

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.



3) Myostatin

Summary: As mentioned muscle cell type and number are genetically based and we are limited in growth by the amount of and type of fibers we have. **Our muscles also have a control mechanism that sets a limit to the size they can grow.** There are a variety of reasons for this but growth differentiation factor-8, more commonly known as **myostatin**, is a major reason. It is the protein responsible for controlling the growth of our muscles. It is essentially a negative regulator of skeletal and cardiac muscle; meaning that the more myostatin you have, the lower the limit of your muscle mass. The extremely muscular cattle, the Belgium Blue, has a mutation for myostatin, and a similar effect has also been observed in humans who lack myostatin due to an inactivating mutation. Experiments in mice have shown that myostatin worked on two levels. First, it controls the muscle fiber (cells) number during embryogenesis and second, it controls muscle fiber size in adults. So it appears that your muscle mass won't increase beyond a certain limit due to your body's inherent genetic myostatin level. **Exercise is one of the safest ways of reducing myostatin levels.** The National Institutes of Health's US National Library of Medicine has published studies showing that aerobic exercise reduces myostatin levels in muscle tissue and the bloodstream ([research](#)). It has also been shown that resistance training may lower myostatin levels ([study](#)). **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.

3) Myostatin

There is a limit to how much we can grow. As mentioned muscle cell type and number are genetically based and we are limited in growth by the amount of and type of fibers we have. There are also control mechanisms that influences growth. For instance, we stop increasing in height after a certain age. Our muscles also have a control mechanism that sets a limit to the size they can grow. There are a variety of reasons for this but growth differentiation factor-8, more commonly known as **myostatin**, is a major reason. It is the protein responsible for controlling the growth of our muscles. It is essentially a negative regulator of skeletal and cardiac muscle; meaning that the more myostatin you have, the lower the limit of your muscle mass. When scientist disrupt the gene for myostatin in mice they grow larger. The extremely muscular cattle, the Belgium Blue, has a mutation for myostatin, and a similar effect has also been observed in humans who lack myostatin due to an inactivating mutation. Myostatin, like most other control mechanisms in the body, works via **negative feedback**. After a certain point, when our muscles are large enough, the myostatin concentration reaches a point where it is high enough to stop muscle growth. Experiments in mice have shown that myostatin worked on two levels. First, it controls the muscle fiber (cells) number during embryogenesis and second, it controls muscle fiber size in adults. So it appears that your muscle mass won't increase beyond a certain limit due to your body's inherent genetic myostatin level. There is some research being done on myostatin inhibitors, but the issue is that it could have negative consequences on other systems like the cardiovascular system and on bone ([research](#)). **Exercise is one of the safest ways of reducing myostatin levels.** The National Institutes of Health's US National Library of Medicine has published studies showing that aerobic exercise reduces myostatin levels in muscle tissue and the bloodstream ([research](#)). It has also been shown that resistance training may lower myostatin levels ([study](#)).

As mentioned the other big player in the game of muscle growth is our muscle cells, also called fibers. Our muscle mass is determined by the number of fibers (cells) that our muscles have, types of muscle fibers (some types grow bigger than others), and the size of those fibers. The number of muscle fibers we have usually does not change after development. On the other hand, the size of these fibers can, of course, increase or decrease depending on diet and exercise.

