

# PERFORMANCE 101:

## What Limits Muscle Growth



When discussing what Limits Growth we need to discuss 4 Topics: 1) Fiber Number, 2) Fiber Type, 3) Myostatin, and 4) Hormones. 1) Fiber Number: Hyperplasia vs Hypertrophy

**Summary:** The amount of muscle cells (fibers) within each of your muscles is pretty much determined at birth. There is some debate that you can grow additional muscle fibers, which is termed hyperplasia, but not much research supports that. For the most part then we have to develop the individual muscle fibers that we have to elicit growth. The growth of muscle fibers is termed hypertrophy. Also, the muscle fibers we have are limited in how much they can grow. So we are limited by how much muscle cells we have at birth and these fibers have a limit to how much they can grow. **If hyperplasia does occur, it likely contributes very little (<5 percent) to absolute muscle growth, and anabolic drugs may play a role. In a study of the biceps of body builders researchers state based on evidence that hyperplasia occurs in human subjects is lacking and, if it does occur at all, the overall effects on muscle cross-sectional area would appear to be minimal** Read On!

# What Limits Muscle Growth

When discussing what Limits Growth we need to discuss 4 Topics: 1) Fiber Number, 2) Fiber Type, 3) Myostatin, and 4) Hormones.

## 1) Fiber Number: Hyperplasia vs Hypertrophy

The amount of muscle cells (fibers) that you have is pretty much determined at birth. There is some debate that you can grow additional muscle fibers, which is termed hyperplasia, but not much research supports that. For the most part then we have to develop the individual muscle fibers that we have to elicit growth. The growth of muscle fibers is termed hypertrophy. Also, the muscle fibers we have are limited in how much they can grow. So we are limited by how much muscle cells we have at birth and they have a certain limit to how much they can grow.

More details on Hyperplasia: How does muscle grow at the cellular level is highly debatable. Historically, two primary mechanisms—hypertrophy and hyperplasia have been proposed to explain how an increase in the size of an intact muscle might occur. As mentioned *hypertrophy* refers to an increase in the size of individual muscle fibers, whereas *hyperplasia* refers to an increase in the number of muscle fibers. The NSCA suggest the research over the past 40 years has shown that the predominant mechanism for increasing muscle size is hypertrophy. Hyperplasia in humans may exist but is still very controversial as a major mechanism for increasing the intact size of a muscle. **If hyperplasia does occur, it likely contributes very little (<5 percent) to absolute muscle growth, and anabolic drugs may play a role.** Its existence may also be attributable to a mechanism called *neural sprouting* if it does occur at all. A meta-analysis by Kelley found that hyperplasia occurs in certain animal species under experimental conditions as a result of mechanical overload. Increases in muscle fiber number were greatest among those groups that used an avian vs a mammalian model, and stretch overload yielded larger increases in fiber count than exercise. However, subsequent research suggests that such observations may be erroneous, with results attributed to a miscounting of the intricate arrangements of elongating fibers as a greater fiber number. **In a study of the biceps of body builders researchers state based on evidence that hyperplasia occurs in human subjects is lacking and, if it does occur at all, the overall effects on muscle cross-sectional area would appear to be minimal (STUDY).**