Post-Traumatic Fibromyalgia:
A New Paradigm

Consider the computer...a vessel of artificial intelligence noted for its complexity as well as its delicacy. Drop it or hit it or expose it to a virus, and some sort of cyber-chaos is likely to follow. The simplest user command may cause confusion. Memory may fail. The system may overheat or become disabled after a few short tasks. Normal operations may become difficult or impossible.

Although infinitely more complex and adaptive than the computer, the human brain is also vulnerable to accident, injury, or other mishaps. The after-effects may be subtler in their manifestations, but they can be frightening and devastating just the same.

Most of us are familiar with the grosser forms of brain injury associated with massive trauma. However, medical science has begun to identify a number of elusive, complex disorders, including fibromyalgia (FM), which result when the brain is subjected to even mild or moderate injury. These can be single episodes of trauma (i.e., an accident or injury) or a series of cumulative injuries that occur over time.

Mary Lee Esty, Ph.D., Director of the Neurotherapy Center of Washington, a specialist in the treatment of traumatic brain injury (TBI), developed a special interest in TBI in persons with fibromyalgia after discovering that several brain-injured research subjects, who also happened to have FM, responded to a new treatment protocol that she and co-investigators were studying as part of a NIH block grant. Further study showed that in FM patients the most powerful electrical activity in the brain was inappropriately in the slowest brain waves (i.e., delta, theta and alpha), a condition known as "EEG slowing".[1] Why this occurs is not yet known, however, it is possible that trauma or severe viral illness (the triggers commonly associated with FM) are at least partially responsible and cause damage to brain cells, particularly in the frontal lobe and limbic system. The shift of the brain's energy to the slower brain waves is thought to be the effect of a self-protective measure adopted by the brain following injury.

The brain is easily overwhelmed by head injury, viruses, severe stress, and even rape and abuse. When an injury to the brain occurs, it triggers a cascade of neurochemicals to protect the traumatized area. Unfortunately for the patient, such defensive actions by the brain can cause significant dysfunctions in the body, i.e., limited energy, poor sleep, impaired cognition, dysautonomia, and mood abnormalities, among others, and they also seem to prevent FM patients from maintaining the effects of rehabilitative treatments over the long-term.[2] Dr. Esty sums it up this way:

As long as the brain is stuck in that condition where the slowest waves have more power in them than the rest of the spectrum, the symptoms will continue. You cannot get rid of them. People will try and try and try, but the control room up there is set at one speed, and it is almost impossible to change it.[3]

As it became more clear that a sizeable number of FM patients might be suffering from the after-effects of a traumatic brain injury, Dr. Esty and a group of co-investigators put together a special protocol to diagnose and treat "EEG-slowing" in FM using the same techniques used with brain injury. An assessment of inappropriate brain wave activity was accomplished in a painless and non-invasive fashion using electroencephalogram (EEG) brain mapping techniques to study up to 21 different brain sites of interest. Brain wave patterns were evaluated and different waves intensities and locations identified. EEG sensor(s) transmitted data concerning the areas of strongest brain wave activity through a processor to a computer which in turn produced quantitative data generating a colorized, schematic picture of the brain which recorded the relative activity levels of different brain sites. EEG patterns revealed imbalances and were predictors of treatment response.

In a healthy brain, the brain waves are regular and relatively smooth. When adults are awake, the slower brain waves (1-12 cycles/second) should be relatively equal in energy and smoothness. However, Dr. Esty and her associates found that EEG activity in FM is excessive in the front of the head, an imbalance consistent with energy, mood, restless mind, sleep, cognitive, loss of libido, dysautonomia, and pain problems. This inefficient energy state reflects the very real life challenges of people with FM.

Once areas of brain wave dysfunction were identified, they were treated with a rhythmic stimulus sent to the brain that essentially shifted power from the slowest brain waves up to the faster waves. The brain then became more flexible and shifted as needed in response to stimuli.[4] This shift seems to be accompanied by improved handling of the pain signals to the brain. In its earliest form, the brain stimulation technology used was Flexyx Neurotherapy System (FNS) that had been developed nine years earlier by Len Ochs, Ph.D., as part of a NIH study involving learning disabled children.

The new brain stimulation that Dr. Esty and her research team now use is delivered by a form of EEG-driven technology known as SyNAPs, or Synergistic Neurotherapy Adjustment Process. SyNAPs treatment is administered while EEG signals from the patient's own brain are monitored and analyzed. The signals are recorded through surface electrodes attached with paste to the patient's scalp. Then, miniscule, high-frequency electrical stimulation identical to the power of a normal brainwave (one trillionth of a watt) is transmitted through the electrodes. The pulsed signal is invisible and imperceptible to the patient. During treatment, the length of exposure to stimulation is modified according to the specific needs and responses of the individual patient.

Once the "brain-slowing" in a fibromyalgia patient has been coaxed by SyNAPs into a flexible, new state which allows it to perform its integrative functions in an optimal way, neuromuscular re-education begins using advanced new surface electromyography (sEMG) protocols designed by Emily Perlman. (The original protocols were developed by Stuart Donaldson, Ph.D. in Calgary, Canada). The sEMG treatment identifies and re-educates muscles that are working ineffectively. While SyNAPs treatments are being administered (usually twice a week), a multi-disciplinary team of specially trained

clinicians can also conduct static and dynamic evaluations of posture and muscle functioning to produce an individualized treatment plan which helps a patient regain the use of deconditioned muscles and develop new awareness of inappropriate postures, work habits, or muscle-guarding. Trigger point therapy and myofascial release treatment is also coordinated with the stimulation to help restore muscle health. Once the brain functions efficiently, then the effects of body therapies hold and provide lasting results.

The efficacy of the brain stimulation technology has been tested, with very promising results, in several arenas: the brain injury study funded by the NIH block grant[5]; a retrospective study of 252 FM patients in Calgary[6]; and most recently, in a large, double-blind, placebo-controlled study of fibromyalgia undertaken by the Neurotherapy Center of Washington in cooperation with Rush Presbyterian St. Luke's Medical Center in Chicago. Results of the latter study are expected in 2003. These studies used the older FNS equipment developed by Len Ochs but opened doors to a new approach to the assessment and treatment of fibromyalgia. The majority of people without concurrent chronic infection or difficult-to treat structural problems who completed the brain stimulation treatment achieved virtual remission of FM symptoms.

SyNAPs (the newer technology) has already proven to be an effective therapy for traumatic brain injuries[7] as well as post-traumatic stress disorder, depression, pervasive developmental delay, and learning disorders. A new study of patients having both fibromyalgia and myofascial pain using the SyNAPs system is beginning in Flint, Michigan. (For information, see: www.fm-research.com.)

This gentle stimulation "tickles" the brain and is thought to activate symptomatic change by evoking a change in neurotransmitters leading to a response-enhancing neural plasticity, the capacity of the brain to change. Mechanisms that may be activated by this minute stimulation include increased blood flow, changes in glucose metabolism, the stimulation of the regrowth of neurons, and a change in cell inhibitory/excitatory potentials. In the brain injury study, Dr. Esty found that those with FM were able to substantially reduce or discontinue medications. While none were expected to ever improve, most in the study resumed their former occupations.

Today, fibromyalgia is more widely viewed as having a large neurological component that may first involve an injury to the muscles or soft tissues but which is sustained thereafter by imbalances in brain functioning that continue to compensate for the insult.[8] As Len Ochs has pointed out, because no glowing pathology exists in the muscles and other fibrous tissues, FM can more accurately be considered a central nervous system myalgia or "CNS Myalgia".[9] This new approach to the assessment and treatment of fibromyalgia is not only exciting in its own right but also raises some interesting questions about the effect of physical trauma on the brain.

References

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