

Conditioning for cognition



Studies suggest that physical activity helps improve cognitive dysfunction in people with MS.

by Donna Shryer

An estimated 50 percent of people with multiple sclerosis live with cognition challenges, such as problems with thinking speed and memory. For 5 to 10 percent of them, the difficulties are severe enough to interfere with everyday activities.

Diagnosed with MS in 1989, Gary Anzovino, 54, of Nutley, N.J., says he tries to soften the symptoms of cognitive deficit, or “cog fog,” by adding more physical activity to his routine and by carefully organizing his days. “I exercise—religiously—because I do believe it helps me think more clearly,” he says.

Anzovino may be on to something. Several independent studies have looked at various diseases associated with cognitive impairment, and data suggest that aerobic exercise may improve cognition and brain function in MS. A third, larger study, currently underway and specific to MS, may further strengthen that theory.

Exercise, cognition and MS

A small pilot study investigated the effects of exercise on memory in people with MS. The results suggest that aerobic exercise improves memory and increases the volume of the hippocampus, a region of the brain associated with learning and memory.

The study, led by Victoria Leavitt, PhD, and James Sumowski, PhD, and conducted by the

Kessler Foundation in West Orange, N.J., followed two people with MS-related memory impairment. Over a three-month period, one study participant did stretching exercises and the other participant did aerobic stationary cycling. Each participant exercised three times per week, in 30-minute sessions. Participants were tested twice—before beginning the treatment to set a baseline, and then after completing the 12-week intervention.

Outcome measures included memory tests, functional MRIs (scans that measure real-time brain activity) and structural MRIs. According to the results, published in the October 2013 journal **Neurocase: The Neural Basis of Cognition**, the person assigned to aerobic exercise had an average 53.7 percent increase in memory for word lists and visual patterns. She also had a slight increase in hippocampal volume, along with increased hippocampal resting-state functional connectivity (RSFC), a relatively new measure of the integrity of the nerve connections that support a primary memory network of the brain. “Ours is the first study to ever look at RSFC after an aerobic exercise intervention,” says Dr. Leavitt. “It aligns nicely with the increased volume of the hippocampus and improved memory, rounding our findings out to include a neurophysiologic measure as well.”

Nonaerobic exercise resulted in minimal change in hippocampal volume and no changes in memory or functional connectivity.

While the study was quite small, its findings were significant enough to increase the buzz—and hope—that aerobic exercise boosts cognition.

Cindy Merchan, 36, who was diagnosed with MS in 1996 and lives in Jersey City, N.J., was the participant assigned to aerobic exercise, and today she continues her workouts. “When the study was finished, I noticed that I was more alert,” she says. Plus the 15 pounds Merchan shed as a result of the added exercise increased her energy level. “I think having more energy helps me think more clearly, too,” she says. “I feel more awake and in the moment.”

Research in motion

A similar but larger Society-supported study is being led by Dr. Barbara Giesser, professor of clinical neurology at the UCLA School of Medicine and clinical director of the MS program at UCLA. Dr Giesser says the study is slated to close this summer, and no preliminary data are available yet.

The study includes 34 people with MS-related cognitive dysfunction. Half the participants have been randomized to an aerobic protocol that involves riding a device similar to an exercise bike. The other participants are following a stretching protocol. Both groups are training three times a week, 20 minutes at a time, for a total of six months.

Dr. Giesser and her team are using two cognition tests to measure data. Both tests were performed on each participant when the study first began in order to establish a baseline. The tests are repeated every three months, and to see if there are carryover effects, the final

tests will be performed three months after completion of the study.

The primary outcome measure involves performance on standard neuropsychological testing. “These are memory, learning and thinking tests with paper and pencil,” Dr. Giesser explains. The secondary measure is an auditory cognitive evoked potential, which assesses a person’s response to a novel or unusual sound in order to measure awareness and processing of auditory information. The noninvasive test begins by placing electrodes on a person’s head and recording his or her brain waves while performing a listening task.

“For our study, participants listen to a series of tones, and they have to count the number of different tones,” Dr. Giesser says. She adds: “You could say that the waves we’re recording represent the brain paying attention to the tones. The waves’ timing is delayed in persons with cognitive deficit. We want to see if exercise improves the timing.”

The next step

While preliminary data suggest that aerobic exercise may improve cognition in people with MS, Dr. Giesser stresses that these benefits are not yet conclusive. “Ours is one of the first large-scale, randomized, controlled studies to address this possible benefit. And if our data does tell us that aerobic exercise improves MS-related cognitive deficit, the next step is to ask if it has to be aerobic exercise,” she says. “Can any type of physical exercise improve cognition? What about resistive weight training and yoga?”

Because additional studies are needed, the Society recently launched a larger-scale, controlled clinical trial to compare impacts of two forms of exercise training on cognition in people with MS.

Another important step is to help all people with MS feel comfortable with exercise—as Merchan and Anzovino are. Because each individual with MS has different capabilities and limitations—which may change over time—a physical therapist experienced with the unique and varied symptoms of MS can be helpful in designing, supervising and revising a well-balanced exercise program.

There is a myth that exercise of any form is bad for people with MS, Dr. Giesser says. “The medical community was naive back when we said, ‘don’t exercise.’ Exercise benefits people with MS just like it does people who don’t have MS.”

Donna Shryer is a Chicago-based freelance writer.

To learn more about cognitive dysfunction in MS, read [“The shifting tides of moods and MS.”](#)