# Endorphin

By Thomas Griner

Endorphin is so named because it is internal (endo) morphine. That is, it acts to block conscious perception of pain. This phenomenon of the body being able to produce its own pain-killers was first given serious study during World War II. It was noted that some soldiers who had arms or legs shot-away wore obviously in no pain. They were not in shock as they were able to carry-on normal conversation. Some of them didn't need anesthetics in order to undergo reparative surgery and yet they felt the pricking pain of the needle when given antibiotic shots. This mysterious blockage of slow agonising pain was termed the "pain gate" and was assumed to function only at very high levels of pain.

About a decade ago, radioactive tagging of morphine was used to find out where in the body morphine attaches itself to produce painlessness. It was discovered that it always went to the same areas of the brain. These areas were named morphine receptor sites. But, why would the brain have developed receptor sites for something injected from outside the body? Research was begun to isolate and identify the body-produced substance for which the receptor sites were intended. A few years ago, the search ended successfully with the discovery of endorphin. Since the endorphin is a perfect fit for the receptor sites, it doesn't produce the side-effects which the imperfectly fitting morphine does. In addition, the mismatch causes morphine to be only l/200th as potent as endorphin at blocking pain transmission.

It has now been shown that pain signals above a certain intensity level will trigger the release of endorphin which in turn will "close the gate" on the pain pathway to the conscious brain. Pains of lesser intensity will remain conscious. Pain signals are generated by distressed tissues with an intensity that is directly related to the degree of tissue distress. In the case of the wounded soldiers, there was a very high degree of tissue distress resulting from physical trauma.

Recent experiments have shown that the physical trauma doesn't need to be that intense to trigger endorphin release. The puncturing of tissues by an acupuncture needle has been shown to distress the tissues enough to release endorphin. This explains the method whereby acupuncture blocks pain transmission. Acupressure produces tissue distress by squashing those tissues directly under the contact point and distending those tissues immediately surrounding the contact point. Tissue distention is also the
means by which traction produces enough distress to release endorphin. Tractive forces may be produced by outside weights, springs,or motors or by hanging right side up or upside down such that body weight produces the pulling force. Being upside down also produces tissue distress by creating a high blood pressure in the jugular vein to thus inhibit proper drainage from the head. The resultant endorphin produces a euphoric feeling.

Thermal shock (hot or cold) will also produce sufficient tissue distress release endorphin. By forcing body tissues to assume a temperature other than their proper operating temperature, distress results from disturbances in tissue consistency, blood-flow rate and metabolic rate. The altered metabolic rate produces a change in the local body chemistry that is an irritant to the tissues. Applications of heat or cold of any kind will therefore, tend to block pain transmission.

A recent experiment demonstrates the stress resulting from total body thermal shock. Three men, each with a resting systolic blood pressure of 120, showed a pressure rise to 190 after one-half hour in a sauna, the men then jumped into a cold stream and promptly showed a pressure rise to 300. The heart automatically increases blood flow whenever there is wide-spread tissue distress.

Certain chemicals,when ingested or injected into the body,are capable of causing sufficient tissue distress to release endorphins. As you might expect, this is the main method by which aspirin (acetylsalicylic acid) produces relief from conscious pain. Surprisingly, megadosages of vitamin C (particularly when taken as ascorbic acid) also produce tissue irritation and resulting endorphin. This is thought to be due to the destruction of the B vitamins by the excess vitamin C. In one test, a significant number of low-back pain sufferers experienced reduced conscious pain levels after taking several thousand milligrams of ascorbic acid. Megadosages of C have also been used successfully in certain drug withdrawal programs. The resulting endorphins take the place of the heroin or morphine which the addict had been using.

When cortisone (or prednisone or ACTH or indocin) is injected with the intention of acting as an anti-inflammatory agent (it is actually an anti-histamine since inflammation is a product of histamine) , it always triqgers distressed tissue endorphin. Any pain reduction produced by such an injection, therefore, need not be the result of reduced inflammation. One well known example of this was a case of a basketball player who injured hisachilles tendon. He was given a cortisone shot to enable him to play in a crucial game that he otherwise would have missed. The loss of warning pain caused him to overstress and rupture his tendon during that game.

A large portion of the general population is known to suffer varying degrees of a sugar metabolism problem called hypoglycemia. This makes many people over-sensitive to ingested sugar. It was recently discovered that people who experienced pain relief when given a sugar "placebo" were not reacting psychologically but, instead, produced distressed tissue endorphin.

Chemicals produced within the body can also cause tissue distress. Adranalin stresses the tissues by producing an elevated metabolic rate. This is why many persons appear incredibly calm immediately after an emotional shock. The shock triggers adrenalin which begets endorphin which produces a euphoric state. People who injure themselves during emotional excitement often don't feel the injury until after the chemistry produced by the excitement has worn-off.

Lactic acid can cause tissue distress particularly when produced in large quantity during heavy activity. It takes the average jogger about twenty minutes to generate enough lactic acid induced endorphin to cause
“jogger’s euphoria” or “second wind”. This is why exercises are often are often prescribed to help reduce pain even though the reason usually given is the exercise is supposed to strengthen some mythical weak muscle. The desire to feel the endorphin euphoria has addicted many people to running, bicycling, swimming, "aerobics" and other prolonged heavy exercises. This activity results in accumulative tissue distress.

Oddly enough, not exercising can also increase the blood lactic acid level. This is the result of the poor circulation that develops from inactivity. This is how prolonged bed rest can sometimes produce pain blockage. Immobilizing a body part can accomplish the same end.

Lactic acid is usually the main disturbing chemical that is formed in excess during times of altered metabolism. This occurs even with something seemingly as mild as hyperventilation (prolonged rapid deep breathing) . The resultant lactic acid and endorphin give a light-headed tingly feeling.

The pituitary manufactures endorphin from a large molecule called a beta-lipoprotein. ACTH is produced in the same reaction. When ACTH reaches the adrenal glands, it causes the release of cortisone. The

endorphin has only a short trip from the pituitary to the amygdala of the brain where it blocks pain transmission but the ACTH has a long journey from the pituitary to the adrenal glands situated on top of each kidney. If only moderate amounts of ACTH are produced, most of it is destroyed by the liver before it can reach the adrenals. This is why aspirin in small quantity produces only pain relief but when taken in large quantities it also produces anti-inflammatory action. It is why ascorbic acid taken in large quantities is able to squelch inflammatory reactions. It is why a runner who mildly sprains his ankle near the end of a long run will not experience pain or swelling until three hours after he has finished.