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# Required strategies of muscles growth

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### Abstract
Muscle use the movement of actin against myosin to create contraction. In skeletal muscle, contraction is stimulated by electrical impulses transmitted by the nerves, the motoneurons (motor nerves) in particular. Cardiac and smooth muscle contractions are stimulated by internal pacemaker cells which regularly contract, and propagate contractions to other muscle contractions are facilitated by the neurotransmitter acetylcholine.
Muscle hypertrophy is an increase in the size of a muscle through an increase in the size of its component cells. It differs from muscle hyperplasia, which is the formation of new muscle cells. Depending on the type of training, the hypertrophy can occur through increased sarcoplasmic volume or increased contractile proteins
Muscle grows best when they have a good internal environment — quality muscle tension during exercise, adequate fuels, protein building blocks, enough rest to recover from hard work, and ample amounts of anabolic hormones.
The keys to the anabolic trigger include hard work, maximizing anabolic hormone levels, providing adequate nutrients for muscle growth, and giving muscles enough rest to recover optimally. Follow these simple procedures and you will create an ideal internal metabolic environment that will help muscles grow:
These "anabolic triggers" are related to each other. If muscle chronically works too too hard, anabolic hormones become suppressed, muscle and liver carbohydrate stores become depleted, and proteins break down. If muscle works hard, but gets enough rest, muscle builds cell receptors that make anabolic hormones work better, suppresses catabolic hormones, build s protein, and maximizes carbohydrate stores in tissues. Some of the biological factors, cross education, exercies, insulin, rest, timing to eat, protiens, creatine phosphate and some minlerls like chromiun, boron, vanadium and HMB are major strategiecal facttors for a good muscle growth.

**Keywords:** Required strategies, muscles growth

### Introduction
The three types of muscle (skeletal, cardiac and smooth) have significant differences. However, all three use the movement of actin against myosin to create contraction. In skeletal muscle, contraction is stimulated by electrical impulses transmitted by the nerves, the motoneurons (motor nerves) in particular. Cardiac and smooth muscle contractions are stimulated by internal pacemaker cells which regularly contract, and propagate contractions to other muscle contractions are facilitated by the neurotransmitter acetylcholine.
The action a muscle generates is determined by the origin and insertion locations. The cross-sectional area of a muscle (rather than volume or length) determines the amount of force it can generate by defining the number of sarcomeres which can operate in parallel. The amount of force applied to the external environment is determined by lever mechanics, specifically the ratio of in-lever to out-lever.
The efficiency of human muscle has been measured 18% to 26%. The efficiency is defined as the ratio of mechanical work output to the total metabolic cost, as can be calculated from oxygen consumption. This low efficiency is the result of about 40% efficiency of generating ATP from food energy, losses in converting energy from ATP into mechanical work inside the muscle, and mechanical losses inside the body. The latter two losses are dependent on the type of exercise and the type of muscle fibers being used (fast-twitch or slow-twitch). For an overal efficiency of 20 percent, one watt of mechanical power is equivalent to 4.3 kcal per hour.

**Energy flow in muscle**

Muscular activity accounts for much of the body's energy consumption. All muscle cells produce adenosine triphosphate (ATP) molecules which are used to power the movement of the myosin heads. Muscles conserve energy in the form of creatine phosphate which is generated from ATP and can regenerate ATP when needed with creatine kinase. Muscles also keep a storage form of glucose in the form of glycogen. Glycogen can be rapidly converted to glucose when energy is required for sustained, powerful contractions. Within the voluntary skeletal muscles, the glucose molecule can be metabolized anaerobically in a process called glycolysis which produces two ATP and two lactic acid molecules in the process (note that in aerobic conditions, lactate is not formed; instead pyruvate is formed and transmitted through the citric acid cycle). Muscle cells also contain globules of fat, which are used for energy during aerobic exercise. The aerobic energy systems take longer to produce the ATP and reach peak efficiency, and requires many more biochemical steps, but produces significantly more ATP than anaerobic glycolysis. Cardiac muscle on the other hand, can readily consume any of the three macronutrients (protein, glucose and fat) aerobically without a 'warm up' period and always extracts the maximum ATP yield from any molecule involved. The heart, liver and red blood cells will also consume lactic acid produced and excreted by skeletal muscles during exercise.

**Muscle hypertrophy**

Muscle hypertrophy is an increase in the size of a muscle through an increase in the size of its component cells. It differs from muscle hyperplasia, which is the formation of new muscle cells. Depending on the type of training, the hypertrophy can occur through increased sarcoplasmic volume or increased contractile proteins

In the bodybuilding and fitness community skeletal muscle hypertrophy is described as being in one of two types: Sarcoplasmic or myofibrillar. According to this theory, during sarcoplasmic hypertrophy, the volume of sarcoplasmic fluid in the muscle cell increases with no accompanying increase in muscular strength, whereas during myofibrillar hypertrophy, actin and myosin contractile proteins increase in number and add to muscular strength as well as a small increase in the size of the muscle. Sarcoplasmic hypertrophy is characteristic of the muscles of certain bodybuilders while myofibrillar hypertrophy is characteristic of Olympic weightlifters. These two forms of adaptations rarely occur completely independently of one another, one can experience a large increase in fluid with a slight increase in proteins, a large increase in proteins with a small increase in fluid, or a relatively balanced combination of the two.

Strength training typically produces a combination of the two different types of hypertrophy: contraction against 80 to 90% of the one repetition maximum for 2–6 repetitions (reps) causes myofibrillated hypertrophy to dominate (as in powerlifters, olympic lifters and strength athletes), while several repetitions (generally 8 – 12 for bodybuilding or 12 or more for muscular endurance) against a sub-maximal load facilitates mainly sarcoplasmic hypertrophy (professional bodybuilders and endurance athletes).The first measurable effect is an increase in the neural drive stimulating muscle contraction. Within just a few days, an untrained individual can achieve measurable strength gains resulting from "learning" to use the muscle. As the muscle continues to receive increased demands, the synthetic machinery is upregulated.

**Required strategies**

Muscle grows best when they have a good internal environment — quality muscle tension during exercise, adequate fuels, protein building blocks, enough rest to recover from hard work, and ample amounts of anabolic hormones.

The keys to the anabolic trigger include hard work, maximizing anabolic hormone levels, providing adequate nutrients for muscle growth, and giving muscles enough rest to recover optimally. Follow these simple procedures and you will create an ideal internal metabolic environment that will help muscles grow:

These "anabolic triggers" are related to each other. If muscle chronically works too too hard, anabolic hormones become suppressed, muscle and liver carbohydrate stores become depleted, and proteins break down. If muscle works hard, but gets enough rest, muscle builds cell receptors that make anabolic hormones work better, suppresses catabolic hormones, build s protein, and maximizes carbohydrate stores in tissues.

**Biological factors**

Several biological factors such as age and nutrition can affect muscle hypertrophy. During puberty in males, hypertrophy occurs at an increased rate. Natural hypertrophy normally stops at full growth in the late teens. An adequate supply of amino acids is essential to produce muscle hypertrophy. As testosterone is one of the body's major growth hormones, on average, men find hypertrophy much easier to achieve than women. Taking additional testosterone, as in anabolic steroids, will increase results. It is also considered a performance-enhancing drug, the use of which can cause competitors to be suspended or banned from competitions. In addition, testosterone is also a medically regulated substance in most countries, making it illegal to possess it without a medical prescription.

**Cross education**

Muscular, spinal and neural factors all affect muscle building. Sometimes a person may notice an increase in strength in a given muscle even though only its opposite has been subject to exercise, such as when a bodybuilder finds her left biceps stronger after completing a regimen focusing only on the right biceps. This phenomenon is called cross education

**Exercises**

Experts and professionals differ widely on the best approaches to specifically achieve muscle growth (as opposed to focusing on gaining strength, power, or endurance); it was generally considered that consistent anaerobic strength training will produce hypertrophy over the long term, in addition to its effects on muscular strength and endurance. Muscular hypertrophy can be increased through strength training and other short duration, high intensity anaerobic exercises. Lower intensity, longer duration aerobic exercise generally does not result in very effective tissue hypertrophy; instead, endurance athletes enhance storage of fats and carbohydrates within the muscles, as well as neovascularization.

**Insulin**

Most people know that testosterone and growth hormone help build muscles. Insulin, on the other hand, is mainly associated with sugar metabolism — it helps the body move glucose from the blood to the cells. But that's not all it does. Insulin is a major player in muscle growth. It is an important anabolic hormone that you can harness to help muscles grow. Scientists have determined that properly timing increases in insulin levels can help you put muscle growth processes in high gear.

Insulin is a hormone produced by the Islets of Langerhans in the pancreas.body increases insulin secretion after a meal to help tissues take in, store, and use blood sugar (glucose) and synthesize and store fat. Insulin also has a tremendous effect on protein synthesis. Insulin enhances muscle growth by increasing the rate that amino acids enter the cell, increasing the production of RNA (a substance important in making proteins), increasing the activity of RNA, decreasing protein breakdown in muscle, and decreasing liver energy processes that use amino acids as fuel (i.e., gluconeogenesis).

The three most important hormones affecting protein synthesis in muscle are testosterone, growth hormone, and insulin. Each of these hormones influences muscle cell nuclei and their messengers to increase the production of muscle proteins.

Insulin also speeds the movement of amino acids into the muscle cell. Most amino acids enter muscle cells via a process called the sodium pump. Insulin speeds the action of the sodium pump, and thus increases the rate of amino acid transport into the cell. This is critical for muscle growth — the more amino acids transported into the muscle cell, the greater the rate of muscle growth.

Insulin also tends to slow protein breakdown. After you does an intense bout of exercise, body increases its protein turnover rate. This means that it increases the speed at which it both builds and breaks down protein and thus muscle tissue. Optimal muscle growth occurs when the rate of muscle growth increases and the rate of muscle breakdown slows.

Even if body increases the rate his (her) body makes new proteins, muscles won't growth if the rate of protein breakdown is also high. Scientists have shown that in fasted dogs, protein degradation rates after exercise remain high. So even though their muscles are building more protein, they don't see a net change in muscle hypertrophy because the muscle is breaking down protein at an equal rate.

If you want to build muscles at a faster rate, eat or drink carbohydrates after exercise. This will increase blood insulin levels, which will stimulate protein synthesis and prevent protein breakdown. In other words, taking in carbohydrates after exercise speeds muscle growth.

**Rest**

Get enough rest in between exercise sessions. Body builds muscle after the exercise session is over — during recovery. Initially, after a difficult exercise session, body accelerates the rates of both protein synthesis and protein breakdown. Gradually, protein synthesis outstrips breakdown. You will experience an accelerated the movement of amino acids into the cells for several days after a tough exercise session.

Unfortunately, if don't get enough rest, this accelerated rate of amino acid transport reverses itself. Studies by Dr. Atko Viru of Tartu, University in Estonia, using dogs and rats, found that exercising prematurely after an intense workout decreased the amino acid transport rate into muscle, thus limiting the potential hypertrophy. The lesson from his studies are that rest is an important ingredient in muscle growth.

**Timing to eat**

Raise blood insulin levels and provide nutrients for muscle growth after exercise. This is a key ingredient in turning on the anabolic trigger. Immediately after exercise and again one hour after exercise, a beverage or meal containing carbohydrates, amino acids, and Creatine monohydrate. This drink will increase blood insulin level for approximately one hour and provide nutrients to help speed muscle growth.

Drink the other beverage one hour after exercise so that insulin level stays elevated.Timing is very important. The basic idea is to stimulate insulin release after exercise, then stimulate it more by feeding your dog additional carbohydrate supplements.

**Protein**

The dietary protein requirements of the general population have been the subject of extensive investigation. It is now generally accepted that a daily requirement of about 0.6 grams of protein per kilogram body weight per day will meet the needs of most of the population, provided that a variety of different protein sources make up the diet, and provided also that the energy intake of the diet is adequate to meet the energy expenditure. To allow for individual variability and variations in the quality of ingested proteins, the Recommended Daily Allowance for protein is set at about 0.8 g/kg in most countries.

The contribution of protein oxidation to energy production during exercise decreases to about 5% of the total energy requirement, compared with about 10-15% (i.e. the normal fraction of protein in the diet) at rest, but the absolute rate of protein degradation is increased during exercise because of the high energy turnover. This leads to an increase in the minimum daily protein requirement, but this will be met if a normal mixed diet adequate to meet the increased energy expenditure is consumed

**Creatine**

Creatine has been used by many successful athletes.Creatine is an amino acid (methylguanidine-acetic acid) which occurs naturally in the diet, being present in meat: 1 kg of fresh steak contains about 5 g of creatine. The normal daily intake is less than 1 gram, but the estimated daily requirement for the average individual is about 2 grams. The body has a limited capacity to synthesise creatine in the liver, kidney and pancreas and in other tissues, but the primary site of synthesis in man is the kidney. This supplies the amount required in excess of the dietary intake, and is also the only way in which vegetarians can meet their requirement. Synthesis occurs from amino acid precursors (arginine and glycine), but the synthetic pathway is suppressed when the dietary creatine intake is high.

**Other supplements**

Protein supplements have not been shown to be effective except in those rare cases where the dietary protein intake is inadequate. Individual amino acids, especially ornithine, arginine and glutamine are also commonly used, but this is not supported by documented evidence. A variety of mineral supplements, including chromium, boron and vanadium, as well as more exotic compounds such as hydroxymethylbutyrate (HMB) are also used by strength athletes, but again there are no well controlled studies to provide evidence of a beneficial effect.

b-hydroxy b-methylbutryrate is a metabolite of leucine, and is also present in small amounts in some foods. There appears to be only one study published in a peer reviewed journal in which the effects of HMB admin istration to humans has been investigated.

Chromium is an essential trace element which has a number of functions in the body, and has been reported to potentiate the effects of insulin.

Boron has been claimed to increase circulating testosterone Levels.

### Glycogen and protein synthesis

In the recovery period, muscle glycogen synthesis is a priority, but synthesis of new proteins should perhaps be seen as being of equal or even greater importance. Because little attention has been paid to this area, it is not at present apparent what factors may be manipulated to influence these processes. The hormonal environment is one obvious factor that may be important, and nutritional status can influence the circulating concentration of a number of hormones that have anabolic properties, the most obvious example being insulin. It is, however, increasingly recognised that cell volume is an important regulator of metabolic processes and there may be opportunities to manipulate this to promote tissue synthesis. During and after exercise there may be large changes in cell volume, secondary to osmotic pressure changes caused by metabolic activity, hydrostatic pressure changes, or by sweat loss.

Alterations in cell volume induced by changes in osmolality are well known to alter the rate of glycogen synthesis in skeletal muscle. Amino acid transport into muscles is also affected by changes in cell volume induced by manipulation of the trans-membrane osmotic gradient: skeletal muscle uptake of glutamine is stimulated by cell swelling and inhibited by cell shrinkage. The intracellular glutamine concentration appears to play an important role in a number of processes, including protein and glycogen synthesis, but the effect of ingestion of glutamine on these aspects of postexercise recovery is not known at this time.

Manipulation of fluid and electrolyte balance and the ingestion of a variety of osmotically active substances or their precursors offers potential for optimising the effectiveness of a training regimen.

### Conclusion

Muscle grows best when they have a good internal environment — quality muscle tension during exercise, adequate fuels, protein building blocks, enough rest to recover from hard work, and ample amounts of anabolic hormones. The keys to the anabolic trigger include hard work, maximizing anabolic hormone levels, providing adequate nutrients for muscle growth, and giving muscles enough rest to recover optimally. Follow these simple procedures and one can create an ideal internal metabolic environment that will help muscles grow.

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