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What Is Muscle Hypertrophy?

By Elizabeth Quinn, MS | Updated on July 05, 2021

Medically reviewed by Michael Lau, PT, DPT, CSCS

Muscle hypertrophy refers to an increase in the size of muscle cells and is often associated with weight training. The most common type of muscular hypertrophy occurs as a result of physical exercises, such as weightlifting, but genetics play a role as well. Learn how muscle hypertrophy works and how to maximize your gains during your strength training workouts.

Hypertrophy: How Do Muscles Grow?

When you start exercising a muscle, first there is an increase in the nerve impulses that cause muscle contraction. This often results in strength gains without any noticeable change in muscle size.

But, as you continue to exercise, there is a complex interaction of nervous system responses that results in an increase in protein synthesis. Over months, the muscle cells begin to grow larger and stronger. This is a three-step process.

1. Stimulation

Stimulation occurs during the contraction of the muscle (during the actual exercising). A repeated contraction during a workout causes damage to the cells that make up internal muscle fibers.

This cellular damage triggers an inflammation response, which the body actually utilizes to promote recovery. Stressing a muscle leads to an increase in hormones connected with muscular growth, such as testosterone, human growth hormone, and insulin-like growth factor-1.

2. Repair

Muscle fiber repair occurs after the workout, while the muscles are resting. New muscle fibers are produced to help replace and repair the damaged ones. More fibers are produced to make up for the damaged ones and this is where the actual muscle growth takes place.

3. Peripheral Fatigue

Researchers have begun to identify another component of muscle hypertrophy. Peripheral fatigue occurs when you are unable to complete exercises, such as at the end of strenuous activity.

> Studies are ongoing, but scientists believe that the more peripheral fatigue you can induce, the harder the muscles have to work. Therefore, the more the muscle that becomes stimulated, the more hypertrophy occurs.

Types of Muscle Hypertrophy

There are three basic types of muscular hypertrophy:

- **Myofibrillar hypertrophy** is the increase in the number of myofibrils, which are the long strands in the muscle that help it contract. When the myofibrils increase, the muscle gets stronger and denser.
- **Sarcoplasmic hypertrophy** refers to the muscles increasing their volume of sarcoplasmic fluid, or the fluid that is filled with a variety of energy-containing substances.
- **Myostatin-related muscle hypertrophy** is a rare condition that involves a significant reduction in body fat and an increase in muscle size—up to twice the normal amount of muscle mass. Those with this condition also tend to have increased muscular strength compared to the average person.

> Research shows that just six weeks of high-volume resistance training can increase skeletal muscle fiber by as much as 23% due to sarcoplasmic hypertrophy.

How Genes Affect Hypertrophy

Although the process of hypertrophy is the same for everyone, the results are likely to be different, even among those who perform the same workouts. This variance in results is due to the genetic make-up of each individual person's muscles. Genetics can affect muscle growth in several ways:

- **Degree of growth**: How big the muscles can get
- **Speed of growth**: The rate at which muscles can increase in size
- **Shape and appearance**: What the muscle looks like

Tendon Length

The shape of a muscle is determined by the length of the tendons of the muscle. Tendon length is a genetic factor. Shorter muscle tendons lead to bigger muscles while longer muscle tendons lead to smaller muscles.

Someone with extremely long muscle tendons may see less growth and shaping of their muscles compared to someone with much shorter tendons. This is despite doing the same amount of (or more) weight training.

Muscle Fiber Types

Muscles are made up of different muscle fibers: type 1, or slow-twitch, and type 2, or fast-twitch. Different muscles have different ratios of type 1 and type 2 fibers, and these are affected by genetics. For maximum hypertrophy, you need to train each muscle fiber type with different exercises.

This is why athletes in sports like football have large muscles. Their training involves different types of activities that target both fast and slow-twitch fibers. Lifting heavy weights, for example, targets slow-twitch fibers, and sprinting targets fast-twitch fibers.

> If you won the genetic lottery, you may grow bigger muscles or see results sooner than others. Unfortunately, however, the opposite may also be true.

Strength Training for Hypertrophy

Exercises that build muscle are those that contract the muscle against resistance repeatedly. This usually means weight training using free weights, exercise machines, resistance bands, or bodyweight exercises.

There are many suggested training regimens that vary the load weight, the number of repetitions, and the rest intervals between sets. While each has its proponents, the end results may depend more on your dedication to your workouts and your body type.

Regardless of the plan that you choose, you want to work to the point of fatigue (muscular failure) as this creates the largest stimulus for muscle hypertrophy. This means lifting until you cannot lift anything more, but without sacrificing proper form.

How Often Should You Strength Train?

The American College of Sports Medicine (ACSM) recommends that most people strength train two to three times per week. Training on non-consecutive days gives the muscle fibers time to relax and repair, thus growing bigger in size.

If this feels overwhelming, research has found that doing just one strength training session per week is as effective as doing three sessions per week; that is, as long as you do the same exercises and the same number of repetitions that you'd do in the three separate sessions.

> If you are new to weight training, start with one session per week and work up from there. If you have been strength training for some time, three sessions weekly may fit into your workout schedule more easily.

How to Maximize Muscle Hypertrophy

While it seems like targeting and isolating a specific muscle such as with biceps curls would generate the most muscle gain, the best way to maximize hypertrophy is with compound exercises that recruit multiple muscle groups.

Try the following compound exercises to build bigger, stronger muscles:

- Bench presses
- Deadlifts
- Pull-ups
- Push-ups
- Shoulder presses

Planning Your Workouts

How often you should exercise for muscle hypertrophy depends on your goals as well as other factors such as your age, sex, and weight.

1. **Designate 2 to 3 days per week for strength training**. This schedule is ideal for beginners, though experienced weight lifters may increase their frequency of training. The idea is to space out your weight lifting workouts to ensure your muscles have time to repair and recover on rest days when you're not lifting.
2. **Progress to heavier weights**. If you're a beginner, start with the lightest weights and gradually increase weight as you get stronger. Do not attempt to lift very heavy weights until you have plenty of experience with lighter weights. If you're more experienced, continue to gradually add weight, ideally under the supervision of a trainer or spotter.
3. **Alternate between upper and lower body lifting**. Devote specific days of the week to focus on either your upper or lower body. If you're looking for total-body results, this method works well for allowing certain muscle groups to rest while you focus on others.

Optimizing Your Workouts

To get the most out of your weight lifting workouts and maximize muscle gain, use these tips to support hypertrophy.

- **Cross-train with cardio** to build cardiorespiratory endurance for a healthy heart. Research shows that cardiovascular exercise also supports lean muscle gain.
- **Follow a reps-and-rest cycle**. Fitness experts advise around 6 to 12 reps per set followed by 60 to 90 seconds of rest between sets to stimulate hypertrophy.
- **Lift the right amount of weight**. Don’t lift a weight that’s too heavy, as this could cause injury. At the same time, you don't want to lift a weight that's too light since that would make muscle gains less likely.
- **Switch up your routine** to engage different muscle groups. Performing the same weight lifting routine over and over again for an extended period of time can lead to a plateau and possibly injury.
- **Work with a certified personal trainer** who can help you create a personalized strength training program to help you achieve your desired results.

> Keep challenging yourself with heavier weights as you progress, but don't try to lift too much too soon. While your muscles will adapt as you get stronger, it's important to be

> mindful to not push yourself past your limits. Working with a personal trainer can help you stay safe and keep you on track with your fitness goals.

A Word From Verywell

Weight training can help you increase your muscle size, but your genes and other factors play a role in hypertrophy as well. As a rule of thumb, always listen to your body when trying to increase your muscle mass, and consider working one-on-one with a personal trainer for additional guidance. Push your muscles hard enough to grow, but avoid pushing them too far as this can cause injury.

11 Sources

Verywell Fit uses only high-quality sources, including peer-reviewed studies, to support the facts within our articles. Read our editorial process to learn more about how we fact-check and keep our content accurate, reliable, and trustworthy.

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