A window to aggression

Shriya Kokaragadda

Aggression, as an emotion in neuroscience, embodies a captivating fusion of biological, psychological, and environmental facets.

Anger is linked to Aggression

Anger is the emotion most closely linked to aggression. One of the six main emotions is anger, which frequently motivates aggressive behavior. Anger can be triggered by feelings of threat, frustration, or provokedness. This can result in aggressive actions or behaviors intended to assert oneself, defend against perceived threats, or express dissatisfaction. Anger is the main emotion that motivates many aggressive reactions, though aggression can also involve other emotions like fear or frustration.

Neurotransmitters linked to Aggression

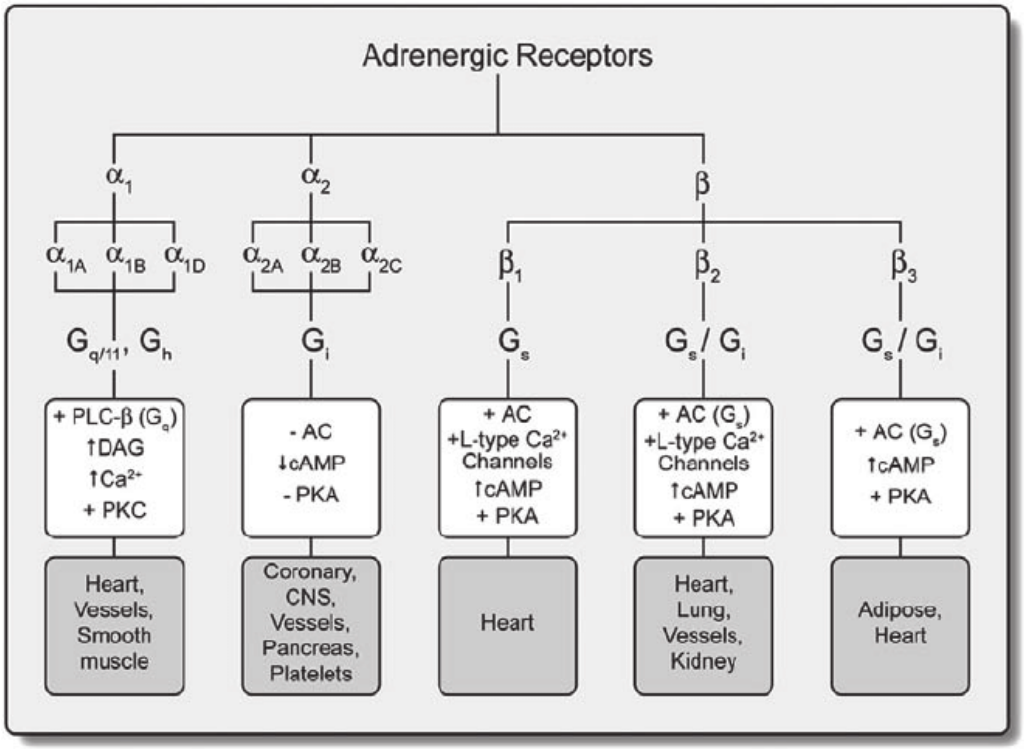
Many neurotransmitters can contribute to aggression such as serotonin, dopamine, GABA, and neuropeptides (such as vasopressin and oxytocin), but the main neurotransmitter is Norepinephrine. As for the structure of the way the brain receives the emotion of aggression, norepinephrine, a neurotransmitter associated with the body's fight-or-flight response, helps the brain control alertness and arousal. Elevations in norepinephrine levels during stressful or perceived threat situations can make people more alert and vigilant.

Furthermore, irregularities or imbalances in norepinephrine levels may be linked to impulsivity or trouble controlling emotions, which in some cases may result in increased aggression. The relationship between norepinephrine and aggression is complicated, though, because aggressive behavior is also influenced by other neurotransmitter systems, individual differences, and environmental cues.

An insight to Norepinephrine

Norepinephrine, a neurotransmitter crucial in the sympathetic nervous system, primarily acts through adrenergic receptors. There are two main classes of adrenergic receptors: alpha and beta. The alpha receptors are further divided into subtypes: alpha-1 and alpha-2, while the beta receptors encompass subtypes beta-1, beta-2, and beta-3. These receptors are widely distributed throughout the body. Alpha-1 receptors are found in various locations such as vascular smooth muscle, where they regulate vasoconstriction. Alpha-2 receptors are present in the central and peripheral nervous systems, modulating neurotransmitter release and regulating sympathetic outflow. Beta-1 receptors are predominantly in the heart, influencing cardiac contractility and rate. Beta-2 receptors are located in smooth muscles of the airways and blood vessels, impacting bronchodilation and vasodilation. Beta-3 receptors are primarily found in

adipose tissue, playing a role in lipolysis (Farzam, Kidron, Lakhkar, 2023). The diverse distribution of these receptors contributes to norepinephrine's multifaceted physiological effects.



"Adrenergic receptor subtypes and their coupled G proteins and effectors. AC, adenylyl cyclase; c-AMP, cyclic adenosine-3 ′ ,5 ′ -monophosphate; DAG, diacylglycerol; PKA, c-AMP-dependent protein kinase A; PKC, protein kinase C; PLC- β , phospholipase C β ; +, activation; –, inhibition; ↑ , increase; ↓ , decrease". (Finch, Angela & Burtet-Sarramegna, Valérie & Graham, Robert, 2006)

Environmental and genetic factors that affect aggression

Results from studies on the interaction between genes and environment (Tuvblad, Baker, 2011), demonstrate that 50% of the variation in aggressive behavior, in both males and females, can be attributed to genetic influences, while the remaining 50% can be attributed to environmental factors that are not shared by family members. Aggression type (physical and relational), assessment technique (lab observation, self-report, parental and teacher ratings), and subjects' age all appear to be important moderators of the degree to which genetic and environmental factors influence aggressive behavior. Research design (twin versus sibling adoption design) and gender (male versus female) do not appear to have an effect on how much genetic and environmental factors influence aggressiveness. Different people will be impacted by experiences and exposures to varying degrees, and genetic predispositions may have distinct effects based on the environment.

Bipolar disorder

Although aggression could be an emotion one experiences alone, it can be also associated with many neurological and psychiatric conditions, especially if it's affecting the amygdala (the part of the brain that's most closely associated with fear, emotions, and motivation.), one of these disorders being Bipolar disorder. Bipolar disorder, also known as manic depression, is a disorder associated with episodes of mood swings ranging from depressive lows to manic highs, and usually lead to aggression, depending on each person (Turgay, 2004). In general, manic, mixed-mood, or psychotic states are associated with an increased risk of aggressive behavior. According to a bipolar disorder study (Pedersen, updated 2021), people who are currently experiencing psychosis score much higher overall on measures of hostility, anger, and aggression than people who are not experiencing psychosis. As of right now, there is no permanent cure for Bipolar disorder, but the primary treatments for Bipolar disorder include medications and psychological counseling (psychotherapy) to control symptoms, which also may include education and support groups. “Medicines like mood stabilizers and Antidepressants can be used for treatment too” (Mayo Clinic, 2022).

Conclusion

Given the issues with aggression, If not detected early, this emotion can not only affect someone, but the people around them too, physically and emotionally. Aggression can be positive or negative, positive if used in self defense, negative if used in arousal. In conclusion, aggression is an emotion we all must take in charge of, and use wisely.

References

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