

# Moving to the beat



## **Music therapy helps people with MS who have difficulty walking.**

by **Brandie Jefferson**

Whether it's a tap of the foot, a bop of the head or even some air guitar, people tend to move to music. Often, we move to the beat without even knowing it.

The drive to move and, specifically, move to the beat has proved useful when it comes to treating a variety of medical conditions. This particular type of music therapy, known as rhythmic auditory stimulation (RAS), has been used to help treat people who have difficulty walking from neurologic conditions like Parkinson's disease.

### **New developments**

As interest in the clinical applications of music grows, multiple sclerosis specialists, too, are investigating how RAS might help people who have difficulty walking.

"Music therapy has been used in Parkinson's [treatment] and with people who have had a stroke, but for MS, the interest has been more recent," says Francois Bethoux, MD, director of rehabilitation services in the Mellen Center for Multiple Sclerosis in Cleveland Clinic's Neurological Institute. He is also the chair of the Department of Physical Medicine and Rehabilitation.

"The idea is to use a rhythmic stimulus to try to improve the way people walk," Bethoux says. The principle is fairly straightforward, but, he says, "the devil is in the details of how to make it happen."

He has been working to figure out those details through research and in his role as the medical director of the Cleveland Clinic's Arts and Medicine Institute, where he is also the chair of the Department of Physical Medicine and Rehabilitation.

The principle underpinning RAS is called rhythmic entrainment — synchronizing the body's internal rhythm to an external one. We have brain circuitry dedicated to controlling rhythmic activities, such as walking, Bethoux says. External cues such as music can trigger that circuitry and maybe even reset it.

Bethoux has reason to be optimistic. He has already carried out a small study with results that were encouraging, he says. After four weeks, practicing five days per week for about 20 minutes, people who walked with RAS showed a slight improvement over those who walked without music and those who only listened to music but didn't do walking exercises.

He's now conducting another study using technology to personalize the RAS experience, both for enjoyment and to maximize the potential benefits to participants.

It may sound obvious: no one particularly likes walking to a metronome (a device that produces a click at a regular interval of time). Bethoux says people he's worked with say walking to just a steady rhythm is also boring. In the past, out of respect for musicians' copyrights, he has only used music composed specifically for his research. For the current study, Bethoux has partnered with MedRhythms, a company that uses sensors to monitor users' gait and change the tempo of the music they are hearing in real time.

This system can offer users a wider variety of music. Bethoux serves on MedRhythms' scientific advisory board. "If we can use music that people enjoy," Bethoux says, that's even better. "We're just starting to understand how emotions can change the way our bodies function, from cardiovascular health to the functioning of the immune system."

### **Improvements in gait**

Eric Klawiter, MD, says he's always been intrigued by the positive effects music. With a pilot grant from the National MS Society, the neurologist at Massachusetts General Hospital is also researching how RAS can affect gait in people with MS.

Of the limited data available, Klawiter says, "They do show there can be improvement in velocity, stride length or cadence. Through multiple therapy sessions, a therapist can gradually increase, for instance, the cadence of the music to improve gait speed."



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For his part, Klawiter is looking at the efficacy of RAS on gait problems and how to understand the underpinnings of music's effect on the brain, using advanced neuroimaging, such as functional MRI. A functional MRI allows a real-time glimpse of the brain at work to see activity in specific brain circuits and areas during the performance of a task. "One aim is to look at the effect of RAS on brain networks to determine, if there is an effect on gait, why?" Klawiter says. "Are there biomarkers we can use to determine why there might be a different effect between one person and another person?"

Klawiter's research uses a slightly different setup than Bethoux's. The research group decided on a crossover design — one group begins the study doing RAS therapy while the other does a non-musical walking exercise program. Then both groups stop, and they are evaluated by researchers. Next, they switch: the general walking exercisers move to RAS therapy, and those previously walking with music move to a generalized walking program.

The study was put on hold due to COVID-19, and researchers were devising a way to deliver RAS remotely.

"This isn't something I've prescribed in the past," Klawiter says. "It's a new area to me, both from the research and the clinical perspective."

On the other hand, the Cleveland Clinic has had a therapeutic arts program for more than a decade, and Bethoux has referred patients to music therapy in the past. Recently, it's even made its way into the infusion room at the Mellen Center to help with stress.

Bethoux would like to expand its use beyond the clinic and even beyond a medical setting. "Sometime in the near future, I'd like to make it available for people to try," he says. He hasn't seen any safety issues but says he wants people to be evaluated before they dive in to make sure their gait is safe — even if they plan to use RAS at home.

"It's low-cost, easy to do and noninvasive," Bethoux says. "When people are stuck at home, maybe we can try to give them another option, something to help them get motivated."

“I always want to be humble,” Bethoux says. “I don’t pretend we understand this completely or can work magic with the arts, but music therapy shows great potential — not to replace, but to be used in addition to more traditional treatment options.”

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