

Muscle Building and Steroids

by Sophia



WHAT'S COVERED

In this lesson you will look at the effects of exercise and steroids on muscle tissue. Specifically, this lesson will cover:

1. Aerobic Exercise

When we talk about **aerobic exercise**, we are referring to exercises that increase your heart rate, such as running, swimming, jogging and biking. This type of exercise will increase the quantity and size of mitochondria in muscle cells.

Mitochondria are the powerhouse of the cell, and their function is to produce ATP energy. Aerobic exercise will increase the quantity and size of mitochondria within muscle cells. This increase allows muscles to produce more energy and, therefore, sustain the aerobic activity for a longer period of time.

A person doing a lot of aerobic exercises will also have more capillaries running to the muscles. This means more blood is going to those muscles, providing more oxygen. More oxygen will mean more **myoglobin**, which is a protein that binds to oxygen. Carbon dioxide is able to be removed at a faster rate as well. Aerobic exercise will also build up endurance for muscles, enabling them to work longer without tiring.

IN CONTEXT

Let's say you don't run very often, but today you decide to start. You may not be able to go very far before your muscles get tired. You then decide to keep going three or four times a week. Over time, your muscles would adapt to that exercise. Your mitochondria would increase, and more capillaries would run to the muscles in your legs. You would have increased blood flow to the area, allowing for more oxygen to reach the muscles and more carbon dioxide to be removed. Eventually, these increases would mean you would be able to run for a longer period of time without tiring out.



TERMS TO KNOW

Aerobic Exercise

A type of physical activity that gradually conditions slow muscles to work for longer periods of time.

Myoglobin

A pigment that binds oxygen for the use of ATP production.

2. Strength Training

Strength training can have effects on muscles as well. Strength training refers to activities like weightlifting. Essentially, this type of exercise increases the force that your muscles can exert; it affects your fast muscle fibers.

Strength training causes more myofibrils to be produced. Therefore, muscles increase in size and strength, but not necessarily in endurance. **Creatine** is a substance that's naturally found in muscles. It works to replace ATP while the muscles are working out. Often people who do a lot of strength training will take creatine as a supplement to replenish ATP in their muscles more quickly, which helps with endurance.



TERMS TO KNOW

Strength Training

A type of physical activity that increases the size of the muscles and has an effect mainly on fast muscle fibers.

Creatine

A substance found naturally in muscles or used as a supplement to replenish ATP during muscle workouts allowing muscles to sustain activity for longer periods of time.

3. Anabolic Steroids & Their Use

You may have heard of **anabolic steroids** before; they have become quite popular in recent years for athletes who use them as performance enhancers. Because of this, they are becoming illegal.

Anabolic steroids are something that people, like athletes or bodybuilders, will use to enhance their physical performance or to build muscle. The word "anabolic" (like the term "anabolism" from Unit I) refers to the ability to help build muscle. They are a synthetic substance that mimics **testosterone**, a hormone (molecular signal) involved in, among other things, muscle-building. Anabolic steroids can be taken orally, or they can be injected.



TERMS TO KNOW

Anabolic Steroids

A substance that mimics testosterone used to build muscle and enhance physical performance.

Testosterone

The hormone that controls the development of the male reproductive system, as well as many tissues in both the male and female body.

4. Side Effects of Anabolic Steroids

Anabolic steroids can have very negative effects on the body. The liver is an organ affected by steroids, as the use of steroids can lead to a condition called **jaundice**. Some other general effects that they can cause include infertility, baldness, high blood pressure, **liver** and kidney tumors, aggressive behavior, mood swings,

and depression. Some of these can be life-threatening and irreversible.

There are also some side effects that are gender specific:

- Male side effects may include reduced sperm count, increased risk of prostate cancers, development of breasts, and the risk of testicles shrinking.
- Female side effects can include growing facial hair, an abnormal menstrual cycle, a deepened voice, and baldness.



TERMS TO KNOW

Jaundice

A disorder associated with liver function that can be caused by the use of steroids.

Liver

The largest of the visceral organs, the liver produces bile and secretes it into the gallbladder to be stored; the liver also processes nutrients such as amino acids and carbohydrates and also “detoxifies” the blood.



SUMMARY

Aerobic exercise and **strength training** both have effects on muscles, but their effects are different. Aerobic exercise will increase mitochondria and blood flow to muscles, thereby increasing endurance. Strength training will increase the myofibrils in muscles, thereby increasing the force that a muscle can exert. Both aerobic exercise and strength training have excellent health benefits; however, speeding recovery and muscle growth with anabolic steroids can cause severe health problems. **Anabolic steroids** are a synthetic substance that mimics testosterone. They can have a large impact on the liver, leading to conditions such as jaundice. Keep up the learning, and have a great day!

Source: THIS WORK IS ADAPTED FROM SOPHIA AUTHOR AMANDA SODERLIND



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Anabolic Steroids

A substance that mimics testosterone used to build muscle and enhance physical performance.

Creatine

A substance found naturally in muscles or used as a supplement to replenish ATP during workouts. Replenishing ATP allows muscles to sustain activity for longer periods of time.

Jaundice

A disorder associated with liver function. Jaundice can be caused by the use of steroids.

Liver

The largest of the visceral organs, the liver produces bile and secretes it into the gallbladder to be stored; also processes nutrients such as amino acids and carbohydrates and also “detoxifies” the blood.

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A pigment that binds oxygen for the use of ATP production.

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A type of physical activity that increases the size of the muscles and has an effect mainly on fast muscle fibers.

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