



POST-POLIO BRAIN FATIGUE  
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## LITTLE SPOTS MEAN A LOT.

Fatigue and “brain brownout” -- difficulty focusing attention and word finding associated with fatigue are the most commonly reported, most disabling and, unfortunately, the least believed of all Post-Polio Sequelae (PPS). The biggest problem is that there is no medical test to prove that you have fatigue. Research that we began in 1993 on the post-polio brain has documented damage done by the original poliovirus infection that prevents survivors from activating their brains and thereby causes fatigue and brain brownout. There are three new studies that support our findings.

A summary of the first study begins with a sentence that warms my heart: “While individuals with post-polio syndrome do not have diminished mental function when they are well rested, their mental function declines considerably after even moderate mental fatigue.” Researchers at the US Uniformed Services University of the Health Sciences asked 65-year-old polio survivors to complete computerized neuropsychological tests of attention, thinking or memory once, and then again one hour later. The so-called “practice effect” typically improves scores the second time anyone takes neuropsychological tests. However, more than 40 percent of polio survivors had a *decrease* in performance on the second administration of seven of the eight computerized tests, while 50 percent did more poorly on at least three tests. Subjects didn’t make more mistakes the second time; they were just much slower performing the tests after being fatigued by taking the first set of tests. Slower performance on neuropsychological tests is exactly what our studies found, that polio survivors reporting severe daily fatigue required 23 percent to 67 percent more time to complete tasks requiring attention than did polio survivors with no or mild fatigue.

Why has our neuropsychological research and this new study found brain brownout to be related to fatigue in polio survivors? In our others studies, we used magnetic resonance imaging (MRI) to look inside the brains of polio survivors. We found small individual or multiple “white spots” (technically called hyper intense signal) in the brain activating system of 55 percent of polio survivors reporting moderate or higher daily fatigue, and no spots in those with mild or no fatigue. The more white spots, the more severe were polio survivors’ fatigue, problems with memory, thinking clearly, staying awake, mind wandering, attention and concentration.

Recently, researchers at Duke University published a study using both regular MRI, which we used, and a new, more sensitive imaging technique (called DTI) to look at white spots in the brains of individuals 60 and older without polio or any neurological disease. The study found that visible white spots on regular MRI may be just the tip of the iceberg, since DTI found that damage to the brain under the white spots was larger than the spots themselves. What’s more, the researchers concluded that those with white spots in one part of the brain may have invisible damage in brain areas where spots have not yet become visible on regular MRI, and that this damage may be preventing brain neurons to talk to each other. This could possibly explain why 45 percent of polio survivors with significant fatigue in our study had no visible spots on regular MRI. When it comes to seeing damage on MRI in polio survivors' brain activating system, apparently little spots mean a lot.

So, there actually is physical evidence that poliovirus damage is related to brain brownout in fatigued survivors. But listen to this: Mayo Clinic researchers studied a virus in the same family as the poliovirus -- the virus that causes the common cold. They infected some mice with cold virus and not others. Both groups had their

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memory tested by completing a maze. Virus-infected mice made more errors and couldn't figure out where they were going. (Sound familiar?) The mice that made the most errors had greater damage to their brains. The study concluded that even the cold virus could cause "at least some degree of neurologic deficit" in humans. If having a cold can cause brain damage, how can so many doctors still say that the poliovirus, a known killer of brain neurons, couldn't possibly cause polio survivors to have brain brownout and fatigue? Time for doctors to read a medical journal or two and start seeing the spots.

### Fear of Alzheimer's

Asked one polio survivor, "When I am very fatigued or stressed I will totally forget the word I was going to use. I'm frightened. Am I getting Alzheimer's disease?"

Nope. You are experiencing word-finding difficulty, a problem for polio survivors that has nothing to do with memory loss or Alzheimer's disease. In our 1990 National Survey, 79 percent of polio survivors reported difficulty "thinking of words I want to say." Thirty-seven percent reported frequent, moderate-to-severe word-finding difficulty. In the *American Journal of Physical Medicine and Rehabilitation*, we describe testing polio survivors and finding that they do indeed have the "tip-of-the-tongue" experience--knowing the word you want to say but not being able to say it. Polio survivors have difficulty with naming objects and sometimes even people they know well. Our results indicated that word-finding difficulty was not associated with memory or thinking difficulty -- symptoms of Alzheimer's disease -- but was related to trouble focusing attention, a characteristic symptom of post-polio fatigue.

We also found that difficulty with word finding and focusing attention were related to polio survivors' brains making less dopamine. Low dopamine is the cause of Parkinson's disease, and we found that word-finding difficulty was identical in both polio survivors and Parkinson's patients, even though polio survivors do not experience the tremor and rigidity of

Parkinson's. In 1996, we published a study in the same journal showing that bromocriptine, a dopamine-replacing drug, reduced word-finding difficulty, attention problems and fatigue in polio survivors. However, medication is not necessary to treat word-finding difficulty or any PPS symptom. Reducing physical and emotional stress decreases *all* PPS symptoms. So don't worry that you have Alzheimer's disease. If you're having trouble thinking of a word that you want to say, try to "talk around" the word by describing what you're trying to name. If you are forgetting your friends' names, try calling everyone "Buddy" or "Honey."