

Exercise as Medicine

Why Mitochondria Matter

Mitochondria are present in almost every cell in the human body. Creating more than 90% of our required energy, our mitochondria transform the food we eat and oxygen we breathe into essential energy, which keeps our hearts beating, lungs breathing, brains thinking, and bodies moving.

When mitochondria don't function properly, they don't produce the energy we need. Mitochondrial disease commonly affects energy-intensive systems such as the heart, liver, kidneys, brain, muscles, digestive tract, eyes and ears.

Exercise is Mito Medicine

If you have mitochondrial disease, safe and mindful exercises can be highly beneficial. Exercise can improve mitochondrial quantity and function, improve muscle strength, and help reduce fatigue.

The benefits of exercise extend to every part of the body and improve mitochondrial health. Exercise advantages for everyone include:

- **increasing production of healthy mitochondria which means more energy!**
- growing muscle strength and joint health
- boosting energy and stamina
- supporting brain health
- helping to maintain blood pressure control
- supporting the reduction of anxiety and depression
- helping to maintain a healthy weight
- increasing the body's ability to use oxygen while exercising (VO2max)
- improving quality of life

A Successful Start to Exercising

The best exercise for you is the exercise you enjoy doing but before you start a new routine, consult your doctor. A cardiac screening is recommended for mito patients to ensure you are fit to move forward.

Focus on your strengths first and start slowly with low-intensity exercises for smaller increments of time. As strength and endurance improve, gradually increase the diversity, intensity and time of exercises. Always listen to your body and adjust accordingly.

Take time to plan the workouts you want to do and reserve time in your schedule. Creating personal goals with help keep you motivated.



Exercising Safely with Mito

It's important to listen to your body and exercise safely when living with mitochondrial disease. Notice personal signs of exhaustion. It's ok to take a break and recover, especially when you are new to exercise. A heart monitor can track your heart rate while exercising to ensure you stay within the recommended target zones. Pushing yourself too hard can lead to levels of fatigue that can be dangerous. Watch out for the following symptoms:

- severe muscle soreness
- light headedness
- hearing loss
- blurred vision
- heart palpitations and/or chest pain
- unable to talk

Important considerations

- do not exercise with a fever or flu
- avoid exercising in extreme heat, humidity or cold weather
- consider what time of day is best for you to exercise
- know your equipment to ensure a safe workout
- ask people at the gym or a buddy for guidance when needed
- wear proper footwear

Know Your Limits

Over-exercising can injure your muscles and lead to **rhabdomyolysis**, a serious condition that occurs when damaged muscles release proteins and electrolytes into the blood. It can cause permanent damage to the heart and kidneys and is sometimes fatal. The hallmark sign of this condition, on top of fatigue and muscle cramps, is dark brown urine. If this occurs, it is important to seek medical attention right away.

Having an exercise buddy is a great way to stay motivated, get help with equipment, and feel safe if you aren't comfortable exercising alone. Make sure that your buddy is someone who understands life with mito.

Nutrition Matters

Proper nutrition is very important when exercising. Keep these tips in mind to keep your energy high:

- don't exercise after fasting for six or more hours
- have a light meal with carbohydrates and hydration before exercising
- keep fats, protein and fibre-dense foods low before exercising
- wait at least 30 minutes before starting exercise after eating
- always stay hydrated before, during and after your workouts
- try to have at least 20 grams of protein and carbohydrates within 30 minutes after exercising

Don't Over-Exercise - Rest and Recover as Need

It's essential for those living with mito to not over-exercise, not do too much too soon, and to take enough time after exertion to rest and recover. If you have a mito episode, be patient and give your body the time it needs to recover. When you are ready, slowly start moving again to build your strength back up.

There are two main types of exercise that can benefit your mitochondrial and overall health. These are i) strength, or resistance, training and ii) endurance training.

Strength (Resistance) Training

Strength training involves contracting muscles against resistance. Resistance can be your own weight or tools like dumb bells, rubber tubing, or items from around the house.

Strength training involves doing a **low number of high-intensity** repetitions. In the beginning, you may only be able to do one set. Over time, your goal is to do three sets of 12-15 repetitions of each exercise.

Benefits of resistance training include:

- promoting mitochondria production
- improving muscle strength and endurance
- increasing power and size of muscle fibres
- decreasing mitochondrial mutations for some patients

Equipment for strength training can include:

- free weights
- therabands
- ankle and wrist weights
- your own body
- water bottles or cans of food



Strategies for Success

Resistance exercises do not have to be done while standing. They can be done while sitting, using assistive devices such as walkers and wheelchairs. If you're unsure whether a resistance exercise is achievable while standing, start sitting and work your way up.

Keep the following in mind as you exercise:

- start slowly
- watch for symptoms of over-exertion
- make and follow a schedule
- wear proper footwear and exercise in front of a mirror to check your form to help reduce the risk of injury

Begin your routine with a 5-minute warm-up. This can include walking, cycling or light resistance exercises. Begin doing one set of repetitions and then gradually build up to 3 sets, focusing on major upper muscle groups (chest, upper back, front and back of upper arms) and lower body muscle groups (thighs, buttocks, calves and hamstrings).

To determine your level of resistance, keep the following in mind:

- you should have some fatigue after 10-15 repetitions
- the resistance is **too heavy** if you can only do 8 repetitions
- the resistance is **too light** if you can do 20 repetitions

Benefits of Balance Exercises

Balance exercises help improve the quality of life for those whose stability is affected by mitochondrial disease. In a safe environment, balance exercises can decrease the risk of falls and support muscle strength.

When starting out, work with a buddy or have something to safely hold onto in case you need it. Start with balance exercises you feel safest doing, then once you're comfortable, you can add others. Examples of balance exercises are yoga, pilates and dance.

Endurance (Aerobic or Cardiac) Exercise

Endurance exercise, also known as aerobic exercise, usually involves **many, low intensity repetitions** that make your heart and lungs work harder.

Benefits of endurance training include:

- promoting mitochondria production
- supporting overall heart and lung health
- improving the heart and lung's ability to obtain and deliver nutrients and oxygen to muscles.
- increasing muscle endurance by improving blood flow and mitochondrial production

Some examples of endurance training are walking, running, biking, jumping rope, swimming, treadmill, ski machine, Stairmaster, recumbent or upright bike (spinning), and pedal ergometer.

When doing exercise outdoors, make sure to take into account air and water temperatures. Managing body temperature through heat and cold can require you to consume extra energy that can stress your mitochondria.

Tips for Staying on Track

It can be hard to stay motivated but don't give up if you miss a day. Take the time you need to recover and start again when you're ready. Tips to help you stay on track include:

- finding exercises you will enjoy and look forward to doing
- using the buddy system when working out
- making a list of goals and what motivates you
- keeping a fitness schedule and be consistent; it takes three weeks to form a habit
- rewarding yourself
- having equipment easily accessible



Make Exercise for Children with Mito Fun!

Make exercise fun for children with mitochondrial disease. Find endurance and resistance activities that they enjoy. Pets such as dogs can be a great motivator for children to do exercise.

Start slow and gradually increase the frequency and intensity of the exercise/activity. Take time to stretch, warm up and monitor carefully for warning symptoms. As with adults, be mindful of nutrition and fasting periods. Take rests, especially with a cold or illness and watch out for muscle aches and pains as a sign to rest.

If you're living with mitochondrial disease, daily exercise is essential to your health. From improving strength and energy levels to reducing fatigue, stress and anxiety, exercise offers many important benefits that can be gained with even small increases in physical activity. Those first steps are the most important and MitoCanada is here to encourage and help you energize your life.

MitoCanada is the Canadian charity dedicated to creating a world where all lives are powered by healthy mitochondria. Visit us at: www.MitoCanada.org.

This education guide has been developed by MitoCanada for information purposes only. It should not be used to replace the medical advice of your physician or other qualified healthcare provider who knows you and your full medical history.