

WEBINAR & TELELEARNING SERIES



Myelin, Movement, and the Mind: Hot Topics in MS Research



April 12, 2016

Presented by:



Teva Pharmaceuticals | Acorda Therapeutics

Mallinckrodt Pharmaceuticals Autoimmune and Rare Diseases, US Bank



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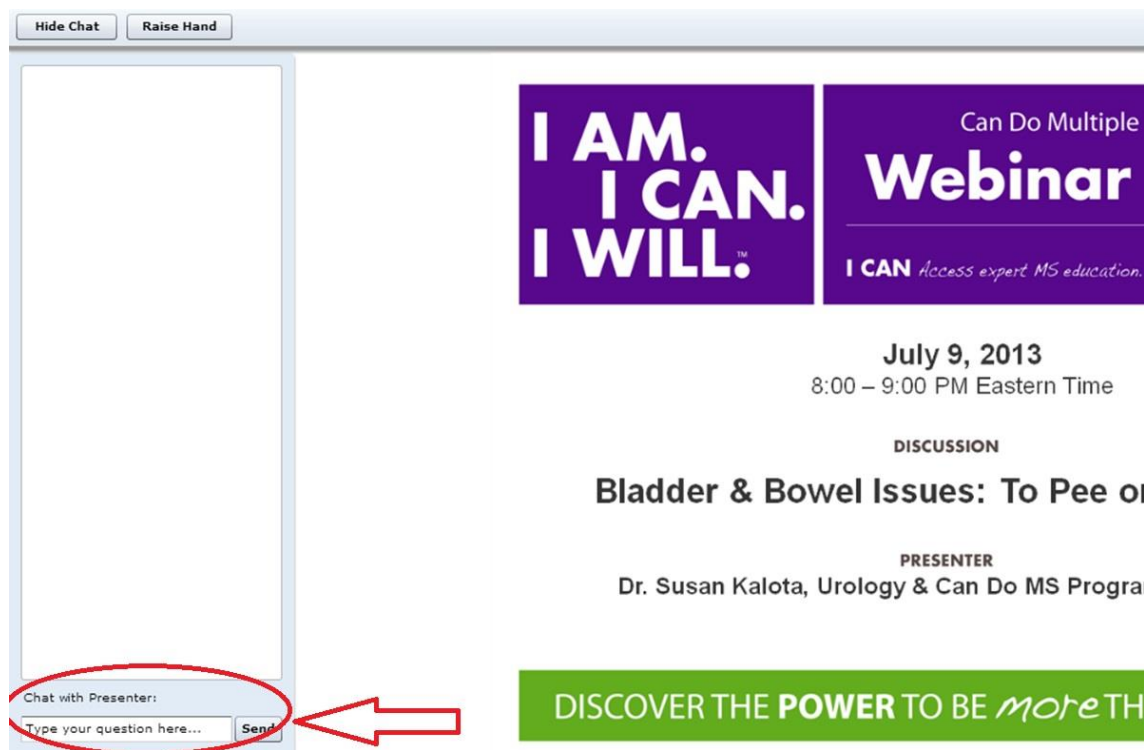


**National
Multiple Sclerosis
Society**



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- **Chat Feature** – Type in your questions using the chat box on the lower left hand side of your screen.



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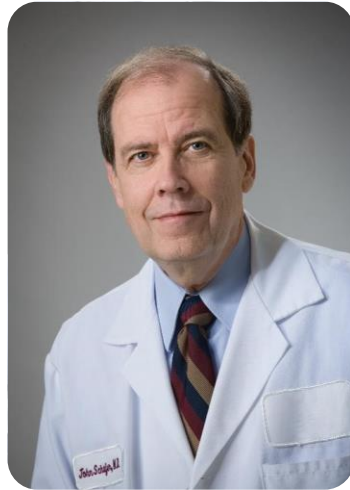
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John Schafer, MD



**Director of Mercy MS Center and Mercy Achievement Center
Sacramento, CA**

Meghan Beier, PhD



**Johns Hopkins University School of Medicine
Baltimore, MD**

Abbey J. Hughes, PhD

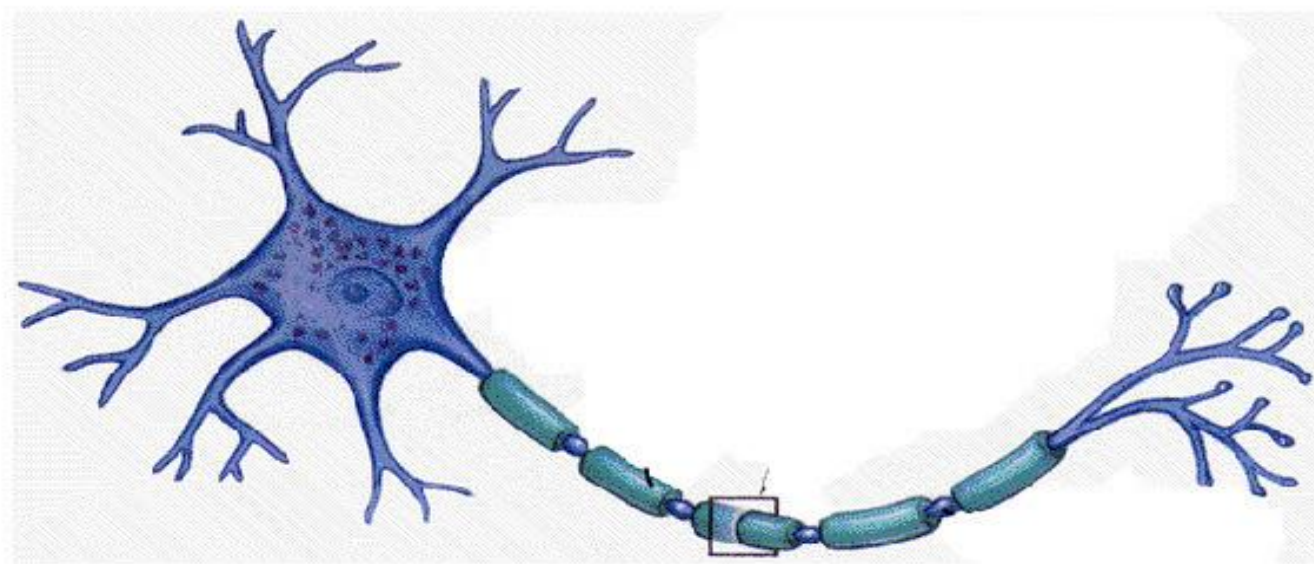


**Assistant Professor, Department of Rehabilitation Medicine
University of Washington School of Medicine
Seattle, WA**

Agenda

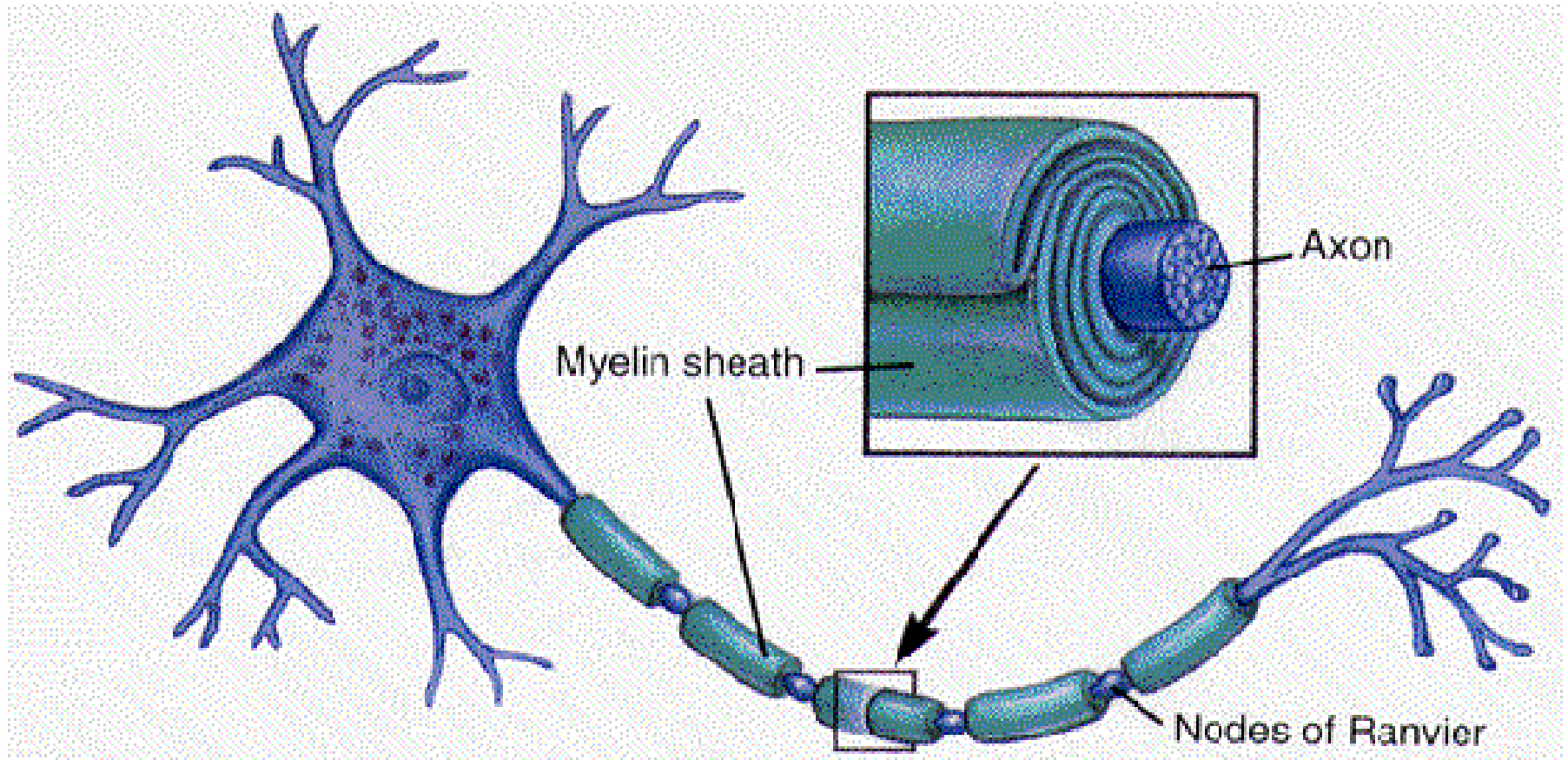
- **Myelin Repair and new developments in stem cell research** ~ John Schaefer, MD
- **Movement, Reasons to Stay Active When You Have Multiple Sclerosis** ~ Meghan Beier, PhD
- **Mindfulness and Meditation Treatment Options** ~ Abbey Hughes, PhD

John Schafer, MD

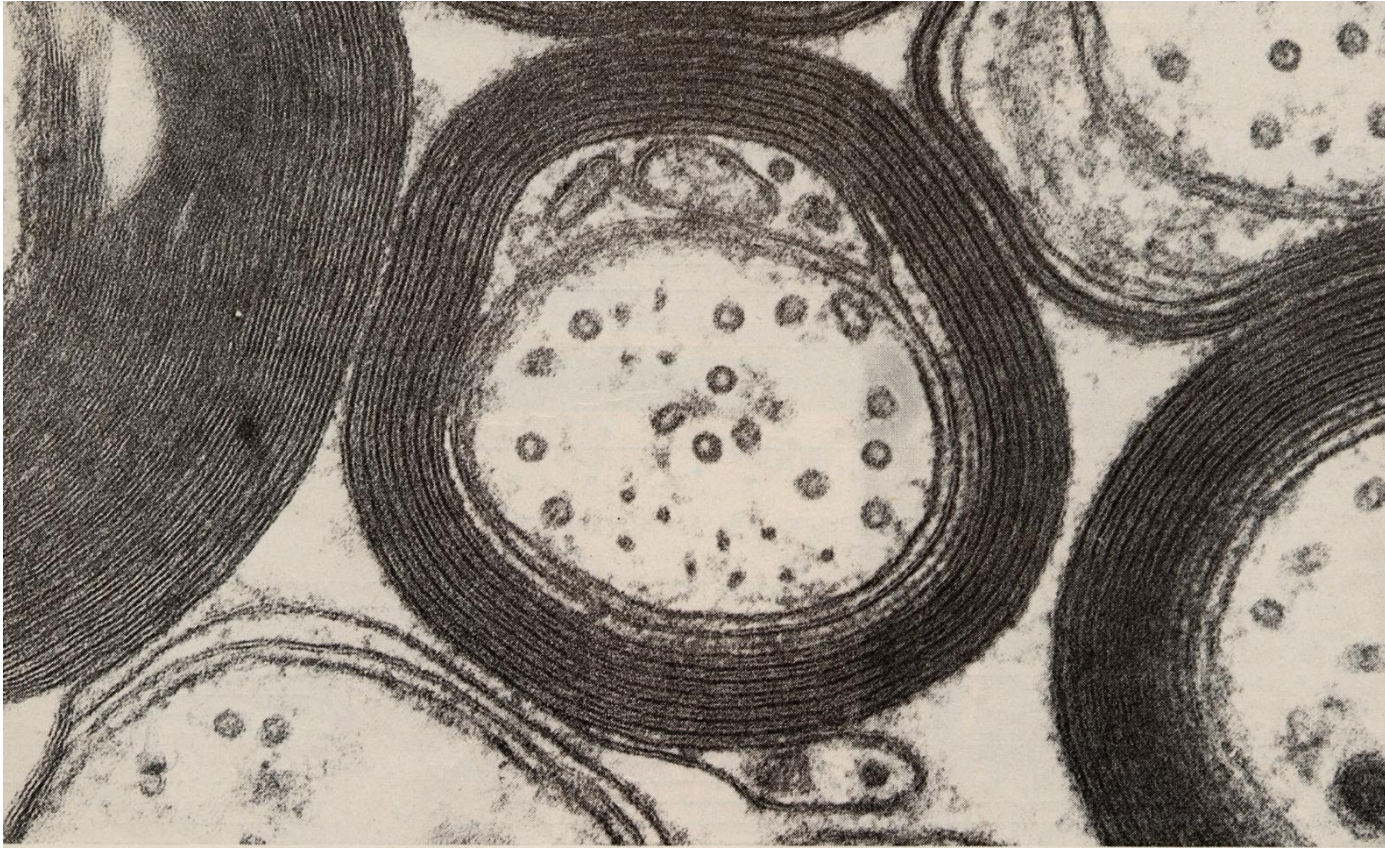


Myelin Repair and Stem Cells

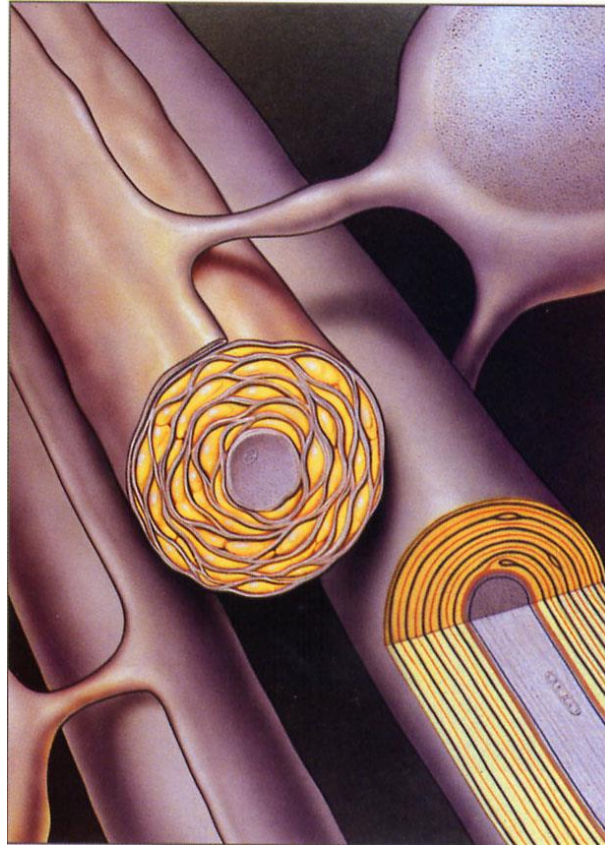
Myelin



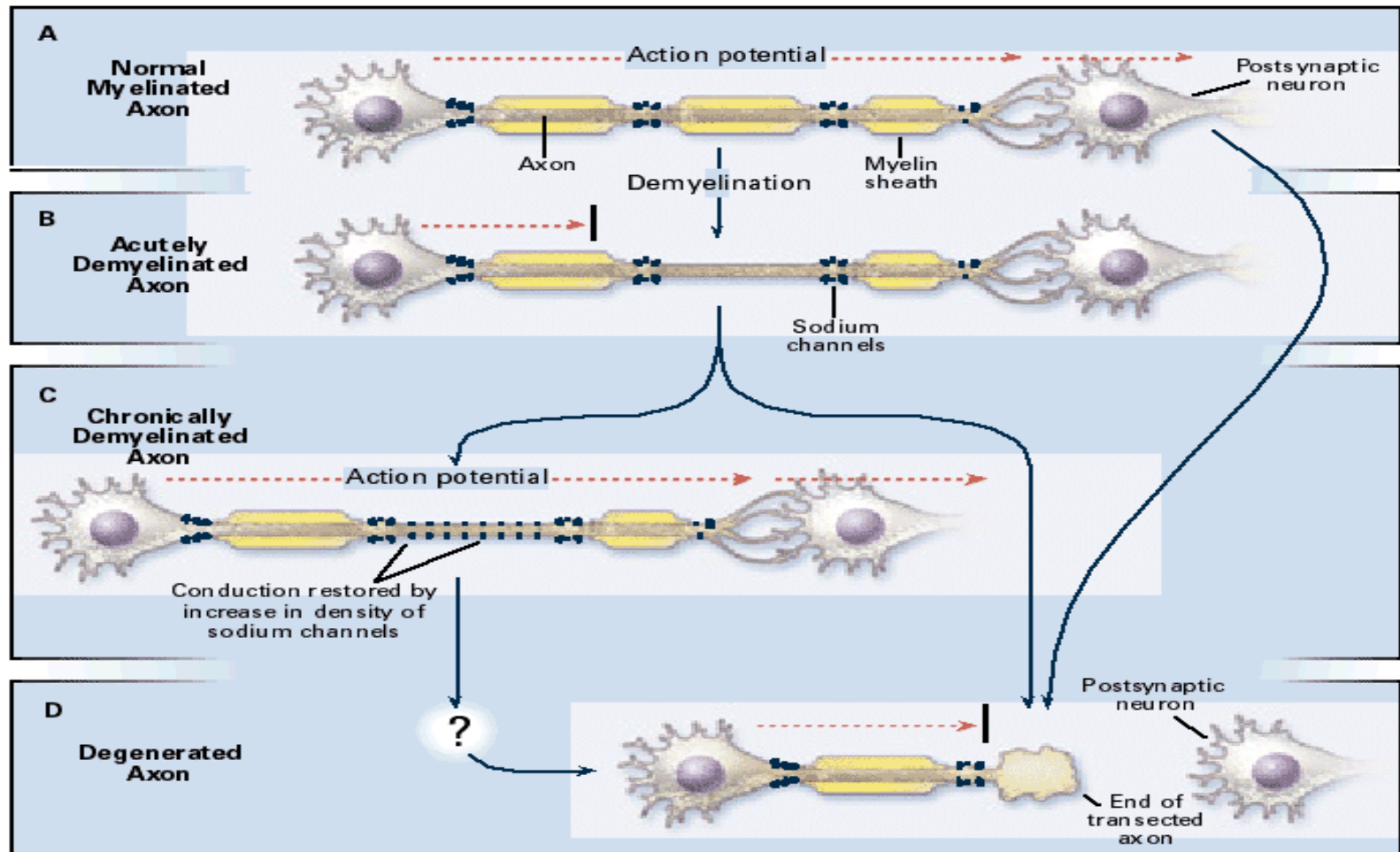
Myelin



Myelin



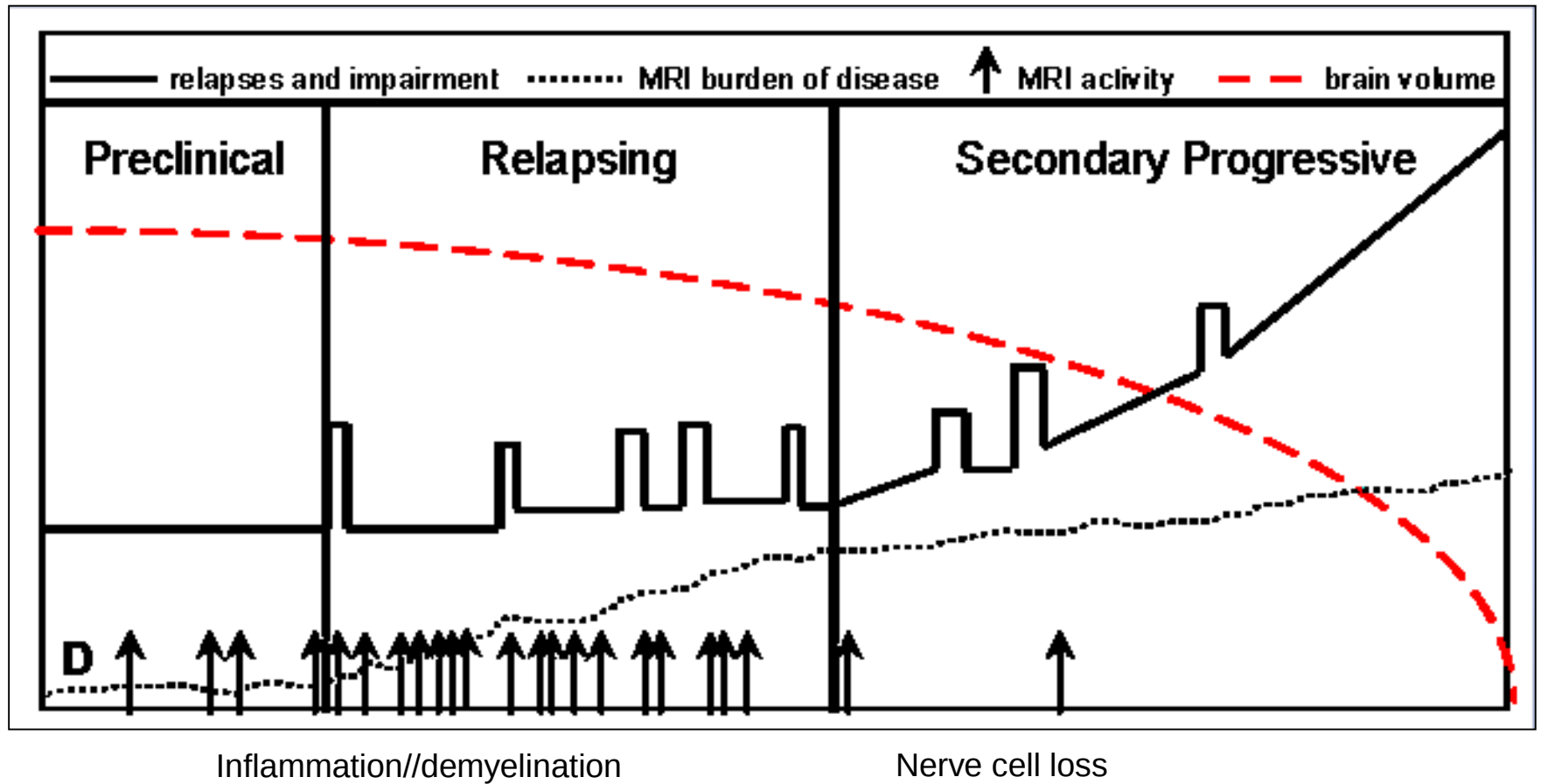
Myelin



Myelin

- **Symptoms in MS are caused by damage to myelin or nerve cells (axons) in the brain, spinal cord and optic nerves.**
- **This damage to the myelin and axons is caused by certain types of cells and activities in the immune system**

Course of MS



Fixing broken nerve cells

- Can putting myelin back on demyelinated nerves and/or creating new nerve cells restore function that is lost in multiple sclerosis?

Remyelination

- **Anti-Lingo antibody**
 - Slows down the molecule that puts the brakes on myelin production.
 - Is currently in trials (RENEW Trial in optic neuritis)
- **Remyelinating antibody (M. Rodriguez)**
- **Drugs which encourage myelin growth.**

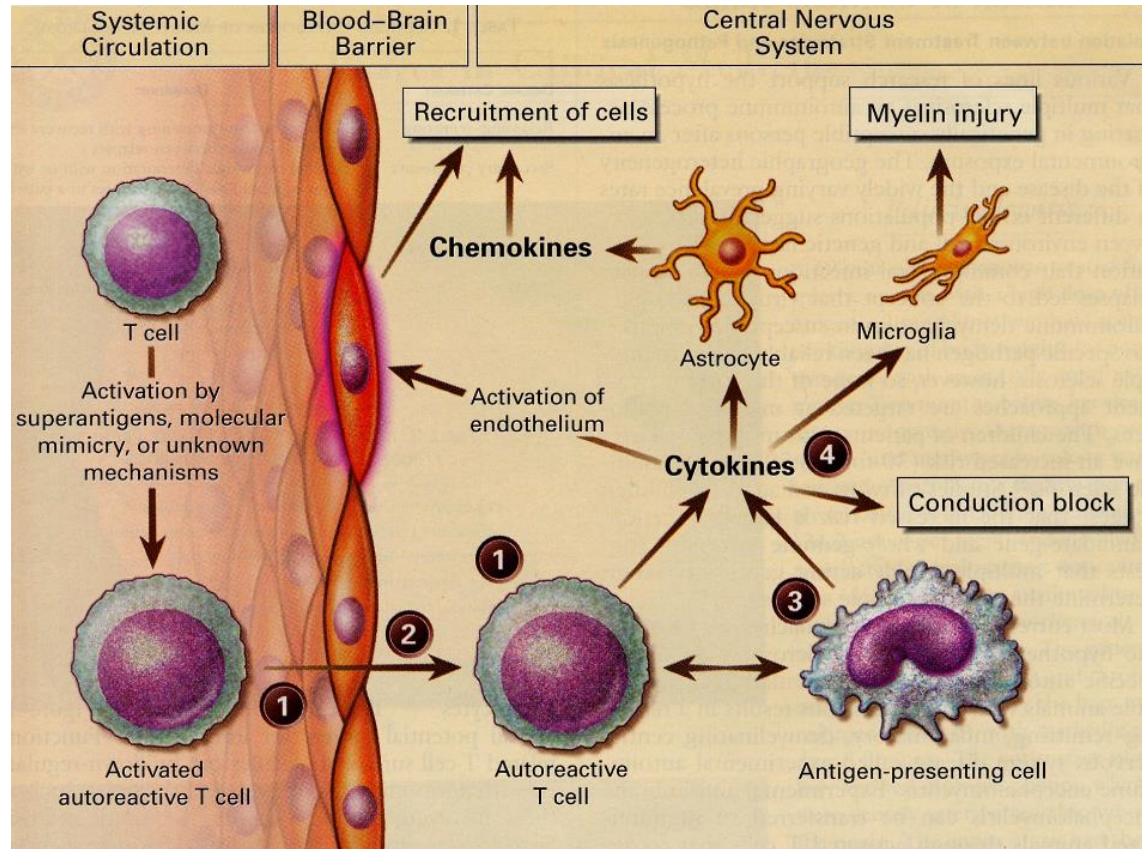
Stem Cells and MS

- **Stem cells are cells which have not yet become specialized and have the potential for developing into any type of cell in the body.**

How stem cells could help MS

- **Replace the immune system**
- **Repair the damaged nervous system**

The Immune System and MS



Stem Cells and MS

- **Replace the current immune system, which is causing damage to myelin and nerve cells with a new immune system which would not cause damage.**
- **How to replace the immune system:**
 - Destroy the current immune system with radiation and chemotherapy.
 - Introduce hematopoietic stem cells which would then build a new immune system.

Stem Cells and MS

- **Problems with immune ablation and hematopoietic stem cell replacement.**
 - Side effects may be considerable
 - Won't necessarily fix damage that has already been done.
 - Benefits and risks must be compared to those of the MS drugs which have multiplied during the same period of time as the stem cell techniques have been developed.

Stem Cells and MS

- **Stem cells to repair the damaged nervous system.**
 - Replace oligodendroglia to make more myelin
 - Replace damaged nerve cells
 - Replace cells that nourish and protect nerve cells and myelin

Stem Cells and MS - Questions

- **Where to get the stem cells?**
 - Mesenchymal stem cells
 - Embryonic stem cells
 - Neural stem cells / oligodendrocyte precursor cells
 - Induced pluripotent stem cells
- **Where to put the stem cells?**
 - Into the brain, blood stream or spinal fluid?
- **How to get the stem cells to develop into the cells necessary to do the job?**

Stem Cells

- **Stem cell science is exciting and may bring new options for treatment.**
- **Immune ablation and reconstitution is in clinical trials at a few prominent medical centers.**
- **Stem cell replacement of injured cells is still a long way off. Experts doing this research warn that it should be done only in clinical trials.**

Meghan Beier, PhD

Movement, Reasons to Stay Active When You Have Multiple Sclerosis

Special Thanks to Kathy Zackowski, PhD, OTR who shared slides and resources

Movement, Reasons to Stay Active When You Have Multiple Sclerosis

“Regular physical activity is one of the most important things you can do for your health.”

~ Centers for Disease Control and Prevention (CDC)

“The single thing that comes close to a magic bullet, in terms of its strong and universal benefits, is exercise.”

~ Frank Hu,
Epidemiologist, Harvard School of Public Health, Harvard Magazine
2007

Special Thanks to Kathy Zackowski, PhD, OTR who shared slides and resources

Sedentary behavior may lead to negative health outcomes for persons with MS, such as:

- **Cardiovascular Disease**
- **Reduced Mobility**

Prevalence of Common Symptoms

- **Cognitive dysfunction**
 - Up to 65%³
- **Pain – chronic and acute**
 - 50 – 65%¹
- **Fatigue**
 - 50 – over 90%^{2, 3}
- **Anxiety, worry**
 - 14 – 40%⁴
- **Difficulties with sleep**
 - 50%²
- **Depression**
 - Up to 60%³
- **Sexual dysfunction**
 - 67 – 75%⁵

1. Ehde, Osborne, Hanley, Jensen, & Kraft, 2006; Hadjimichael, Kerns, Rizzo, Cutter, & Vollmer, 2007; Khan & Pallant, 2007
2. Induruwa, Constantinescu, Gran, 2012
3. Chiaravalloti & DeLuca, 2008
4. Hartoonian, Terrill, Beier, Turner, Day, Alschuler, under review
5. Foley, Zemon, Campagnolo, Devitt, Tyry, Marrie, Cutter, Sipski, Vollmer, 2007; Valleroy & Kraft, 1984

Benefits of Exercise

- Improved quality of life
- Weight loss
- Stronger bones and muscles
- Reduced risk of:
 - Cardiovascular disease, such as heart disease or stroke
 - Type 2 diabetes
 - Metabolic syndrome
 - Cancer; specifically colon, breast, endometrial, and lung cancers
 - Falls
- Improved mood
- Better sleep
- More energy, less fatigue
- Improved sexual functioning
 - increased arousal in women
 - fewer problems with erectile dysfunction in men
- Improved cognition
 - executive functioning
- Longer life

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Strength, Walking, and Reduced Falls

85% of people with MS report reduced mobility as a major limitation

- A 2013 review of 54 studies found moderate exercise two times per week improved aerobic capacity, and increased muscle strength
- Walking improved by 19%; 32% if training was supervised

Greater than 50% of people with MS fall

Fall rates range from 1.6 to 18.4 falls per individual, per year

- All exercise interventions helped
- Those focused on balance and strength seemed to work best

Sosnoff, J. J., & Sung, J. (2015). Reducing falls and improving mobility in multiple sclerosis. *Expert Review of Neurotherapeutics*, 15(6), 655–666.

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Exercise, Mood, and Multiple Sclerosis

Depression: Up to 50%

- 20 minutes of walking or yoga, immediate improvement in mood
- Progressive strength training: improved depression after 12 weeks
- Aerobic exercise: 40min, 3 times per week → reduced depression

Anxiety, Worry: 14 to 40%

- Not much research in MS
- Among patients with chronic illness, any exercise reduced anxiety
- Greatest reduction seen for 12 week programs, duration at least 30 minutes

Effects of Single Bouts of Walking Exercise and Yoga on Acute Mood Symptoms in People with Multiple Sclerosis., 18(1), 1–8.

Pedersen, B. K., & Saltin, B. (2015). Exercise as medicine - evidence for prescribing exercise as therapy in 26 different chronic diseases. *Scandinavian Journal of Medicine & Science in Sports*, 25 Suppl 3, 1–72.

Herring, M. P., & O'Connor, P. J. (2010). The effect of exercise training on anxiety symptoms among patients: a systematic review. *Archives of Internal Medicine*

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ORIGINAL ARTICLE

Improved Physical Fitness Correlates With Improved Cognition in Multiple Sclerosis



Meghan Beier, PhD,^a Charles H. Bombardier, PhD,^a Narineh Hartoonian, PhD,^a
Robert W. Motl, PhD,^b George H. Kraft, MD, MS^a

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M. Beier et al

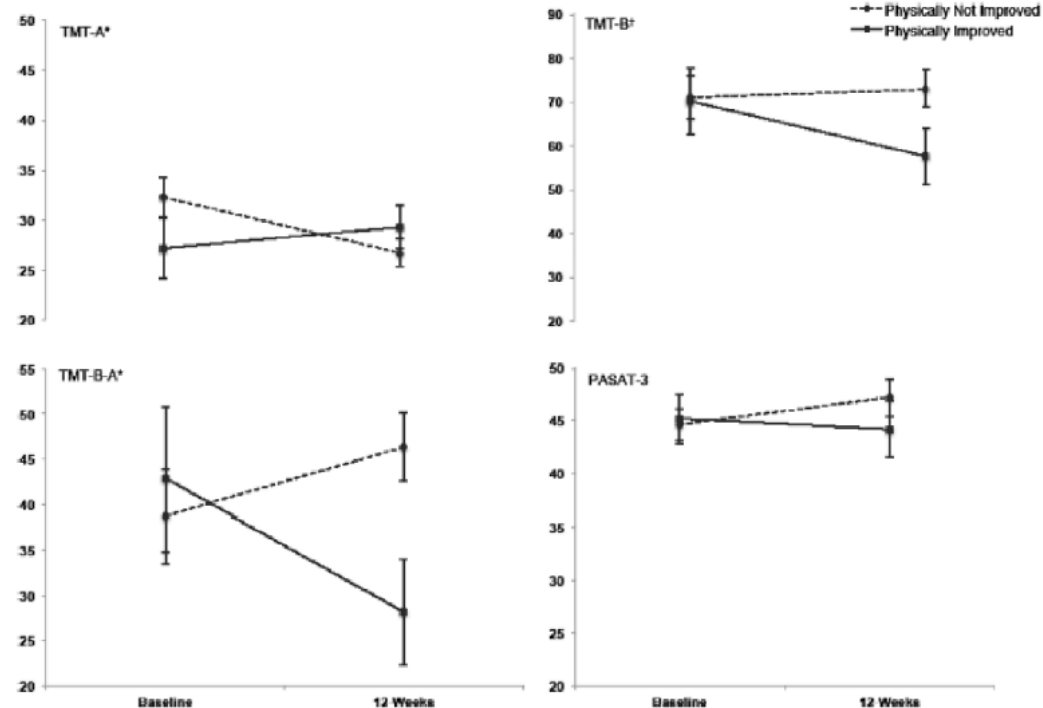


Fig 1 Time-by-group interaction for cognitive measures. * $P < .05$ denotes significant interactions; † $P = .066$ for interaction term. (Values for PASAT 3 represent the total number of correct answers; a higher score indicates better performance. Values for TMT-A, TMT-B, and TMT-B-A represent the number of seconds to complete each task; a lower score represents better performance.)



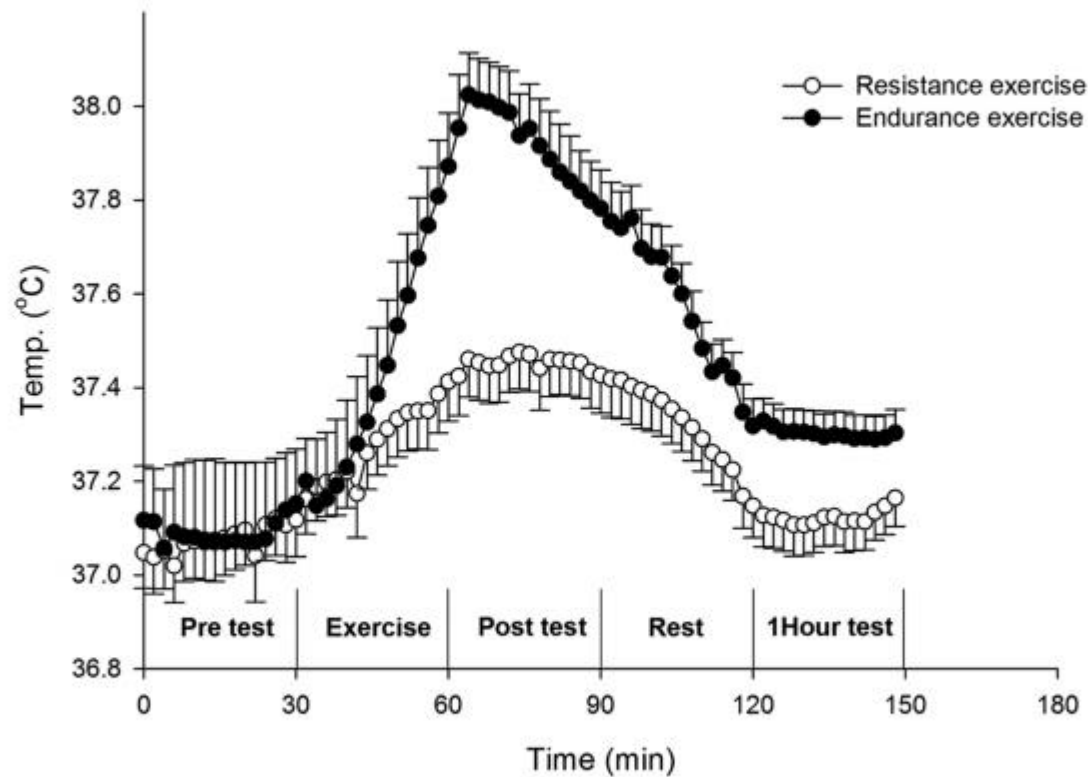


Figure 2. Core temperature before, during and after 30 min of resistance exercise and endurance exercise in heat sensitivity (HS) persons with multiple sclerosis (MS). Core temperature increased more during endurance exercise than during resistance exercise. SI: symptom intensity

Slide provided by Dr. Zackowski

(Skjerbæk et.al, Multiple Sclerosis, 2012)

Exercise Options: Physical Therapy



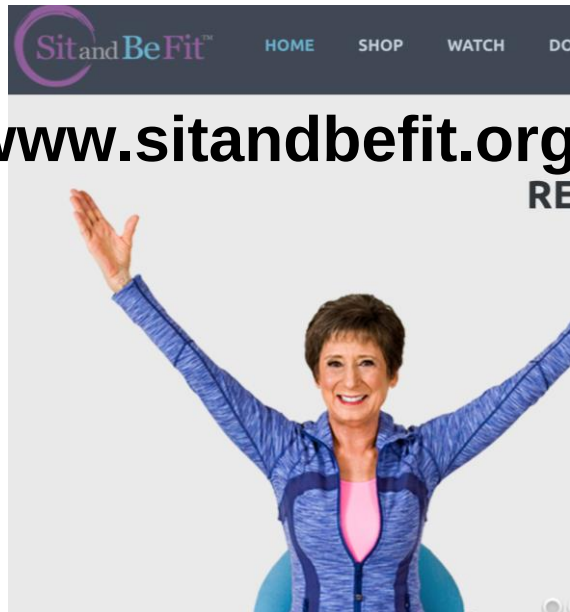
Exercise Options: Walking



- **Can improve:**
 - walking speed
 - endurance
 - balance
 - gait
 - Moo
- **Try to walk for 20 minutes or more**
- **If you use a treadmill, try walking with an uphill or downhill grade, which may help improve balance and gait**



Exercise Options: Home Exercise

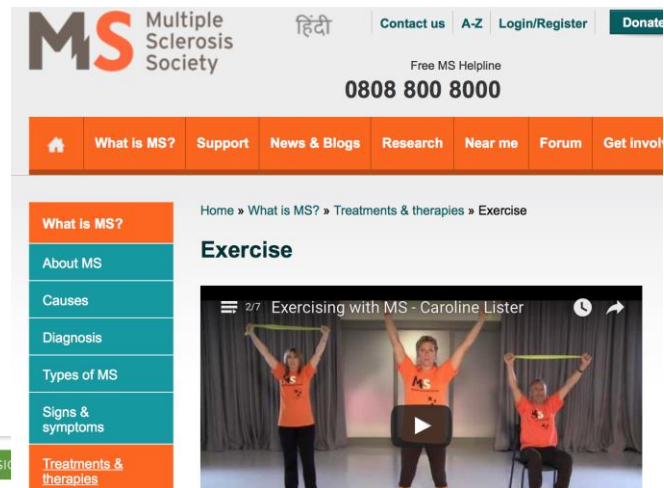


Exercising at Home

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www.mssociety.org.uk



www.abovems.com

Exercise Options: Finding an Expert or Classes

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Montgomery County

Moving with Multiple Sclerosis

Sunday, 1 – 2 p.m.
Germantown Community Center
18905 Kingsview Rd.
Germantown, MD 20874
For more information contact:
Matt Rowe, Program Coordinator
240-777-6895

TR Swimming for Physical Disabilities

Thursday, 8:30 – 9:30 p.m.
Kennedy Shriver Aquatic Center
5900 Executive Blvd
North Bethesda, MD 20852
For more information contact:
Matt Rowe, Program Coordinator
240-777-6895

Adaptive Yoga: Chair Poses

Tuesday, 11 a.m. – 12 p.m.
Activity Center at Bohrer Park
506 South Fredrick Ave

Each National MS Society Chapter keeps a listing of professionals that have taken the NMSS training for fitness professionals.

Exercise Options: Aquatic Exercises





SWIM FOR MS
ANY POOL, ANY TIME
MULTIPLE SCLEROSIS ASSOCIATION OF AMERICA

SWIM FOR MS
ONLINE
AQUATIC CENTER

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Welcome to MSAA's
Swim for MS Aquatic Center

MSAA recognizes the importance of regular exercise as part of an overall health and wellness program for individuals with multiple sclerosis (MS). For individuals who may have difficulty with tr

IMPORTANT LINKS

Exercise Options: Cycling



Mindfulness in MS

- **Overview of today's topics**

- What is mindfulness?
- What are some of the benefits of mindfulness for people with MS?
- Mindfulness-based treatments
 - Mindfulness-based stress reduction
 - Mindfulness-based cognitive therapy
 - Mindful movement
- Two introductory mindfulness exercises
 - Mindful breathing
 - Progressive muscle relaxation

What is Mindfulness?

•History¹

- Ancient Hindu (1500 BCE), Dao (600 BCE) and Buddhist (535 BCE) practices
- Also found in Christian, Jewish, and Muslim practices
- Focus on breathing, calmness, presence of mind

•1970s

- Applied to clinical psychology and psychiatry practices
- Jon Kabat-Zinn (1979) founded Mindfulness-Based Stress Reduction (MBSR)²

What is Mindfulness?

•Definitions²

- “Paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally”
- “Bringing one’s attention to the present experience on a moment-to-moment basis”
- “Moment-by-moment awareness”
- “Gentle effort to be continuously present with experience.”

What is Mindfulness?

- **Two components³**

- Self-regulation of attention, focused on the present experience
 - Emphasis on observation
- Approaching the present moment with curiosity, openness, and acceptance
 - Emphasis on allowing the mind to wander rather than controlling it in a particular state

Benefits of Mindfulness in MS

- **Physical health benefits⁴**

- Improvements in standing balance⁵
- Reductions in bodily pain⁶
- Reductions in fatigue^{6,7}

- **Mental health benefits⁴**

- Reductions in anxiety^{5,7}
- Reductions in depression^{5,7}

- **Quality of life benefits⁴**

- Improvements in well-being⁷
- Improvements in health-related quality of life⁷

Mindfulness-based Treatments

- **Mindfulness-based Stress Reduction (MBSR)⁷**
 - Most well-studied
 - Typically conducted in group sessions (4-12 weeks), can also be individual sessions
 - Applied in many chronic health populations, (e.g., chronic pain, depression, anxiety, stroke, HIV)
 - 3 meditation strategies:
 - awareness of breath
 - awareness of body
 - mindful movement

Mindfulness-based Treatments

- **Mindfulness-based Cognitive Therapy (MBCT)⁹**
 - Based on MBSR
 - Employs cognitive therapy strategies, based on Aaron Beck's Cognitive Therapy of Depression¹⁰
 - Identify unhelpful/maladaptive patterns of thinking and behavior
 - Changing (“restructuring”) unhelpful thought patterns results in improvements in emotions and behavior
 - Uses mindfulness strategies to prevent relapse of depression or mood disorders

Mindfulness-based Treatments

- **Mindful Movement^{5,11}**

- A variety of practices:
 - Tai Chi – focuses on martial art
 - Qi Gong – focuses on movement to guide energy
 - Yoga – focused on spiritual, mental, and physical practice
- Reduces stress
- Enhances strength and flexibility
- Improves mood, concentration, relaxation

Practice Exercise 1: Mindful Breathing

- **Get into a comfortable sitting or reclined position**
 - Loosen any tight clothing
 - Uncross legs
- **Place one hand on chest, one hand on abdomen**
- **Take three deep, relaxed breaths, counting to 3 for each inhale, and 3 for each exhale**
- **Focus on allowing your abdomen to rise and fall, while keeping your chest still**
- **Continue for 2-10 minutes**

Practice Exercise 1:

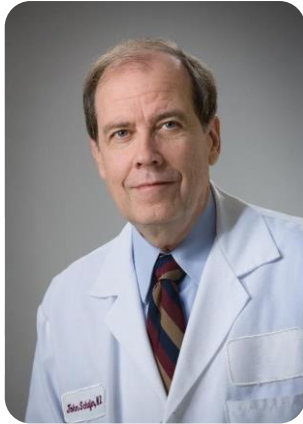
Progressive Muscle Relaxation

- **Get into a comfortable sitting or reclined position**
- **Begin with mindful breathing for 1-2 minutes**
- **Start at your feet and work your way up, focusing on one muscle group at a time**
 - Curl your toes downward, hold for 5 sec, relax
 - Flex your feet upward, hold for 5s, relax
 - Flex your thigh muscles, hold for 5s, relax
 - Flex your buttocks, hold for 5s, relax
 - Arch your back, hold for 5s, relax
 - Tighten your abdominal muscles, hold for 5s, relax
 - Push out your chest, hold for 5s, relax
 - Clench your fists, hold for 5s, relax
 - Flex your biceps, hold for 5s, relax
 - Raise your shoulders, hold for 5s, relax
 - Gently roll your neck forward, hold for 5s, relax
 - Gently roll neck backward, hold for 5s, relax
 - Smile as wide as you can, hold for 5s, relax
 - Close your eyes tightly, hold for 5s, relax
 - Raise your eyebrows, hold for 5s, relax

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11. Khalsa, S.B. (2004). Yoga as a therapeutic intervention: A bibliometric analysis of published research studies. *Indian J Physiol Pharmacol*, 48(3), 269-285.

Thank You!



John Schafer, MD



Meghan Beier, PhD



Abbey J. Hughes, PhD

Questions/Comments

Can Do MS Resources

e | NEWS
your best life update

Q&A

Can Do Library

Find these resources at www.MSCanDo.org.

National MS Society Resources

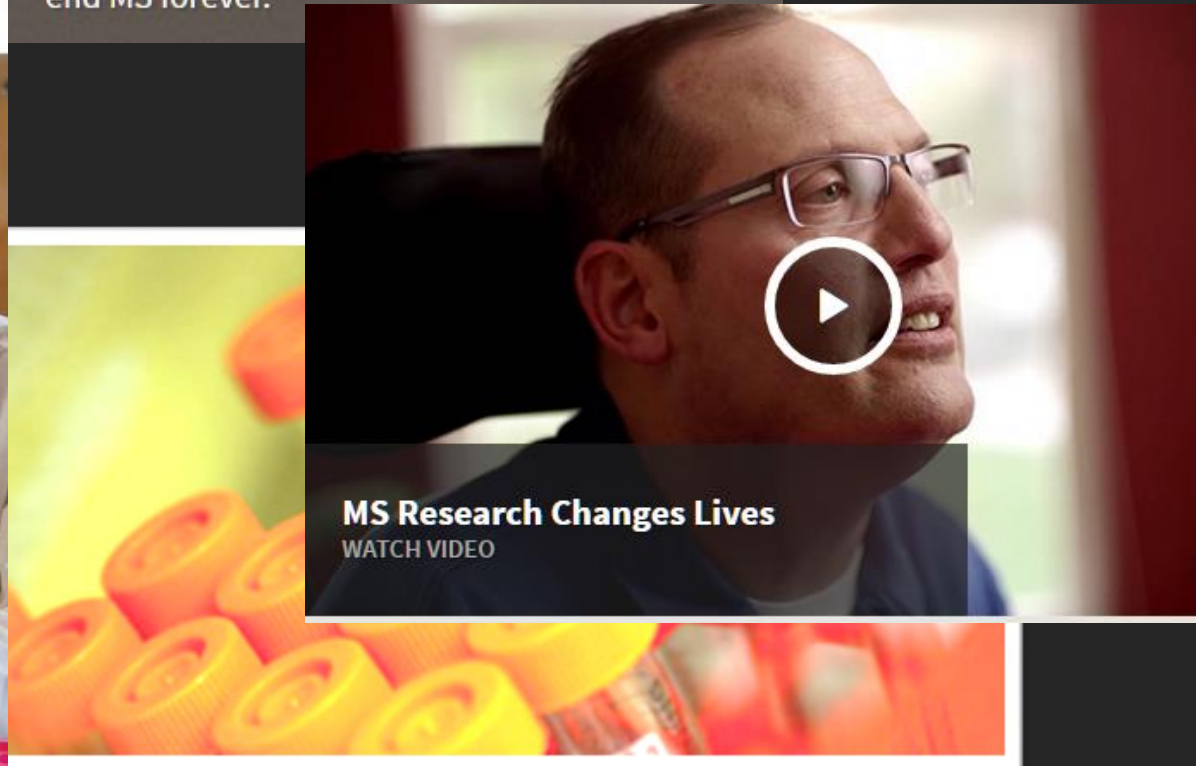
Research Directions in MS: Progress & Strategies

GENERAL INFORMATION



Research

Our Vision is a World Free of MS. We are a driving force of MS research and treatment to stop disease progression, restore function, and end MS forever.



nationalMSSociety.org

WEBINAR & TELELEARNING SERIES



Mind and Body: A Winning Team in Stress Management



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