex reactions and ability to pay attention. Like epinephrine, norepinephrine also triggers the fight-or-flight response. The fight-or-flight response is directly related to heart rate. It causes glucose from energy being stored to be released and blood flow to increase to muscles that enable the body to react as necessary.

Norepinephrine raises blood pressure when used as a drug. This raise in blood pressure causes a correlated drop in heart rate.

Dopamine, another neurotransmitter in the brain, opens dopamine receptors also affecting blood pressure and heart rate. Serotonin is a neurotransmitter that deals with mood. Excessive aggressive, sadness, or jealousy is linked to the medulla oblongata. Acetylcholine is used in the motor division and cross over in the medulla oblongata. It is involved in muscle movement, autonomic body functions, and excitatory reactions.

Many diseases and disorders affect the medulla oblongata. One disorder is a very rare and often fatal medullar abscess (Wait 2009). A medullar abscess is viewed as a condition of rapidly progressive multiple cranial nerve palsies and decreased level of consciousness (Wait 2009). Multiple system atrophy is a neurological disorder that degenerates nerves cells located in areas of the brain including the medulla oblongata. This disease can cause the loss of control of autonomic functions such as bladder control, movement, and coordination (Benarroch 1997).

Damage to the medulla oblongata can cause several functions of the body to be thrown off and even death. Because cranial nerves run through this section of the brain injury there can cause several sensory problems. For instance, injury can cause numbness or paralysis of the palate and throat causing drooling and a lack of taste. This numbness can also obviously cause problems with speech. It can also cause gagging, inability to rotate the neck, and acid reflux. Surprisingly if a person suffers from brain damage their body can still function if the medulla oblongata is not damaged. However, damage

to the medulla oblongata can cause the need for a breathing machine or other life support equipment. If the medulla oblongata is damaged sometimes the brain and body can recover and no longer need the use of a life support machine, but often the body cannot recover and a person is considered to be brain dead. In this stage, the removal of a life support machine will mean a person’s body will no longer function and that person will die.

A great assortment of medications and drugs can also alter the state of the medulla oblongata. Overdoses usually result in death because the medulla oblongata cannot carry out its functions under that amount of a specific drug. Opiates, coma, and hypothermia can affect the medulla oblongata in ways that cause the body to exude physical conditions comparable to death. Anesthesia is able to function as it does because its chemical components cause the medulla oblongata to decrease its autonomic functions.

References

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