



Exercise in MG



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Disclosures

- No relevant disclosures
- Alexion pharma – Advisory Board
- Ra pharma – Advisory Board
- Immunovant – Advisory Board

Exercise and MG

Common questions:

- Can I exercise?
- Will I have an exacerbation?
- Does exercise help my MG?
- Which exercises help the most?
- Which exercises should I avoid?
- How long can/should I exercise?
- How should I build onto my exercise regimen?



<https://www.pinclipart.com>

Exercise

- Great for the body & mind
- Tons of data showing benefits for physical & mental health
 - Increases longevity
 - Lowers risk of osteoporosis
 - Weight management
 - Mood & self esteem
- Makes you feel great



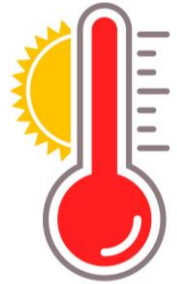
<https://splitrockrehab.com/benefits-exercise-hyped-or-true>

Exercise and MG

- Currently no exercise protocol exists
- Limited data
- However, several studies show low impact, moderate intense exercise **improves endurance & strength, reduces fatigue**
 - Psychological benefit
- Hard to give general recommendations or individualize a program
 - Factors: MG control, age, gender, fitness level

Exacerbating factors

- Extreme temperatures & humidity
- High intensity exercises
- Working out too long
- Not pacing (no breaks)
- Stairs or incline activities (not always)



Challenges

- MG is a fluctuating disease – highly variable
 - Between patients, day-to-day, within a day
- Many factors contribute on ability to exercise, on a particular day

➤ Timing of meds

➤ Disease stability

➤ Stress

➤ **Sleep**

Great
resource!



<https://www.sleepadvisor.org/exercise-and-sleep>

Fatigue

- A major issue and concern for MG patients
- In one survey, 2/3 said fatigue limits participating in activities, *even with well-controlled disease* (Naumes et al)
 - 20% of these pts engaged in low impact aerobic exercise
- Interesting fact: individuals who self reported exercise involvement had highest levels of function

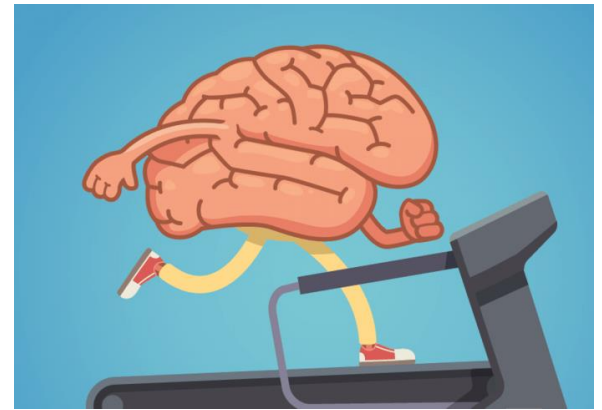
Fatigue

- Very common symptom in general population
- Many other causes: thyroid disease, anemia, cardiac or pulmonary issues, obstructive sleep apnea, chronic pain, depression
- Important to rule out other causes

Fatigue

- Maybe not just physical fatigue...
 - Stress reduction, cognitive therapy – all reduce perceptions of fatigue
 - Proper sleep hygiene
 - Other medical problems
 - Nutrition
- Holistic care: part of every MG treatment plan
 - Physical activity is an essential part

Previous study of 28 MG pts reported subjective fatigue in 82% - 1/2 of these patients experienced **cognitive fatigue**



<https://www.nextavenue.org/you-affect-brain-health>

Endurance

- Positive data that exercise helps with endurance
- Only 7% of generalized MG pts are involved in regular physical activity (Naumes et al 2016)
- **Elliptical machine** good way to start, build endurance (myastheniagravis.org)
 - Less danger of falling
 - Two sets of grab bars: one set moves, one set stationary
 - Start with stationary, graduate to moving



<https://clipartlook.com/img-228734.html>

Weight bearing exercises

- Builds strong bones
 - Prevent spine problems
 - Steroid-induced osteoporosis
- Builds muscle mass
 - Increase metabolic rate
 - Steroid-induced myopathy
- Numerous studies showing exercise increases insulin sensitivity –help with blood sugar levels



<http://blog.mercydesmoines.org>

Resistance training

- Classic thought: can worsen symptoms, possibly lead to exacerbation/crisis
- Case studies show **resistance training** can improve strength in MG patients

Case 1:

- 26 year old with MG
- Taking Prednisone and Azathioprine (Imuran)
- Began taking creatine 5 g daily + resistance exercise 3 times per week x 15 weeks
- **After 5 weeks**, improvement in strength, increase in lean body mass

Resistance training

- Helps with blood pressure regulation
- Helps reverse some of the degenerative processes associated with aging
 - Muscle loss
 - Walking speed
 - Control of movements
 - Functional daily activities
- Adults who don't engage in resistance exercise lose muscle every decade
 - ~5 lbs of muscle every decade before 50 yrs, 10 lbs of muscle every decade after 50 yrs of age

Data on Exercise

Citation	n	Type	Duration	Design	What was tested?	Positive Results	Negative Results
Lohi et al. [9]	11	Strength-training	10 weeks 27-30 sessions	Internal control; Ipsilateral trained; Contralateral untrained	Voluntary muscle force; Dynamic, repetitive max. isometric contraction fatigue	23% ↑ max. muscle force in knee extension	Slight to moderate pain initially; Fatigue with repetitions
Wong et al. [5]	5	Balance Strategy Training	8-16 weeks 16 sessions	Delayed entry control	MG severity, function, balance	↓ QMG; ↓ TUG; ↑ balance	None
Davidson et al. [8]	1	Strength-training and aerobic	6 weeks total (4 weeks at home)	Case study	Balance, gait, fatigue, and strength	↓ fatigue; ↑ hip extensor and flexor strength; able to golf	Fatigue with repetitions

Table 1: Research on exercise and MG.



- Improves functional ability & balance
- Improves maximal muscle force & endurance
- Lohi et al: 1st prospective study showing supervised strength-training is **safe**, can **improve leg strength** in the MG population
- Westerberg (2018): 11 patients, 12 week supervised PT regimen
 - **Safe, quadriceps strength improved**, performance based measures improved (30 second chair stand test)

Rest or Exercise (RESTOREX) in Myasthenia Gravis: A Randomized Controlled Trial

Usha K Misra¹, DM; Jayantee Kalita¹, DM; Varun K Singh¹, DM; Aditya Kapoor*, DM;

Abhilasha Tripathi, PhD; Prabhakar Mishra, PhD**

56 Pages • Posted: 30 Jan 2020

- 2 groups: exercise (30 min walk) or rest
- Measurement: 50% change in MG Quality of Life score at 3 months
- Pts in **exercise group** had **significantly better QOL scores**
 - Increase in # of steps in the 6 min walk test (plus walking distance covered)
- **Exercise group also reduced their Mestinon & Prednisone dose!**
- No adverse events in either group
- This study shows class II evidence of improved QOL in mild to moderate MG by 30 min walking

Temperature

Med Sci Sports Exerc. 2006 Jan;38(1):13-20.

Preliminary results: Effect of whole-body cooling in patients with myasthenia gravis.

Mermier CM¹, Schneider SM, Gurney AB, Weingart HM, Wilmerding MV.

- 5 female, 1 male with generalized MG (29-58 yrs)
 - Cooling vest vs normal body temp
 - Muscle strength & endurance measured using upper body muscle groups
 - Myasthenia muscle score, lung function measurements, fatigue scale
- Results: myasthenia muscle score & inspiratory pressure **increased significantly** with cooling



Case

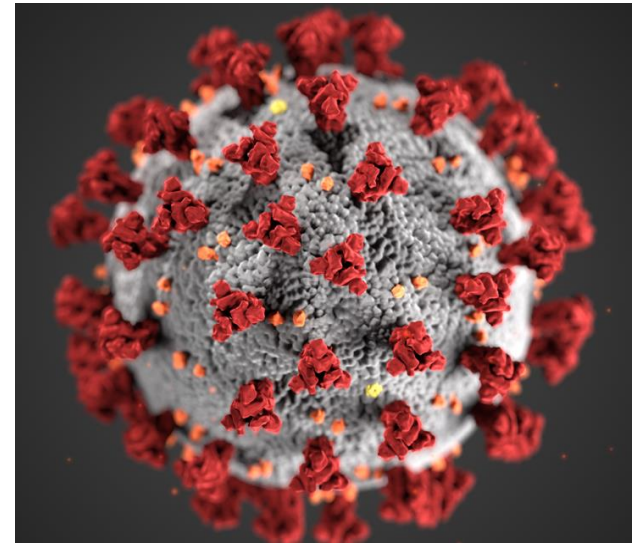
- Case study of a runner with MG who completed an ultra endurance event (Scheer et al)
 - Completed a 220-km 5-day ultramarathon
 - Had weakness, fatigue, unintelligible speech, swallowing issues, ocular issues, etc.

So, don't recommend training for an ultra endurance event....

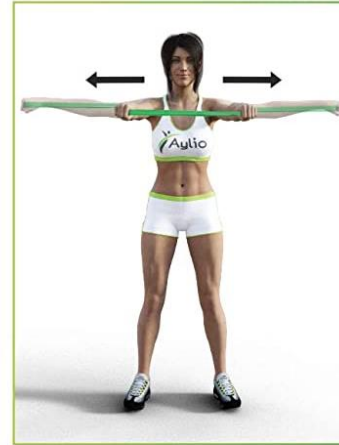
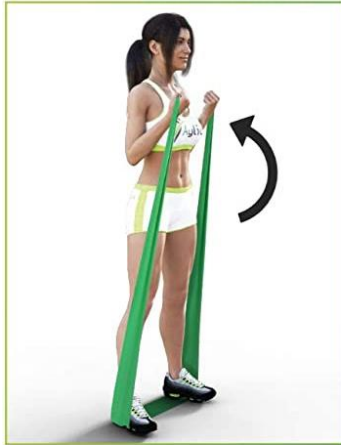


Exercise during a pandemic

- Over 105,000 cases of coronavirus COVID-19 in the U.S.
- Social distancing recommended
- Many cities with shelter-in-place order – gyms closed
- Don't need a gym!



Resistance exercises



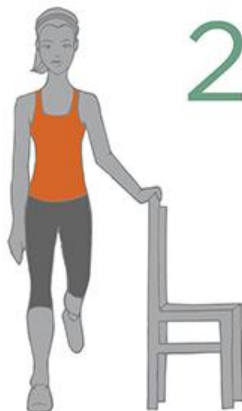
Weight bearing exercises

1 SQUAT



Stand with feet slightly wider than shoulder-width apart. Bend or hinge 30 to 40 degrees at the hips, shifting them back and down as you bend your knees. Lower yourself to a comfortable position. Your knees should not extend past your toes. Push through your heels to return to the starting position. Repeat 10 times.

2 SINGLE LEG STANDING WITH SUPPORT



Stand with feet shoulder-width apart. Bend one knee slightly and slowly lift that leg 3 to 6 inches off the floor. Hold for 10 seconds before returning your foot to the floor. Repeat 10 times for each leg. **Challenge move:** Lift your leg higher, so your thigh is parallel to the floor.

5 FORWARD LUNGE



Stand with feet shoulder-width apart. Lift one foot and step forward, planting your foot firmly on the ground. Slowly shift your weight onto your front foot, lowering your body to a comfortable position. Return to the starting position. Repeat 10 times for each leg.

3 SIT TO STAND



Stand with a sturdy chair behind you, knees just in front of the seat. Bend at the knees and hips, slowly lowering yourself to a sitting position. Pause, then stand up. Use a chair with arms for extra support. Repeat 10 times.

4 STEP UP



Stand in front of a low step with feet shoulder-width apart. Place one foot firmly on the step. Push through the heel, bringing the other foot onto the step. Slowly return one foot to the ground, then the other. Repeat 10 times for each leg. **Challenge move:** Use a higher step.

TIPS:

Hold onto a railing, the back of a sturdy chair or a countertop for support.

Make each exercise more challenging by doing more repetitions, performing the movement without support, or holding weighted objects.

 **Marshfield Clinic**
..... Don't just live. Shine.

Online classes

- Free on-demand programs available
- Nike training club
- Campgladiator.com
- YMCA360.org
 - Boot Camp, Barre, Yoga
 - Low impact programs for seniors



“COVID19 has presented our country with unprecedented challenges, & YMCA360 is one way we are responding to help people of all ages stay active & engaged.”

- Kevin Washington, President & CEO of YMCA, USA

YMCA HEALTH & FITNESS VIDEOS



Yoga



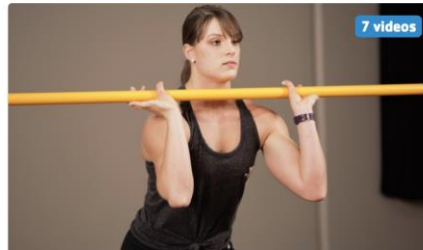
Bootcamp



Barre



Active Older Adults



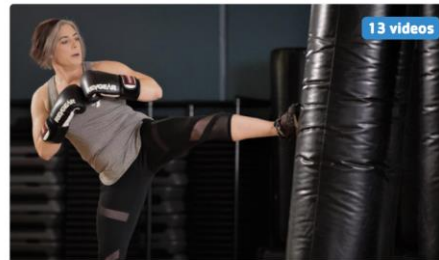
Weightlifting



Tai Chi



Youth Soccer



Y BOX



Youth Sports Performance



Nike Training Club 4+

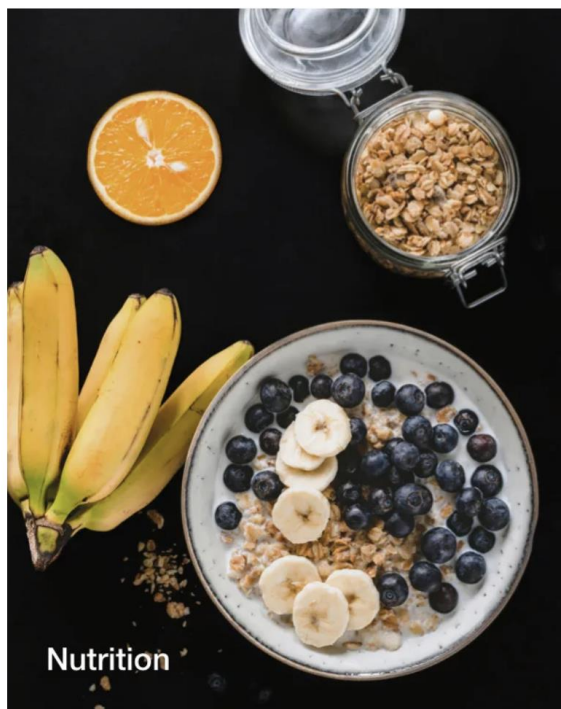
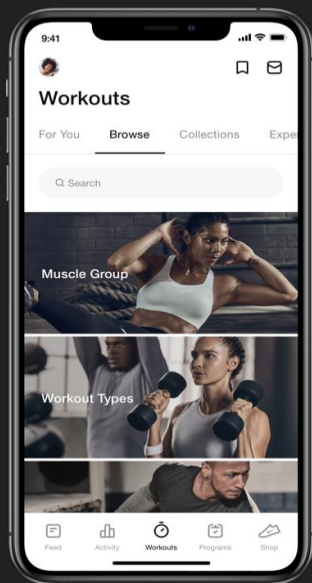
workouts & fitness guidance

[Nike, Inc](#)

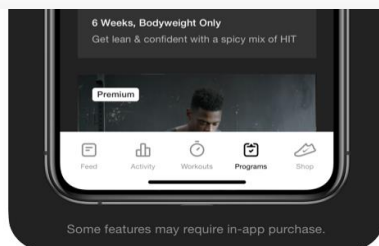
#10 in Health & Fitness

Screenshots [iPhone](#) [Android](#)

185+ Free Workouts
for All Levels

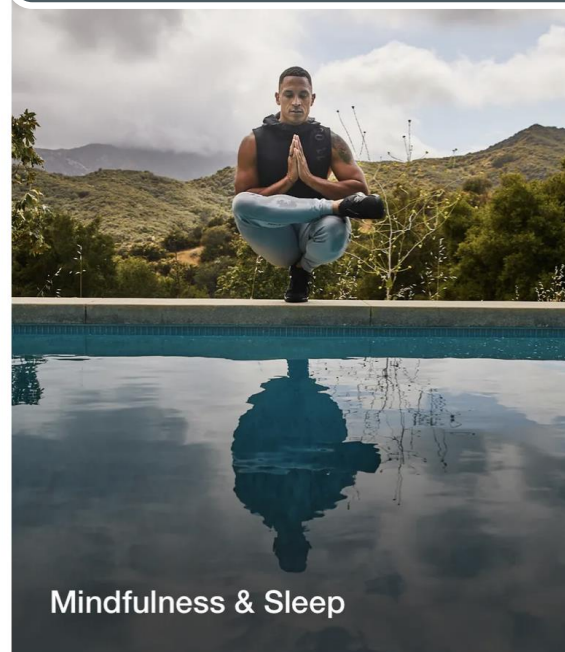


Eat better with strategies from our team
of nutrition and fitness experts.

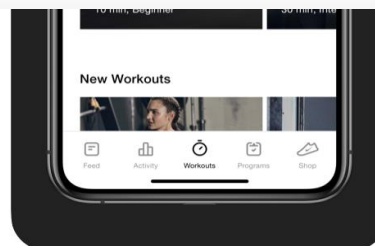


Some features may require in-app purchase.

Nutrition + mindfulness & sleep tips!



Keep your outlook positive and your body
powered up.



Some features may require in-app purchase.

Moderate to severe MG

- Moderate to severe MG: not enough evidence to determine risk/reward of exercise
- Typically *higher risk* for exercise
- Have trouble with activities of daily living, so exercise more tenuous if disease unstable

Discussion

- “Protocol” - what would this look like?
- Can be confusing
 - For patients & doctors
- Need to develop stronger evidence
- PT regimen
- Set reasonable goals
- Individualize



Different forms of exercise

- What constitutes exercise?
 - Park further away and walk – work, shopping
 - Stand up from chair 5 times, then 10, then 15
 - Yard work, gardening
 - Weight lifting, resistance bands
 - Walking, jogging, running



Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

What do moderate- and vigorous-intensity mean?

Moderate: While performing the physical activity, if your breathing and heart rate is noticeably faster but you can still carry on a conversation — it's probably moderately intense. Examples include—

- Walking briskly (a 15-minute mile).
- Light yard work (raking/bagging leaves or using a lawn mower).
- Light snow shoveling.
- Actively playing with children.
- Biking at a casual pace.

Vigorous: Your heart rate is increased substantially and you are breathing too hard and fast to have a conversation, it's probably vigorously intense. Examples include—

- Jogging/running.
- Swimming laps.
- Rollerblading/inline skating at a brisk pace.
- Cross-country skiing.
- Most competitive sports (football, basketball, or soccer).
- Jumping rope.

Health benefits

- MG patients are not immune to other diseases (cardiovascular)
- **Physical inactivity ranked as one of the top 5 risk factors for overall mortality globally**
- Work with your doctor to create a good exercise plan
- LISTEN to your body



Summary

- MG symptoms should be stable
- Set reasonable goals
- Exercise at highest point of day (Mestinon, morning, post nap)
- Resistance training & low-mod intense exercise are safe
- **Improves strength, fatigue, mobility, quality of life**
- Cooler temperatures can help
- MG fluctuates: change exercise regimen to meet changes in function



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- <https://www.cdc.gov>
- <https://health.clevelandclinic.org>
- <https://shine365.marshfieldclinic.org>
- <https://ymca360.org>

Questions?

