

Supplement Talk

Amino Acids

There are two main types of amino acids; the indispensable amino acids (essential) and the conditionally dispensable amino acids (non essential). Indispensable amino acids, also called essential amino acids, must be supplied to the body from food or supplements. Conditionally dispensable amino acids are based on the body's ability to actually synthesize them from other amino acids. Here is the amino acid guide and their benefits.

Indispensable Amino Acids (Essential)

Isoleucine - BCAA

A branched chain amino acid readily taken up and used for energy by muscle tissue.

Used to prevent muscle wasting in debilitated individuals

Essential in the formation of hemoglobin

Leucine - BCAA

A branched chain amino acid used as a source of energy

Helps reduce muscle protein breakdown

Modulates uptake of neurotransmitter precursors by the brain as well as the release of enkephalins, which inhibit the passage of pain signals into the nervous system.

Promotes healing of skin and broken bones.

Valine - BCAA

A branched chain amino acid

Not processed by the liver; rather actively taken up by muscle

Influences brain uptake of other neurotransmitter precursors (tryptophan, phenylalanine and tyrosine).

Histadine

One of the major ultraviolet absorbing compounds in the skin

Important in the production of red and white blood cells; used in the treatment of anemia

Used in the treatment of allergic diseases, rheumatoid arthritis and digestive ulcers.

Lysine

Low levels can slow protein synthesis, affecting muscle and connective tissue

Inhibits viruses; used in the treatment of herpes simplex

Lysine and Vitamin C together form L-carnitine, a biochemical that enables muscle tissue to use oxygen more efficiently, delaying fatigue

Aids bone growth by helping form collagen, the fibrous protein that makes up bone, cartilage and other connective tissue.

Methionine

Precursor of cystine and creatine

May increase antioxidant levels (glutathione) and reduce blood cholesterol levels.

Helps remove toxic wastes from the liver and assists in the regeneration of liver and kidney tissue

Phenylalanine

The major precursor of tyrosine

Enhances learning, memory, mood and alertness

Used in the treatment of some types of depression

Is a major element in the production of collagen

Suppresses appetite

Threonine

One of the amino detoxifiers
Helps prevent fatty buildup in the liver
Important component of collagen
Generally low in vegetarians

Tryptophan

Precursor of key neurotransmitter serotonin, which exerts a calming effect
Stimulates the release of growth hormones
Free form of this amino acid is unavailable in the U.S.
It is only available in natural food sources

Dispensable Amino Acids (Non Essential)

Alanine

Major component of connective tissue
Key intermediate in the glucose alanine cycle, which allows muscles and other tissues to derive energy from amino acids
Helps build up the immune system

Arginine

Can increase secretion of insulin, glucagon, growth hormones
Aids in injury rehabilitation, formation of collagen and immune system stimulation.
Precursor of creatine, gamma amino butyric acid (GABA, a neurotransmitter in the brain)
May increase sperm count and T-lymphocyte response

Aspartic Acid

Helps convert carbohydrates into muscle energy
Builds immune system immunoglobulins and antibodies
Reduces ammonia levels after exercises

Cysteine

Detoxifies harmful chemicals in combination with L-aspartic acid and L-citrulline
Helps prevent damage from alcohol and tobacco use
Stimulates white blood cell activity

Glutamic Acid

A major precursor of glutamine, proline, ornithine, arginine, glutathione, and GABA
A potential source of energy
Important in brain metabolism and metabolism of other amino acids.

Glutamine

Most abundant amino acid
Plays a key role in immune system functions
An important source of energy, especially for kidneys and intestines during caloric restrictions.
A brain fuel that is an aid to memory and a stimulant to intelligence and concentration

Glycine

Aids in the manufacture of other amino acids and is a part of the structure of hemoglobin and cytochromes (enzymes involved in energy production)
Has a calming effect and is sometimes used to treat manic depressive and aggressive individuals
Produces glucagon, which mobilizes glycogen
Can inhibit sugar cravings

Ornithine

May help increase growth hormone secretion in high doses
Aids in immune and liver function
Promotes healing

Proline

A major component in the formation of connective tissue and heart muscle
Readily mobilized for muscular energy
Major constituent of collagen

Serine

Important in cells' energy production
Aids memory and nervous system function
Helps build up immune system by producing immuno-globulins and antibodies

Taurine

Aids in the absorption and elimination of fats
May act as a neurotransmitter in some areas of the brain and retina

Tyrosine

Precursor of the neurotransmitters dopamine, norepinephrine and epinephrine, as well as thyroid and growth hormones and melanin (the pigment responsible for skin and hair color).
Elevates mood

Individual Amino Acid Supplementation

L-arginine is largely responsible for Nitric Oxide production in the body, which can assist with oxygen transport to muscle cells. Many users enjoy the feeling of fullness in their muscles when supplementing with arginine. Using Arginine can lead to longer training sessions. Arginine significantly contributes to insulin production, muscle metabolism, liver lipid metabolism, and is a component of collagen. It enhances the immune system, specifically by stimulating the thymus gland and the manufacture of T cells. This increase in T cell activity can be effective in fighting bacteria, viruses, cancer tumor cells, AIDS, chronic fatigue, and other immune system related health challenges.

Arginine also neutralizes ammonia, which helps in liver detoxification and regeneration. As a component of collagen, it can assist with wound healing, skin problems, arthritis, and connective tissue problems.

Dosage:

A typical dose of L-Arginine is between 2g and 6g per day. For best results, multiple smaller doses are advised. It is best used as a workout enhancer, 30 minutes before training.

AAKG (Arginine Alpha-ketoglutaric acid) is Arginine with a malic acid attached. The effects are said to be more pronounced over Arginine, with users gaining advantages in nitric oxide production and oxygen delivery to muscle cells. AAKG can help give users higher energy levels in the gym and create a "pump" effect.

If you have high ammonia levels, often alpha-ketoglutaric acid is depleted. It binds to toxic ammonia in muscle cells, in the liver, and in the brain, thereby converting ammonia into glutamic acid, improving glutamine levels and assisting in elimination of toxic ammonia from the body. Also, this amino acid activates the citric acid cycle (Krebs) where energy is produced. Without sufficient alpha-ketoglutaric acid, you will be very tired. For the first couple of weeks, until your body gets used to this supplement, you might find it best to take this amino in the morning, otherwise it might interfere with your sleep. Later, you may find it is best to take it at night as studies have shown elevated concentrations of anabolic (growth) hormones and amino acid metabolites, including insulin-like growth factor 1 (IGF1).

Beyond this, alpha ketoglutarate improves the endogenous production of glutamine and glutamic acid, both important for muscle growth and for the immune system. AAKG is a Krebs Cycle intermediate, improving VO2 Max and energy metabolism in muscle cells.

Dosage:

2-6g per day. For best results, multiple smaller doses are advised, directly before training. Doses for bodybuilders and performance athletes can be up to one half level tablespoon (4 grams), 3 times per day for a total daily dose of 12 grams.

Beta Alanine is a non-essential amino acid and is the only naturally occurring beta-amino acid. Beta Alanine's main effect comes from its ability to boost the syntheses of carnosine. This can help ward off fatigue leading to more intense and longer training sessions. Many users experience intense vasodilatation/pumps from the very first dose, as carnosine is a powerful intensifier of nitric oxide. Carnosine helps muscles soak up excess hydrogen ions released during intense exercise, which make muscles more acidic and contribute to muscular fatigue and decreased strength.

What is the prickling I feel when I first take Beta-Alanine?

The prickling - called parathesia - is caused by beta-alanine binding to nerve receptors, activating them and causing them to discharge/fire. Many of these nerves are below the skin, giving a prickling/pins-and-needles sensation. This sensation begins approximately 15-20 minutes after ingesting beta-alanine and usually continues for 1-1.5 hours.

The intensity varies depending on dosing, individual sensitivity and potentially from activators of Ca²⁺ channels, such as caffeine. This sensation, though generally enjoyed, often subsides over a few weeks of continued use. Carbohydrates/food may also blunt the prickling effect from beta-alanine.

Dosage:

Between 1g and 5g per day, before, during or directly after training. On initial doses a general itchiness may be felt. This is normal and usually subsides within 30 to 60 minutes and will generally not be experienced in later doses.

BCAA (Branch Chain Amino Acids) are a combination of the three branched chain amino acids: Leucine, Isoleucine, and Valine.

The incorporation of 2 Leucine, 1 Valine and 1 Isoleucine is generally considered the most optimum for muscle growth and recovery. BCAA's are well known for their ability to help muscle repair, supplementing with these can decrease breakdown of other amino acids and lead to a more positive nitrogen balance.

Dosage:

A typical dose is between 5 and 20g. Have before, during or directly after training.

L-carnitine is produced in the kidneys and liver, and its main job is to carry fatty acids into the mitochondria. In addition, carnitine protects cells in the heart muscle from damage when a heart attack or spasm cuts off the oxygen supply. We produce about 15mg a day via L-lysine and L-methionine.

L-carnitine also gives the body a boost in energy levels. The release of fat makes LC important in weight loss or exercise regimens because it helps convert body fat into fuel. It also raises levels of certain enzymes needed to metabolize sugars, starches and other carbohydrates. A supplement of L-carnitine promotes stamina when used with an exercise program, while also reducing production of lactic acid, which causes that burning feeling in the muscles.

The body rarely produces carnitine in amounts that are high enough to provide significant benefits. The body only absorbs about 25 percent through diet. So for those seeking the heart healthy effects of carnitine, the recommended supplement dosage is generally 1 to 2 grams per day, with the higher dosage suggested for seniors because carnitine levels progressively decrease as we age, especially in the heart and skeletal muscles.

In the process of delivering fatty acids to the mitochondria, L-carnitine is converted to acetyl-L-carnitine, which enhances brain activity.

Dosage:

One study shows that patients who took 2 grams of L-carnitine a day for four weeks cut the number of complications from a heart attack (angina, heart rhythm disturbances and heart failure) in half. For those seeking the heart healthy effects of carnitine, the recommended supplement dosage is generally 1 to 2 grams per day, with the higher dosage suggested for seniors because carnitine levels progressively decrease as we age, especially in the heart and skeletal muscles.

For weight loss, dosages up to 2 grams 3x a day are sometimes used. Blood levels peak between 3-6 hours after ingestion so take it 3-4 hours prior to training.

Acetyl Carnitine, an acetylated version of carnitine base helps supply the brain with energy by improving energetics in the mitochondrion, the cell's energy generator. Acetyl-L-Carnitine (which is reported to be the most effective form of carnitine) has been shown in clinical studies to benefit cognitive ability, memory and mood, however its major benefit for those involved in weight training and exercise is that it allows the body to use stored fat for energy more easily.

It is therefore very popular for those looking to lose weight while retaining as much muscle as possible.

It also helps stimulate acetylcholine, which is the most important neurotransmitter for memory function. In a clinical trial we told you about in the March 2000 Members Alert, Alzheimer's disease patients who took 3 grams of ALC per day for one year showed significantly less deterioration in brain function than the control group.

Dosage:

A typical dose of Acetyl Carnitine is between 500mg and 2g per day. It is recommended it is best to split these doses into smaller serves directly before meals for those looking to lose weight.

Citrulline Malate is a pre cursor to Arginine. It can help users increase nitric oxide levels, which may lead to increased strength and endurance, through the increase in blood flow, glucose uptake and oxygen delivery to the muscles. Researchers also have shown that Citrulline Malate may help to eliminate the burn associated with lactic acid build up as well as reduce the negative effects of ammonia and bacterial endo toxins on performance. While citrulline acts to increase NO and reduce performance inhibiting metabolic toxins, malate conditions the recycling of lactate and pyruvate, and takes part in the kreb cycle supplying instant and sustained energy.

Dosage:

It is recommended to take between 2g and 5g per day, 30 minutes prior to training.

EAA (Essential Amino Acids) usually contain all 9 essential amino acids: Leucine, Isoleucine, Valine, Histidine, Lysine, Methionine, Phenylalanine, Threonine, and Tryptophan. Essential Amino Acids are considered the most important for muscle growth and repair. EAAs apart from being fantastic complimentary amino acids, can also be used by those who can't tolerate any dairy or lactose as a stand alone protein source.

Dosage:

A typical dose is between 5 and 20g. For best results consume before, during or directly after training, when the rapid absorption qualities of free form amino acids are best utilised.

Glutamine can assist muscle repair and immune recovery by having a positive affect on the body's nitrogen levels. Glutamine can also assist preventing muscle wastage as when needed it can be broken down by the liver to produce glucose and is important for the removal of toxic ammonia from the brain. Glutamine also plays another anabolic role by assisting growth hormone levels.

Because glutamine's role in the nervous system is so important, during times of stress, illness, or surgery up to 1/3 of the muscle stores of glutamine are released for nervous system usage; causing extensive muscle deterioration and loss. The muscle glutamine release is much lower if glutamine levels are increased through supplemental L-glutamine. This makes Glutamine especially effective for those who are dieting wanting to preserve muscle.

Athletes who train for endurance events (like marathons) may reduce the amount of glutamine in their bodies. It's common for them to catch a cold after an athletic event. Some experts think that may be because of the role glutamine plays in the immune system. For this select group of athletes, one study showed that taking glutamine supplements resulted in fewer infections. The body uses glutamine and glucose to make glucosamine, an amino sugar that plays a key role in the formation of nails, tendons, skin, eyes, bones, ligaments, heart valves, and mucous secretions throughout the body.

Dosage:

A dose between 5g and 10g is normal. For best effect, take multiple times per day, before or directly after training where it can assist with anabolism and before bed so it can assist the body's production of growth hormone. For endurance athletes dosages of up to 150g have been reported to have been used safely.

L-glycine is defined as a non-essential amino acid. Glycine can help remove toxic substances like lactic acid from the body, and it may also increase the use and availability of growth hormone. It has been proven to promote the release of growth hormone and to support cell volumizing as well as slowing down the breakdown of muscle tissue. It is also helpful in healing damaged muscles or in simply rebuilding muscle tissue in athletes who participate in strenuous workouts.

Dosage:

A typical dose of Glycine is around 500mg to 2g taken twice daily.

Creatine

Creatine has been recognised for over 150 years. It has been used in supplement form for about 25 years. The average 70kg human holds approx 120g creatine stored mostly in skeletal muscle as well as in the heart, smooth muscle, brain and testes. Creatine uptake seems to be mediated by insulin. As it is osmotically active it will increase intracellular water. It can be made from glycine, arginine and methionine. So by supplementing with creatine, you may be sparing more arginine for the NOS pathways since arginine is also used to form creatine in the body.

The most important benefit is the increase in free creatine and creatine phosphate. With increased CP concentration the body can sustain muscle contractions for longer periods. With a higher level of free creatine there will be a greater resynthesis of CP during recovery. It also acts as a buffer for muscle acidity as a hydrogen ion is used in resynthesising ATP from ADP. With an elevated buffer the body can increase duration of high intensity exercise before reaching a limiting PH level.

Creatine may also enhance fat burning by increasing the level of citrate synthase activity, a marker of oxidative capacity. Most importantly increased CP will enable athletes to reach a higher training load, improve repetitive-interval sprint capacity, reducing muscle fatigue and accelerating muscle hypertrophy.

Creatine has been shown to stimulate protein synthesis by promoting intracellular fluid retention and increasing osmotic pressure. With increased synthesis there is a decrease in protein degradation (catabolism). This is important as increased fat free mass may help in sports that require absolute power to overcome an external object or the inertia of an other body.

Dosage:

Daily requirements of about 2-3g per day based on creatine turnover. Studies have shown that approx 0.3g per body mass kg for a period of 5-6 days to load up the muscle stores of creatine. This is about 20-30g in 4 equal dosages of 5-7g in about 250ml of water in the morning, noon, afternoon and evening. With a maintenance dose of about 2-5g (0.03g per body mass kg) will be enough as the body uses approx 2g per day. If 5g creatine is taken with a 90g glucose total creatine levels increased by 60-100% compared to consumption of creatine alone. This is contributed to the insulin response to the glucose for the uptake of creatine. Creatine excretion was reduced by 50% using glucose suggesting increased retention mediated by insulin. Exercise also creates a higher creatine uptake. Creatine uptake peaks at about 1 hour after consumption so take 1 hour prior or immediately after for the post exercise absorption help.

After stopping creatine supplementation it takes about 28-30 days for creatine levels to return to baseline levels, which are 20-30g lower than supplemented levels. No studies have conclusively proven that creatine supplementation can affect the natural production of creatine in the body, cause renal and liver damage. Studies have actually shown that trials lasting up to 5 years in duration have posed no health risk, even providing therapeutic benefits for certain populations.

Creatine Monohydrate is the original Creatine. It is the one that all the scientific studies were done on. The problems with Creatine Monohydrate is that it has very low solubility, may cause stomach upset, and visible bloat. Creatine "non-responders" is also common with this form, which is not surprising since it only has a 1% absorption rate.

Micronized creatine is micronized creatine monohydrate. It really isn't any different than creatine monohydrate except it's more efficiently absorbed, so you don't need as much. Micronization increases the surface area of regular creatine monohydrate and results in a much better absorption into the body. This creatine will be more effective than creatine monohydrate per serving and have less side effects. Micronized creatine still requires a loading phase.

Tri and Di Creatine Malate is formed by creatine monohydrate and malic acid. Malic acid is involved directly in the Krebs cycle, the main energy cycle of the cell. Users report more muscular energy and endurance over regular creatine monohydrate, as a result. Creatine Malate also is more water soluble and absorbs in the body at a higher rate, than regular creatine monohydrate. Creatine Malate also requires no loading phase. Between 3g and 10g a day is typical, 30-60 minutes before training.

Creatine Ethyl Ester (CEE) has been hyped as having higher solubility and stability against stomach acidity compared to creatine monohydrate. Despite all the hype the last few years there has never been a study to prove CEE is viable and recently a study even contradicts those claims.

Effervescent Creatine is creatine combined with sodium and sugar. Not really any different than creatine monohydrate except unnecessary ingredients combined. It also is highly priced.

Creatine Citrate is creatine bonded to a citrate molecule. Even though it has better absorption than regular creatine, Creatine citrate dosage has to be twice as much.

Creatine Kre-Alkalyn is Creatine bonded to Kre-Alkalyn. Higher absorption so doesn't require loading. Less bloating and stomach problems.

Creatine Orate is creatine bonded to the Orate molecule which is derived from orotic acid. The orate has special energy properties because of it being a pre-cursor to nucleic acids which are needed to build ATP (the universal energy currency in the muscle cells). Creatine Orate is another creatine form that has no current studies on the side effects of the orate molecule. Unfortunately, creatine orate is also very expensive.

Test Boosters

DAA (D-Aspartic Acid) is the newest natural testosterone booster on the market. DAA is the D-form of the amino acid aspartic acid. The body can produce DAA from the nonessential amino acid L-aspartic acid (the dietary form of aspartic acid). D-form amino acids, such as DAA, are found in higher concentrations in specific tissues in the body. For example, higher concentrations of DAA are found in the testes, pituitary gland, and hypothalamus.

Supplementing with 3 grams of DAA increased circulating luteinizing hormone (LH) levels by 33% and testosterone levels by 42% in men aged 27-37 years old. Note that this increase in testosterone was not in healthy men with normal testosterone function. D-aspartic acid is a naturally occurring, endogenous amino acid that is found in nervous and endocrine tissues of the human body.

Dosage:

A typical serve would be 2g, twice daily.

Tribulus Terrestris also known as Puncture vine is a herb that has been used in the traditional medicine of China and India for centuries. In the mid-1990s, tribulus terrestris became known in North America after Eastern European Olympic athletes said that taking tribulus helped their performance.

The active compounds in tribulus are called steroidal saponins. Two types, called furostanol glycosides and spirostanol glycosides, appear to be involved with the effects of tribulus. These saponins are found primarily in the leaf and not in the root. Tribulus is most often used for infertility, erectile dysfunction, and low libido. In the last decade, it has become popular to improve sports performance.

Tribulus has been marketed these conditions because research performed in Bulgaria and Russia indicates that tribulus increases levels of the hormones testosterone (by increasing luteinizing hormone), DHEA, and estrogen. The design of these research studies, however, has been questioned. A more recent study found that four weeks of tribulus supplements (at 10 to 20 milligrams per kg of body weight daily) had no effect on male sex hormones testosterone, androstenedione, or luteinizing hormone compared to people who did not take tribulus.

Dosage:

Variuos dosages have been suggested along with variuos times ie 85 to 250 mg three times daily, with meals. Also suggested use is 1-2 capsules daily divided among meals. One capsule contains 750 mg of Tribulus Terrestris. A common usage is to take it post work out when test levels are low and especially before bed when LH will help produce test. Combined with ZMA (zinc, magnesium and B6) it will help you sleep and produce both test and gh.

Stimulants and Mental Support

Choline Bitarate is structurally similar to other B vitamins, however it not recognised as such. Choline is involved in many activities relating to the nervous system and brain, supplementing with it is said to benefit functions of memory and cognitive function, as well as general intellect.

Choline while beneficial for many people, may be particularly useful marathon runners, tri athletes and any other sports people involved in prolonged physical activity for more than a few hours. In prolonged athletic events, the body relies on choline to provide suitable levels of acetylcholine. It is suggested that when acetylcholine levels fall beyond a point that the bodies nerves will fail to stimulate the muscles, resulting in severe fatigue which inhibits such athletes.

Dosage:

A typical dose of choline is between 500mg and 2.5g. Doses over 5g are generally not recommended as sensitive people can suffer side effects such as low blood pressure and diarrhea.

DMAA (1,3-Dimethylamylamine) is the concentrated oil derived from geranium that provides the same effect as adrenaline. Therefore, the primary utility of DMAA was for removing nasal congestion but the adrenaline effect of DMAA combined with other chemicals showed positive results in fat loss and weight control due to which nowadays DMAA has become the most popular dietary pills. DMAA is a central nervous system stimulant, most of the athletes use it during the period of diet control and extra focusing. DMAA also works as natural ephedrine that triggers the messenger in the body, which instigates fat release.

Based on dozens of scientific studies germanium appears to have a wide range of health benefits which include helping to boost the immune system, normalize high blood pressure and cholesterol, protect the body against harmful cellular aberrations and abuse, providing some pain relief, alleviate rheumatoid arthritis symptoms and generally normalize physiological functions.

Dosage:

1,3-Dimethylamylamine powder should only be taken in 20mg or 30mg increments at first. Once tolerance is established, 1,3-Dimethylamylamine can be taken in higher doses, but nothing over 100mg in a 24-hour period is recommended.

Guarana is primarily used as a stimulant to improve mental alertness, shorten reaction time, improve performance of attention-requiring tasks, temporarily sustain performance during physical exertion, restore mental alertness, and keep people awake which could be considered advantageous in many sports. Contains 2.5-7% caffeine, (compared to 1-2% in coffee)

Professional athletes use it to loss weight in this combination Asprin, Ephedrine & Guarana. 50-100mg of Ephedrine, 200mg of guarana and 300mg of Aspirin. Cycling it for 6 weeks at a time and then taking 2 weeks away from it. In this stack guarana is used in place of caffeine. Guarana is also a diuretic (remove water from body). It also aids in weight loss, by stimulating adrenaline release and mobilizes fatty acid release .this means more fatty acids are used for energy and less glycogen. It also suppresses appetite.

Dosage:

Above 5mg/kg body weight for weight loss. If used in conjunction with other stimulants the dosage can be lower

Schizandrol A has been shown to outperform amphetamine in cognitive tasks involving focus and increase the capacity of muscles to perform work by 222%, increasing physical force. In essence, it is able to provide a stimulating effect to the body and mind. It has been shown to improve respiratory and cardiovascular function, while improving muscle power in athletes. It has also been shown to improve running times in endurance events, reducing fatigue, muscle pain and shortness of breath. It has even been shown to improve the eyes sensitivity to light and result in improved night vision (2-fold improvement!). It is also possible that the compound may increase energy expenditure, also resulting in a loss of body fat.

Also unlike other stimulants which can increase catabolic hormone levels (i.e. glucocorticoids), this compound may actually lower levels of hormones like cortisol.

Dosage:

If using the schisandra chinensis extract for boost stamina and recovery, 2000 mgs daily is suggested. If conatined with a product like Jack3d or Freak3d use suggested serving size and take 15-30 minutes before exercise.

Weight Loss

Citrus Aurantium (otherwise known as bitter orange) is commonly used as a "fat burner". Its mechanism is due to it's actice component synephrine which can reduce appetite and increase metabolism. Unlike other stimulants such as ephedra, Citrus Aurantium contains chemicals called amines (tyramine and octopamine), which are not as lipophilic, meaning they do not cross the blood/brain barrier as easily as ephedra, which reduces central nervous stimulation and cardiovascular effects.

Dosage:

A typical dose of Citrus Aurantium 30% is between 10mg to 40mg per day. Due to its potency we encourage any users to be extremely careful with their dosage.

Green Teas Extract has been used in China for thousands of years. Green Tea extract has said to assist fat oxidation by increasing metabolic action, lower blood pressure, reduce cholesterol levels, fight various cancer cells, fight liver disease, assist with diabetes and help reduce inflammation. The antioxidant activity of EGCG in green tea extract is purportedly up to 100 times more powerful than that of vitamin C or E.

Dosage:

500mg to 1g per day is a typical dose and is equal in EGCG and polyphenols to 2-4 cups of green tea. It should be taken 30 minutes before meals.

Hydroxycitric Acid is an ingredient in fruit rind of Garcinia cambogia, a tree native to Southeast Asia. Citrate, a natural chemical in our body, slows down the enzyme that makes fatty acids out of carbs. Hydroxycitric acid is chemically almost identical to citrate. It has been suggested that HCA slows down the fat-making enzyme even more that the natural citrate does.

Dosage:

1-10g daily has been shown to be effective. 3-4g a day is the average intake with a 1g serve 15-30min prior to meals.

CLA (Conjugated Linoleic Acid) decreases the volume of fat cells, therefore reduces body fat. CLA improves muscle to fat ratio by enhancing insulin sensitivity so that fatty acids and glucose can pass through muscle cell membranes and away from fat tissue. It has also been shown to promote wight loss by decreasing fat deposition

especially on the abdomen. CLA activates enzymes and enhances glucose transport into the cells. This results in lower blood sugar levels and stable insulin levels.

Dosage:

2000-6000mg is suggested per day. Take it 10-20minutes before meals.

Protein

The Biological Value (BV) is a scale of measurement used to determine what percentage of a given nutrient source is utilized by the body. The scale is most frequently applied to Protein sources, particularly whey Protein. Biological Value is derived from providing a measure intake of Protein, then determining the nitrogen uptake versus nitrogen excretion. The theoretical highest BV of any food source is 100%. The biological value does not represent a percentage. Egg protein is given a biological value of 100 however only approximately 94% is digested and absorbed for use by the body. Because this is the highest percent from natural food sources it is given the reference biological value of 100 and every other food is rated in comparison.

FOOD	RATING
Hydrolyzed Whey Isolate	182
Whey Protein Isolate	159
Whey Protein Concentrate	104
Eggs (whole)	100
Eggs (whites)	88
Chicken / Turkey	79
Casein	77
Soy	74
Fish	70
Lean Beef	69
Cow's Milk	60
Brown Rice	57
White Rice	56
Wheat protein powder	54
Soybeans	47

The simplified explanation of the whey process is to make cheese. The left over is a combination of casein and whey. The casein is solid and the whey is liquid. The liquid whey is then processed into whey protein powder, followed by whey protein concentrate, whey protein isolate and more recently Hydrolysed Whey Isolate.

You may have noticed some proteins cause stomach discomfort, bloating and flatulence. This is because the digestive enzymes produce partially broken down protein from complex and poorly processed protein, including milk, which then pass down through the digestive chain to be broken down by bacteria. Lactose has the same effect which causes digestive problems. Due to the action of bacteria breaking down the proteins and lactose, hydrogen sulphide and other products of putrefaction are produced causing bloating and flatulence.

Whey Protein Processes

Ionic Exchange processing involves separating proteins based on their electrical charge. Two chemicals are used to achieve this: hydrochloric acid and sodium hydroxide. Ion Exchange processing costs only about 1/5 as much as setting up microfiltration. However, because of the chemical reagents used, pH sensitive fractions are damaged and some amino acids are denatured--noticeably, the glycomacropetides, immunoglobins, and alpha lactalbumin. These are the valuable and health promoting fractions lost in Ion Exchange process. This results in higher concentration of other fractions such as beta-lactoglobulin--known as whey's least interesting and most allergenic subfraction.

Microfiltration uses high tech ceramic membranes to filter the whey. No chemical regents are used so majority of biological fractions are intact without being damaged. Ultrafiltration is a similar method to the microfiltration but uses smaller pores with higher pressure. By using membrane filters, undesirable components (fat/lactose) are filtered out. The particles are separated based on their molecular size and shape. The advantage of this process includes:

- Minimal denaturing of protein
- Preserved biological fractions
- Better amino profile

Cross Flow Microfiltration is patented and owned by Glanbia (one of the largest dairy industry that recently bought Optimum Nutrition). Therefore, there is an added cost for manufacturers to use this method--resulting in higher price. Once again, very similar to microfiltration but is kicked up a notch to produce an isolate that is greater than 90% protein with no fat or lactose, and leaves almost 100% of the protein and the important peptides

intact. The CFM includes the advantage of micro/ultrafiltration plus:

- Contains more calcium and less sodium
- Highest level of undenatured protein

Cold-Filtration and Microfiltration both use the same extraction process of filtering, but the Cold-Filtration is just that, the liquid mass is chilled and then filtered. As well the mass is then sprayed dried in a non heat environment to preserve the undenatured proteins. Using the Cold-Filtration method, the overall protein is said to only be 0-3% denatured, in comparison to other proteins that can be denatured up to 15%. Whey Protein Isolate Cold-Filtration is very high in bioactive whey protein fractions, including immunoglobulin, lactoferrin and glycomacropeptides.

Whey Protein Isolate Cold-Filtration possesses an extremely clean taste. This product alone is opaque in nature (almost clear) and does not have any distinct flavor. Great for the individual that dislikes the taste of "protein powders.

Whey Protein Concentrate is more varied and lower in bio value than that of whey protein isolate. The levels can be anywhere from 29% to 89%. Whey protein concentrate also is noticeably higher in levels of lactose. If anyone is lactose intolerant, it is important to seek advice from a medical practitioner before considering to take whey protein. Whey protein concentrate does tend to cost less than when protein isolate.

Dosage:

Best used as a throughout the day protein supplement due to its slow digesting nature.

Whey Protein Isolate is a highly processed whey protein. By weight, whey protein isolate is 90% protein. This makes it a purer protein than whey protein concentrate. It is also absorbed faster into your muscles, which is beneficial if you are taking whey protein post workout, as this is when your muscles require protein the most.

Whey protein isolate, despite losing some of its immune boosting properties through its multiple processing, is still ripe with Glutathione levels, which are still important for the immune system. Whey protein isolate also has lower lactose levels than concentrate. Because of its higher quality however, whey protein isolate can be more expensive.

Dosage:

Best used postwork out or inconjunction with slower digesting proteins so as to have a sustained release, ie mix with WPC or have at the same time as a chicken meal.

Hydrolyzed Protein is protein that has undergone an enzyme process much like that which happens in your digestive system. Specific enzymes have 'predigested' the protein allowing for faster transport through your digestive system, into your body. Fully 'hydrolyzed' means specific peptides are absorbed straight away with no side effects (eg: bloating, flatulence, etc..)

With there being different levels of Hydrolyzation, the higher the level, the more growth factors, immune factors and small peptides will be isolated within the protein, supplying more 'bio-active' peptides which will give you better results. However, if you go too high with the degree of hydrolyzation (dh), the 'bio-active' peptides will be broken down and lost. An ideal degree of hydrolyzation is a value between 15-25%, to separate and isolate the 'bio-active' peptides within the protein.

Dosage:

Best taken pre and postworkout. Studies have shown that taken preworkout muscle catabolism was lower during the workout, helping to decrease cortisol levels. Post workout it should not be mixed with any whey isolate or concentrate. However, it works great in conjunction with added BCAA's, glutamine and glucose (dextrose).

Protein and Carbohydrate Pre and Post workout

Protein and carbs are required pre and postwork out. There have been various formulas on ratios for this. Here is a formula that may work for you if you are exercising in the following capacities. First we must establish your current protein requirements. 1.5-2g per lean bodyweight kg. This is then split up through out the day in 3-6 meals dependant on the speed of protein turn over.

25% of your daily protein requirements should be consumed post workout. So if you weigh 100kg then you should consume 37.5-50g postwork out. The carbohydrate ratio to this will be equal parts glucose. So in the circumstance of various sports it will 50g protein : 50g glucose or up to 50g protein : 200g glucose.

The ratio is as follows:

- 1:1 Weight training
- 1:2 Boxing
- 1:3 Running
- 1:4 Triathlon

Another formula suggested that pre workout glucose to protein should be 2/3 carb to 1/3 protein and then post 2/3 protein to 1/3 carb. Taking into account the nature of most exercisers being body fat loss, then post work out should be conservative with glucose. However the more advanced the athlete and the more advanced their training, the optimal protein glucose replenishment is needed.

If trying to avoid over ingesting of carbs, then BCAA and EAA while training can be used for glucose substitution. Pre workout as long as you have ingested some form of anti catabolic amino and have enough protein that you are in a positive nitrogen balance, then glucose levels should drop. This will result in fat store activation and muscle will be spared. Take advantage of the high glucose consumption pre and especially postworkout to absorb the creatine supplement better.

Sweat Smells like Ammonia

The key to ammonia in urine and sweat is the nitrogen. The only macronutrient in your body that contains nitrogen is amino acids, the building blocks of protein. In fact, many bodybuilders are always seeking a "positive nitrogen balance" meaning that less nitrogen leaves their body than enters their body. Since nitrogen is in every amino acid, and amino acids are the building blocks of muscle, someone in positive nitrogen balance is more than likely gaining muscle mass.

Your body uses amino acids for energy every day. There is no way to avoid this. Your body constantly goes into catabolic (tissue breakdown) and anabolic (tissue building) phases. When you accumulate mass (lean or fat), your anabolic phases exceed your catabolic phases, but you still experience both phases. When your body uses an amino acid for energy, it must convert the amino acid to a useable form of energy.

It does this by stripping the nitrogen atom off of the molecule. The skeleton molecule that is left behind is then further converted into glucose and used as fuel. In order to get rid of the excess nitrogen, your body typically processes the nitrogen in your kidneys and forms urea, $\text{CO}(\text{NH}_2)_2$ - basically, a carbon dioxide molecule bound to nitrogen and hydrogen. Urea is then excreted in the urine. If your kidneys cannot handle the load of nitrogen, then the nitrogen will be excreted as ammonia in your sweat.

One other factor to consider is water intake. The methods used for getting rid of excess ammonia, such as urine and sweat, all require water as a transport mechanism. If you are not getting adequate fluid, then the solution (ammonia + water) will not be diluted. Therefore, water plays a definite role. If you are not drinking enough fluids to have at least one or two clear urinations every day, you should drink more.

Based on this explanation, it is clear that your sweat will smell like ammonia only if an excessive amount of amino acids are being used for energy, or you are not receiving adequate water.

The key to avoiding that ammonia smell is to ingest sufficient carbohydrates. If you eat an ample amount of carbohydrate with every meal, then you should have plenty to fuel your exercise activity. Even people who work out on an empty stomach should have some glucose in their bloodstream upon rising - unless they subscribe to the myth that cutting out carbohydrates before bed helps you lose fat. If you find that the ammonia smell persists (even when you consume carbohydrate with every meal), try having a low glycemic carbohydrate before you workout.

Digestive Times of Foods

Here is list of digestive times of foods and how long it may take to break down dependant on the efficiency of your digestive enzymes. These measurements were taken starting from a fasted state. So it would be reasonable to suggest that times will take longer if food is still within the digestive system when next meal is consumed.

Vegetables

Raw tossed salad vegetables - tomato, lettuces, cucumber, celery, red or green pepper, other succulent vegetables - 30 to 40 min. digestion. -

Steamed or cooked vegetables

Leafy vegetables - escarole, spinach, kale, collards etc. - 40 min. - Zucchini, broccoli, cauliflower, string beans, yellow squash, corn on cob - all 45 min. digestion time

Root vegetables - carrots, beets, parsnips, turnips etc. - 50 min.

Jerusalem artichokes & leafy, acorn & butternut squashes, corn, potatoes, sweet potatoes, yam, chestnuts - all 60 min. digestion.

Concentrated Carbohydrates - Grains

Brown rice, millet, buckwheat, cornmeal, oats (first 3 vegetables best) - 90 min.

Lentils, limas, chick peas, peas, pigeon peas, kidney beans, etc. - 90 min. digestion time

soy beans -120 min. digestion time

Nuts - Almonds, filberts, peanuts (raw), cashews, brazil, walnuts, pecans etc. - 2 1/2 to 3 hours to digest.

Dairy and Supplements

Skim milk, cottage or low fat pot cheese or ricotta - approx. 4 to 5 hrs

Whole milk hard cheese - 4 to 5 hours digestion time

Whey concentrate - 2-3 hrs

Whey isolate - 30-60 min

Hydrolysed isolate - 5-30 min

BCAA and amino's (ie.glutamine) - 5 -10 min

Animal Proteins

Whole egg - 45 min.

Fish - cod, scrod, flounder, sole seafood - 30 min. digestion time

Fish - salmon, salmon trout, herring, (more fatty fish) - 45 min. to 60 digestion time

Chicken - 1 1/2 to 2 hours digestion time (without skin)

Turkey - 2 to 2 1/4 hours digestion time (without skin)

Beef, lamb - 3 to 4 hours digestion time

Pork - 4 1/2 to 5 hours digestion time