5.5.2

The Posterior Pituitary

Recall that the posterior pituitary is not composed of glandular tissue, rather it is an extension of the hypothalamus. Rather than produce hormones, its function is to store neurohormones that are produced in the hypothalamus. The connection between the hypothalamus and the posterior pituitary is the **hypothalamo hypophyseal tract.** Neurons in specialized nuclei in the hypothalamus produce neurohormones. The axons of these neurons pass down the hypothalamo hypophyseal tract to the posterior pituitary. The neurohormones are transported in vesicles down the axons to the posterior pituitary where they are stored in the axon terminals. When these same neurons receive the proper signal, they send action potentials down those same axons which stimulate release of the neurohormones in the same way that action potentials in other neurons stimulate the release of neurotransmitters.

The posterior pituitary doesn't actually make any hormones (note: every standardized test will have something like this: true or false, vasopressin is made by the posterior pituitary gland. Don’t choose true!); however, it stores and releases two neurohormones that are synthesized in the hypothalamus. Certain neuron cell bodies located in the hypothalamus produce the hormones which are then transported down the neuron axon the axon terminal located in the posterior pituitary (hypothalamo hypophyseal tract). These

neurohormones are then released into the blood in response to the proper stimulus. The two hormones released from the posterior pituitary are antidiuretic hormone (ADH) and oxytocin. Both are small peptides composed of only nine amino acids.

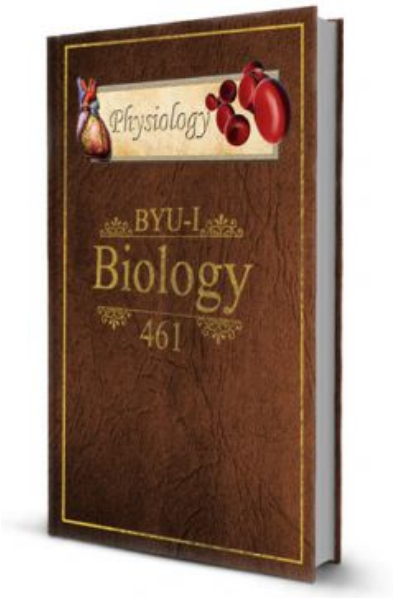
Antidiuretic Hormone
Antidiuretic hormone (ADH), also called vasopressin, is important in regulating the concentration of the body's extracellular fluids. It is released when the osmolarity of the blood is elevated and stimulates the kidneys to reabsorb water (conserves body water). The role of ADH is discussed in the unit on the kidneys, however, you are responsible to know the actions and effects in this material.

Oxytocin

Oxytocin plays a major role in both child birth and milk let down, both of which represent beneficial positive feedback mechanisms. Its role in child birth is to stimulate the uterine smooth muscle to contract. As labor begins and the baby's head begins to push against the cervix of the uterus stretch receptors are stimulated that signal oxytocin release from the posterior pituitary. The oxytocin stimulates stronger uterine contractions which results in further stretch of the uterus and increased oxytocin release. This results in a positive feedback loop. The cycle is stopped when the baby is born and the cervix is no longer being stretched. Oxytocin's role in release of milk from the mammary glands is similar. Stimulation of the nipples by the nursing baby triggers oxytocin release which results in expulsion of milk from the mammary glands. The stimulus is removed when the baby stops nursing.

Recent studies suggest that oxytocin plays major roles in both women and men with regard to orgasm, social recognition, pair bonding, anxiety and maternal behaviors. Oxytocin is sometimes referred to as the "bonding hormone". In female rats it has been demonstrated that

oxytocin is responsible for triggering maternal behaviors in the new mothers. Additionally, investigators have recently demonstrated a role of oxytocin in moral behavior, showing that oxytocin release increased when people did moral things like: praying, giving money away or serving others. However, other studies have shown that oxytocin release increases during amoral behavior as well, providing the behavior benefits the group the individual belongs to. In the study if a person lied, but the lie benefited the group, oxytocin release increased. Together these results may indicate that oxytocin is not so much a moral hormone, but that it is released during activities that strengthen social ties, be they positive or negative actions. It would appear that there is more to be learned about the precise role of oxytocin as it relates to human behavior.



Shaw, J. & Hunt, J. (n.d.). *BIO 461 Principles of Physiology*. EdTech Books. https://edtechbooks.org/bio_461_principles_o