



Why Exercise?

The benefits of an exercise program

People with chronic lung disease often avoid exercise because they feel short of breath. They may feel exercise will be harmful. The opposite is actually true. Inactivity decreases the efficiency and strength of muscles, which makes them require more energy to do daily tasks.

A program with endurance, strength, and flexibility exercises, helps muscles become stronger and more efficient. Your muscles will need less energy to complete daily tasks.

Deconditioning

Deconditioning occurs with prolonged bed rest or in a person who is sedentary for an extended period of time. The effects of deconditioning result in decreased:

- Muscle mass
- Strength
- Cardiovascular function
- Total blood volume
- Plasma volume
- Heart volume
- Orthostatic tolerance
- Bone mineral density

The Big Picture

Coronary Artery Disease Risk	Exercise Effect
Smoking	Same or decrease
Hypertension (high blood pressure)	Decreases systolic and diastolic blood pressure
Increased blood lipids	Increases HDLs (good cholesterol)
Diabetes	Increased muscle activity has insulin effect
Obesity	Decreases
Stress	Decreases

Notes:

Aerobic vs. Anaerobic

- Just like a car uses gas for fuel, our muscles use **Adenosine Triphosphate (ATP)** for their “fuel.”
 - ATP in stored muscle: 3
 - ATP from glucose metabolism: 36
 - ATP from fat metabolism: 463
- Metabolism of oxygen occurs in the part of our cells called the **mitochondria**.
- Most of the oxygen in the blood is carried by **hemoglobin**.
- When we measure your oxygen saturation during exercise, we are referring to how saturated the hemoglobin in your blood is with oxygen, and it is based on the pressure of oxygen in your alveoli.
- **Myoglobin** is what carries oxygen in our muscles.

The Small Picture

Training Effects of Aerobic Exercise

- Increase in size and number of mitochondria
- Increase in skeletal muscle myoglobin
- Increase in capacity to burn fat
- Increased ability to oxidize carbohydrate in trained muscles
- Increased blood volume and total hemoglobin
- Increase in amount of oxygen extracted from circulating blood
- Increase in maximum breathing volume, decrease in submaximal ventilation
- Increase in stroke volume at rest and during exercise
- Increase in maximum cardiac output
- Blood flow re-distribution
- Metabolic adaptations in muscle fiber type
- Decrease weight, decrease body fat, increase lean body mass
- Increase body heat regulatory mechanism
- Increased bone density with weight-bearing exercise

How do you get a training effect?

Overload Principle: You have to exercise at a level above normal to bring about a change.

METs: Metabolic equivalents. 1 MET equals 3.5 ml/O₂/kg body weight/min. There is a direct relationship between how much oxygen you consume and your heart rate as a guide to determining how much oxygen you're consuming. Problem for people with lung disease is that your ventilation usually limits you before heart rate does.

Borg Scale: On a scale of 0 to 10, 0 is no shortness of breath and 10 is the most you have ever felt. Maintain a Borg Scale rating of 3 to 5 (moderate to severe).

Warm-up: The goal is to increase body temperature and slowly increase heart rate and blood pressure to meet your body's new demands. Warm-up should last 5 to 10 minutes. Often the best warm-up is a lesser intensity of the aerobic exercise you intend to do. For example, a good warm-up on the treadmill is SLOW walking before faster walking.

Aerobic Exercise: Aerobic exercise should be 20 to 60 minutes in duration. Added health benefits beyond 30 minutes are minimal. Always try to use pursed-lip breathing, especially if getting short of breath. Try to increase your distance or time a little each day. Frequency: 4 to 6 times a week.

Strength Training: Strength training should only be done every other day. Perform 8 to 12 repetitions, 3 times a week. Increase weight by 5% once you can do 12 repetitions. Exhale as you do the work, avoid the **Valsalva** (holding your breath). Always lift slowly and control the motion as you return to your start position.

Flexibility: Always hold the stretch for 30 seconds and keep breathing. Avoid positions that compress your lungs and abdomen. It is best to do your stretches after your body has warmed up, to avoid injury. Stretch either after your warm-up or near the end of your exercise session.

Cool-down: Spend 5 to 10 minutes slowly bringing your heart rate back down, to avoid possible blood pooling in your legs which can result in dizziness. Again, a lesser intensity of your aerobic exercise is a good way to do this.

Specificity of Training: Specific exercise elicits specific adaptations creating specific training effects. For example, if you want to get stronger walking, you need to walk.

Always remember to warm up and cool down. Beginning exercise too suddenly can cause abnormal heartbeats, increase your shortness of breath, and increase your risk of injury. Stopping exercise too suddenly can cause dizziness and abnormal heartbeats.

Questions?

Your questions are important. Call your doctor or health care provider if you have questions or concerns. UWMC Clinic staff are also available to help at any time.

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Factors Affecting Training: Factors affecting training include disease state, initial fitness level, frequency of training, intensity of exercise, duration of exercise, and type of exercise.

Oxygen Use with Exercise: The goal is to keep your oxygen saturation above 90% during exercise. Oxygen use during exercise enables your body to make physiologic adaptations that occur with training. Don't view it as a failure – it is just the key to opening up the door.

Reversibility Principle: Significant reductions in working capacity can be measured after only 2 weeks of de-training, and almost all improvements are lost within several months.

Home Exercise: Here are home exercise guidelines for people with Chronic Obstructive Pulmonary Disease (COPD):

- Leg endurance exercise
 - Walking or cycling
 - 5 times a week
 - 10 to 20 minutes in duration
- Arm endurance exercise
 - “Arm-r-cise,” arm ergometer
 - 3 times a week
 - 10 to 15 minutes in duration
- Strength training
 - Weights, circuit training, theraband
 - 3 times a week, not two days in a row
 - 6 to 10 upper and lower body exercises
- Flexibility
 - Choose 6 to 10 stretches (half upper/half lower body)
 - 5 times a week, preferably after endurance exercise
 - Hold stretches for 20 to 30 seconds to get benefit

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