



# A Brain Health Guide: Multiple Sclerosis (MS)



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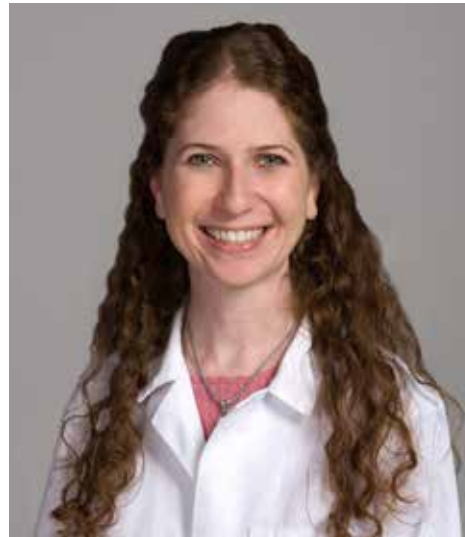
# HEALTHY BRAIN & HEALTHY MS



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Multiple sclerosis (MS) is an autoimmune disease of the brain and spinal cord that affects how our neurons communicate with each other. While disease-modifying therapies are critical in managing the condition, wellness practices are also vital in sustaining a healthy life and preserving how well our brain functions. These practices are individualized and incorporate a holistic approach. They include a focus on physical, emotional, spiritual, occupational, and intellectual activities.

Wellness is a lifelong commitment to engaging in healthy practices that improve how you feel, think and move. By participating in these activities, individuals living with MS can take back some control and possibly lessen long-term disability, fatigue and pain. Abiding by a healthy plant-based diet, exercising routinely, maintaining sufficient vitamin D levels, abstaining from tobacco use, engaging in health maintenance with a primary care provider, incorporating stress management techniques and remaining active in the community and workplace are all ways in which persons living with MS can help improve the way they live their everyday lives.

We are proud to present Cleveland Clinic Mellen Center for MS and Lou Ruvo Center for Brain Health's *A Brain Health Guide: Multiple Sclerosis (MS)*. This guide provides a road map for the journey to brain health. Where supportive evidence is available, recommendations are based on the most current clinical and epidemiological data. All recommendations are likely to evolve as scientific evidence accumulates over time.

Read this guide and learn about the six pillars of brain health for persons living with MS. Understand how to protect, maintain and boost brain health in these recommended wellness practices.

Stay healthy!



Physical Exercise



Food & Nutrition



Medical Health

## The Six Pillars of Brain Health



Mental Fitness



Social Interaction



Sleep & Relaxation

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## Brain: The Three-Pound Universe

- Weight: 3 lbs
- 100 billion neurons
- 500 trillion synapses
- 300 mile/hour speed
- 70,000 thoughts per day



### It's a workhorse

The brain works 24 hours a day, 7 days a week. Even when you sleep, it doesn't.



### It's powerful

The brain generates enough electricity to power a light bulb. It is the most powerful supercomputer ever created.



### It gets better with use

When you learn something new, the structure of your brain changes. It continues to grow and change throughout life. The more you use it, the better it gets.



### It's amazing

The brain creates thoughts, drives emotions, stores memories, and controls your movement and behavior.



### It's busy

Whenever you dream, think, see or move, tiny chemical and electrical signals race along billions of "highways" between neurons. In fact, neurons create and send more messages than all of the phones in the world.



### It's resilient

Due to its "neuroplasticity," the brain is able to adapt and respond to changes and compensate for injuries and diseases. Neuroplasticity allows your brain to be jump-started, fine-tuned and remodeled throughout your adult life.

### Comorbidity: Double the Trouble

Comorbidity is the presence of one or more additional diseases or disorders occurring with a primary disease or disorder.

#### In MS this can result in:

- More disability
- More trouble walking
- More fatigue
- Increased pain
- Decreased quality of life
- Increased depression and anxiety

## What is Multiple Sclerosis?

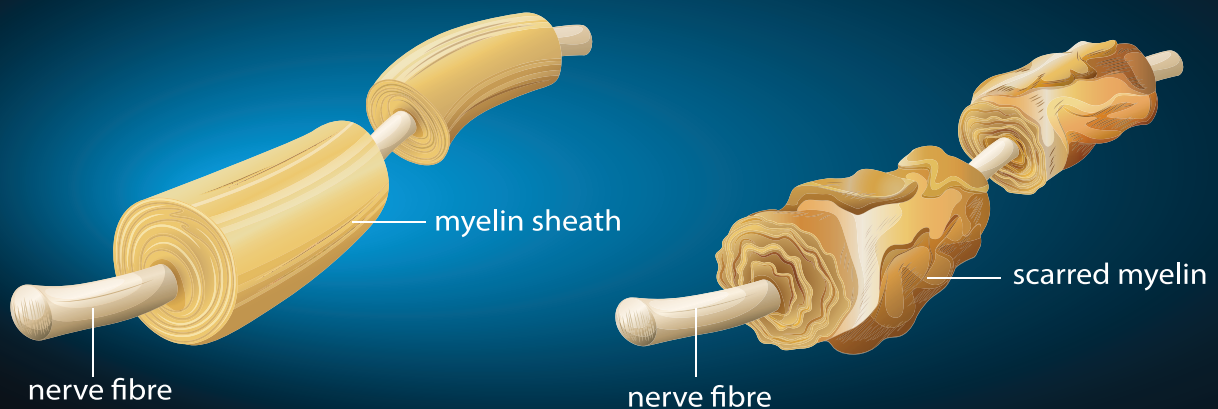
MS is an unpredictable, often disabling disease of the central nervous system that disrupts the flow of information within the brain and spinal cord, and between the brain and body. MS affects the myelin (insulation), called demyelination, and the axons and neurons (wires), called neurodegeneration.

MS symptoms are variable and unpredictable. No two people have exactly the same symptoms, and each person's symptoms can change or fluctuate over time.

Medications are used in MS to modify the disease course, treat relapses and manage symptoms. These medications help people manage their MS and enhance their comfort and quality of life.

Living well is a key component to optimal MS management. Certain factors increase the risk of worsening MS disability such as vitamin D deficiency, smoking, a diet high in sodium, diabetes, hypertension, obesity, high cholesterol, stress and lack of physical and mental activities. Lifestyle plays a significant role in brain health. Folks living with MS can manage the risk and take control to stay physically and mentally active.

### Multiple Sclerosis - Demyelination & Neurodegeneration

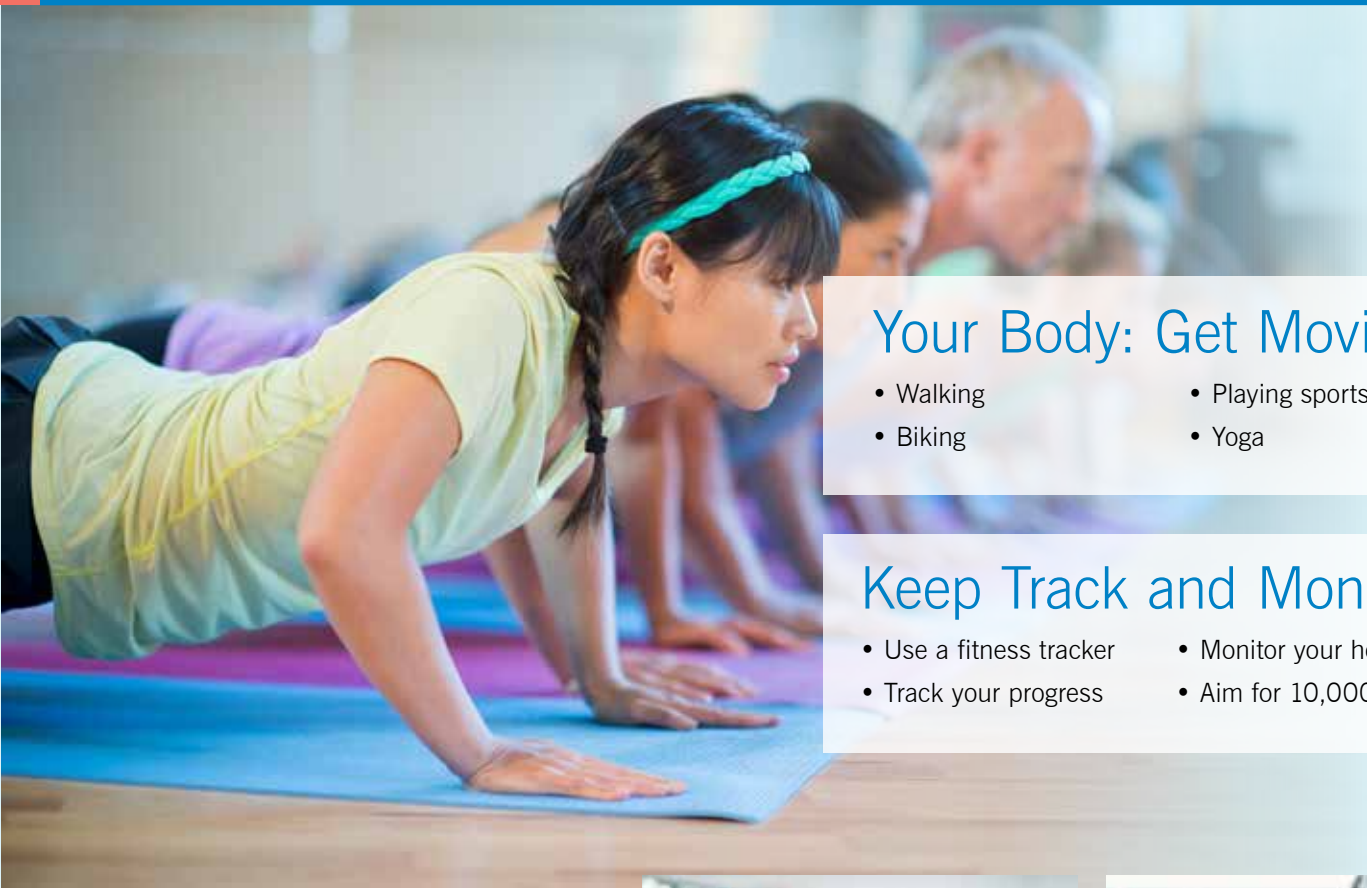


### Americans with Multiple Sclerosis

- 2.5 million people worldwide are affected with MS
- 400,000 people in the United States are living with MS



# PHYSICAL EXERCISE



## Your Body: Get Moving

- Walking
- Biking
- Playing sports
- Yoga

## Keep Track and Monitor

- Use a fitness tracker
- Track your progress
- Monitor your heart rate
- Aim for 10,000 steps

## What's good for your heart is good for your brain

People who exercise regularly may have a lower risk of developing MS disability. Exercise also improves physical functioning, walking, flexibility, and overall brain health in individuals with MS. Exercise improves blood flow and memory; it stimulates chemical changes in the brain that enhance learning, mood and thinking. Building muscles, staying flexible and practicing balance can improve posture and reduce the risk of falls. Exercise also helps to reduce stress, and improve sleep quality, both of which are important to your brain health. Physical and Occupational therapists and a mental health provider can help MS patients make positive changes in their lives.





*“The only way you can hurt your body is if you don’t use it.” – Jack LaLanne (Fitness Expert)*

## Pump Up Your Heart

Your target heart rate range for aerobic exercise of moderate intensity should be:

Age	Heart rate range (beats per minute)
70	75-128
50	85-145
30	95-162
20	100-170



### Just Get Started

***Even if you have never exercised, any physical activity is better than none at all.***

Experts recommend you exercise using a combination of aerobic, strength, flexibility and balance training as detailed below. As you can see from the example workout schedule, you should alternate activity so you do not work the same muscle groups two days in a row. Consult your doctor before beginning an exercise program, start slowly and gradually build frequency and duration. Consider seeing a physical or occupational therapist.

***For additional tips, exercises, and more, visit the office of Disease Prevention and Health Promotion website:***

<https://health.gov/paguidelines/>

#### Aerobic

- At least 3-5 days a week
- 30 minutes a day of moderate intensity
- Moderate intensity means you can talk but not sing while exercising
- Aim for your target heart rate (see box above)
- Walk, hike, bike, swim, dance or just move

#### Strength

- 2 days a week
- 1 set per muscle group, with 8-12 repetitions per set
- Exercise all major muscle groups with a 2-day minimum rest in between.
- Squats, lunges, planks, bicep curls, tricep press-down, shoulder press, etc.
- Yoga

#### Flexibility

- 3-5 days a week
- 10 minutes each session
- Hold each stretch 30 to 90 seconds
- Stretch muscles through a full range of motion
- Tai Chi, yoga and stretching

#### Balance

- 2-3 days a week
- Sit to Stand
- Stand with feet touching side by side
- Stand heel to toe
- Walk backwards and sideways
- Walk on heels and toes
- Stand on one leg
- Yoga or Tai Chi

### Example Weekly Workout Schedule

#### Monday



Walk



Weights



Stretch

#### Tuesday



Swim



Balance

#### Wednesday

#### Rest

#### Thursday



Bike



Weights



Stretch

#### Friday



Dance



Balance

#### Saturday



Hike



Balance



Stretch

#### Sunday

#### Rest



# FOOD, NUTRITION & VITAMIN D

## Choose Well, Live Well

- Limit sugar and processed foods
- Lower sodium intake
- Increase fruits and vegetables
- Choose lean sources of protein
- Eat healthy fats
- Consume adequate amounts of fiber and fluids

## The Mediterranean Way

Research shows that a Mediterranean-style diet rich in fish, whole grains, green leafy vegetables, olives and nuts helps maintain brain health and may reduce the risk of MS. Cook and eat fresh food, savor the taste, enjoy dining with family and friends. A Mediterranean regimen is more than just a diet. It's a lifestyle, a way of living well.



### Load your plate with fruits and vegetables.

Spinach, kale, broccoli and other leafy green vegetables are rich in many brain-loving nutrients. Eat some every day.



### Eat plenty of whole grains.

Whole grains — such as oats, barley and quinoa — are rich in many of the B vitamins that work to reduce inflammation of the brain. Whole grains are also an excellent source of fiber.



### Don't forget fish.

Fish is a great source of omega-3, the type of fatty acid your body can't produce, and it's good for your brain. At least twice a week, eat five ounces of omega-3-rich fish, such as salmon, cod, haddock, tuna or halibut. Fish isn't your thing? Try walnuts, flaxseeds or soybeans instead.



### Get plenty of fiber and fluids.

Adequate fiber and fluid intake is important for regular bowel movements as constipation is a common symptom. Get 25 to 35 grams of fiber daily and at least 64 ounces of water (8 8-ounce cups of water a day). Fruits, vegetables and whole grains are an excellent source of fiber.



## Take Your Vitamin D

Low levels of vitamin D (25-hydroxy vitamin D) have been associated with increased risk of developing and worsening MS. Vitamin D has effects on the immune system and may be a potential neuroprotective agent. Maintaining normal levels of vitamin D is therefore felt to be very important in MS care. 2,000 IU daily of vitamin D3 is thought to be safe in individuals with MS.



While these foods, drinks and supplements have been identified as having potential benefits for brain health, these benefits have not yet been scientifically proven.



## Give up salt

Recent evidence points to sodium intake as a potential factor in MS disease activity. Sodium is a primary component of salt. Studies show that moderate or high amounts of salt in the diet can increase the risk of relapses and the formation of new lesions. Data suggests limiting sodium intake to less than 2,000 mg a day in individuals with MS and less than 1500 mg a day for those with MS and heart disease risk factors. Try using herbs instead.



## Toast to your good health

Drink red wine in moderation. Resveratrol, found in red wine and the skin of red grapes, is a potent antioxidant. Resveratrol can possibly reduce cell damage associated with aging and may protect against the formation of damaging plaques in the brain. Stick to the maximum recommended daily amounts of one glass for women and two for men. Not a wine drinker? Enjoy red grape juice.



## Enjoy dark chocolate

Dark chocolate contains flavonoids, which are strong antioxidants. They potentially improve blood flow to the brain and reduce inflammation. Unsweetened cocoa powder offers the greatest benefit, followed by dark chocolate with at least 72 percent cocoa solids.



## Spice up your life

Many herbs and spices — such as turmeric, cinnamon and ginger — are packed with antioxidants that may decrease harmful inflammation in the brain and elsewhere. The strong flavors and the bright, intense colors are clues to the benefits hiding inside your spice cabinet.



A variety of medical conditions are strongly linked to the decline of brain function. Smoking, hypertension, diabetes, obesity, depression and high cholesterol all increase the risk of worsening MS related disability. Keep your blood pressure and weight at healthy levels, take medication as prescribed, cut down salt and sugar, keep active and stay socially connected and positive. All of this can help you stay sharp, smart, and increase the vitality and quality of life.

## RISK FACTORS

## KEEP IT IN CHECK



### Smoking

Smoking tobacco increases the risk of developing MS and the rate of disability progression. Many studies show that chronic tobacco use is a negative risk factor for worsening MS. It also increases the risk of vascular events of the brain including stroke.

- Quit.
- Cut down with a goal of quitting.
- Seek medication and group support.



### Hypertension

High blood pressure is associated with worsening physical and cognitive functioning in people with MS. Chronic high blood pressure also increases the risk of vascular events of the brain including stroke.

- Cut down on salt (less than one teaspoon a day).
- Check your blood pressure regularly.
- Keep active.
- Maintain a healthy weight.
- Take your medication.
- Aim to keep blood pressure under 120/80 mmHg.

*“How come every other organ in your body can get sick and you get sympathy, except the brain?”– Ruby Wax (Actress and Author)*

## RISK FACTORS

## KEEP IT IN CHECK



### Diabetes / Obesity

Overweight people are more likely to develop diabetes. Obesity and diabetes increase the risk of worsening disease activity and physical functioning in MS. Diabetes also increases the risk of vascular events of the brain including stroke.

- Avoid white sugar, white flour and hydrogenated fats.
- Eat more fiber.
- Eat some protein with every meal.
- Control portion size.
- Exercise for at least 30 minutes 5 times a week.



### High Cholesterol

High cholesterol increases the risk of worsening MS related disability and increases the risk of vascular events of the brain including stroke.

- Take cholesterol-lowering medications when prescribed.
- Control other risk factors like hypertension, diabetes, and obesity as advised by your doctor.

## Mental Health



### Depression & Anxiety

Mental health symptoms are more common with MS than in the general population and can lead to worsening fatigue and cognitive function, decreases in quality of life and diminished treatment adherence.

- Stay socially connected
- Seek out help in adjusting to a chronic disease
- See a mental health provider for depression, anxiety, and any psychiatric concerns
- Treating depression, anxiety and other mental health issues is an essential part of your MS care





## Your Mind: Use It or Lose It

Mental exercise is just as critical as physical exercise in keeping your brain fit and healthy. Mental exercises may improve your brain's functioning and promote new brain cell growth, which could decrease your likelihood of developing cognitive impairment. As with muscles, you have to use your brain or you lose it.

### Build your brain reserve

*You have something called "brain reserve," which helps your brain adapt and respond to changes and resist damage. Your brain reserve begins to develop in childhood and gets stronger as you move through adulthood. People who continue to learn, embrace new activities, and develop new skills and interests are building and improving their brain reserve.*



*“Every man can, if he so desires, become the sculptor of his own brain.”*  
– Santiago Ramón y Cajal (Neuroscientist and Nobel Laureate)

## Play

Do crossword puzzles, play chess, card games or online games. They stimulate the brain to produce new neurons and form new connections.

Playing electronic “brain games” can help improve your reaction time and problem-solving ability. It may also boost your attention span and help maintain your brain health.



## Learn

Take up a new hobby or skill. Study a new language, learn a musical instrument or take woodworking classes. If you are right-handed, try using your left hand more often. Novel activities help your brain form new cellular connections and strengthen connections that already exist.

## Study

Get educated. It can substantially increase your ability to fight off mental decline. The same is true of working at a challenging job. So go back to school, take classes, get a degree. You're never too old to learn and your brain will thank you in the long run.





# SOCIAL INTERACTION



## Stay Connected

Leading an active social life can protect you against cognitive impairment, which is common in MS. Spending time with others, engaging in stimulating conversation, and staying in touch and connected with family and friends are good for your brain health.

A rich social network provides sources of support, reduces stress, combats depression and enhances intellectual stimulation. Studies have shown that those with the most social interaction within their community experience the slowest rate of memory decline. Happy marriages or long-term relationships and having a purpose in life have shown significant protective effects against cognitive impairment.





*“If you haven’t learned the meaning of friendship, you really haven’t learned anything.” – Muhammad Ali (Professional Boxer and Activist)*

Keep in touch with family, maintain old friendships and work on new relationships. Here’s how:

### Branch out

Shared hobbies are a great way to meet like-minded people. Get active in sports or cultural activities. Volunteer or join clubs. You’ll be surprised at how easy it is to talk to others in a relaxed setting that you both enjoy.

### Be interested

When you begin a friendship with someone, show a genuine interest in learning about the person and his or her interests.

### Treasure your loved ones

It can be exciting to form new friendships, but remember to cherish the friends you already have by spending time with them.



### Live with purpose

A life with purpose decreases risk of depression in MS. Volunteer, get involved, worship, help others.



## The Power of Pets

People aren’t the only source of loving relationships. Animals have proven to be just as good for our brain health. If you can take on the responsibility, consider adopting a pet.

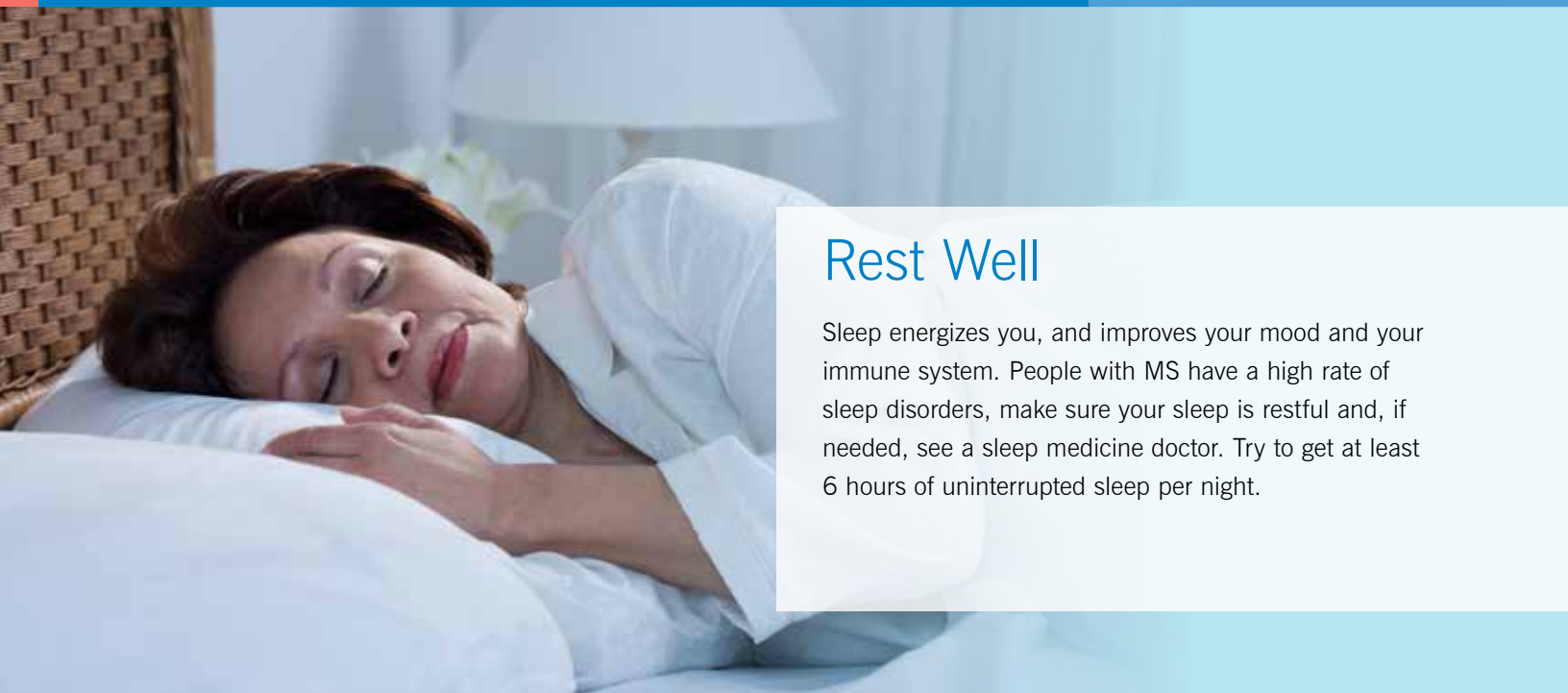
Pets ...

- Calm us down
- Boost our immunity
- Improve our heart health
- Keep us moving
- Enhance our social life

*Jordan, our Cleveland Clinic Lou Ruvo Center for Brain Health “pet therapist”: the greeter, the icebreaker, the elevator ride guide, the makes-you-feel-good companion.*



# SLEEP & RELAXATION



## Rest Well

Sleep energizes you, and improves your mood and your immune system. People with MS have a high rate of sleep disorders, make sure your sleep is restful and, if needed, see a sleep medicine doctor. Try to get at least 6 hours of uninterrupted sleep per night.

### Keys to a good night's sleep



#### Get moving.

Exercise regularly. It makes it easier to get to sleep and improves the quality of your sleep.



#### Get some rays.

Exposure to sunlight in the morning regulates your sleep/wake cycles.



#### Keep the weight down.

Sleep affects weight, and weight affects sleep. Insufficient sleep is a risk factor for overeating, while sufficient sleep helps to modulate your food intake.



#### Make it private.

Make your bedroom a sanctuary. Keep it cool and comfortable. Darken your room with heavy shades and curtains or wear an eye mask to bed.



#### Ditch the electronics.

Clear your bedroom of TVs, computers and other electronics. These gadgets emit blue light, which can disrupt the body's natural urge to sleep.



#### Trash the tobacco.

Smokers spend less time in deep sleep and more time in light sleep. They go through nicotine withdrawal throughout the entire night, which further disrupts their sleep.



#### Stick to a routine.

Develop a relaxing bedtime ritual that you perform every night before bed. Also, try to keep to the same sleep and wake time every night and morning — even on the weekends.

## Manage Stress

Stress is a given, and you will always have stress in your life. The question is not really whether you have stress, but rather, whether you're riding the waves or they're beating you up. Your own strategies for managing stress make a big difference in the health of your brain.

### How to de-stress

- **Practice saying “no”** to requests to take on projects you'd prefer to avoid.
- **Focus on the present.** Try not to worry about what may never happen or what's already in the past.
- **Keep a list of what's bothering you** and schedule five minutes a day to review the list.
- **Give your brain a 10-minute break** each day by sitting in a quiet place and focusing on your breathing.
- **Use imagery.** Consider placing a photo of your favorite spot where you can easily see it. Whenever you feel stressed, you could look at that photo, imagining for a moment how it feels, looks, sounds, and even smells to be there.
- **Think positively.** When you find yourself in a stressful situation, tell yourself: I can do this. I can figure this out. I'm going to be okay.
- **Allow events to unfold naturally.** This mindset may help to reduce the anxiety that comes with high (sometimes unrealistic) expectations.
- **Focus on the specific problem at hand** to protect yourself from making it into a bigger issue than it actually is.



### Meditation and Brain Health

Meditation is good for your brain health. Research shows that regular meditation helps keep your brain happier and healthier, hopefully for years and years to come.

*“Practice makes progress; perfection is the enemy of progress.” -- Roxanne B Sukol MD*





HealthyBrains.org is an innovative website and mobile app designed by Cleveland Clinic to engage, educate and empower all who are eager to maximize their brain health, minimize their risk of brain disorders and participate in the discovery of new treatments that may prevent, treat, and cure Alzheimer's, Parkinson's and Multiple Sclerosis.



## How Does It Work?

Signing up is completely voluntary. Use a computer, tablet, or smartphone to:

- Browse the HealthyBrains.org website
- Download the HealthyBrains app
- Register for a free, online self-administered brain checkup

Signing up for a free brain checkup does not enroll you in any other research initiatives, but you can indicate an interest in clinical trials.

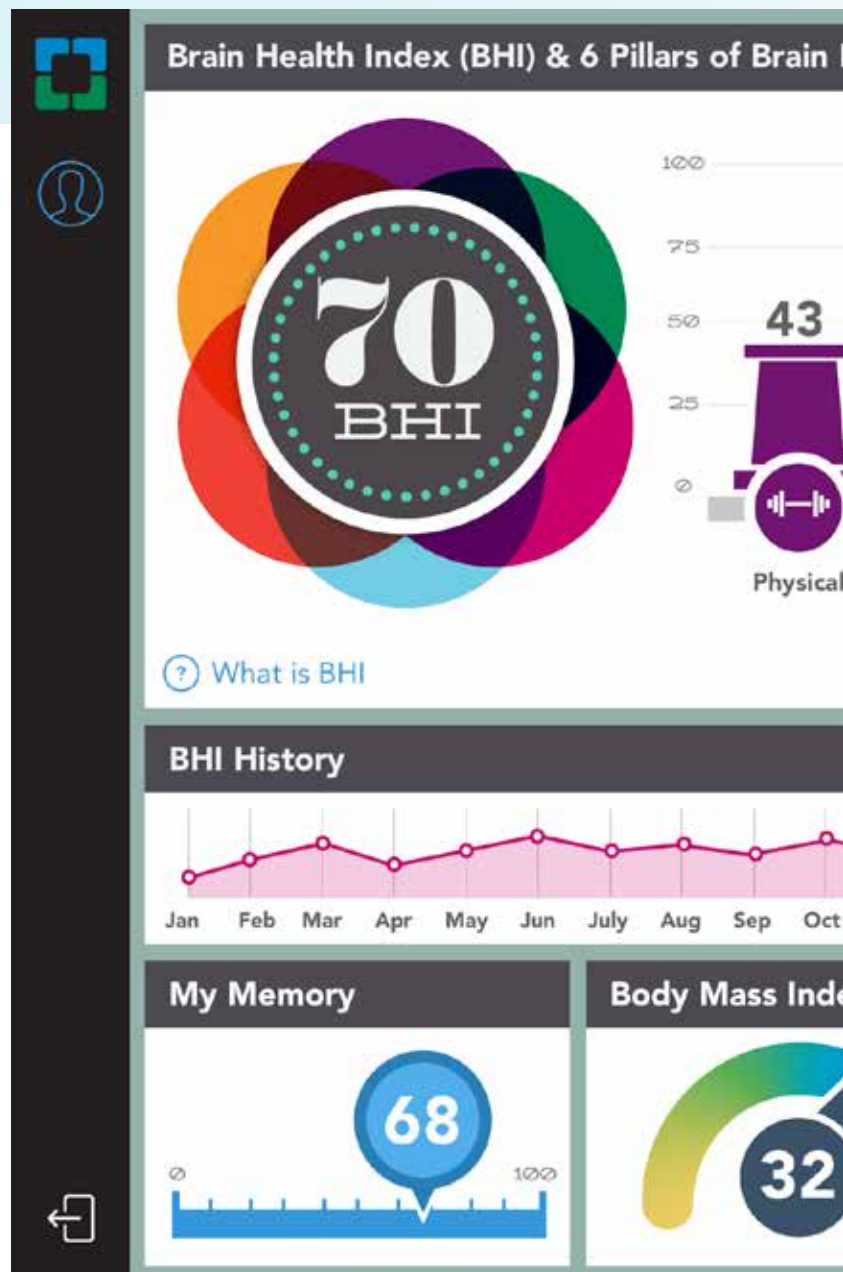


## What is HealthyBrains.org?

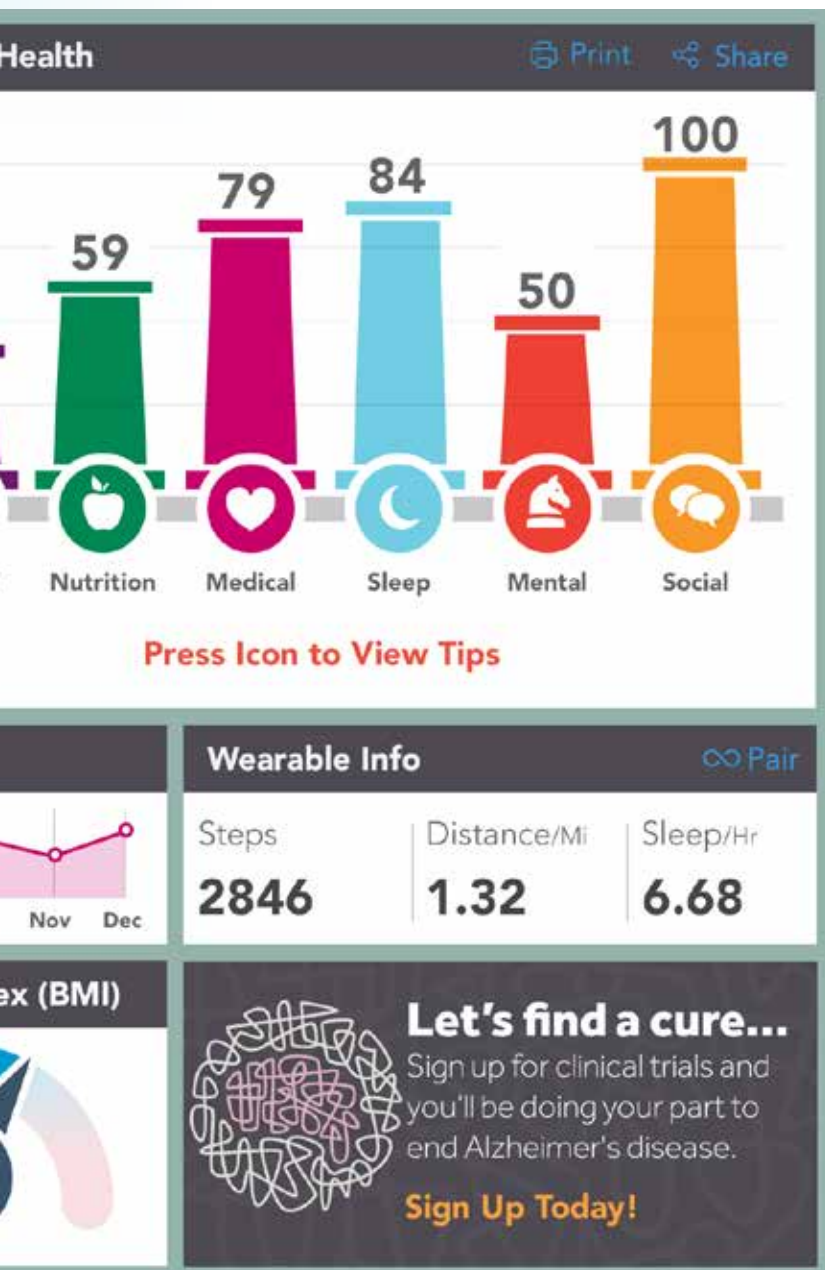
It's a tool designed to engage, educate and empower all who are eager to maximize brain health, minimize risk of brain disorders and participate in the discovery of new treatments for Alzheimer's, Parkinson's and Multiple Sclerosis

On the HealthyBrains.org website or app, you can:

- Take a free self-administered brain checkup
- Get your Brain Health Index (BHI) score and report
- Use your personal dashboard to track progress and get tips
- Test your memory as often as you'd like
- Elect to receive news trends in brain health
- Choose to learn about possible clinical trials participation



## Know your Brain Health



## Health Index (BHI) Score



### Get Informed

- Access up-to-date scientific information and resources
- Provide your email to receive current news, articles and recommendations
- Stay informed on brain health news and community events



### Join Our Community

- Become a citizen scientist
- Learn about and access clinical trials
- Join the HealthyBrains community of researchers, doctors, caregivers and people just like you
- Together we will reduce the risk, advance science and find cures for brain diseases

**Leave a legacy. Keep Memory Alive.**



**Want to Learn More?**

**HealthyBrains.org/hbg**  
healthybrains@ccf.org

Get a FREE  
brain checkup

**HealthyBrains.org/hbg**

# RESOURCES

Many resources are available to help you learn and do more to maintain the health of your brain. Here are just a few recommended by Cleveland Clinic Mellen Center for MS and Lou Ruvo Center for Brain Health.

## Websites

### AARP Brain Health Center

[aarp.org/health/brain-health/](http://aarp.org/health/brain-health/)

Brain health material spanning brain games, exercises, lifestyle, diet choices and more

### American Brain Foundation

[americanbrainfoundation.org](http://americanbrainfoundation.org)

A resource center for brain diseases

### Center for Disease Control and Prevention

[cdc.gov/aging/pdf/2013-healthy-brain-initiative.pdf](http://cdc.gov/aging/pdf/2013-healthy-brain-initiative.pdf)

The public health road map for state and national partnerships: Healthy Brain Initiative

### Multiple Sclerosis Association of America

[mymsaa.org](http://mymsaa.org)

A resource and education center for Multiple Sclerosis

### National Multiple Sclerosis Society

[nationalmssociety.org](http://nationalmssociety.org)

A resource and education center for Multiple Sclerosis

### NIH Senior Health

[nihseniorhealth.gov](http://nihseniorhealth.gov)

Health and wellness information for older adults.

See especially the Memory and Mental Health sections

### Multiple Sclerosis Foundation

[msfocus.org](http://msfocus.org)

A resource and education center for Multiple Sclerosis

### Smokefree.gov

[smokefree.gov](http://smokefree.gov)

Get encouragement, advice, tips to quit smoking, tips for a healthy diet, and exercise tips using text reminders

### SuicidePreventionLifeLine.org

National Suicide Prevention Lifeline

24/7, free and confidential support

### NAMI.org

National Alliance on Mental Illness

Dedicated to building better lives for the millions of Americans affected by mental illness.

### NCHPAD.org/14weeks/

National Center on Physical Activity and Disability

14-Week Program to a Healthier You

## Cleveland Clinic Sites

### Cleveland Clinic

[clevelandclinic.org](http://clevelandclinic.org)

Every Life Deserves World Class Care

### Cleveland Clinic Lou Ruvo Center for Brain Health

[clevelandclinic.org/brainhealth](http://clevelandclinic.org/brainhealth)

Learn about brain diseases, treatments and clinical trials

### Cleveland Clinic Mellen Center for MS

[clevelandclinic.org/Mellen](http://clevelandclinic.org/Mellen)

Treatment & Research

## Products

### Cleveland Clinic Wellness Institute

[my.clevelandclinic.org/wellness](http://my.clevelandclinic.org/wellness)

Programs to prevent illness and foster health through nutrition, exercise and stress management

## Contact Us

Cleveland Clinic Mellen Center for Multiple Sclerosis



For information on MS wellness and clinical trials, please contact:

### Cleveland Clinic - Cleveland

### Cleveland Clinic - Fairview

### Cleveland Clinic - Mayfield

[clevelandclinic.org/mellen](http://clevelandclinic.org/mellen)

[MCRResearchTeam@ccf.org](mailto:MCRResearchTeam@ccf.org)

Direct: 216.445.0303

Toll-free: 800-233-2273

Appointments: 216-444-8600

### Cleveland Clinic - Florida

[clevelandclinic.org/mellen](http://clevelandclinic.org/mellen)

Direct: 954.659.5000

Toll-free: 866.293.7866

### Cleveland Clinic - Las Vegas

[healthybrains.org/hbg](http://healthybrains.org/hbg)

[HealthyBrains@ccf.org](mailto:HealthyBrains@ccf.org)

Toll-free: 855.LOU.RUVO (855.568.7886)

