

Neurofeedback helps relieve chemo brain symptoms, Cleveland researcher finds



Social psychologist Jean Alvarez is one of two Northeast Ohio local providers of the neurofeedback system used in the chemo brain study. *(Courtesy Jean Alvarez)*

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CLEVELAND, Ohio -- Chemotherapy can save a cancer patient's life. But those who have struggled with [chemo brain](#) -- if they even know its name -- can testify to the frustration of not being able to complete the simplest tasks.

Social psychologist Jean Alvarez, a breast cancer survivor, struggled with the condition for years. In 2007, the Lakewood resident turned to neurofeedback when nothing else seemed to help her get rid of the two symptoms she said were "left over" from chemotherapy treatment that ended years earlier.

Alvarez wanted to regain her ability to multitask cognitively, instead of being able to focus only on one thing at a time. She also wanted to stop getting stuck trying to find words midsentence. The ability to have a fluid conversation had escaped her.

Electroencephalogram, or EEG, biofeedback, otherwise known as neurofeedback, is a noninvasive treatment that provides information on and measures changes in a person's brain-wave activity. The brain "self-corrects" by using the feedback to reorganize.

Traditional neurofeedback pinpoints a specific area of the brain in need of correction. But no one knows what the electrical "signature" of chemo brain is, so Alvarez used another type of neurofeedback equipment that addresses the brain as an integrated system, making the specific location of the problem less important.

Resistant to the suggestion of her physician at the time to undergo neuropsychological testing, Alvarez instead decided to pursue neurofeedback after revisiting something she had previously read about the technique.

Not only did Alvarez find relief, but after 10 treatments, she felt as good as she had before she began chemotherapy. That led her to design a research study to see if her success could be replicated. She hoped to provide relief to others more quickly than if they waited for symptoms to dissipate on their own, months or years later.

The small study looked at the impact of neurofeedback on lessening post-cancer cognitive impairment, or PCCI.

Her study was published online April 12 in the journal [Integrative Cancer Therapies](#).

The type of neurofeedback employed in the study was a brief interruption in music that the study subject was listening to.

This newer approach to neurofeedback, Alvarez wrote, trains the whole brain by having participants "let go" instead of engaging actively or consciously with the instrument providing that feedback.

Alvarez, director of research at the newly incorporated Cleveland-based Applied Brain Research Foundation of Ohio, [began enrolling breast cancer patients for the study in early 2010](#).

Twenty-three women, who ranged in age from 43 to 70 and who had completed treatment for breast cancer, received biofeedback in 45-minute sessions, twice a week for 10 weeks. The time from the last chemotherapy treatment to the start of the biofeedback ranged from six months to five years.

The study participants were given four different self-reporting tests for 10 weeks that measured cognitive function; fatigue, energy level and quality of life; sleep quality and disturbances; and somatization (when mental factors such as stress cause physical symptoms), depression and anxiety.

Over a second 10-week period, the participants received neurofeedback twice a week, for 33 minutes a session, and continued the self-reporting tests. Four weeks after the last neurofeedback session, the women completed one final self-reporting test.

What Alvarez found was that the treatment did help relieve symptoms of PCCI, or chemo brain, and it did help other patients return to the level of function they had prior to starting chemotherapy.

Chemo brain symptoms were reversed in 21 of the 23 women.

"I was hoping to see all of those good results, but I'm not sure I was expecting to see them," Alvarez said.

"Almost everyone improved and returned to normal levels. That was surprising and gratifying."

Not all of the study participants showed benefits right away, or at the same rate, she said. Some started noticing a change after a half-dozen sessions, while a few didn't begin seeing improvement until toward the end of their participation, Alvarez said.

For some women, sleep quality improved first; in others, symptoms of depression lessened, she said, adding, "It's a pretty individual process."

A real difference for one patient

Diagnosed with breast cancer in late 2008, Dianne Borowski of Bay Village completed chemotherapy in July 2009. In February 2010 she contacted Alvarez and enrolled in the study soon afterward.

"I was having quite a bit of it [chemo brain]," said Borowski, 71, who was plagued by memory and sleep troubles. When she heard about the trial and that it was looking for volunteers, "I thought, 'My goodness. This is wonderful.' "

Relief from the sessions was not instantaneous, she said. But as time went by, she started to notice a real difference. She started misplacing things less frequently. Her sleep improved. She no longer had to search for words to express herself.

"I was amazed at the process and how it started to work," she said.

Borowski says her chemo brain flares up occasionally if she's under a lot of stress, but so far it hasn't returned to her pre-chemotherapy levels.

Researchers continue to shed light on the effect that chemo brain -- given that name only in the past dozen years or so -- has on cancer survivors.

Last week, the Journal of the National Cancer Institute published online [a study from the University of California, Los Angeles](#). Researchers who evaluated 189 early-stage breast cancer patients post-treatment (radiation and/or chemotherapy) found a strong link between patients' self-reported complaints of changes in memory and thinking and data from neuropsychological testing that showed those changes.

A [study that appeared in the Journal of Clinical Oncology](#) in early 2012 found lingering cognitive effects of chemotherapy in some breast cancer patients as long as 20 years after treatment.

Over the summer at the annual American Society of Clinical Oncology meeting, Cleveland Clinic's Taussig Cancer Institute oncologist Dr. Halle Moore presented the [results of a small pilot study](#) that showed the EEG to be a good measuring tool in documenting the impact of chemo brain on changes in brain function.

"Chemo brain is real," said Dr. Fremonta Meyer, a psychiatrist at the Dana Farber Cancer Institute in Boston and co-author of Alvarez's study who helped interpret the data.

Among the patients she sees are those with post-cancer cognitive problems that may sound like the effects of normal aging or menopause. But difficulty finding words, short-term memory loss, problems sleeping and the inability to multitask effectively are all things that can be the result of chemo brain, she said.

One of the big shortcomings in the literature dealing with chemo brain has been the lack of solutions to the defined problem, Meyer said. "We now have another intervention that we can [potentially] offer to patients, which I think is huge," she said.

It wasn't just a placebo effect

While questions can be raised about whether the soothing qualities of the neurofeedback worked as a placebo and served to calm the participants or whether it was the neurofeedback that led to cognitive improvements, the researchers maintain that the results are hard to attribute to a placebo effect alone.

They point to several factors that underscore the validity and reliability of neurofeedback, among them:

- Analysis that focused on improvement following the self-reporting tests, after a placebo effect would have been present.

- Measuring the neurofeedback impact took place before the start of each session, typically three to four days after the previous session, so that responses didn't just reflect short-term effects.
- Improvement was measured in four distinct clusters of symptoms -- cognitive function, fatigue, sleep and emotional well-being -- which were not highly connected at the start of the testing.

A follow-up study with a control group will provide a definitive answer, said Alvarez, who added that she hoped any future studies would involve a larger, more diverse population of cancer survivors, and incorporate pre- and post-functional MRI and neuropsychological tests that would confirm the study's findings.

She also hopes future studies will answer whether or not genetic markers exist that can help identify which people would benefit the most from neurofeedback and if neurofeedback would be able to keep chemo brain from emerging in the first place, if given in conjunction with standard cancer treatment.