

INTRODUCTION

When I was diagnosed with multiple sclerosis (MS) in 2002, I was first told not to exercise. I was warned against “overdoing it.” Since I was always an active person, this was devastating news.

A new set of doctors told me that I could try gentle yoga or Pilates. Still, I was warned not to work too hard, not to challenge myself, not to exercise more than a half hour or so.

So, for over a year, that’s what I did. Until one day, I decided I wanted to do power yoga instead of gentle yoga. And, I didn’t feel worse; I felt better. Then, I joined a gym. I started doing Pilates regularly. I stopped listening to the doctors and started listening to my own body and what it wanted to do. And it wanted to move.

In the course of this disease, I consider the worst injury I’ve received to be one inadvertently perpetrated by the medical system – its failure to send me to physical therapy after I was initially diagnosed. At that point, I had terrible vertigo and tremendous weakness in my left leg, especially in my ankle dorsiflexors. I couldn’t walk for six weeks. However, a course of steroids, however, calmed the flare-up and enabled me to walk again. So, the doctors told me to get on with my life. They never told me that residual weakness was potentially fixable. They also failed to mention that if I didn’t work on that weakness, it could potentially cause structural changes in my body that would be much, much more difficult to fix later on.

This training is the culmination of my experience with MS symptoms and how I have addressed them with Pilates and physical therapy, the stories and experiences of other MS patients (including my clients), interviews with leading neurologists, physical therapists and other Pilates teachers, and research into an exercise science point of view on treatment for the major symptoms of MS, as well as the fascinating science of neuroplasticity.

Since research in exercise for MS is sadly lacking, I’ve also referenced research on exercise and physical therapy for other neurological conditions and injuries, including stroke, cerebral palsy, Parkinson’s disease, and traumatic brain injury. I’ve also included research on movement issues such as poor balance, muscle imbalances, and compensatory patterns. From my experience as a patient, I believe there to be significant potential for treatments for other conditions to positively impact those suffering from MS. I have anecdotal evidence of what non-MS-related methods worked for me or for people I know.

Although I set out with the ambitious goal of creating a simple, comprehensive Pilates-based program for the treatment of MS, the truth is that no single plan will work for everyone. The symptoms of MS are incredibly varied and unique to an individual; any “comprehensive” plan won’t be simple.

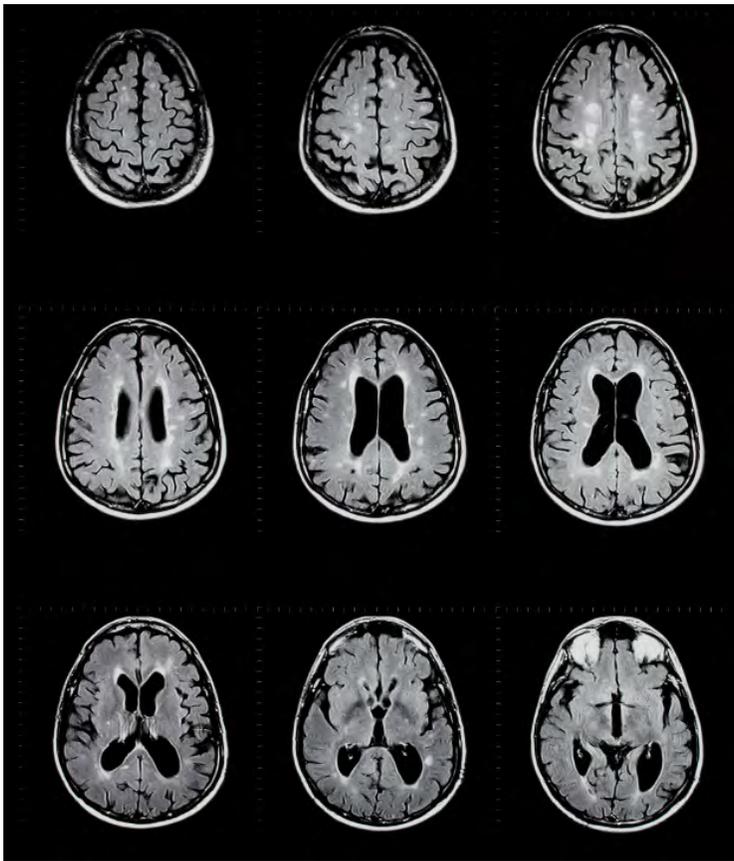
In my experience, the best way to approach any client is with an open mind, a desire to learn more (from your client and from research), and to experiment to uncover the complex puzzle of interactions that are causing the body to malfunction and to help it function better.

More than a decade after my diagnosis, I’m still trying to figure out the “cure” for some of my issues. But, I’m thrilled when I find another piece of the puzzle, even when it doesn’t yield automatic results. There’s something else to try, I think, and often, that something else is the hope I need.

I encourage you to experiment, to add your own knowledge to the training, and to please let me know how it goes. This is a work in progress, and will be updated as together, we find out what to add to the repertoire.

For anyone recently diagnosed, I encourage you to get a good Physical Therapist or movement professional who can watch for compensations and keep you moving as well as possible for as long as possible. “As long as possible” might just be forever.

In health,
Mariska



In the above photo, the white “splotches” on the MRI indicate MS lesions.

“Sclerosis” (also known as plaques or lesions) essentially means scarring – the visible signs of MS that show up on an MRI, mainly in the white matter of the brain and spinal cord, which is largely comprised of myelin.

In the most common form of MS, relapsing-remitting MS, patients experience alternating periods of relapse (worsening of symptoms or the development of new symptoms) and complete or partial remission. Over 70 percent of MS patients will develop some degree of permanent disability over time. Proper rehabilitation and exercise are essential for maintaining as much function as possible.

Some Statistics

1. MS is two to three times more common in women than men.
2. It is the most common progressive and disabling neurological condition in young adults.
3. The average time between clinical onset of MS and diagnosis by a physician is four to five years.
4. MS is most common in Caucasians of northern European ancestry, although it also occurs in other ethnic groups.
5. Most people are diagnosed between the ages of 20 and 50, but even children and much older adults can develop the disease. People who are diagnosed after the age of 50 are more likely to have a progressive course of the disease that mainly impairs their ability to walk.
6. MS risk increases for those who live at northern latitudes. People who live closer to the equator are less likely to develop MS.
7. MS is not inherited, but genetics are believed to play a role.
8. The majority of people living with MS do not become severely disabled. Two-thirds of people who have MS remain able to walk, although many will need an aid, such as a cane or crutches at some point.
9. The majority of MS patients have damage to the myelin sheath in the brain, spinal cord, and/or optic nerves. But, only an estimated 5% show damage to the myelin in the peripheral nervous system.
10. About 50% of MS attacks result in what’s considered “irreversible central nervous system damage.”

MS TREATMENTS (TRADITIONAL)

Although there is no cure for MS, most patients take one or more medications. Traditional treatment focuses on modifying the disease course via immune-suppressant or immune-modulating drugs, treating flare-ups with steroids and physical therapy, managing the symptoms with medications and therapy, and improving a patient's function with physical or occupational therapy.

Even though exercise is not generally considered a "treatment" for MS, more and more doctors are recognizing its benefits to the long-term health of their patients.

Of note, the most commonly recommended exercises are swimming and water exercises, since these mitigate the effects of heat that negatively impact most MS patients.



Medications and Their Side Effects

Many therapies are available to treat symptoms such as spasticity, pain, bladder problems, fatigue, and weakness. Many of those treatments have significant side effects.

Two important things to note about MS medications are the painful site reactions from the injectable drugs and the risk for osteoporosis that comes from steroid usage.

Many MS patients are put on immune-modulating injectable drug therapies. Rebif, in particular, causes extremely painful site reactions (welts, bruises, etc). The client will not be able to tolerate weight or pressure on these sites (usually in the glutes, top of the thighs, and stomach).

Severe MS flares are generally treated with high doses of methylprednisolone, a synthetic adrenal steroid hormone similar to cortisone that has powerful effects upon the immune system and on inflammation, often shortening the flare. For MS patients who have undergone steroid treatment, there is an increased risk for osteoporosis.

Other common medications are listed below, along with common side effects.

Note: this is not a complete list of uses or side effects of each of these medications – just those that are common and might affect your client in an exercise environment.

Ampyra (dalfampridine)

Why it's prescribed:

To improve walking in MS patients. It is a potassium channel blocker that is thought to work by improving nerve conduction.

Common side effects:

Trouble sleeping (insomnia), dizziness, nausea, and headache

Armodafinil (Nuvigil)

Why it's prescribed:

Improves wakefulness in patients with severe fatigue.

Common side effects:

Nausea and headache



SUPINE CALF STRETCH

LEVEL 1



From the supine hamstring stretch, flex the foot deeply. Hold. Point the foot without actually moving it into plantar flexion. Hold with this tension for 10 seconds. Release and hold the relaxed calf stretch for an additional 30 seconds.

* The soleus muscle is often a great culprit in lower leg spasticity than the gastroc. To access the soleus muscle, put a slight bend in the knee while doing this stretch.

Assist – The teacher rests the student's leg on her shoulder and manually flexes the foot. The teacher can lean her weight towards the student to deepen the stretch, and the student can press against that weight for the contraction phase of the stretch.

ASSISTED GASTROC STRETCH PRONE

LEVEL 1



Lie prone on the Cadillac with your feet hang over the edge.

The teacher holds onto your ankle with one hand, and presses into the ball of the foot with the other, bringing your toes closer to the shin and stretching the gastroc.

Hold for 30 seconds. Then try to press your foot into your teacher's hand for 6-10 seconds. Release the push. The teacher then holds the foot in this position for another 30 seconds or so.

Switch legs.



CADILLAC LEG SPRINGS



If no Cadillac springs are available, you can use a Pilates stick or bands. The Cadillac is the best apparatus for working with clients who use a scooter or wheelchair, as it is the easiest to transfer to and from.

The student can sit “upright.” Build a slant by placing the short box against the tower poles. Rest the jumpboard against it. The student can lean against the jumpboard for a comfortable seated position. *Note - this is sometimes easier for someone to transfer to and from than completely supine if they are very weak.*

Begin by putting both knees into the springs. The strength of the student will determine how high to load the springs, as well as whether to use heavy or light springs.

Begin working bilaterally (circles, walking, etc.). Progress to single leg variations. To strengthen the gluteus medius, use the strap on the opposite side of the leg you want to work.

To progress, do the leg spring work supine. *Note that supine work more closely mimics walking gait and should be favored when you’re working on gait exercises.*

For more unilateral exercise ideas, see the chapters on Balance and Gait.



exercises for leg and glute weakness

BRIDGING WITH MAGIC CIRCLE

 LEVEL 1-2



Lie supine with the legs through the magic circle and the magic circle pads slightly above the outside of the knees. On an exhale, lift your hips up while simultaneously keeping a slight pressure out into the circle. Inhale to lower. Repeat 5-10 times.

PELVIC CURL ASSIST

 LEVEL 1



Student – Lie supine with a towel under her hips.

Teacher – Assist with the lift by lifting the outside edges of the towel.

Repeat 5 or more times.



INVERSION WITH FOAM ROLLER

LEVEL 1



Sit on the floor with your legs long in front of you. Place a foam roller in between your legs.

Lengthen your feet (don't point your toes), and press the inner edge of both feet equally against the roller. Hold for a count of 10. Repeat 5-10 times.

EVERSION WITH THERABAND

LEVEL 1



Begin seated in a chair. Wrap a theraband tightly around both feet, leaving several inches of theraband on either side of your feet. Hold onto the band with your hands.

Open your feet into a small V, pressing with the outside of your feet into the band. Hold for a count of 10. Return to the start position. Repeat 5-10 times.

WEAKNESS

GAIT

Gait problems are a common and frustrating fact of life for many with MS. Although approximately 65 percent of MS patients are still able to walk 25 years post-diagnosis, how well they are able to walk is widely varied.

Gait abnormalities, such as slower gait speed, shorter stride length, prolonged time spent in the double-support phase, and a lower cadence are all commonly observed in people with MS. Slowness is often correlated to knee extensor and plantar flexor weakness, as well as fear of falling because of bad balance or previous falls.

A Little Bit About Gait

Everyone has their own gait pattern, which comes from how she learned to walk, muscle memory and movement habits, injuries, regularity in wearing high heels, etc.

Smooth walking is a dance between the entire body. The pelvis should move forward smoothly (with minimal twisting) and that movement should be economical. The loaded leg should be straight, the head should be stacked above the torso, and the motion should transition smoothly from one step to the next.

The gait cycle consists of:

1. Heel strike
2. Foot flat
3. Mid stance
4. Heel off
5. Toe off
6. Swing (early, mid, and late)

If the heel doesn't strike first, you don't propel forward using your hip extensors. That's a problem because we're **biologically designed to walk from the hips**, using the hamstrings and glutes extensively.

Ideally, your **pelvis should be neutral** (not arched or tucked). That allows the psoas to lengthen properly.

The motion should also be in the direction OPPOSITE where you're going. That means, **if you're walking forward, the motion of your body should be moving backward**. Your right leg pushes back as you step your left leg forward. To keep the pelvis from twisting around, you balance it out with a reciprocal arm movement (the arm moves in opposition to the opposite leg).

If you're lifting your knee up really high, planting your foot down, and leaning forward, you are basically falling forward. This is more like marching than walking, which wastes energy and overuses the knee and hip flexors. For someone with difficulty walking, the goal is to help her walk as efficiently and properly as possible. For someone who experiences fatigue (like many with MS do), the goal is to walk as efficiently and economically as possible.

GAIT TERMINOLOGY

- **Step length** – the distance between corresponding successive points of heel contact of the opposite feet
- **Stride length** – the distance between successive points of contact of the same foot (= 2 consecutive step lengths)
- **Stance phase** – from heel strike to toe off
- **Swing phase** – from toe off to heel strike.
- **Cadence** – the speed of a person's walk



hip stability exercises

Exercises to strengthen the glute medius and minimus and TFL are necessary to preserve or regain hip stability.

LIMITED EQUIPMENT SERIES EXERCISES FOR HIP STABILITY

PELVIC LISTING

LEVEL 2



Use a spotter!

Stand on a moon box or step with one foot, with the other foot dangling off the side. Keep both legs straight. Dip into your standing hip to try to touch the opposite foot to the floor. *This degree of movement is what you want your hips NOT to do when you're standing or in the stance phase of gait.*

Engage the outer hip muscles of the standing leg to lift the hovering leg even with the standing leg. Hold with square hips for a count of 10.

Repeat 5-10 times. Switch legs.

You can also do this exercise using a moon box and the pedal from the Wunda chair (medium weight). Stand adjacent to the chair, with one foot on the pedal and one foot on the moon box. Move the pedal weight by leveling your hips.

If you don't have a moon box or a Wunda chair, you can do this exercise standing. Simply bend one leg slightly to lift it off the floor.

NEUROPLASTICITY

Neuroplasticity – the Basics

Neuroplasticity is the ability of the brain to change based on your experience and activities. Basically, the nerve cells in the brain and nervous system are changeable.

The brain changes its structure with every single different activity it does. It literally “rewires” its circuitry so it becomes more capable of completing a given task. If part of the brain fails, it is possible in many cases for another part of the brain to take over.

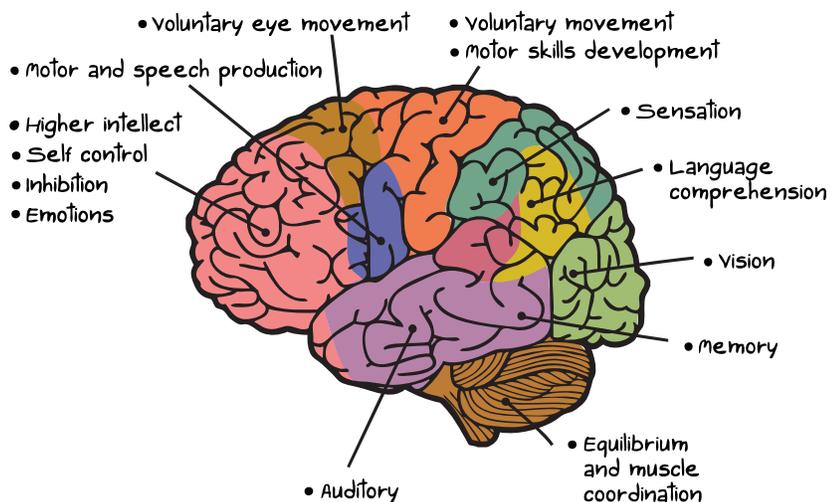
The brain has an amazing capacity for reorganization and healing. In the case of neurological injury, it offers amazing hope for recovery. But working to build those connections is difficult. I will tell you from experience that trying to work a muscle that isn't getting a good signal is frustrating. It's exhausting.

Still, working the areas that don't want to work is essential in maintaining and growing neurons or getting the brain to rewire. And not working an area causes the brain map (the part of the brain that controls that action) to shrink.

Brain Topography

Both sensory and motor sections of the brain are topographical. That means that areas next to each other on the body's surface (like two adjacent fingers) are usually also next to each other in brain maps.

Scientists used to believe these maps were fixed and unchangeable (and the same in every person). However, they vary from brain to brain in terms of their borders, size, and shape, dependent upon what we do over the course of our lives.



Brain function “map.” Recent studies have found that these areas aren't as definitive as once thought.

for instance, a process called sensory substitution. That's because you see with your brain. Your eyes just deliver the information. If they fail to deliver, you can train other senses to do it for them. (Granted, this takes a lot of work and special equipment, but the important and inspirational thing is to know that you can.)

The trick is how to get the brain to do it?

Rewiring Your Brain

The brain is made up of many neuronal pathways. If key pathways are blocked from loss of myelin (or damage from another cause), the brain can reroute the signal by using other pathways. The more you use those pathways, the more efficient they become.

Rewiring means that the synapses between the neurons can become stronger and build more connections between the neurons. (They can also become weaker and lose the number of connections – use ‘em or lose ‘em).

You can even use pathways from other senses to take over when a sense becomes weak. You can learn to see with your tongue,