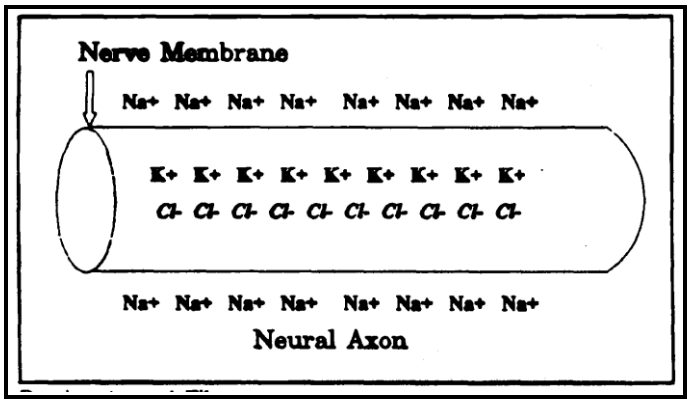
Neurological Effects of the New Magnetic Therapeutic Pads

Clinical studies have indicated a possible mechanism for the remarkable ability of the new magnetic therapeutic pads to relieve pain. As we are all aware, the transmission of physical pain is strictly a function of the nervous system. The human body contains an extensive network of nerves which collectively make up our five senses, allowing us to perceive the physical around us and alerting us to conditions which are harmful to our bodies through the perception of pain. So as unpleasant as it might feel, pain plays a very important role in our survival. However, millions of people suffer needlessly from pain that has no apparent cause. Such a condition is clinically known as ***Chronic Pain Syndrome.*** To understand why this happens we must first understand how pain is transmitted by the nerves.



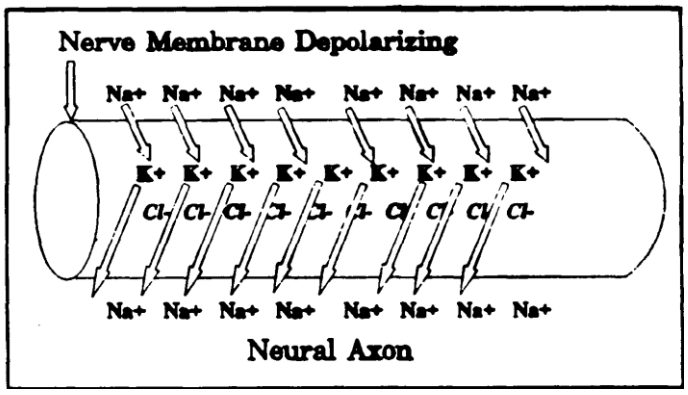
Resting Axonal Fiber

The nerve itself can be thought of as an electrochemical device that responds to external stimulation by producing minute electrical signals which initiate a series of chemical and electrical changes between the inside and outside of the nerve. These changes occur in a chain reaction which travels down the long nerve stem called the **axon connecting to other nerves until it finally reaches the brain.**

The figure above shows the axon in it normal, unstimulated state. Notice that sodium ions (Na•) are concentrated just outside the axon while potassium (K+) and chloride (G) ions are on the inside.

The separation of these electrically charged particles by the nerve membrane produces a voltage of about 70mV (70 thousandths of a volt) between the outside and inside of the nerve. This voltage is called the **resting membrane potential.** As long as the resting potential is present pain cannot be transmitted. But when a sufficiently strong stimulus is imposed on the nerve a change occurs as illustrated in the next figure. Suddenly the nerve membrane becomes more porous and the Na' ions rush in while K+ ions move out.

This exchange of ion concentrations cause a change in the electrical voltage across the nerve. The resting potential suddenly drops from 70mV to OmV. This is called ***depolarization.*** But the process doesn't stop here. The section of nerve just ahead of the depolarized area responds to this change and also becomes depolarized while mechanisms in the nerve cause the area that was just depolarized to return to its original state. This is



Depolarizing Axonal Fiber

called ***repolarization.*** This chain reaction can be described as a pain impulse that travels from its point of origin to the spinal cord and then to the brain where it is finally recorded as pain. As involved as this might sound, the whole process takes place in less than a split second!

A critical point to understand is that the pain impulse process is an all or nothing event. Once the resting potential drops to 55mV, the threshold potential, the whole chain of events is started and nothing can stop it!

Think for a moment what could happen if a nerve were sluggish and didn't maintain a healthy resting potential of 70mV. Let's say it produced only 6OmV across its membrane. That means a drop of only 5mV would start the whole pain process. The slightest stimulus would cause pain and that dreaded condition of chronic pain

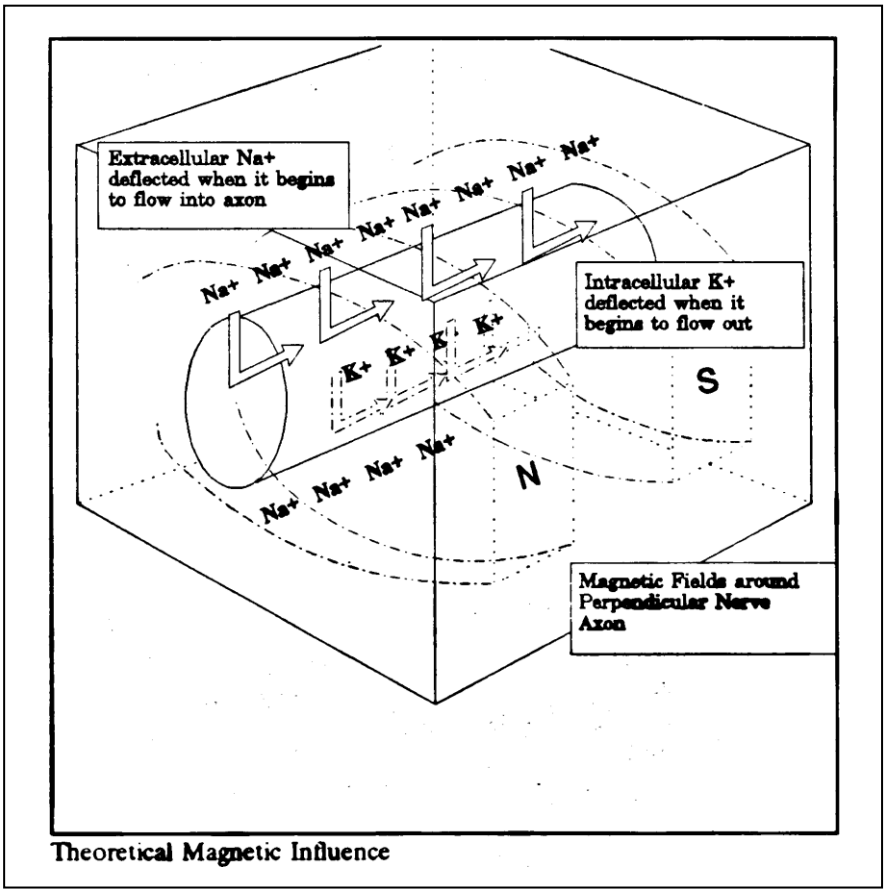
would now exist. Although this is only one possible explanation of a very complicated condition, it does bear a lot of weight and is supported by clinical observations on the effects of magnetic therapeutic pads. Dr. Peter Kokoschinegg of the Institute for Biophysics and Ray Research in Vienna firmly believes in the neurological effects of static alternating magnetic fields. In his report **The applications of Alternating Fields in Medicine** he states *...the magnetic field apparently reduces the neural depolarization of the slow C-fibers by shifting the membrane resting potential. The entire excitation of pain is thus influence and the subjective perception of pain changed.* Dr. Kokoschinegg successfully treated over 200 patient conditions using magnetic therapeutic pads.

In order to understand how the magnetic pad might influence the nerve consider that like the blood, nerves are also replete with ions. A properly positioned magnetic field would effect the movement of these ions and hence the electric field established between them.

In fact, anytime a magnetic field passes through ions in a direction perpendicular to their movement, the Hall Effect takes place and a Hall Voltage is produced. This voltage could add to the nerve's resting potential and raise it to a higher level making it less likely to depolarize. Also, the deflecting action of the magnetic field on the ions could make it more difficult for the ions to pass through the nerve membrane. This concept is illustrated below.

Either way, or perhaps a combination of both, tends to prevent nerve depolarization and hence stops the cycle of pain transmission.

Ultimately, though, however the magnetic pads work, they do work! And, like aspirin, various theories exist which try to explain their effectiveness. I believe that the theory presented in this paper is a very plausible one and I hope it lends some insight into a very complicated subject, pain.



Theoretical Magnetic Influence

1. **Facts on Electromagnetic Radiation**. George S. Lechter. Safe Technologies Corporation, Needham, MA 02194. 1991
2. **Facts on Electromagnetic Radiation**. et. al.