

November 2019 Newsletter



Opening Up New Possibilities

MS is a complex condition, which requires comprehensive, long-term management. While current disease-modifying therapies aim to reduce MS exacerbations and slow disease progression, none can cure the disease and repair the damage it does. Rehabilitation programs aim to improve the function, well-being and quality of life of individuals in the face of disease progression. In most cases they are the best option to preserve or improve the ability to participate in daily living activities for those whose conditions may be worsening. MS researchers are making significant progress toward better understanding the underlying causes for disability and are improving rehabilitation techniques and programs.

The risk of falling is high in people with MS. To reduce this risk, clinicians frequently recommend a mobility aid, such as a wheelchair or a scooter, for those that are unsteady on their feet. A [2017 study](#) evaluated fall risk in 44 participants with MS who use these devices as their primary means of mobility. Participants completed a survey that included questions about the frequency of falls, the circumstances surrounding them, and how they affected quality of life. Results show 75



percent of individuals with MS using a wheelchair or scooter report falling at least once every 6 months and 66 percent limited their activities because of concerns about falling. The majority of participants reported that their most recent fall occurred at home. The most common activity that was being performed when a subject fell was using the toilet. Other common activities included transfers to/from the wheelchair or scooter and reaching for objects. Data suggest many people with MS walk short distances in their home after being prescribed a wheelchair or scooter and often lose their balance at that time, but they still sustain falls while using these devices during everyday activities. Specifically, 67 percent of subjects using a power wheelchair or scooter reported they have fallen when using the device and almost 40 percent of manual wheelchair users reported the same. The research team concluded that clinicians must be aware the risk of falls continues to be high when a person with MS uses mobility devices and preventative interventions are needed. The research team is currently developing a comprehensive therapeutic program designed to educate people with MS who use wheelchairs about how to prevent and recover (get up) from falls. Such a program could be widely used to improve quality of life and reduce injuries for those living with the disease.

MS rehabilitation therapy can be administered on an inpatient or an outpatient basis. A [2016 study](#) explored which of these two settings is best for MS rehabilitation. As part of this research, 146 subjects with MS were divided into three different groups: outpatient rehabilitation, inpatient rehabilitation and no treatment (subjects were placed on a waiting list for rehabilitation). Researchers concluded inpatient and outpatient rehabilitation approaches both significantly benefit subjects. Outpatient rehabilitation was more effective at improving subjects' quality of life. However, investigators noted the inpatient setting may be more suitable for those struggling with more severe disability, or for those preferring to be treated without the involvement of relatives or caregivers.

[Constraint-induced movement therapy](#) (CIMT) is a rehabilitation technique originally developed for stroke victims. CIMT works on the theory of "learned non-use," which means when a limb is impaired people learn to not use it for daily activities.

They therefore switch to using the better limb for everything. CIMT reverses this habit by placing a mitt over the functional hand and forcing individuals to use the impaired limb. As discussed in our [April 2019 newsletter](#), nerve networks in the brain change when an



individual learns new things or memorizes new information. This ability to change is called neuroplasticity. These new nerve connections are reinforced and strengthened through behavior. With effective CIMT therapy, the brain “rewires itself” and movement of the affected arm or leg may be improved. [Researchers](#) at the University of Alabama at Birmingham (UAB) recently conducted a [study](#) in which 20 subjects with MS received either CIMT or complementary and alternative medicine (CAM) for upper limb weakness. The CAM group underwent 35 hours of holistic exercises such as pool exercise and yoga. The other group received the same amount of CIMT. Each subject’s functional ability was recorded before and after therapy. Results show CIMT to be significantly more effective than CAM at improving arm/hand function in MS. Specifically, subjects receiving CIMT improved on average 2.7 points on the scale ranging from 0 to 5 points, while those receiving CAM saw an improvement of only 0.5 points. Subjects were retested one year after therapy and found the same results, suggesting the benefit of CIMT is long-lasting. In a second [study](#), the UAB study team used MRI to examine 20 subjects who underwent either CIMT or CAM. They found improved brain connectivity in CIMT subjects, compared to no changes in CAM subjects. This reinforces the concept that CIMT may help the brain rewire itself with resulting improved function. Investigators are planning further studies involving lower limbs, and to determine how long the benefits last. The end result of this research could introduce a new therapeutic technique to address weakness in MS.

Exercise is an essential component of rehabilitation therapy for MS. These exercise regimens may be tedious and repetitive and as a result, lack of motivation and boredom can affect a person’s adherence to the treatment. Exercise programs may also require specialized equipment and supervision to ensure it is used correctly requiring those with MS in need of therapy to travel to treatment centers, which is not always convenient or even possible. [Spanish researchers](#) evaluated “virtual rehabilitation” as a means of exercising. As the name implies, this involves using [virtual reality](#) and [natural user interfaces](#) for physical activities. In this study, 11 subjects were randomly assigned to either exercise traditionally or by using a virtual reality system called RemoviEM. Subjects doing virtual exercise participated in 3 different activities: TouchBall (subjects touched virtual objects with their hands before they disappeared, while keeping their feet in place), TakeBall (subjects moved virtual objects from one position to another using both hands) and StepBall (subjects stepped on virtual objects before they disappeared, without



TakeBall

touching them). Results showed subjects using RemoviEM experienced a greater improvement in balance and reach. In addition, virtual exercise was widely accepted, easy to use and safe. This suggests that virtual exercise represents a motivational and effective alternative to the traditional physical regimen. Of note, investigators are working to update and improve RemoviEM to include new rehabilitation exercises. [Researchers](#) in Italy also found technology-based exercise to be effective at improving balance in people with MS. They assigned 36 subjects randomly to perform traditional balance exercises, or an exercise regimen using the [Nintendo Wii system](#). Subjects in the Wii group had significantly greater improvements in balance, suggesting that interactive visual-feedback exercises such as Wii may be an effective way of improving balance disorders in MS.

In MS the immune system damages nerves in the brain and spinal cord. The effects of this damage depend on what parts of the nervous system are affected. The [cerebellum](#) and [brainstem](#) process signals from various systems of the body including sensory, visual and the inner ear (vestibular system). Damage to these areas can cause problems with balance, which may be severe enough to cause falls. [Researchers](#) at the University of Colorado developed and are testing the effectiveness of a vestibular-related exercise program for people with MS called Balance and Eye-Movement Exercises for People with Multiple Sclerosis (BEEMS). This program includes three components: balancing on different surfaces; walking, both with and without head movements, and with eyes open and closed; and eye movement exercises. As part of this research, 88 participants with MS were randomly assigned to either complete the BEEMS regimen or be placed on a waiting list for the program. Results measured at six weeks showed that subjects in the BEEMS group experienced significantly greater improvements than the control group in balance, fatigue, cognition, dizziness and quality of life. These benefits were sustained at 14 weeks. Investigators are planning future studies to confirm these findings, determine how long the program must be for maximum benefit, and determine whether or not it needs to be supervised. BEEMS holds exciting potential in MS rehabilitation therapy, not only for its benefits, but also in the possibility that individuals may be able to participate in it remotely.

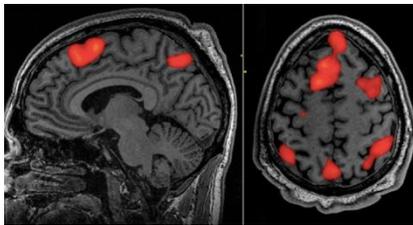


Researchers at the Shepherd Center are conducting the [STEP for MS](#) study (Supervised versus Telerehab Exercise Program for People with Multiple Sclerosis) to see if an at-home exercise program can help improve



mobility and quality of life for people with MS. The team is comparing a home-based exercise program to one that takes place in a facility like a gym. A trained instructor teaches participants how to exercise and provides encouragement throughout the program, regardless of where they exercise. The [iConquerMS portal](#) is being used for data collection, and to communicate with participants. In addition, the team is looking at whether people have better mobility and quality of life when they get to choose where they exercise, compared with when the research team assigns them by chance to exercise at home or in a facility. The research team hopes to enroll 500 subjects across seven sites in the United States. Interested in joining the study? Contact information for each site, as well as criteria for participation, can be found on the STEP for MS [website](#).

Many people with MS experience severe physical and mental fatigue. [Investigators](#) at the Kessler Foundation are studying whether a rehabilitation technique known as “feedback presentation” can relieve this troubling symptom. Feedback presentation is a technique that tells individuals how successful they are at performing a particular task. It has been shown to affect activity in areas of the brain thought to be compromised in individuals with fatigue (the [fronto-striatal network](#)). Positive feedback presentation (such as receiving food or money) increases brain activity and negative feedback presentation (not receiving a reward) has the opposite effect. As part of this study, 14 healthy subjects and 19 subjects with MS performed a gambling task during functional magnetic resonance imaging (fMRI).



[Results](#) showed all subjects receiving a monetary reward (positive feedback) experienced a significant decrease in fatigue. Scans showed significantly greater activation in different areas of the brain with positive and negative feedback. This is the first fMRI study showing that

stimulation of the certain brain networks through positive feedback for attaining a goal (winning money) leads to decreased fatigue in MS subjects and healthy participants. This could help determine whether a feedback technique can reduce MS fatigue without medication, which would represent a major step forward for people with MS.

Functioning better and feeling productive adds enormously to the quality of life of people with MS and their families. Rehabilitation is more than an “extra” therapy that is given after other medical treatments. It is an integral part of managing and treating the diverse set of issues often encountered throughout the course of MS. As such, learning more about and improving therapeutic techniques is of vital importance to those living with the disease so they can live their best life every day. The core of ACP’s mission is to facilitate research efforts like these, that significantly impact the MS community.

