

## Managing Symptoms in Multiple Sclerosis Resources:

### Fatigue

Fatigue is the most common symptom among patients with MS. Evidence shows that appropriate exercise addresses fatigue in MS by decreasing patient reports of fatigue.<sup>1-3</sup> Exercise may be in the form of aerobic training, resistance exercise, aquatics, stretching, or yoga. One RCT found that a group of people with MS performing individualized exercises demonstrated significantly improved fatigue compared to a control group.<sup>1</sup> Another RCT found that patients participating in aquatic exercise had significantly lower fatigue levels than the control group.<sup>4</sup> A pilot cohort study determined that fatigue had a significantly lower impact on physical activity after patients participated in an individualized exercise program.<sup>2</sup> In addition to providing individualized exercises to people with MS, physical therapists (PTs) can educate patients on energy conservation techniques, management of heat sensitivity, and assist in choosing adaptive devices for mobility; all of which may contribute to lowering fatigue levels.

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### Spasticity

Spasticity can cause pain for patients with MS, as well as make functional mobility difficult. One RCT pilot trial found that botulinum toxin, in combination with stretching, is significantly more effective than botulinum toxin alone.<sup>1</sup> Another RCT found that patients participating in aquatic exercise reported decreased spasticity.<sup>2</sup> A survey of 1000 people with MS showed that those participating in yoga perceived reduced spasticity and pain from doing this type of exercise.<sup>3</sup> PTs are trained to identify and grade spasticity and can provide the patient with individualized stretches that address areas with spastic muscles as well as recommend appropriate yoga and aquatic programs. In addition, PTs can provide patients with a stretching regimen anytime during the MS diagnosis in order to maintain flexibility for prevention of contractures and improved ability to perform functional motor tasks.

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## Heat Sensitivity

Patients with MS often have concerns regarding physical activity because of the exacerbations they experience from heat. Physical therapists can educate patients on ways to decrease the heat in the internal and external environments, both of which have been shown to improve physical performance in people with MS.<sup>1-4</sup>

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## Functional Mobility Deficits

Patients with MS experience gait deviations for a variety of reasons, including weakness, spasticity, balance deficits, and compensations. PT interventions can address these impairments in ambulatory patients with MS through strengthening exercise and gait training. An RCT showed that a group of people with MS performing progressive resistive exercises significantly improved walking speed compared to the baseline and improved on all functional mobility testing in comparison to the control group.<sup>1</sup> A small pilot study found positive outcomes on walking speed and endurance in patients with MS that participated in body-weight supported treadmill training.<sup>2</sup>

If independent ambulation is no longer possible because of MS, patients have many options for ongoing independent mobility. This may include the use of assistive devices, such as: orthotics, functional electrical stimulation (FES) of the common peroneal nerve, canes, walkers, wheelchairs, or power scooters. As part of the rehabilitation team, a PT is trained to assist the patient in selecting and fitting an assistive device based on the patient's home and work environment, family dynamics, patient goals, fatigue levels, functional abilities, community participation and fall risk. A large cohort study showed that people with MS that used FES for 4.5 months significantly improved walking speed and decreased the cost of gait with an FES device on compared to off, demonstrating the orthotic effect of the device.<sup>3</sup> Several national and local organizations offer financial assistance for patients with MS that do not have insurance coverage for mobility devices.<sup>4</sup>

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# Fall Prevention in MS Resources:

## Falls and MS

Recent studies have found that approximately 50% of people with MS have experienced a fall within the past 6 months to 1 year.<sup>1,2,3,4</sup> Kasser et al performed a detailed examination of balance and postural stability, lower extremity strength, and gait/mobility.<sup>1</sup> They found that the leaning and standing sway, lower extremity strength, and gait deviations correlated with falls in women with MS.<sup>1</sup> Other factors that contribute to falls include: older age, use of an assistive device, fear of falling, poor concentration, and bladder incontinence.<sup>2,3,4</sup> Interventions for balance and strength can improve confidence and fear of falling, reduce the need for an assistive device, and improve general mobility.

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## Balance and Vestibular Interventions

Two cross-sectional studies revealed that patients with MS produced abnormal results for latency and adaptation on dynamic posturography,<sup>1</sup> and have abnormal limits for horizontal and vertical visual alignment<sup>2</sup>. An RCT was conducted to evaluate effects of balance retraining on people with MS using motor and sensory-motor retraining methods.<sup>3</sup> Researchers found significant improvements on functional assessments related to fall prediction.<sup>3</sup> Another RCT was conducted to evaluate the benefits of a vestibular rehabilitation program for improving balance for people with MS.<sup>4</sup> Researchers found that after participating in the standardized vestibular program, subjects improved significantly on the Balance Master sensory organization test and dizziness handicap inventory.<sup>4</sup> Additional physical therapy interventions including visuo-proprioceptive training,<sup>5</sup> and integrated balance and general exercise<sup>6</sup> improved results on balance and mobility functional assessments.

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## **Core Strengthening**

In addition to balance exercises that work on visual and proprioceptive training, core strengthening has been shown to be an important component of a balance intervention program.<sup>1</sup> A multi-centre case series was conducted to assess the effect of core stability training on balance and mobility for patients with MS.<sup>1</sup> The 8-week intervention phase consisted of 16 individualized core stability exercises and an individualized home exercise program. Researchers reported significant improvements on the 10-meter timed walk test (10MWT), MS Walking Scale, TUG, and forward and lateral functional reach after the intervention phase. Improvement on the TUG was maintained through the 4-week withdrawal phase.<sup>1</sup>

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## **Lower Extremity Strengthening**

Muscle weakness is a common impairment for patients with MS, and Ponichtera et al. found that patients with MS demonstrated lower peak torque velocity of their quadriceps and hamstrings as compared to healthy controls.<sup>1</sup> Several studies have demonstrated the effectiveness of progressive resistance training for the lower extremity in improving leg strength<sup>1,2,3</sup> and functional capacity<sup>4,5</sup>. A study by Gutierrez et al. shows how an 8 week lower extremity resistance training program improved gait kinematics for patients with MS.<sup>5</sup> Researchers noted increased stride time in swing phase of gait, increased step length, increased stride length, and improved foot angle. They also noted decreased stride time in the stance phase of gait and time spent in double-support phases.<sup>5</sup> These results suggest an improvement in gait kinematics, which, in addition to lower extremity weakness, were also a contributing factor to falls.

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## **UNC Educational and Scholarship Track in Multiple Sclerosis**

The *Education and Scholarship Track in Multiple Sclerosis* is a unique collaboration between the University of North Carolina, Division of Physical Therapy and the Greater Carolinas Chapter of the National MS Society. This program is for doctoral physical therapy students interested in learning more about MS and becoming specialized in treating these patients.

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