

# Weight training



**A vest with a few extra ounces could help people with multiple sclerosis improve their balance and reduce falls.**

by Brandie Jefferson

Research suggests there is an effective, drug-free technique for people with multiple sclerosis to improve balance, reduce falls and potentially improve their walking speed.

And all they need to do is wear a relatively small bit of extra weight, precisely located. The technique, called balance-based torso-weighting, isn't new, says Diane D. Allen, PhD. It involves donning a vest that can hold weights to make it heavier.

## **Light weights**

Traditionally, wearing weights has involved heavy weights used to physically depress a tremor or to increase inertia, giving a person the stability needed for instance to carry their leg through the full motion of a step.



**Diane D. Allen, PhD, is collecting data to look at long-term effects of torso-weighting.**

Allen, a professor of physical therapy at the University of California San Francisco and San Francisco State University, has been working with colleagues on torso-weighting with a tiny twist.

“We’re using light weights instead of heavy weights — a quarter of a pound to a half-pound,” Allen says. People may need a few weights, but in total, she says, “It’s not even 5 pounds.”

Torso-weighting is a neurofacilitation technique, a therapy that uses sensory input to change a person’s response to their environment while performing a function such as walking, Allen says.

### **Promise for balance and gait problems**

Torso-weighting has promise for people with gait or balance problems, common in many neurological disorders, including MS.

“But one of the issues with MS and a lot of other neurological disorders is fatigue,” says Allen, who practiced as a clinician for 20 years before focusing on research. “You don’t want to add 10 pounds of weight to someone who’s already fatigued.”

In a 2018 study, 60 people with MS and 10 control subjects without MS wore an average weight of 1.9 pounds.

To tease out the effects of the vest, participants first had to undergo a sensory organization test (SOT) to record baseline data about their balance.

They also took clinical tests, such as a timed 25-foot walk, and then stepped onto a computerized platform where they were strapped into a safety harness. The platform put participants’ balance to the test. They tried to keep upright as the platform swayed, tilted and even shifted their visual surroundings via a moving panel.

When participants lost their balance, the platform recorded steps taken to regain balance or recorded a complete loss of stability; the harness caught people before they fell.

Researchers then evaluated participants to determine where to add weight to the vests. To find imbalances, Allen says, you can try to unsteady them a little bit, “with a little nudge, front and back, side to side,” to see how they react.

“You’re not just placing the weights randomly,” Allen says. “You want to see where they have the most balance loss, then place the weights specifically to counter that loss.” Once properly fitted with a vest, participants went through the SOT again. Researchers studied the results to see if there were improvements.

The results were promising. Participants with MS showed improved scores during the SOT when they wore the weights. Notably, this includes a 35% reduction in falls despite reporting that they were fatigued during a testing session that lasted about three hours.

### **Increase in gait speed**

In a smaller study in 2015, Allen and collaborators showed that gait speed increased with balance-based torso-weighting, not only in participants with MS but also in the control group. Most people have asymmetries and imbalances, Allen says. “It may not be much, but our asymmetries can be noticed when you are watching someone closely.”



**It’s not just the vest alone that helps. The vest also encourages people to get active and improve muscle power and endurance.** Photo: Motion Therapeutics, Inc.

Correcting these asymmetries with light weights has more to do with the presence of sensory input than any kind of “strengthening” due to the weights themselves. “What we’re thinking

is we're changing how the body processes the sensory input," Allen says.

### **Sensory reactions**

People with MS and other neurological conditions can have a sensory loss, but it can be spotty and asymmetrical. "What you're doing with the light weights is increasing sensory input," Allen explains. Instead of thinking about applying the right amount of pressure to take a solid step or thinking about shifting weight to keep balanced, the body responds to the new feeling provided by the weight and reacts automatically.

"They stop thinking about it because they are feeling something that seems more normal to them," Allen says. Before COVID-19 made its way to the United States, Allen and her colleagues had been collecting data in a new pilot study to look at the longer-term effects of torso-weighting.

"We're finding that it's not just an orthotic device," Allen says. It's not something you put on, temporarily benefit from, and then go back to baseline when you take it off. Allen says some of their most recent, not-yet-published work has shown that a couple of hours a day of wearing a vest can lead to improvements that last even when the vest is removed. "There seems to be a kind of motor learning that is going on, in addition to the orthotic benefit of just wearing the weights," Allen says. And there could be another aspect: motivation.

It's not the vest alone doing the work, she explains. "It's people's motivation to get out and do the walking," Allen says. Once people become active again, muscle power and endurance can improve.

"One participant got up, and she walked, and walked and walked, and now she's hiking and climbing and doing great," Allen says.

Not all trial participants had such "home-run effects," of course, but the results Allen has seen make her eager to return to the pilot study that was disrupted by the pandemic.

"The main thing is that it's so exciting for people who, when they get the vest on, and they've been used to being unsteady, they just say, 'Wow, I don't have to think to move.'"

### **Don't do this at home (at first)**



**Rona (right) was diagnosed in 1986.**

Balance-based torso-weighting is more than throwing on a weighted vest and walking around. It involves fine-tuning the location of extremely light weights based on imbalances that might be hard for a non-specialist to discern. For that reason, it's not something people can do entirely on their own. It requires at least one consultation with a professional familiar with the technique.

But if a person has a balance or gait problem that isn't getting worse, they might require just a single visit to a specialist. You could have someone weigh you, then after wearing the vest for two to six weeks, you may be able to take it off, and your body will have retained what it learned with the vest.

People with a more progressive course of MS might have to return for regular vest tune-ups as their condition changes.

Either way, says Diane D. Allen, PhD, balance-based torso-weighting requires less work, time and money than many other interventions. "There are no side effects, no additional pharmaceuticals, and it's fairly inexpensive compared to many other treatments."

Interested? Allen says the best thing to do is point your doctor or physical therapist to the research. "It's fairly consistent in showing the vest is better than no vest," she says.

**Brandie Jefferson is a writer in St. Louis, Missouri. She was diagnosed with MS in 2005.**