



Dr. Henry writes more on Post Polio Brain Fatigue

I have written in the past about post-polio brain fatigue. This symptom complex that many of us experience involves a feeling of total body fatigue, difficulty remaining alert, word finding problems, concentration difficulties, and occasional forgetfulness. These problems are usually absent when we are well rested. In the November/December issue of the newsletter of the [Florida East Coast Post-Polio Support Group](#), there is an article written by Donald Peck Leslie, MD, of the Shepherd Center, Inc. of Atlanta, Georgia entitled "*POST- POLIO FATIGUE: WHAT IS IT? WHAT CAN WE DO ABOUT IT.*" It is a lengthy article that summarizes the development of PPS and many of the theories regarding the causes of PPS. I was particular interested in some of the information relating to PPS brain fatigue and will attempt to relate it to you.

Quoting from Dr. Leslie's article,

Fatigue is the most commonly reported and the most debilitating of the post-polio sequelae which affects the nearly two million North American polio survivors and the least studied. Among polio survivors in my practice, over 90% report new or increased fatigue. Of these, approximately one half report fatigue which is significantly interfering with performing or completing their work. As many as one fourth of them have fatigue which interferes with their self-care activities. Other literature supports these percentages and is very similar. Fatigue has reported to be triggered or increased by physical exertion in again greater than 90% and by some emotional stress in over 60%. It is important that polio survivors distinguish between physical tiredness and the decreased endurance they associate with new muscle weakness, and what is called "Brain Fatigue." This is characterized by problems with attention and thinking. Between 70% and 95% of polio survivors reporting fatigue complained of problems with concentration, memory, attention, word finding, maintaining wakefulness, and thinking clearly.

Dr. Leslie's article continues,

Problems with attention, memory and thinking suggest that the symptoms of post-polio fatigue cannot be explained merely by the polio virus damaging the anterior horn cells of motor neurons in the spinal cord. Autopsies which were performed 50 years ago on people who died after having polio, whether they were paralyzed or not, showed that the polio virus almost always damaged specific areas in the brain as well as in the spinal cord. There were severe lesions in the reticular formation, vestibular nuclei, cerebella roof nuclei, and periaqueductal gray. Moderate lesions were seen in the paraventricular hypothalamic nucleus, posterior hypothalamic nuclei, and substantia nigra. Mild lesions were found in the globus pallidus and putamen, locus ceruleus, medium raphe nuclei, preoptic hypothalamic nuclei, and thalamic nuclei.

As you can ascertain, the polio virus involved more of the brain than most of us would have ever known. These damaged areas include the brain's activating system that helps us remain awake and to focus our attention. The virus also damaged nerve cells that produced neurotransmitters such as the endorphins (our own source of morphine), serotonin, dopamine, and ACTH (adrenocorticotrophic hormone). Dr. Leslie mentions that reports during the great polio epidemics indicated that many patients did experience drowsiness, lethargy, and even coma. About one third of patients with spinal, bulbar, and even non-paralytic polio had disorientation, apathy, and prolonged sleep.

Dr. Leslie writes:

I heard data presented by Dr. Richard Bruno when he reported to the New York Academy of Sciences, and also was published in the Archives of Physical Medicine and Rehabilitation in 1993, an article entitled, "[Neuropsychology of Post-Polio Fatigue](#)." These findings indicate fatigue in chronic fatigue syndrome as well as polio survivors is associated with impairment of attention and information processing speed but not of memory or thinking ability. Given the findings of frequent and severe polio virus lesions in the brain's activating system, it was hypothesized that damage to the brain's activating system is probably responsible for both fatigue and impaired attention in polio survivors.

In trying to find evidence for this hypothesis, MRI (magnetic resonance imaging) was done on some polio survivors with brain fatigue symptoms. In a study reported in the Archives of Physical Medicine and Rehabilitation in 1994 entitled "[The Neuroanatomy of Post-Polio Fatigue](#)," white spots were seen in the brain's activating system in a majority of PPS patients with brain fatigue and were not seen in any of the PPS patients without fatigue.

I realize that much of this article is technical in nature, but the information does indicate that research is being conducted to help explain what is happening to many of us, and hopefully, better treatment will eventually result.

I will continue with Dr. Leslie's remarks and his discussion about the white spots and the possible effect of ACTH in post polio brain fatigue. He writes,

Finding these spots on MRI supports the theory that fatigue and problems with attention in polio survivors may be related to damage the polio virus did to the brain's activating system. The association of these spots and the brain's activating system with the symptoms of post-polio fatigue suggested that the effects of polio virus on other brain areas might also be evident in polio survivors. Polio virus lesions were often seen on autopsy in the hypothalamus, in the brain area that automatically controls the body's internal environment and its response to stress. To test the function of the hypothalamus, researchers measured polio survivors blood concentration of ACTH, one of the body's stress hormones whose release is triggered by the hypothalamus. ACTH was measured following an overnight fast, which is a mild stress known to cause the release of ACTH in normal individuals. ACTH was increased outside of the normal range as it should be following stress in polio survivors who reported no or mild fatigue. However, there was no ACTH increase in subjects reporting severe daily fatigue. Further, the higher the ACTH, the lower the subjects reported fatigue and the less difficulty with memory, muscle weakness, and staying awake during the day. Obviously these findings indicate that the hypothalamus had not been activated in the subjects with post-polio fatigue and ACTH production is reduced in these individuals. This is an interesting conclusion because ACTH has been found in humans to promote alertness, increase attention, and decrease fatigue by directly stimulating the brain's activating system.

Thus, a decrease in ACTH production may prevent brain activation and contribute to the symptoms of post-polio fatigue.

Dr. Leslie also mentions that the reduction in the body's own morphine (decrease of enkephalins and beta-endorphins) in post-polio brain fatigued patients helps to explain why polio survivors have a nearly double sensitivity to pain.

In summary, Dr. Leslie writes:

Taken together, these findings may suggest a model for the cause of post-polio fatigue:

1. Polio virus damaged the brain activating system;
2. MRI and hormonal findings suggest the damage to the brain activating system is present today in polio survivors;
3. Neuropsychological test showing impaired attention in patients with post-polio fatigue.

Therefore, the polio virus damage to the brain activating system may cause decreased brain activation, impair attention, and generate the symptoms of post-polio syndrome.

The article continues for another three double column pages to explain the involvement of dopamine in post-polio brain fatigue. I found this medical article to be most interesting and to lend some medical rationale to what many of us are experiencing with trying to understand and live with post-polio brain fatigue. I should emphasize that all of this information is theoretical, but to me, a lot of it makes sense. We just never had any idea the degree of havoc that the polio virus accomplished once it invaded our central nervous systems. We all thought that the initial brain attack was over and we just had to deal with the residual loss to our motor systems forty or more years ago. This remarkable virus is more of a "deja vu" than we realized.

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