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| **Name:** |
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| **Group:** |
| 8-B2 |
| **Basic Science Question:** |
| What physiological processes are involved in an anxious response? |
| **Report:** |
| The brain is complex as many neurotransmitters have potential to be involved in anxiety and panic attacks, as individuals have unique chemical compositions. In this complex web, there are two main neurotransmitters involved in anxiety and panic attacks. They are glutamate and GABA.  When we perceive a threat, whether actual or psychological, the brain kickstarts a response known as the fear model (Möhler 2013). This stimulus causes an action potential allowing glutamate, the major excitatory neurotransmitter in the central nervous system (CNS), to be released presynaptically into the synaptic cleft. Once released, glutamate can bind with ionotropic cation receptors, exciting a postsynaptic neuron. This allows the excitatory impulse to travel from the sensory neuron to the amygdala (Yedidya and Chaya 2012). The amygdala is the central point of fear information processing in the brain and when excited by the glutamate neurotransmitter will activate the body's autonomic responses to fear (Torterolo and Levin 2012) which includes sweating, tachycardia, and tachypnea (Torterolo and Levin 2012).  GABA is the major inhibitory neurotransmitter in the brain and results in sedative effects. GABA neurons, like glutamate, are released into the synapse. Here they bind post-synaptic receptors which send inhibitory signals to the amygdala which suppress the fear response (Möhler 2013). This action results in the ability to reduce your breathing and heart rate back to its base level.  In anxiety and panic attacks where the fear model is prolonged, this healthy balance of glutamate and GABA is disrupted. With prolonged stress or anxiety, your brain exhausts GABA. Without GABA, there is excessive excitation of glutamate receptors (Torterolo and Levin 2012). Overstimulation of glutamate keeps the body's autonomic fear responses heightened resulting in uncontrolled anxiety and panic attacks (Torterolo and Levin 2012). |
| **References:** |
| *Möhler, H. 2013. Differential roles of GABA receptors in anxiety. In D. S. Charney, J. D. Buxbaum, P. Sklar, & E. J. Nestler (Eds.), Neurobiology of mental illness., 4th ed. p. 567–579. Oxford University Press. Available from https://0-doi-org.libus.csd.mu.edu/10.1093/med/9780199934959.003.0042*  *Torterolo, A. D., & Levin, J. K. 2012. Panic Disorder: Symptoms, Treatment, and Prevention. Nova Science Publishers, Inc.*  *Yedidya, A., & Chayat, G. 2012. Glutamate: Functions, Regulation, and Disorders. Nova Science Publishers, Inc.* |