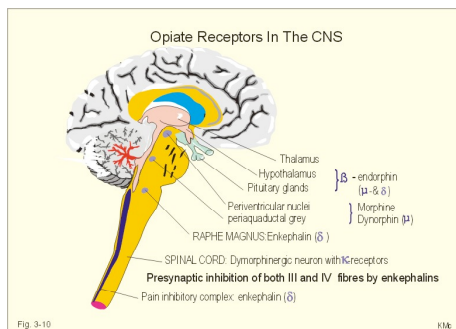


ENDORPHINS

RYAN ANDREWS, BIOMEDICAL ENGINEERING, UNIVERSITY OF RHODE ISLAND

In a typical day's activity, the body is tested and tortured with a variety of stresses and countless damages. Occasionally, these injuries can cause an immense and unbearable sensation of pain, which may even lead to further health complications. In order to survive, the human body has a rather simple solution, an inhibiting mechanism to "turn off" the sensation of pain. That solution is known as endorphins.

Endorphins are peptide hormones that function as neurotransmitters in the central nervous system. As they bind to the opiate receptors on the neurons of the brain, they reduce the sensation of pain and also take an effect on emotions. There are three main classes of endorphins. The first to be categorized were the enkephalins, characteristically found in the basal ganglia, the thalamus, and the periaqueductal grey matter. The second type of endorphins is dynorphins. These endorphins are located in the hypothalamus, hippocampus, and the spinal cord. The third and most common class of endorphins is the beta-endorphins, produced primarily in the pituitary gland. These hormones are released into the blood stream whenever the body is under a state of extreme stress and are assumed to have a role in metabolism, release of pituitary sex hormones, and shock.



Although little is known about what key factors stimulate the release of endorphins, it is commonly understood and accepted that their release is a bodily response to extreme stress, such as exercise. When physical exertion lasts for a prolonged period of time at a moderate or high level of intensity, breathing becomes difficult and the muscles consume all of their glycogen reserves, relying solely on oxygen. In this physical state, it is believed that endorphins are released into the body, causing elongated sensations of pleasure and euphoria. This condition was first discovered in the sport of running and was thus given the name "runner's high." Other such activities that have been reported to give similar results are swimming, cross-country skiing, long distance rowing, bicycling, weight lifting, aerobics, and other sports. Another situation in which endorphins are typically released is during a traumatic accident. Occasionally, patients may be found unaware of their critical injuries in

spite of complete consciousness. Finally, clinical researchers believe that the Chinese stress-relieving treatment acupuncture may cause the production of endorphins as they were found in the patients' cerebrospinal fluid.



In today's world of medicine, there are many practical applications of substances that mimic the effects of endorphins. For example, codeine, a common cough suppressant, analgesic, and hypnotic, is a drug that is known to activate the body's opiate receptors and suppress the cold symptoms. Another more essential pain relieving medicine is morphine. Typically administered intravenously, morphine is a powerful analgesic and sedative that is prescribed to a patient who has experienced a major surgery or suffered significant injuries. Finally, the recreational drug heroin is also considered to have effects analogous to those of endorphins.

Scientists and clinical researchers are currently working to verify the effects of endorphins and the circumstances in which they are produced naturally in the human body. At present, there are some uncertainties with regards to their production of the "runner's high," claiming that these peptide hormones are too large to penetrate the blood-brain barrier and cause a legitimate "high;" instead, they believe that it is merely the result of one's sense of accomplishment combined with physical exhaustion. Nonetheless, endorphins are a unique class of compounds that works wonders to relieve the body's limitless ailments.

References:

- <http://www.answers.com/beta-endorphin?cat=health&gwp=13>
- <http://www.answers.com/main/ntquery?s=endorphin&gwp=13>
- <http://www.mfi.ku.dk/ppaulev/chapter3/images/fp3-10.jpg>
- <http://www.runnersworld.com/article/0.7120.s6-243-297--1102-0.00.html>