



## Do These Supplements Increase Muscle Growth?

Anabolics, or compounds purported to increase lean mass, are one of the most popular categories of dietary supplements amongst bodybuilders, athletes and exercise enthusiasts alike. Legal compounds purported to increase muscle mass have experienced a “mixed bag” of results in the literature. Some authors and critics argue the type of resistance training employed has been inconsistent across studies further creating difficulties identifying efficacy among compounds. Research methodology, small sample sizes, differing populations, and lack of scrutiny to contributing factors add to the problem. While caloric sufficiency, appropriate energy balance and timing, and specific training methodology are all consistently important for lean mass development and maintenance some substances may be additionally beneficial. Of interest it seems the properties that exist in the body seem to be the most relevant factor in predicting changes to muscle size.

The following provides a list of some of the most common anabolic supplements and applicable research for each. Exercise professionals can use this information to become more educated as to the products and potential benefit.

### **Popular dietary supplements claimed to promote anabolic activity:**

- **Individual amino acids or the branched-chain amino acids (BCAAs)** - Amino acids including arginine, ornithine, aspartate, glycine, taurine, tryptophan, tyrosine as well as the BCAAs are used as dietary supplements for supporting muscle growth and protein synthesis. Aspartate, tryptophan and glycine have demonstrated no proven benefits. Arginine and ornithine can increase growth hormone but only at extreme doses that are not well tolerated by the

gastrointestinal tract. Taurine is commonly used in energy drinks but ergogenic claims remain unconfirmed. Tyrosine has been shown to prevent a decline in cognitive performance and mood during acute stress - but not to further promote anabolism and only in large dosages not commonly found in supplements. The BCAAs (leucine, isoleucine and valine) are utilized at high rates during exercise and may be useful for those with low daily protein intake or those who need more protein due to training demands. Leucine seems to have the greatest impact on potential for adaptations when intake is insufficient thus explaining why whey protein is so popular. However, one should note that many foods contain high quantities of BCAAs so supplementation may be more of a matter of convenience rather than necessity. The timing of BCAA intake seems to be a relevant consideration. When consumed with resistance training the act of protein synthesis may be benefitted. "Complete protein" sufficiency seems to be the most important consideration for lean mass gains with proper training, but food timing certainly plays an important role. Arguments exist as to the maximal quantity per serving but most agree the size of the individual is a factor. That said 25-40 grams seems to be an adequate serving size range.

- **Creatine** - The benefits of supplemental creatine seem to occur by increasing energy provisions of the substance by ~20%. The increased energy stores provide for potential greater volumes of intense, shorter-duration work common of weightlifting and sprinting. Initial weight gain is presumed to be mainly associated with increased water retention in muscle tissues to offset changes in cellular osmolarity caused by increased phosphocreatine storage. Following an appropriate loading phase, and in conjunction with appropriate resistance training, subjects have demonstrated improvements in strength and many studies cite increased muscle mass in responders. The idea of non-responders is interesting as supplemental creatine has not shown to be effective in all cases. Supplemental levels of 5 g/day seem to be adequate to promote greater availability and re-synthesis of phosphocreatine in type II muscle fibers and may promote direct anabolic effects through improved signaling pathways. Most literature supports a loading phase of 3-7 days to optimize the benefits among responders.
- **Glutamine** - Glutamine does not directly promote increased anabolic activity amongst healthy adults, but it may be useful for those clients who engage in very high-stress programs such as high-mileage endurance training. In research, it has been shown to help optimize immune function and stimulate healing amongst burn victims and others suffering severe physiological distress. Those of normal health and activity seem to have adequate quantities of glutamine to manage the stress hormone response and prevent lean mass attrition when a normal diet is consumed.
- **DHEA** - DHEA (or dehydroepiandrosterone) is a legal supplement which functions as a precursor of testosterone. It is a weak androgen steroid hormone synthesized during early adulthood in the adrenal cortex. Little is conclusively known of its side-effects and long-term complications but research seems to indicate it may benefit older males who have gone through andropause

## Do These Supplements Increase Muscle Growth?

and have low T, by having a small effect on muscle mass and immune function. It is one of the supplements banned by most athletic organization and when consumed in higher doses may aromatize to estradiol in men.

- **HMB** - HMB (or beta-hydroxy beta methylbuterate) is a metabolite of leucine purported to attenuate protein breakdown, improve muscle mass and expedite recovery. Some findings seem to suggest benefits for those suffering from clinical muscle wasting conditions or burn victims but results are inconclusive among peer reviewed trials. Again when leucine is consumed in adequate levels it seems to be less effective as a dietary supplement. Supplement timing may yield better results in future trials when matched to optimal training methodology and volume.
- **Deer velvet (antler)** - Deer velvet contains protein peptides, minerals, omega-3 fatty acids and compounds that support joint function. Supplement companies claim that it contains large amounts of insulin-like growth factor which functions as a signaling compound for muscle hypertrophy. Anecdotal reports of efficacy have been criticized for its masking properties. There is still insufficient scientific evidence to back the supplement's various claims including increased muscle growth and recovery.
- **Androstenedione "Copy Cats"** - Androstenedione is actually no longer a legal supplement as it was re-classified as an anabolic steroid in 2005. However, there are various products which claim to mimic its effects by combining specific ingredients (e.g., tribulus terrestris, arginine HCl, maca root, etc.) and often include "Andro" somewhere in the name. Like androstenedione, these proprietary blends are purported to stimulate testosterone production, increase muscle mass, improve libido and expedite recovery. Interestingly, most research does not seem to back claims for androstenedione increasing testosterone or strength. Conversely, it can increase estrogen production and decrease good HDL cholesterol. Furthermore, it is a banned substance by the International Olympic Committee (IOC) and should be avoided by competing athletes. Most ingredients in proprietary blends have no supporting scientific research; therefore, consumers would be prudent in straying from products claiming to mimic the effects of this once popular supplement.
- **Micronutrients** - A number of micronutrients such as calcium, chromium and boron are touted as having the ability to increase anabolic activity or muscle growth through various mechanisms, but research indicates supplementation will not improve performance amongst healthy adults who do not suffer from a deficiency. A well balanced diet is recommended to maintain micronutrient sufficiency.

## Do These Supplements Increase Muscle Growth?

- **Yohimbine** - Yohimbine is purported to increase testosterone, fat-free mass and strength but no supporting evidence demonstrates its effectiveness as an anabolic agent. It has been studied in several countries as to its benefits for erectile dysfunction, but is also linked with various severe side-effects including as heart arrhythmias.

There are various compounds marketed as effective anabolic aids, but clearly the exercise professional will be well served in examining research conclusions concerning products a given client shows interest in investing - as many fail to provide the benefits suggested due to a variety of factors.