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## Superstar Bodybuilding Supplements

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### Creatine Monohydrate

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This substance is without question one of the biggest advances in bodybuilding supplements in the past 10 years. Significant weight gains are frequently reported after utilizing creatine monohydrate in 20 grams per day amounts for seven to 14 days.

For some individuals, however, such high creatine doses are not tolerable either physically or financially. Fortunately, recent data show that lower amounts of creatine monohydrate can have a beneficial effect on growth. Bob Fritz and Thomas Fahey, PhD, have completed field tests that indicate that doses of creatine as low as six grams per day increase nitrogen retention. While 20 gram doses may be required to increase sprint performance, smaller amounts may be adequate to support increases in muscle protein synthesis, growth and strength, albeit at a slower rate.

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### Vanadyl

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Vanadyl's ability to mitigate insulin resistance and improve carbohydrate utilization efficiency may be indirectly responsible for the results of field studies (again by Fahey and Fritz) that demonstrate that vanadyl increases nitrogen retention in bodybuilders and other strength athletes.

Vanadyl's effects on insulin resistance make it a prime candidate for athletes who are exposed to lengthy training sessions that often result in overtraining. For these applications, vanadyl may not only improve carbohydrate utilization efficiency but also lower catabolic hormones such as cortisol that tend to rise after overtraining.

Vanadium (IV), however, has a newer form that is considered safer than vanadyl sulfate. Bis vanadium, Bis (maltolato) oxovanadium (IV). This substance has been shown to have a greater margin of safety over its close relative, vanadul sulfate, due to its improved absorption and decreased tissue accumulation.

In addition to bodybuilders, other athletes, including football players, may also benefit from supplementation advances such as vanadium and creatine. Maintaining bodyweight and strength throughout an entire season can mean the difference between not only winning or losing but staying healthy.

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### Mahuang

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This is another supplement that produces noticeable ergogenic and anticatabolic effects when taken as mahuang extracts containing various amounts of ephedrine isomers. The most potent of the active isomers is 1-ephedrine and is responsible for increased muscle contraction strength, endurance, thermogenesis and lipolysis, and decreased muscle protein degradation.

In addition to ergogenic effects that benefit resistance training, mahuang also facilitates fat loss without loss of lean mass by helping to maintain metabolic rate and thyroid function, both very important to any long term fat loss program.

Ephedrine effects and margin of safety are strongly supported in scientific literature. Although there are contraindications, such as cerebrovascular and cardiovascular disease, mahuang can be taken in small enough doses to improve tolerance and increase its margin of safety in those individuals who may initially be highly sensitive to its effects.

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### Leucine

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This is one of the most important amino acids for hard training bodybuilders. Leucine and the other branched chain amino acids (BCAAs), isoleucine and valine, escape liver metabolism and can directly and significantly influence muscle protein metabolism. Dietary leucine serves as a substrate for muscle metabolism during periods of cellular energy depletion, thereby sparing critical contractile and enzyme muscle protein from degradation to supply leucine requirements.

Because leucine contributes to glutamine synthesis, taking supplemental leucine before and after intense training and between meals can help to normalize glutamine levels in both the serum and muscle, thereby promoting anticatabolic muscle metabolism as well as supporting immune function.

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### **Ketoisocaproate (KIC)**

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KIC is another very important nutrient capable of producing significant anabolic effects. KIC is the branched chain keto acid of leucine, and it occurs naturally in muscle and liver metabolism. Unlike leucine, however, dietary KIC affects the liver to a greater extent than muscle tissue. Eighty percent of dietary KIC is taken up by the liver, where it decreases the catabolism of amino acids.

The immediate obvious effect of dietary KIC is that it reduces urine urea nitrogen retention, the long term effect of which could be increased muscle mass.

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### **Alpha-Ketoglutarate**

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The salts of alpha-ketoglutarate (calcium, magnesium and potassium) have been demonstrated to increase muscle glutamine stores in severely catabolic hospital patients to a greater degree than leucine. Alpha - ketoglutarate is utilized in the Krebs cycle and provides the carbon skeleton for a portion of glutamine synthesis. The combination of leucine and salts of alpha - ketoglutarate can provide invaluable support for both muscle metabolism and immune function during periods of physical stress.

The combination of KIC, leucine (or BCAA supplements high in leucine) and salts of alpha - ketoglutarate can produce measurable anabolic effects. The strong anticatabolic effects produced by the combination of KIC, alpha - ketoglutarate and leucine can limit the use of amino acids for energy and promote the use of fatty acids, resulting in decreased urine-urea nitrogen.

It's reasonable to assume that this combination of nutrients could eventually lead to increased lean mass and decreased bodyfat, provided that appropriate diet and training procedures are followed.

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### **Whey Protein**

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Whey protein is a clear improvement over other sources of protein for athletes. Previously, egg protein (especially egg white) was considered the best protein for bodybuilders. However, while egg protein does possess a very high ratio of essential to nonessential amino acids, its ratio of BCAAs to essentials is not as good. Due to the fact that BCAAs, especially leucine, are utilized to a great degree during intense training, resupplying them is very important. Because whey protein is very high in leucine, containing almost twice as much as egg protein, whey becomes a better choice for athletes.

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### **Beta-Ecdysterone**

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This is a plant sterol that has been shown to increase muscle deposition in rats at a comparable level to Dianabol. Also, in field studies by Fahey and Fritz, 30 mg of beta - ecdysterone were shown to improve nitrogen balance in weight trained athletes. However, it was found that protein with a high biological value (BV) was found to be a very important if not critical component of this equation.

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### **Hydroxycritic Acid (HCA)**

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Though not a thermogenic agent, HCA interferes with hepatic triglyceride synthesis by inhibiting citrate lyase. The rationale of incorporating HCA in a diet regimen is that it limits carbohydrate conversion to fat. When citrate lyase is inhibited, serum glucose levels remain higher, depressing appetite. HCA may also contribute to an increase in liver glycogen that may facilitate longer periods of anabolism by maintaining serum glucose, which, in turn, can reduce release of catabolic stress hormones.

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### **Ornithine alpha-ketoglutarate (OKG)**

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Once hailed as the most anabolic of supplements, OKG has not produced the effects of the supplements listed earlier in well nourished athletes. However, there is no question that OKG decreases nitrogen loss and limits muscle wasting during severe illness.

Every athlete has experienced periods in which an illness has produced training setbacks. Part of the problem during illness is that sufficient calories and protein can't be consumed, thus resulting in loss of muscle protein.

OKG may provide significant relief during periods of illness by protecting stores of muscle protein. This is because of OKG's effects on intramuscular glutamine stores. The loss of intramuscular stores of glutamine during trauma, illness or stress leads to an increase in muscle protein degradation. Subsequent to a variety of stressors, which includes caloric restriction, glutamine is released from the muscle to support to metabolism of tissues such as the gastrointestinal tract and immune system.

The alpha-ketoglutarate portion of OKG provides the carbon skeleton for glutamine synthesis, while it is believed that ornithine slows the production of urea, resulting in higher and more stable serum levels of glutamine.

Because maintenance of immune function is dependent on glutamine, adequate serum levels of glutamine are important for optimal immune response and timely recovery. Consequently, taking gram amounts of OKG during illness not only limits muscle wasting but also supports immune response, facilitating a quicker recovery.

OKG may be effective in conditions of overtraining as well. Overtraining can readily occur after months of relentless workouts. The importance of adequate nutrition and stress reduction in limiting the loss of bodyweight as well as injury cannot be understated. Adding recommended maintenance amounts of OKG to a bodybuilder's diet may go a long way toward stabilizing muscle mass and limiting injuries linked to loss of strength and bodyweight.