**The Wonderful Benefits of Branch Chain Amino Acids better known as BCAA.**

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As I've stated in a few articles on select amino acids such as L-Glutamine the importance of these supplements are way understated. If you are looking for optimal health you really need to be taking a variety of these Amino-acids. I feel the same way about BCCA's outside of L-Glutamine and L-Arginine BCAA's are of the utmost importance for a multitude of reasons.  
  
In the quest to build muscle, most athletes can't seem to get enough protein. We eat copious amounts of chicken, steak, eggs, and fish to get it. We isolate the various types of proteins like whey and casein and make them into powders to take advantage of different digestion rates. We don't stop there though, we then isolate individual amino acids that protein is comprised of and consume them separately as well.  
  
Even the most serious of health minded people are left wondering why they need to take additional amino acids when they are already getting so many amino acids in all the protein they are consuming. The truth is that individual amino acids can influence muscle growth through a variety of different pathways, and of all the amino acids none have been shown to be more important than the branched chain amino acids.  
  
Branched chain amino acid supplements (BCAAs) have been around longer than others such as creatine and beta-alanine, but few realized the full range of their capabilities regarding muscle growth and performance. Branched chain amino acids have jumped to the forefront of research in recent years and the results have been turning heads within the fitness industry. We now know that BCAAs go far beyond simply being building blocks for muscle tissue and can affect muscle growth through pathways few thought possible.  
  
**Let's take a look at just what are the BCAA's**  
The BCAAs are leucine, isoleucine, and valine. The name "branched-chain amino acids" is derived from the structure of these compounds. Each one has a forked outcropping that looks a bit like a branch, hence the name branched chain amino acids..The three BCAAs are incredibly essential and actually fall into the category of essential amino acids. Essential amino acids are amino acids that the body cannot synthesize on its own and therefore must get adequate amounts through dietary sources. In fact, even though there are about 20 amino acids that the muscles use for growth, the BCAAs comprise roughly a third of the aminos within muscle tissue. So if muscle growth is your goal BCAAs are a must.  
  
**How are the BCAA'a metabolized?**  
It may not seem like the metabolic process of different amino acids matters as long as the end point is muscle tissue. The truth is that the manner in which amino acids are metabolized plays a large role in their functions within the body. The metabolism of BCAAs is different that the metabolic processes of other amino acids. What truly makes the BCAAs special is how they are metabolized. While most amino acids are metabolized in the liver BCAAs are metabolized primarily by muscle. Despite their structural similarities the three branched chain amino acids have different metabolic routes. The breakdown of leucine is accomplished solely through fat pathways. Valine is broken down solely through carbohydrate pathways, and isoleucine through both. The different metabolic pathways of these three amino acids lead to varying requirements for each.  
  
BCAAs, unlike most other amino acids, are metabolized in within muscle tissue, allowing them to be oxidized (used as energy) by muscle cells to produce cellular energy in the form of ATP. ATP is the primary source of energy that fuels muscle contraction and allows you to lift weights.  
  
The fact that leucine, isoleucine, and valine are metabolized within muscle tissue allows them to be a quick energy source when the body needs it. There is a significant increase in BCAA metabolism during prolonged exercise simply because the body requires more energy during periods of stress such as training. This makes BCAAs incredibly effective when taken around workout time.  
  
The unique metabolic processes, requirements, and versatility of BCAAs allow them to impact nearly every aspect of training.

**BCAA's will improve performance**  
  
Improving performance during training is of utmost importance no matter what your goals. If you are an athlete, improved performance will help you in your sport of choice during actual competition. Improved performance is just as important to the health enthusiast as well since improved performance translates into more muscle mass, which eventually translates into more fat burning.  
  
BCAAs have been proven in many studies to be a potent performance enhancer, and as previously mentioned, BCAAs make a great energy source for working muscles because of their unique metabolism. This can have a positive impact on performance. Not only can BCAAs be used as energy themselves but they also enhance fat oxidation in glycogen depleted subjects. This allows individuals to train harder for longer without fatigue due to the higher energy demands being met. This goes for both high intensity training as well as endurance training.  
  
Another way that BCAAs can enhance performance is through their ability to spare glycogen during training. Found as stored carbohydrates within muscle tissue and the liver, glycogen is the favored fuel source for working muscles engaged in high intensity exercise. This makes glycogen availability and preservation vitally important if you wish to continue to train hard for longer periods of time. Studies have shown that by ingesting BCAAs before and during training glycogen levels can be spared by 25%. It is thought that the ingestion of BCAAs boosts blood alanine levels which gets converted to glucose in the liver and then sent back to working muscle to be used as fuel. This glycogen sparing effect of BCAAs will not only allow for longer more intense training sessions but also allows for faster recovery leading to a better workout tomorrow.  
  
**How do BCAA's effect hormonal function?**  
  
They are the primary determinant for how much muscle someone will build. They are what separate top level bodybuilders from the rest, elite athletes from everyone else, and cause the muscular differences between men and women. They are hormones! The hormones that are of most importance to us as serious lifters are anabolic hormones. Anabolic hormones are hormones within the body that promote protein synthesis (muscle growth), and the most notable anabolic hormones are testosterone, insulin, and growth hormone (GH). These hormones play a large role in controlling your muscle building destiny. Luckily it has been shown that BCAA intake can have a positive effect on anabolic hormone release.  
  
Testosterone may be the most well know of the anabolic hormones. BCAAs can have a positive impact on testosterone levels when consumed pre-training. During intense training it is normal for testosterone levels to rise. After training is ceased testosterone levels will begin to fall back to normal baseline levels. Studies have shown that when athletes were given BCAAs prior to training, post-workout testosterone levels remained elevated for several hours, whereas the control groups noticed a significant drop in testosterone once training ceased. This can go a long way to maximizing growth from every single training session.  
  
Ingestion of BCAAs not only increases testosterone in the post-training period but also builds muscle by improving the body’s testosterone to cortisol ratio. While testosterone is an anabolic hormone and promotes muscle growth, cortisol is a catabolic hormone and breaks down muscle tissue. Anyone looking to build muscle will want testosterone levels to remain high while minimizing the release of cortisol. It has recently been found that taking BCAAs while resistance training results in significantly higher testosterone levels with a lower creatine kinase and cortisol response. This leads to more muscle tissue being built and less muscle tissue being broken down.  
  
Lastly, the amino acid leucine has also shown promise for increasing insulin sensitivity. Essentially, insulin sensitivity ensures that the insulin within your body maintains its effectiveness. This leads to easier fat loss, more muscle growth, and defense against diabetes.  
  
**Can BCAA's help me drop body fat? YES**  
  
The effects of BCAA intake on fat loss is something that has only been explored in more recent years. Newer research is showing that BCAAs can have a positive effect on fat loss. This doesn’t mean you can eat pizza at every meal with a side of BCAAs and the fat will just melt away though. BCAAs seem to maximize fat loss when one is already on a fat loss diet. On any fat loss diet, carbohydrates will need to be lowered to some degree. It seems that BCAAs ability to spare glycogen and increase insulin sensitivity may play a role in speeding up the results of a fat loss plan.  
  
BCAAs should also be used as a supplement during any fat loss plan because of the muscle preserving effects. On any calorie restricted plan muscle tissue loss is a serious concern that must be addressed. All of the positive effects that BCAAs have on muscle growth will also serve to protect muscle during periods of calorie restriction. It is always important to remember that anything which builds muscle will also preserve muscle.  
  
**Now a little more technical info on BCAA's and how it helps build muscle and save it when you are dieting**.  
  
Last, but most certainly not least, of BCAAs many functions is their ability to act as signaling molecules within the body. This has been bringing about some of the most exciting new research within the bodybuilding community in recent years. To get an understanding of how important this is you must first understand the role of protein within the body.  
  
It has long been known that amino acids act as substrate for muscle tissue. This essentially means that when you consume protein, your body will take the amino acids from that protein to compose muscle tissue and other proteins. This is why people often refer to amino acids as building blocks. BCAAs have been proven to be much more than simple building blocks though. Within recent years it has been discovered that BCAAs, particularly leucine, act to send signals to the body that inform it to build muscle.  
  
One of the ways leucine works to signal muscle growth is through it’s interaction with mTOR which stands for mammalian target of rapamycin. The mTOR is located within the cells and, among other things, is responsible for detecting an excess of amino acids. It has been shown to play a key role in regulating muscle hypertrophy (growth). Though this process is not entirely understood, the mTOR pathway has been discovered to be extremely sensitive to the amino acid leucine. Recent tests have shown that when leucine is taken orally it activates mTOR, which activates protein synthesis (muscle growth), and increases a cell’s capacity to produce new proteins (muscle tissue). This means that along with resistance training there is a way to send messages that control growth right at the cellular level. This is truly exciting news.  
  
Many people will ask “If leucine has the greatest effect on muscle growth, then why not take take leucine alone without isoleucine and valine?” It has consistently been shown that the greatest results in protein synthesis are seen when a 2:1:1 ratio of leucine, isoleucine, and valine are taken. When leucine is taken alone it can lower concentrations of the other two amino acids.  
  
It is also important to note, although BCAAs can act to signal muscle growth, there must be a full spectrum of amino acids to act as substrate for muscle growth. This means that you can send signals to your body to build muscle all you want, but if it has nothing to build with you are out of luck. So make sure you ingest enough whole protein every day.

**Dosage and when to take BCAA's**  
  
As with everything the dosage will vary with every single person. It's really simple though, once you get started.  
  
The more muscle mass you have and the more you are restricting calories is a good indicator on the dosage you need to be taking.  
  
Remember anytime you restrict calories below caloric requirement you will go into a catabolic phase and your body starts to feed on the muscle you worked so hard to build. That's why you need BCAA's and L-Glutamine.  
  
Taking to little of a dose is like using a garden hose to put out a major forest fire. Some of us will require larger doses than others. The best way to know your taking the right amount is simple.  
1. You lose the cravings for carbohydrates  
2. The mental fog that comes with low calorie intake improves  
3. Your sleep at night improves  
4. You feel fresher in the gym while you are training  
5. You muscle belly will take on a more full and hydrated look.  
  
For those of you that weigh under 140lbs your dosage will vary between 3 to 10 grams daily.  
  
For those of you that weigh over 141 lbs I would suggest 5 to 15 grams daily.   
  
The optimal time to take your BCAA's will be before your training session and within one hour after training. There are other times to take BCAA's as well. I recommend taking a small portion upon wakeup and you may well want another portion late evening. The amino acid you should focus on at bed time though is L-Glutamine this will help you sleep better and prevent enzymatic breakdown of muscle tissue while you sleep. You can also take L-Glutamine with you BCAA's before and after training. I also suggest taking a small dose (.500MG to 1 gram) of L-Glutamine with at least 3 of your meals.