HYPOTHALAMIC NEWSLETTER

Welcome to this edition's Hypothalamic Newsletter! We will be discussing oxytocin, the adolescence brain, and electric eels.

What is Oxytocin?

Hormones are molecules in the human body, most common proteins, that are in charge of signaling and stimulating biological responses in the body. There are many hormones in the human body, with numerous different roles affecting behaviors, sensations, and bodily functions. One of these such hormones is oxytocin, a hormone that has a large role in social behaviour, and has even been dubbed the “love hormone”.

Oxytocin is produced in the hypothalamus, located below the thalamus and above the pituitary gland. When oxytocin is produced, it can be released into the bloodstream by the posterior pituitary gland, or be extended into other parts of the brain directly. When released into the bloodstream, oxytocin can have many effects; some of which are stimulating maternal instincts and contractions during labor. But through studies involving animal behavior, scientists have discovered that there are many other roles that this hormone can play.

Oct 14, 2021

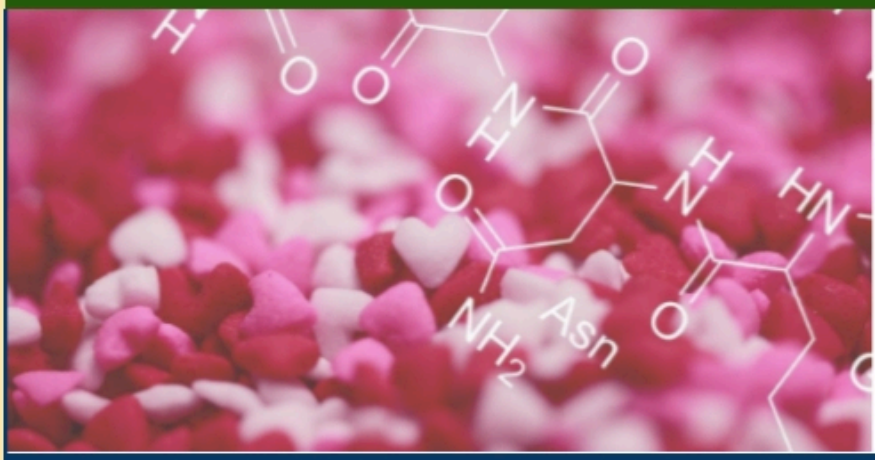
VIsit The Neuroscience Establishment
https://www.neuroscienceestablishment.org/

> Brain size accounts for between 9 and 16 percent of the overall variability in general intelligence

Oxytocin continued

One such role is the one played in general socialization. Oxytocin allows animals to learn and recall social information.The process of social learning begins with sensory signals called olfactory cues. These cues are transmitted from the olfactory epithelium, which are patches of receptor cells located in the nasal cavity, that are transmitted to the olfactory bulb and then to the olfactory cortex, both located in the forebrain. The process of social process involves signals being transmitted to and from the cerebral cortex. What role does oxytocin play in this process? Oxytocin plays a role in regulating excitatory and inhibitory neurotransmitter balance.

As you can see, oxytocin plays a crucial role in the everyday functioning of social animals. Alongside this, oxytocin also is important in a number of other neurological functions such as influencing limbic circuitry and fear behaviors in the amygdala that affect social recognition. Scientists are also beginning to study oxytocin more closely, as it could possibly lead to treatments for diseases such as autism, borderline personality disorder, and obesity.



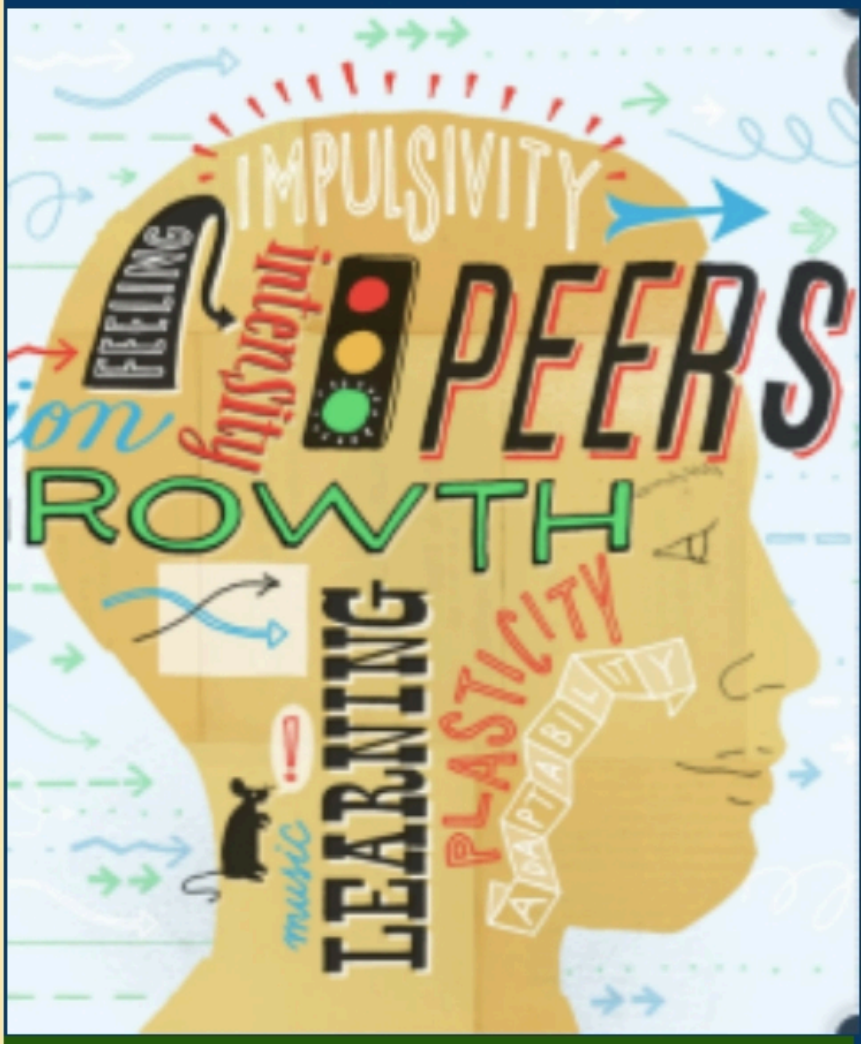
The Adolescence Brain

Current literature suggests that it's around age 25 or so when the brain finishes the period of adolescence." The brain, even in adulthood, is changing in relation to what we learn and the conditions we live in, however, by 25 our brain has completed the tedious process of structural development. As for teenagers, their brain is clearly still developing, but with different parts developing at different rates. Usually, there is greater activation in the emotional centers of the brain at first, with prefrontal cortex development coming in later on.

The Adolescence Brain continued

The prefrontal cortex is what allows us to think about the future, to understand consequences, and generally make better decisions. As expected, this part of the teen brain is still immature. During adolescence, the impulsive, emotional side of the brain develops faster, while the logical side lags behind, explaining teen behavior. The analogy is that these two are kind of going head-to-head. When a teenager reaches adulthood. The parts would balance each other out, resulting in rational decision making. There might be an evolutionary basis to this developmental cycle. Research has found that not only are teens more sensitive to rewards than adults, this makes them better learners.

Compared to adults, teenagers have more reward center activation when they are developing new skills, and this sense of reward fosters more skill development, helping fine tune a teenager's skill set. A higher emotional activity may also improve one's memory of the event, helping teenagers retain what they learn with passion.



> The human brain begins to lose some memory abilities as well as some cognitive skills by the late 20s.

The Nervous System of Electric Eels

The electric eel generates large electric currents by way of a specialized nervous system that has the capacity to recruit disc-shaped, electricity-producing cells to activate in electricity producing organs running down its abdomen and tail. A signal arrives from the nervous system to order this organ to fire. A complex system of nerves ensures that all these cells in the organ would fire at a single time once the signal is received. Each electrogenic cell carries a cell potential across its membrane of around 100 millivolts. When the command signal arrives, the nerve terminal releases acetylcholine, a neurotransmitter. This allows charge to flow like a battery from the outside to the inside since the cell is negative.

This positive charge enters the cell in the form of sodium cations. Since the organ orientents the cells in a stack to carry the signal, the current generated by an activated cell creates similar changes in nearby cells, setting off an activation cascade lasting milliseconds. This creates an actual current through the eel's body and out the tail. Judging how the eel's cells are stacked as discussed before, the tail is the negative end, while the upper abdomen is the positive end. Above the surface, the eel could theoretically generate up to 500 volts and one amp of current. But in the water, the current leaked into its surroundings, stunning its prey.

> Twenty-five percent of the body's cholesterol resides within the brain.