Your Name

Instructor Name

Course Number

Date

Biology and Life Sciences: Essay

A fireman’s body enters the fight-and-flight-mode the moment he wakes up at the sound of the emergency siren deep in the night. This response of his body prepares him to spring into action and jump out of bed, get dressed and put on his gear, hop onto his truck and rush out of the door to put out a fire in a nearby hospital stairwell.

The fight and flight response of the body is specifically designed to make an individual alert, giving him the ability to respond to a high-stress situation. The body undergoes a number of physiological and anatomical changes during this phase, that enables an individual to respond to the external stimuli in the correct manner, on the basis of the given scenario. In terms of the physiological response, the reaction first begins in the amygdala. This triggers a response in the hypothalamus in the brain, which is followed by the release of Adrenocorticotropic hormone (ACTH) from the pituitary gland (Margioris and Tsatsanis). Almost simultaneously, the adrenal gland is activated, which secretes epinephrine into the body through the sympathetic nervous system. The release of adrenaline triggers the release of cortisol, another hormone that suppresses the immune system while increasing the blood pressure and blood sugar levels (Padgett and Glaser). This response is often referred to as the ‘adrenaline rush’, which is often cited as the reason why people can perform unimaginable physical feats, even while being injured. Adrenaline gives the body a boost of energy by binding itself to liver cells. This gives it control over the production of glucose and hence the availability of energy to the body. Additionally, it also converts fatty acids into sources of energy, which prepares the muscles to respond adequately to stress situation (Utah).

The release of adrenaline or other Catecholamine hormones facilitates immediate physical or anatomical changes within the body, that prepares it for the violent muscular action needed in such a stressful situation. It begins with the acceleration of the heart and increased lung action. This is followed by flushing of the skin and inhibition of the digestion process. During the fight-or-flight response, the blood vessels in the body remain constricted to the main parts of the body. Metabolism is high during such a time, with the blood vessels for the muscles completely dilated. The glands responsible for tear production are inhibited and the pupils are dilated. The bladder relaxes, and loss of hearing and peripheral vision occurs. Even the spinal reflexes are disinhibited, with the entire body shaking (Cannon).

The fight-or-flight response brings about intense changes within the body of the fireman, most of which can mimic medical (Jansen et al.). During the fight-or-flight response, the fireman’s breathing rapidly becomes faster and a whole lot deeper. This increases the amount of oxygen that enters the body, making it possible to fight or flee. This higher uptake of oxygen is used by the muscles is focused on gathering high amounts of energy needed by the body (Walter).

Furthermore, in order to efficiently circulate the high levels of nutrients and oxygen accumulated in the body and muscles, the fireman’s heart rate and well as the strength of the heartbeat are both elevated. It also changes the blood flow patterns within the body, tightening the blood vessels from areas blood is not needed and dilating the ones where it is. For instance, under fight-or-flight response blood is taken away from fingers, toes, and skin (Cisler et al.). This is the decreases the likelihood of bleeding out from these regions in case of an injury during the high-stress situation. However, it may also result in the skin of the area turning pale or feeling cold, with the body even resorting to shivering. This blood is redirected to large muscles i.e. thighs, biceps and the heart which aid with the fight-or-flight response and have the individual perform in a more efficient manner (Joyner and Dietz).

During such a time, the fireman’s digestive activity is also greatly decreased. Digestion of food stored in the stomach is not a high priority for the body, especially given the circumstances. The energy needed to digest food is used here to aid in survival purposes. This also results in a rapid decrease in salivation, causing a dry mouth, also known as the “cotton mouth” effect (Alm). Additionally, the fight-or-flight response causes an increase in attention and alertness in the body. This attention is focused on the perceived threat i.e. the hospital stairway in this instance. This unilateral focus allows the body to stay focused on what truly matters and improves the chances of one’s survival (Bracha et al.).

The fight-or-flight response puts the body through repeated cycles of activation and deactivation of various systems and muscle groups within the body. With the amount of energy generated and consumed during the process, feeling drained and exhausted once the body cools down is normal (Dhabhar). Once the threat has been averted, the body takes 20 to 60 minutes to return to normal (Herbert Benson and Klipper). Here, the flow of blood returns to the extremities of the body. Tunnel vision and cottonmouth are both remedied, with the amount of energy being consumed and generated by the body reducing. Digestion and other systemic processes, including cardiac rhythm return to normal as the body returns to a state of complete homeostasis. Furthermore, the production of adrenaline along with other hormones also ceases and the body is returned to its passive regular state. The fireman, at such a point, feels drained, washed out and in terrible need of both sustenance and rest.

# Works Cited

Alm, Per A. “Stuttering, Emotions, and Heart Rate during Anticipatory Anxiety: A Critical Review.” *Journal of Fluency Disorders*, vol. 29, no. 2, 2004, pp. 123–33.

Bracha, Stefan, et al. “Does" Fight or Flight" Need Updating?” *Psychosomatics*, vol. 45, no. 5, 2004, pp. 448–49.

Cannon, Walter B. “Bodily Changes in Pain, Hunger, Fear and Rage, New York, D.” *Appleton & Co*, 1929, pp. 360–76.

Cisler, Josh M., et al. “Emotion Regulation and the Anxiety Disorders: An Integrative Review.” *Journal of Psychopathology and Behavioral Assessment*, vol. 32, no. 1, 2010, pp. 68–82.

Dhabhar, Firdaus S. “A Hassle a Day May Keep the Pathogens Away: The Fight-or-Flight Stress Response and the Augmentation of Immune Function.” *Integrative and Comparative Biology*, vol. 49, no. 3, 2009, pp. 215–36.

Herbert Benson, M. D., and Miriam Z. Klipper. *The Relaxation Response*. Harper Collins, New York, 1992.

Jansen, Arthur SP, et al. “Central Command Neurons of the Sympathetic Nervous System: Basis of the Fight-or-Flight Response.” *Science*, vol. 270, no. 5236, 1995, pp. 644–46.

Joyner, Michael Joseph, and N. M. Dietz. “Sympathetic Vasodilation in Human Muscle.” *Acta Physiologica Scandinavica*, vol. 177, no. 3, 2003, pp. 329–36.

Margioris, Andrew N., and Christos Tsatsanis. “ACTH Action on the Adrenals.” *Endotext [Internet]*, MDText. com, Inc., 2016.

Padgett, David A., and Ronald Glaser. “How Stress Influences the Immune Response.” *Trends in Immunology*, vol. 24, no. 8, 2003, pp. 444–48.

Utah, University of. *HOW CELLS COMMUNICATE DURING THE FIGHT OR FLIGHT RESPONSE*. 2013. 2019.

Walter, Cannon. *The Wisdom of the Body*. United States: WW. Norton & Company, 1932.