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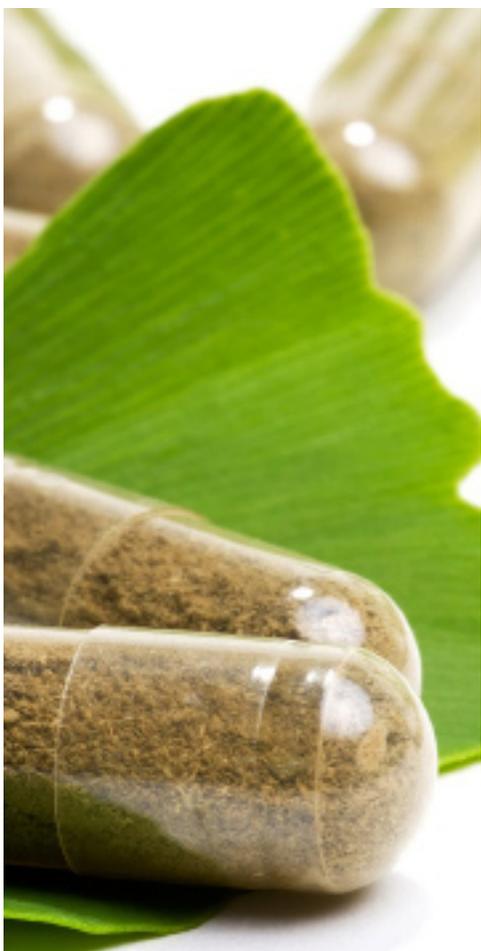
# 11 Looking for the Edge— Dietary Supplements

## Key Points

- Dietary supplements (DS) sold on military installations are not always safe, effective or legal.
- Manufacturers of DS are not required to conduct research on safety or effectiveness. The Food and Drug Administration must prove a product is unsafe before it can be taken off the market.
- If you use DS, select high quality products with USP (United States Pharmacopeia) certification labels. The label assures consumers that the product has been tested and verified in terms of its ingredients and manufacturing process.
- Combining and stacking of DS increases the potential for undesired and unsafe side effects.
- Energy drinks are not regulated and the long-term effects of their combined ingredients are unknown.

**T**he most common reasons active duty personnel give for using DS include improving performance, increasing muscle mass, enhancing energy level, accelerating recovery, increasing alertness, boosting their immune system, and improving joint function. The best sources of information on DS are dietitians, sports nutritionists, physicians, or pharmacists. The purpose of this chapter is to provide an overview of dietary supplements, describe issues with dietary supplements, and provide basic information on a number of commonly used supplements. This will not be inclusive as new products appear on a regular basis, but the information is for educational purposes.

Individuals who spend their money on supplements should be aware that these products target our human desire for health and performance shortcuts. Some may be detrimental and dangerous: if it sounds too good to be true, it probably is. The consequences of taking various supplements, either alone or in combination, should be carefully considered, and the information obtained for making that decision should be from reputable sources.





## Dietary Supplements and the Law

Well over 50% of the US population take some type of dietary supplements. Sales of vitamins, minerals, herbs, meal supplements, sports-nutrition supplements, and specialty supplements were in excess of \$22 billion in 2006. To understand why dietary supplement use is a concern, one must appreciate the history. In 1994 the Dietary Supplement Health and Education Act (DSHEA) was passed by Congress for several reasons:

- Limit impediments to marketing and promoting dietary supplements.
- Provide for wide availability of supplements to consumers.
- Enhance information available to consumers.

The passing of DSHEA gave the Food and Drug Administration (FDA) regulatory control over dietary supplements, and the law required that the label of a dietary supplement provide the name and quantity of each ingredient. However, it is incumbent upon the manufacturer to provide the information and the innocent consumer assumes that information on labels is truthful and not misleading. This is, more than often, not the case. ConsumerLab.com, a product-certification company, conducted a survey of nearly 1,000 supplements and found that one in four had quality problems.

The FDA also regulates whether new ingredients can enter the marketplace or existing ones should be removed for safety reasons. However, federal rules requiring makers of dietary supplements to test all their ingredients were not part of DSHEA. The FDA also regulates what claims may (or may not) be made, but they do not monitor claims. The regulations within DSHEA contain many gaps. Some of the concerns include:

- The responsibility of ensuring that products are properly labeled lies with the manufacturer.
- Supplement ingredients sold in the United States before October 15, 1994 are presumed to be safe and are therefore not subject to review by the FDA for safety.
- The responsibility of providing evidence of safety lies with the manufacturer.
- The FDA has to prove that a product is not safe if it is already on the market.
- Government resources to check dietary supplement quality are limited.

In June, 2007, FDA imposed new regulations, which had been mandated by DSHEA. The FDA established regulations that dietary supplements must be produced in a quality manner, do not contain contaminants or impurities, and are accurately labeled. Supplement manufacturers will now be required to test all of the ingredients in their products to make sure they are neither adulterated nor contaminated.

[Click for more information on this new ruling.](#)

Purity is a concern:  
Supplements may be  
contaminated with  
heavy metals and even  
prescription medications.

## Combining and Stacking Supplements

Once it is known what a supplement contains, consideration should be given to what might happen when multiple supplements are combined, or “stacked.” The concept of “stacking” is a concern. Many variations of “stacking” exist. Several examples of stacking and how they work are listed:

- “Additive,” or,  $1+1=2$ . This suggests that when two supplements are combined, the effect is equal to the sum of the individual effects. An example of this concept might include calcium and vitamin D.
- “Antagonize,” or,  $1+1=0$ . In this case, the effects of one supplement may actually negate the effects of another. One example is the combination of creatine and caffeine: Studies have shown that caffeine antagonizes the effects of creatine.
- “Synergize,” or,  $1+1=3$ . This is seen when two supplements are combined and their effect is greater than the sum of their individual effects. An example is Coenzyme Q10 and fat: When CoQ10 is taken with fat, the action of CoQ10 exceeds what it would be if not taken with fat.
- “Potentiate,” or,  $1+1=10$  is similar to synergism, but to a much greater degree. Two examples are vitamin C and iron, and ginseng and caffeine. Vitamin C enhances the absorption of iron, which is a good thing, but if ginseng is taken with caffeine, it may be detrimental, as ginseng has been shown to increase the effects of caffeine, to possibly cause nervousness, sweating, insomnia, and/or an irregular heartbeat.

The number of potential stacking combinations is staggering and the effects of combinations of ingredients are, for the most part, unknown. One stacking approach that has proven deadly is the “EAC” stack, with ephedra, aspirin and caffeine. Now that ephedra is banned, ephedra-free products are being used, but the combination remains dangerous and should be avoided.

A list of products commonly considered “stackers” is shown on the following page. Some are trade names and many are potentially dangerous. Become familiar with ingredients and ask questions about combining different compounds.

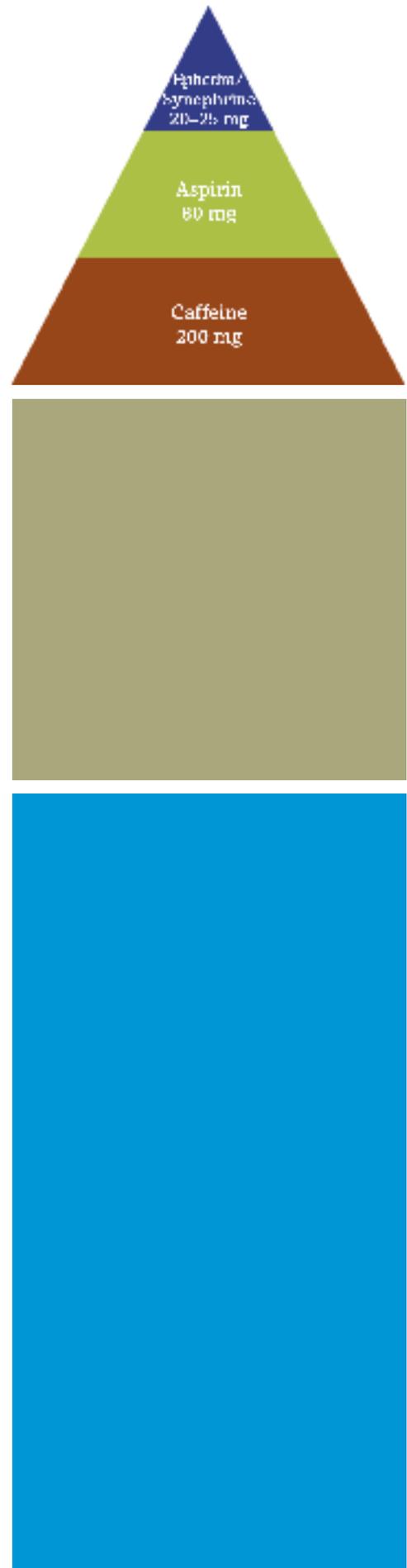


Table 11–1. Common “Stackers”

Muscle Milk	A blend of casein and whey proteins, combined with fats and other substances.
NO <sub>2</sub> or NO	Products contain many ingredients, but typically arginine (described below).



Table 11–1. Common “Stackers”

Hydroxycut	A classic EAC stacker that has resulted in a number of deaths: <b>Avoid.</b>
GAKIC	A NO product with Glycine-l-arginine-alpha-ketoisocaproic acid.
Epovar	A NO product with Magnesium Orotate and Potassium Orotate.
Zantrex 3	A thermogenic product with many forms of caffeine.
Xenadrine EFX	A thermogenic product with synephrine and many forms of caffeine. Company was fined for false advertising.
Triflex	A combination of glucosamine, chondroitin and methylsulfonyl-methane.
Arginine Ethyl Ester	A NO product.
Redline	A line of products high in caffeine and other substances.
ZMA	A combination of vitamin B6, Magnesium and Zinc, among other ingredients.
Lipo-Products (Lipo-6, Lipo-AMP, Lipo-THIN Lipo-Complex)	Contains many combinations of ingredients—thermogenic agent.
Animal Cuts	May contain up to 20 ingredients, including synephrine: <b>Avoid.</b>
Metabolic XXX (Drive, Booster, Action, or Optimizer)	Contains many combinations of ingredients—thermogenic agent: <b>Avoid.</b>

## Be a Smart Shopper: Consumer Safety Tips

Supplements should be clearly labeled with “Seals of Approval.” The seals include “CL” for a Consumer Lab seal of approval and “USP” for US Pharmacopoeia. These for-profit and not-for-profit agencies inspect the product and assign scores or ratings if they contain no contaminants, have standardized doses, can be absorbed by the body, can be broken down by the body, and the company that produces the products has quality control standards in place during production and manufacturing to ensure safety and purity.

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If supplements do not have approval seals, do not use them!

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[Click to choose verified dietary supplements.](#)

[Click for information about dietary supplements from the FDA.](#)

[Click for information about dietary supplements from the Office of Dietary Supplements.](#)

## Individual Products Discussed

It would be impossible to discuss all of the dietary supplements and herbals available. However, some are used more than others. Although not inclusive, the following products will be discussed:

Bitter Orange	Boron	Branched Chain Amino Acids
Caffeine	Carnitine	Choline
Chondroitin Sulfate	Chromium	Chrysin
CoEnzyme Q10	Conjugated Linoleic Acid	Cordyceps
Creatine	DHEA	Ephedra
Fish Oil	Ginkgo Biloba	Ginseng
Glucosamine	Glutamine	Guarana
HMB	Hoodia	Hydroxycitric Acid/ HCA

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Bitter Orange  
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 Yohimbe

Hydroxymethylbutyrate	5-Hydroxytryptophan	Lysine
Melatonin	Nitric Oxide	Pycnogenol
Quercetin	St. John's Wort	Synephrine
Tribulus Terrestris	Tryptophan	Turmeric
Tyrosine	Whey Protein	Yohimbe

Products in red should not be used.

## Performance-Enhancing Agents

Performance enhancing agents are substances claiming to increase work output, performance or lean muscle mass. A discussion of each is not possible, so some that are mass marketed are discussed.

## Muscle Building Agents

These agents are listed in alphabetical order.

### Boron

<b>Claims</b>	Builds muscles and increases testosterone levels; may enhance cognitive function.
<b>Other Names</b>	Borate, Boric Acid, Boric Tartrate, and Sodium Borate.
<b>How It Works</b>	No one is sure how (or if) boron is effective because its biological role is unknown.
<b>Dose</b>	No DRI has been established for boron, but a diet high in boron would provide approximately 3.25 mg boron per 2,000 kcal/day, whereas a diet low in boron would provide less than 0.25 mg boron per 2,000 kcal/day. The maximum dose, at which no adverse effects would be expected, is 20 mg per day for adults.
<b>Adverse Effects</b>	None have been reported.

## Boron

<b>Comments</b>	More evidence is needed to determine the importance of boron.
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## L-Carnitine

<b>Claims</b>	Enhance athletic performance, particularly endurance.
<b>Other Names</b>	Carnitine, Carnitor, DL-Carnitine, L-Carnitine Fumarate, L-Carnitine L-Tartrate, L-Carnitine Tartrate, Levocarnitine, Levocarnitine Fumurate.
<b>How It Works</b>	Carnitine enhances the transport of fats to the energy powerhouse within the muscle and the subsequent use of fats as fuel during exercise.
<b>Dose</b>	2–4 grams/day have been taken without any clear benefit. No dose has been established for improving athletic performance.
<b>Adverse Effects</b>	Nausea, vomiting, cramps, diarrhea, heartburn, body odor, and seizures have been reported, when used inappropriately.
<b>Comments</b>	Carnitine is found naturally in the body and can be obtained in the diet from red meats and dairy products. Taking L-Carnitine has <b>not</b> been shown to improve athletic performance or endurance.

## Chromium

<b>Claims</b>	Increases lean muscle mass; is the natural alternative to steroids.
<b>Other Names</b>	Chromium Acetate, Chromium Chloride, Chromium Nicotinate, Chromium Picolinate, Chromium Polynicotinate, Chromium Proteininate, Chromium Trichloride, Chromium Tripicolinate, Cr <sup>3+</sup> , Glucose Tolerance Factor-Cr, GTF, GTF Chromium, GTF-Cr.

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## Chromium

<b>How It Works</b>	Chromium is part of a number of substances that regulate glucose metabolism.
<b>Dose</b>	Doses ranging from 200–1000 mcg/day appear to be safe.
<b>Adverse Effects</b>	Chromium can cause headache, insomnia, and motor dysfunction in some people in doses as low as 200–400 mcg/day.
<b>Comments</b>	Some evidence suggests that chromium can increase weight loss, body fat loss and increase lean body mass in people taking chromium picolinate (200–400 mcg/day) as part of a resistance training program, but the results are questionable. Chromium may be helpful in diabetes, hypertension, and potentially weight loss.

## Chrysin

<b>Claims</b>	Enhances response to resistance training.
<b>Other Names</b>	Flavone X, Flavonoid, Galangin Flavanone.
<b>How It Works</b>	Claims are that it increases testosterone levels.
<b>Dose</b>	A dose of 300 mg daily has been used, but it is usually in combination with other potential testosterone releasers, such as DHEA, Tribulus terrestris, and saw palmetto.
<b>Adverse Effects</b>	None have been reported.
<b>Comments</b>	Chrysin is a naturally occurring isoflavone found in various plants. Most chrysin products are extracted from the passion flower species. It does not seem to be effective for enhancing the response to resistance training in athletes, but minimal data are available for this herbal because it is typically used in combination with other substances.

## Creatine

<b>Claims</b>	Gain muscle mass and improve anaerobic performance.
<b>Other Names</b>	Creatine Monohydrate, Creatine Citrate, Creatine Ethyl Ester, Creatine Ethyl Ester HCl, Serum Creatine, Creatine Pyruvate, Phosphocreatine.
<b>How It Works</b>	Taking creatine allows the muscles to store greater amounts of creatine phosphate (or phosphocreatine), which is used to regenerate ATP, the primary energy for muscle contraction. Creatine can cause visible bulking up of muscles by increasing the water content of muscle cells.
<b>Dose</b>	A dose of 3 grams/day is adequate and a loading dose is unnecessary. The dose commonly recommended for loading is 20 grams/day for 5 days followed by a maintenance dose of less than 10 grams/day. The higher doses are not any more effective than the 3 grams/day.
<b>Adverse Effects</b>	Side effects, not demonstrated by research but reported in association with creatine use include: muscle cramping, gastrointestinal disturbances, kidney problems or dehydration. High doses of creatine may negatively affect kidney function. Individuals taking drugs that affect the kidneys (cyclosporine, gentamicin, tobramycin, and NSAIDs; ibuprofen and naproxen) should avoid high doses of creatine. Caffeine may negate the effects of creatine.
<b>Comments</b>	The body makes creatine (1–2 gm/day) with 95% being stored in skeletal muscle. Creatine supplementation may produce a small increase in explosive strength or enhance performance for short burst, high-intensity activities, like weight lifting and sprinting. It does not improve endurance and if weight gain is high, endurance may be impaired.

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## HMB (Hydroxymethylbutyrate)

<b>Claims</b>	Increases muscle mass and enhances recovery.
<b>Other Names</b>	B-Hydroxy B-Methylbutyrate Monohydrate, Beta-Hydroxy-Beta-Methylbutyric Acid, Hydroxymethyl Butyrate.
<b>How It Works</b>	HMB might promote muscle growth by decreasing or slowing down the catabolism or breakdown of muscle protein.
<b>Dose</b>	Doses of 1 gram three times daily or 1.5 grams once or twice daily have been used for muscle building and increasing strength during weight training.
<b>Adverse Effects</b>	No known adverse effects have been linked to HMB.
<b>Comments</b>	Evidence about the effectiveness of HMB for weight training is conflicting. Some research shows no effect and other data suggest that HMB may be effective in people who have not previously trained. HMB is a by-product of the metabolism of the amino acid, leucine and a precursor to cholesterol.

## Nitric Oxide (NO)

<b>Claims</b>	Enhances delivery of nutrients to muscles so they can increase in mass with training. Increases strength, improves in stamina, and accelerates recovery.
<b>Other Names</b>	NO-Xplode, Nitrix, NOX-CG3, NOx2, and NO.
<b>How It Works</b>	NO works in part by increasing bloods flow. However, supplements marketed as NO do not contain NO because it is a gas, which cannot be put into a pill. Rather the products contain the amino acid, arginine.

## Nitric Oxide (NO)

<b>Dose</b>	No dose has been established. Products marketed as NO will vary with the type and amount of ingredients.
<b>Adverse Effects</b>	Because NO products are all different, it is very difficult to document adverse effects. Combinations of ingredients are a concern.
<b>Comments</b>	Nitric Oxide is actually a gas produced in the body from the amino acid, arginine, to communicate with other cells. Most NO products are typically amino acid mixtures containing arginine alpha-ketoglutarate (A-AKG) and arginine-ketoisocaproate (A-KIC).

## Tribulus Terrestris

<b>Claims</b>	Enhances muscle strength and athletic performance; an antidote for male impotence.
<b>Other Names</b>	Cat's-Head, Devil's-Thorn, Devil's-Weed, Goat-head, Nature's Viagra, Puncture Weed, Tribule Terrestre.
<b>How It Works</b>	Increases levels of testosterone, dehydroepiandrosterone (DHEA), and dihydrotestosterone.
<b>Dose</b>	A dose of 250 mg per day has been used.
<b>Adverse Effects</b>	None have been reported.
<b>Comments</b>	No study to date has demonstrated any benefit to strength or athletic performance after taking Tribulus Terrestris. This herbal is derived from a Mediterranean plant that bears a spine-covered fruit.

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## Athletic/Recovery Agents

The list of substances marketed to enhance or improve athletic performance is extensive and continually changing. Some commonly used products, listed in alphabetical order (not order of effectiveness), are described below.

### Branched-Chain Amino Acids (BCAA)

<b>Claims</b>	Enhances exercise performance, prevents fatigue, reduces protein and muscle breakdown during intense exercise.
<b>Other Names</b>	BCAA, Isoleucine, Leucine, L-Isoleucine, L-Leucine, L-Valine, N-Acetyl Leucine, Valine.
<b>How It Works</b>	BCAA act as signaling molecules to stimulate protein synthesis or production; they are also used as an energy source during stress.
<b>Dose</b>	No established dose.
<b>Adverse Effects</b>	BCAA in doses of 60 grams or higher daily can increase ammonia levels in the blood, which can lead to fatigue and loss of motor coordination.
<b>Comments</b>	Research has not demonstrated that BCAA enhance exercise or athletic performance. The Estimated Average Requirements for BCAA are 68–144 mg/kg/day (leucine 34 mg/day; isoleucine 15 mg/day; valine 19 mg/day). This would equate to 4.7–10 grams per day for a 70 kg (154 lb) person. BCAA are found in meat, dairy foods, and legumes. About 15–25% of the total dietary protein intake is BCAA.

### Caffeine

<b>Claims</b>	Improves mental alertness and enhances athletic performance; used for weight loss and diabetes.
<b>Other Names</b>	Methylxanthines and herbal products such as Black Tea, Green Tea, Oolong Tea, Coffee, Cola Nut, Guarana, and Maté.

## Caffeine

<b>How It Works</b>	Caffeine is a stimulant. It stimulates the central nervous system, heart, skeletal muscles, and respiration.
<b>Dose</b>	100-600 mg/day consumed over a period of 4–8 hours is the most common dose. For endurance doses may range from 2-10 mg per kg body weight. Higher doses may produce urine levels greater than allowed by the International Olympic Committee.
<b>Adverse Effects</b>	<p>Adverse effects are in part determined by sensitivity to caffeine. Some people are rapid and others slow caffeine metabolizers. Reported effects of caffeine include headache, anxiety, agitation, insomnia, nervousness, restlessness, gastrointestinal distress, nausea, rapid heart rate, arrhythmias, quickened respiration, tremors, convulsions, and frequent urination. Chronic use, especially in large amounts, can produce tolerance, habituation, and psychological dependence.</p> <p>Caffeine produces physical dependence and withdrawal of caffeine elicits physical and behavioral symptoms, to include:</p> <ul style="list-style-type: none"> <li>• Headache.</li> <li>• Fatigue.</li> <li>• Difficulty concentrating.</li> <li>• Mood disturbances (depressed mood, irritability).</li> <li>• Flu-like symptoms (muscle aches, nausea, vomiting).</li> </ul> <p>The symptoms of withdrawal can occur taking only 100 mg of caffeine per day for 7 days or 300 mg per day for 3 days. The onset of withdrawal symptoms occurs within 12 to 48 hours after last dose and may last up to nine days. Withdrawal symptoms, which can vary from mild to incapacitating, can be reversed 30 to 60 minutes after ingesting a product containing as little as 30 mg of caffeine.</p>

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## Caffeine

<b>Comments</b>	<p>Caffeine is included on the FDA list as a substance “generally recognized as safe.” However, the FDA for cola beverages has established a maximum concentration for caffeine: 32.4 mg per 6 oz or 65 mg per 12 oz. Other than colas, the caffeine content of food and beverages is not regulated.</p> <p>It is clear that caffeine is “performance enhancing,” and because of this, the International Olympic Committee (IOC) has banned its use above a certain level (as detected in the athlete’s urine). Caffeine seems to increase physical endurance and may increase the time to exhaustion. It does not seem to affect activities that require high exertion over a short period of time, such as sprinting or lifting, activity.</p>
<b>Comments</b>	<p>Caffeine improves mental performance and alertness after prolonged sleep deprivation. Some data suggest that caffeine reduces pain. Although caffeine is a diuretic, doses over 300 mg are usually required to compromise fluid status.</p> <p>Some people are very sensitive to caffeine, and show symptoms (tremors, sleep disturbances, gastrointestinal upsets) after small doses. Persons who experience adverse reactions to caffeine-containing drinks or people with heart disease should avoid caffeine containing energy drinks (discussed below).</p> <p><a href="#">Click for the caffeine content of various products.</a></p>

## Choline

<b>Claims</b>	<p>Enhance athletic performance by increasing energy and delaying fatigue in endurance activities and maintaining muscle strength for resistance exercise.</p>
<b>Other Names</b>	<p>Choline Bitartrate, Choline Chloride, Choline Citrate, Lipotropic Factor, Phosphatidylethanolamine, Alpha-GPC, Lecithin, and Phosphatidylcholine.</p>

## Choline

<b>How It Works</b>	Choline is an essential part of the neurotransmitter responsible for muscle contraction—acetylcholine. Maintaining a supply of choline could possibly prevent depletion of acetylcholine and sustain muscle contraction.
<b>Dose</b>	The typical dose is 1–2 grams/day; unsafe in amounts above 3.5 gm/day for adults over 18 years of age.
<b>Adverse Effects</b>	Choline can cause sweating, fishy body odor, vomiting and diarrhea.
<b>Comments</b>	Taking choline does not seem to enhance athletic performance or endurance or delay fatigue. However, the newer forms of choline have not been tested. Choline is a component of phosphatidylcholine or lecithin. Choline is considered a B vitamin, even though the body can make it. Liver, meat, fish, nuts, beans, eggs, and peas are high in choline. The typical diet provides 200–600 mg/day. Choline is a component of Alpha-glycerophosphorylcholine (GPC), Lecithin, and phosphatidylcholine.

## Co-Enzyme Q10

<b>Claims</b>	Improves aerobic capacity.
<b>Other Names</b>	CoQ10, Coenzyme Q10, CoQ10.
<b>How It Works</b>	CoQ10 is important in the production of ATP and acts as an antioxidant.
<b>Dose</b>	A common dose is 100 mg/day divided and taken at two different times during the day. Some research suggests it might slightly improve tolerance to higher workloads, but more research is needed. No established dose has been set for aerobic performance.

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## Co-Enzyme Q10

<b>Adverse Effects</b>	None identified.
<b>Comments</b>	Dietary sources are meat and seafood; it can also be produced from fermenting beets and sugar cane with special strains of yeast. CoQ10 is also used for preventing “statin”-induced myopathy.

## Cordyceps

<b>Claims</b>	Improves athletic performance, increases energy and stamina and reduces fatigue; strengthens the immune system.
<b>Other Names</b>	Caterpillar Fungus, Caterpillar Mushroom, Vegetable Caterpillar.
<b>How It Works</b>	May work by stimulating various immune cells to accelerate recovery.
<b>Dose</b>	Typical dose is 3 gm/day.
<b>Adverse Effects</b>	None identified at this time.
<b>Comments</b>	Cordyceps sinensis is a fungus parasite that lives on insects and arthropods. No research has demonstrated an effect on athletic performance. Many commercial products grow the parasite in the laboratory.

## Ginseng

Ginseng refers to a group of extracts derived from the plant family, Araliaceae. Three major types—Panax, American, and Siberian—are marketed; each are available in a variety of forms, ranging from root powders to root extracts to leaf powders and extracts. The forms also differ in terms of the active ingredients.

<b>Claims</b>	All forms claim to enhance resistance to environmental stress or serve as an “adaptogen”, a term used to indicate that a substance strengthens the body and increases resistance to stress.
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## Ginseng

<b>Claims</b>	The name panax, or “all-healing,” ginseng has been touted for a broad range of ailments and is used to restore life energy.
<b>Other Names</b>	<ul style="list-style-type: none"> <li>• Panax ginseng (or P. ginseng)</li> <li>• Asian or Asiatic, Chinese, Korean, and Oriental ginseng, radix ginseng rubra, ren shen, sang, seng, red or white ginseng. Red ginseng is steamed and dried in heat or sunlight while white ginseng is simply the dried or powdered root.</li> </ul>
<b>Other Names</b>	<ul style="list-style-type: none"> <li>• American Ginseng (<i>Panax quinquefolius</i>).</li> <li>• Anchi Ginseng, Canadian Ginseng, Ginseng, Ginseng Root, North American Ginseng, Occidental Ginseng, Ontario Ginseng, Panax quinquefolium, Red Berry, Wisconsin Ginseng.</li> <li>• Siberian Ginseng (<i>Eleutherococcus senticosus</i>).</li> <li>• Acanthopanax Obovatus, Ciwujia, Ciwujia Root, Ciwujia Root Extract, Devil’s Bush, Devil’s Shrub, Eleuthero Ginseng, Eleuthero Root, Russian Root, Shigoka, Siberian Eleuthero, Siberian Ginseng, Thorny Bearer of Free Berries.</li> </ul>
<b>How It Works</b>	Appears to work by modulating the immune system. Ginseng preparations have antioxidant properties and may lower blood glucose. Panax ginseng may work against stress by affecting the responsiveness and regulation of the stress-responsive hormone axis.
<b>Dose</b>	<p>Dosing is generally around 0.6–3 grams of root powder 1 to 3 times per day for Panax ginseng as a capsule or an extract standardized to 4–8% ginsenosides, 200–600 mg/day.</p> <p>Dosing is slightly lower for American and Siberian ginsengs. Sometimes ginseng is taken continuously, but cycling is usually recommended. Ginseng is taken for 3 weeks to 3 months followed by 2 weeks to 2 months off.</p>

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## Ginseng

<b>Adverse Effects</b>	Each form acts differently, but gastrointestinal, nervous, hypoglycemia, cardiovascular system effects, insomnia, slight drowsiness, anxiety, irritability, and feeling of sadness may be reported.
<b>Comments</b>	The form of ginseng is very important. Please read product labels—thousands of commercial products contain the various forms of Ginseng but only three are USP certified. Siberian ginseng is often misidentified or adulterated. American and Panax ginseng may be much more expensive. Be very careful when using ginseng products.
<b>Comments</b>	American Ginseng is indigenous to both the Americas and the Far East; it has been used as a medicinal plant for 5,000 years. Wild American ginseng is highly sought after, for that reason, it may become an endangered species in some states.

## Glutamine

<b>Claims</b>	Enhances exercise performance and accelerates recovery from strenuous exercise.
<b>Other Names</b>	GLN, Glutamate, Glutamic Acid, Glutamic Acid HCl, L-Glutamic Acid, L-Glutamic Acid HCl, L-Glutamic Acid Hydrochloride, L-Glutamine, N-Acetyl-L-Glutamine.
<b>How It Works</b>	Glutamine works by maintaining normal function of the intestine, immune system, and muscle amino acid homeostasis during stress; it also serves as a metabolic fuel for immune cells.
<b>Dose</b>	Doses of 15–30 grams have been used after exercise. It appears safe at up to 40 grams/day.
<b>Adverse Effects</b>	None identified at this time.

## Glutamine

<b>Comments</b>	Glutamine does not appear to enhance exercise performance; but it has been shown to suppress the rise in muscle breakdown during recovery. Importantly, glutamine may prove to be a biologic marker of overtraining.
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## Guarana

<b>Claims</b>	Enhance endurance performance, and improve mental acuity, weight loss, and reduce mental and physical fatigue.
<b>Other Names</b>	Brazilian Cocoa, Zoom.
<b>How It Works</b>	Guarana is a stimulant and contains caffeine, as well as other potentially psychoactive substances.
<b>Dose</b>	Doses vary, but 75 mg has been suggested. It is usually combined with other active ingredients.
<b>Adverse Effects</b>	Same as for caffeine.
<b>Comments</b>	Guarana is a plant species native to the central Amazonian Basin, with a long history of use for its stimulant effects. It is a common ingredient in Brazilian soft drinks. The guarana seed contains 3.6%–5.8% caffeine. Guarana is often used in combination with other ingredients for weight loss products and as a stimulant.

## L-Lysine

<b>Claims</b>	Promote gains in muscle strength and mass.
<b>Other Names</b>	Lysine, L-Lysine HCl, Lysine Hydrochloride, Lysine Monohydrochloride.
<b>How It Works</b>	Lysine may stimulate the release of growth hormone.

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## L-Lysine

<b>Dose</b>	No established dose for athletic performance, but doses of 1–6 grams/day have been used, without benefit.
<b>Adverse Effects</b>	Can cause diarrhea and abdominal pain.
<b>Comments</b>	Oral doses that might be high enough to induce growth hormone (GH) release are likely to cause stomach discomfort and diarrhea. Exercise of moderate to high intensity is a far greater stimulus for GH release than lysine. No proven benefits have been established for performance, but lysine appears to be effective for reducing recurrence of herpes simplex infections.

## Pycnogenol

<b>Claims</b>	Improves athletic endurance and decreases muscle cramps and pain.
<b>Other Names</b>	French Marine Pine Bark Extract, Maritime Bark Extract, OPCs, Pine Bark Extract, Pygenol.
<b>How It Works</b>	Benefits may reflect antioxidant activity.
<b>Dose</b>	Typical dose is 200 mg daily.
<b>Adverse Effects</b>	None identified at this time.
<b>Comments</b>	Pycnogenol is an extract from the bark of the French pine tree. Research has shown that it improved endurance in recreational athletes aged 20–35 yrs and prevented muscle cramps and muscular pain at rest, and pain after/during exercise.

## Pyruvate

<b>Claims</b>	Improves athletic performance and promotes weight loss.
<b>Other Names</b>	Alpha-Keto Acid, Alpha-Ketopropionic Acid, Calcium Pyruvate, Calcium Pyruvate Monohydrate, Creatine Pyruvate, Magnesium Pyruvate, Potassium Pyruvate, Proacemic Acid, Pyruvic Acid, Sodium Pyruvate.
<b>How It Works</b>	Pyruvate serves as a metabolic regulator and may modify fat and CHO metabolism.
<b>Dose</b>	Doses range from 6–44 grams/day. The most effective dose has not been determined.
<b>Adverse Effects</b>	May cause gastric distress.
<b>Comments</b>	Research suggests that pyruvate, either alone or in combination with creatine, does not improve athletic performance. Its effect on weight loss remains to be determined.

## Taurine

<b>Claims</b>	Improves mental performance and serves as an antioxidant.
<b>Other Names</b>	L-taurine.
<b>How It Works</b>	Believed to act as an antioxidant and free radical scavenger. Its presence in brain suggests it may also alter normal hormone function and neurotransmission.
<b>Dose</b>	A dose of 2–6 grams per day has been used.
<b>Adverse Effects</b>	None reported.

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## Taurine

<b>Comments</b>	Taurine is a naturally occurring amino acid found in meat, fish and shellfish and is formed in the body. Dietary intakes of taurine range from 50–400 mg/day. However, taurine is now often added to energy drinks and these drinks may contain 25, 300, 2,000 mg, or 4,000 mg/L. As such, dietary intakes of taurine may be very high in individuals consuming energy drinks with added taurine. An upper limit of safety has not been determined. Taurine has not been shown to enhance performance.
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## Tyrosine

<b>Claims</b>	Improves alertness following sleep deprivation; maintains cognitive performance during stress.
<b>Other Names</b>	Acetyl-L-Tyrosine, L-tyrosine, N-Acetyl L-Tyrosine, Tyr.
<b>How It Works</b>	Providing additional tyrosine should maintain brain tyrosine and allow continued synthesis of essential neurotransmitters and avoid negative effects of stress.
<b>Dose</b>	Up to 150 mg/kg/day has been used to maintain alertness and cognitive performance.
<b>Adverse Effects</b>	May cause headache, fatigue, nausea, and heartburn.
<b>Comments</b>	Tyrosine is an amino acid made by the body from other amino acids. It is found in dairy products, meat, fish, eggs, nuts, beans, oats, and wheat. Tyrosine may improve alertness following sleep deprivation.

## Whey Protein

<b>Claims</b>	Increase muscle mass and promote weight gain.
<b>Other Names</b>	Bovine Whey Protein Concentrate, Goat Milk Whey, Goat Whey, Milk Protein Isolate, Mineral Whey Concentrate, Whey, Whey Peptides, Whey Protein Concentrate, Whey Protein Hydrolysate, Whey Protein Isolate.
<b>How It Works</b>	May enhance immune system and regulate muscle protein synthesis.
<b>Dose</b>	No established dose, but from 8–30 grams per day are used. A high dose would be over 50 grams per day.
<b>Adverse Effects</b>	May cause nausea, thirst, bloating, cramps, fatigue, poor appetite and headache.
<b>Comments</b>	Whey protein is the name for a variety of proteins isolated from whey, which is the watery part of milk after milk separates into a liquid and solid phase from heating. Casein, or curds, is the protein in the solid phase. Whey protein contains carbohydrates (lactose), proteins (albumin and others), minerals, and amino acids. BCAA make up 24% of whey protein. No research shows any benefit in healthy people. Some research suggests that whey protein is more effective than casein for promoting muscle mass during weight training. However, soy protein may be as effective as whey protein. Research as to whether whey protein can promote weight loss is ongoing. The best protein source is still real foods because they provide essential nutrients.

## Yohimbe

<b>Claims</b>	Enhances energy and stamina.
<b>Other Names</b>	Johimbi, Yohimbine.

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## Yohimbe

<b>How It Works</b>	Yohimbe may work in several ways, but primarily it works by blocking selected receptors that control the nervous system.
<b>Dose</b>	A dose equivalent to 15–30 mg of Yohimbe daily is typical for impotence. No dose has been established for stamina.
<b>Adverse Effects</b>	Yohimbe may cause high blood pressure, headaches, anxiety, dizziness, and sleeplessness and increase heart rate.
<b>Comments</b>	Yohimbine is derived from the inner bark of an evergreen tree native to Zaire, Cameroon, and Gabon. Yohimbe has been used for centuries as an aphrodisiac, and is used to treat erectile dysfunction. Yohimbe interacts with many other dietary supplements, and should not be used. No data indicate it improves stamina.

## Dietary Supplements for Weight Loss

Supplements that may aid in weight loss can be grouped according to how they affect the body. They are typically classified as appetite suppressants, thermogenic agents, or digestion inhibitors. The number of weight loss supplements is staggering. In January 2007, the Federal Trade Commission fined four prominent weight loss supplement (Xenadrine EFX, CortiSlim, Trim Spa, and One-A-Day WeightSmart) manufacturers for deceptive advertising. Many weight loss supplements make claims of effectiveness without reliable scientific evidence. Buyer beware!

### Appetite Suppressants

Some dietary supplements marketed as natural appetite suppressants are 5-HTP and Hoodia. Several prescription and over the counter (OTC) medications, such as Wellbutrin, Redux, Meridia, and dexatrin, are also appetite suppressants. More recently, Alli (pronounced ally), whose active ingredient is Orlistat, was approved as the first over-the-counter, FDA-approved weight loss pill. In certain circumstances, Active Duty personnel may be prescribed a weight loss medication for a limited time, under the care of a physician.

## 5-Hydroxytryptophan or 5-HTP

<b>Claims</b>	Promotes weight and/or body fat loss.
<b>Other Names</b>	5-hydroxy L-tryptophan, 5-Hydroxy Tryptophan, 5-L-Hydroxytryptophan and L-5 HTP.
<b>How It Works</b>	5- HTP crosses the blood brain barrier and increases production of serotonin in the central nervous system. Serotonin can affect sleep, appetite, temperature, and pain sensation.
<b>Dose</b>	A typical dose is 150–300 mg/daily. No dose has been established for weight loss.
<b>Adverse Effects</b>	May cause gastrointestinal symptoms, such as heartburn, stomach pain, flatulence, nausea, vomiting, diarrhea, and loss of appetite. Safety concerns are comparable to tryptophan: 5-HTP has may cause eosinophilia myalgia syndrome (EMS) because of certain contaminants.
<b>Comments</b>	5-HTP or 5-hydroxytryptophan is related to both L-tryptophan and serotonin. In the body, L-tryptophan is converted to 5-HTP, which can then be converted to serotonin.

## Hoodia

<b>Claims</b>	Achieve weight or body fat loss.
<b>Other Names</b>	Cactus, Hoodia Gordonii Cactus, Hoodia P57, Kalahari Cactus, Kalahari Diet, P57, Xhoba.
<b>How It Works</b>	Contains a substance that is believed to be an appetite suppressant.
<b>Dose</b>	No established dose has proven effective for weight loss.
<b>Adverse Effects</b>	None yet reported due to lack of published research.

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## Hoodia

<b>Comments</b>	Hoodia gordonii, Hoodia P57 or Kalahari Cactus, is a succulent plant that grows in the Kalahari Desert in southern Africa. It was used by bushman to minimize sensations of hunger.
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## Other Supplements

### Chondroitin Sulfate

<b>Claims</b>	Alleviates pain and improves function in persons with osteoarthritis.
<b>Other Names</b>	Chondroitin Polysulfate, CPS, CS, CSA, CSC, GAG.
<b>How It Works</b>	Chondroitin is found in cartilaginous tissues where it functions to form the joint matrix structure; it may also protect cartilage against degradation by inhibiting a particular enzyme.
<b>Dose</b>	A typical dose is 200–400 mg two to three times daily or 1,000–1,200 mg as a single daily dose.
<b>Adverse Effects</b>	Chondroitin appears to be well-tolerated, although some people experience can have stomach pain and/or nausea.
<b>Comments</b>	Products containing chondroitin or chondroitin plus glucosamine vary greatly in quality and label claims. Make sure the product is USP approved. Chondroitin plus glucosamine combinations that also contain manganese may be the more effective products.

### Dehydroepiandrosterone

<b>Claims</b>	Dehydroepiandrosterone (DHEA) is used for a multitude of different reasons to include reversing the effects of aging, weight loss, enhancing immune function, increasing strength, energy, and muscle mass, depression, and diabetes.
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## Dehydroepiandrosterone

<b>Other Names</b>	DHEA
<b>How It Works</b>	DHEA is produced in the adrenal glands, liver, brain and testes of men. DHEA and its sulfate ester, dehydroepiandrosterone sulfate (DHEA-S), act on many tissues, but the actual way it might work is not certain. For sure it has potent actions in the brain, and limited actions as a testosterone promoter.
<b>Dose</b>	The dose depends on the use. Typically 25–50 mg daily are used for the elderly whereas up to 90 mg is used for depression. Up to 200 mg daily has been used.
<b>Adverse Effects</b>	No real adverse effects have been noted at doses below 75 mg daily.
<b>Comments</b>	DHEA can be chemically made or derived from natural sources, such as soy and wild yam. However, these natural sources have no effect on blood levels of DHEA. Natural products (wild yam and soy) labeled, as “natural DHEA” should be avoided. DHEA products have been shown to contain 0%–150% of what is stated on the label. Lastly, DHEA is banned by the National Collegiate Athletic Association.

## Fish Oils

<b>Claims</b>	Used to decrease blood lipids, protect against coronary heart disease and high blood pressure; used to decrease inflammation and symptoms of asthma.
<b>Other Names</b>	Cod Liver Oil, Marine Lipid Oil, Marine Oils, Menhaden Oil, N-3 Fatty Acids, N3-polyunsaturated Fatty Acids, Omega 3, Omega-3 Fatty Acids, Omega-3 Marine Triglycerides, Polyunsaturated Fatty Acids (PUFA), Salmon Oil, W-3 Fatty Acids.

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## Fish Oils

<b>How It Works</b>	Fish oils are high in the omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), which have anti-inflammatory and antithrombotic (preventing aggregation and entrapment of cellular debris) effects.
<b>Dose</b>	Doses range from 1–3 grams/day in a single or two divided doses. Doses over 3 grams are discouraged.
<b>Adverse Effects</b>	Can cause breath and burps to taste and smell like fish. May experience heartburn and/or nausea. Doses greater than 3 grams per day might adversely affect immune function.
<b>Comments</b>	Fish oils come from a variety of marine life including mackerel, herring, sardines, tuna, halibut, salmon, cod liver, and trout. Shellfish, such as oyster, shrimp, and scallop contain less. Evidence is rapidly accumulating that taking fish oil, as food or a supplement, has a very positive impact on health.

## Ginkgo Biloba

<b>Claims</b>	Improve memory and concentration; prevent or minimize altitude sickness.
<b>Other Names</b>	Fossil Tree, Ginkgo Folium, Japanese Silver Apricot, Kew Tree, Maidenhair Tree.
<b>How It Works</b>	Ginkgo contains many flavonoids or substances with antioxidant properties. It may work by protecting against free radical damage.
<b>Dose</b>	Doses of 120–600 mg per day have been used for improving memory and 120 mg twice a day for preventing altitude sickness. Doses over 120 mg at any one time may cause mild gastrointestinal problems.
<b>Adverse Effects</b>	Well tolerated but may cause mild gastrointestinal problems, headache, dizziness, and constipation. Increased risk of bleeding.

## Ginkgo Biloba

<b>Comments</b>	The Ginkgo tree, also known as the Maidenhair Tree, is unique, and may be the oldest tree in the world. The female tree yields an apricot-like structure containing nuts, fruit or seeds that are eaten for health benefits and for special occasions. The substances from the ginkgo leaf are also extracted for medical uses. Studies regarding its efficacy for altitude sickness are varied—some report success and others no success. Ginkgo may help some and not others, but who will benefit is unknown.
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## Glucosamine

<b>Claims</b>	Reduces symptoms associated with osteoarthritis, joint pain, back pain, and possibly other musculoskeletal problems.
<b>Other Names</b>	Glucosamine hydrochloride, glucosamine sulfate and N-Acetyl glucosamine. Chitosamine, D-glucosamine HCl, Glucosamine, Glucosamine HCl, Glucosamine KCl, Glucose-6-Phosphate.
<b>How It Works</b>	Glucosamine hydrochloride is a constituent of cartilage and is required for the formation and maintenance of tendons, ligaments, and cartilage.
<b>Dose</b>	Typical doses are 500 mg three times daily alone or in combination with chondroitin sulfate.
<b>Adverse Effects</b>	Mild gastrointestinal symptoms such as gas, abdominal bloating, and cramps have been reported.
<b>Comments</b>	Glucosamine is usually derived from the outer structure of marine organisms or produced synthetically. Read glucosamine product labels carefully for content. Avoid confusion with glucosamine sulfate and N-acetyl glucosamine because these products may not be interchangeable. Glucosamine sulfate has been studied the most for osteoarthritis. Great variability exists among glucosamine and glucosamine plus chondroitin products. Make sure the product is USP approved. Discuss these products with your physician.

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## Melatonin

<b>Claims</b>	Acts as a sleep agent; defends against jet lag and oxidant stress.
<b>Other Names</b>	MLT, Pineal Hormone.
<b>How It Works</b>	The hormone, melatonin is produced in the pineal gland and released into the circulation, where it binds to areas in the brain.
<b>Dose</b>	A typical dose for insomnia is 0.3–5.0 mg or 3–5 mg for promoting sleep during transcontinental flights to alleviate jet lag.
<b>Adverse Effects</b>	Minimal to no side effects are noted. Those noted include drowsiness, headache, and dizziness.
<b>Comments</b>	Oral administration of melatonin has a rapid, transient, and mild sleep-inducing effect. Melatonin is also used to advance the body clock before eastward flights by ingesting up to 5 mg in the evening of the days before departure. Melatonin is derived from serotonin (via tryptophan and 5-HTP), which is converted to N-acetylserotonin, and then to melatonin.

## Quercetin

<b>Claims</b>	May be a substitute for ibuprofen/motrin/ and other anti-inflammatory agents.
<b>Other Names</b>	Bioflavonoid, Bioflavonoid Complex, Bioflavonoid Concentrate, Bioflavonoid Extract, Citrus Bioflavones, Citrus Bioflavonoid, Citrus Bioflavonoid Extract, Citrus Flavones, Citrus Flavonoids.
<b>How It Works</b>	Acts as an antioxidant and anti-inflammatory agent.
<b>Dose</b>	A typical dose is 400–500 mg three times daily, but 500 mg twice daily has been used. The appropriate dose for anti-inflammatory actions is unclear.

## Quercetin

<b>Adverse Effects</b>	May cause headache and tingling of the extremities.
<b>Comments</b>	Quercetin is a flavonoid found in red wine, tea, onions, green tea, apples, berries, broccoli, spinach, cabbage, cauliflower, Brussels sprouts, kale, collard greens, pak choi and kohlrabi. It is also a component of Ginkgo biloba and St. John's Wort. Many forms of quercetin are not well absorbed, which results in low bioavailability.

## Tryptophan (L)

<b>Claims</b>	Induces sleep.
<b>Other Names</b>	L-trypt, L-Tryptophan
<b>How It Works</b>	L- tryptophan acts on the brain to induce sleep.
<b>Dose</b>	Doses of 0.3–6 grams per day have been used, with 1–2.5 grams being most common for sleep.
<b>Adverse Effects</b>	L-tryptophan has been linked to eosinophilia myalgia syndrome (EMS) and several deaths; 95% of the cases were traced to a product produced in Japan.
<b>Comments</b>	L-tryptophan may be beneficial as a sleep aid. Dietary tryptophan from protein sources is first converted into 5-HTP (see below) and then to serotonin, which has calming effects. Tryptophan should be obtained from food, such as milk, cheese, meats, poultry, and soy foods. Tryptophan should not be taken in combination with sedating products or herbals, such as 5-HTP, St. John's wort, kava, skullcap, or valerian.

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## Turmeric

<b>Claims</b>	May have pain-reducing and anti-inflammatory properties. Also used to treat upset stomachs.
<b>Other Names</b>	Curcumin, Indian Saffron, Radix Curcumae, Rhizoma Cucurmae Longae.
<b>How It Works</b>	Appears to inhibit the inflammatory pathways, similar to NSAIDs.
<b>Dose</b>	No dose established for anti-inflammatory actions; 500 mg four times daily has been used for stomach upsets.
<b>Adverse Effects</b>	Tolerated if dose is appropriate; may cause gastrointestinal distress.
<b>Comments</b>	Turmeric is a perennial plant of the ginger family, and native to tropical South Asia. Plants are gathered to obtain the thickened stem (rhizomes) that grows below or on the soil surface. Turmeric is frequently used to flavor or color curry powders, mustards, butters, and cheeses.

## Thermogenic Agents

None of these agents should be used.

A multitude of thermogenic or “energy metabolism boosting” substances are available on the market. The most common ingredients in dietary supplements marketed to promote weight loss are bitter orange (*Citrus aurantium*), country mallow or heartleaf (*Sida cordifolia*), and ephedra. Others are marketed as “fat burners.” Each carries a significant degree of risk, particularly when used during exercise training and extreme environmental conditions, such as a warm environment, diving, and at altitude.

### Bitter Orange and Country Mallow

<b>Claims</b>	Increase metabolic rate and induce weight loss.
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## Bitter Orange and Country Mallow

<b>Other Names</b>	Orange Peel Extract, Seville Orange, Shangzhou Zhiqiao, Sour Orange, Synephrine, Citrus aurantium, and/or Zhi Shi, Heartleaf, and White Mallow.
<b>How It Works</b>	Synephrine, like ephedra, is a stimulant that increases heart rate and blood pressure.
<b>Dose</b>	Since serious adverse effects have been linked to low doses of these substances, there is no known safe or recommended dose for these products. The ephedra ban was upheld after a recent court challenge in Feb 2007; the Food and Drug Administration has submitted recommendations to have both bitter orange and country mallow added to the ephedra ban.
<b>Adverse Effects</b>	Bitter orange and country mallow all contain ephedrine or synephrine, which has been linked to serious cardiovascular, or heart, events to include ischemic stroke, rapid heart rate, heart attacks, and even death.
<b>Comments</b>	Manufacturers have substituted synephrine in products that previously contained ephedra. Marketed as ephedra-free, they typically contain synephrine from bitter orange and/or country mallow, plus caffeine and/or caffeine-containing supplements. These may pose the same or greater risks than the original product that contained ephedra. Bitter orange has Generally Recognized as Safe (GRAS) status in the US and is commonly found in foods.

## Conjugated Linolenic Acid (CLA)

<b>Claims</b>	Improves body composition/decrease fat mass in overweight or obese persons; reduces hunger.
<b>Other Names</b>	Conjugated LA, CLA-Triacylglycerol, LA, Linoleic Acid.
<b>How It Works</b>	CLA may help shrink fat tissue by inducing cell death of fat cells.

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## Conjugated Linolenic Acid (CLA)

<b>Dose</b>	Doses ranging from 2–7 grams per day have been used, but more than 3.4 grams per day does not confer additional benefit.
<b>Adverse Effects</b>	CLA has been associated with gastrointestinal distress to include nausea, loose stools, and heart burn. One form of CLA might predispose to type 2 diabetes and cardiovascular disease.
<b>Comments</b>	Although CLA appears to reduce hunger, this is not associated with a reduction in energy intake.

## Ephedra

Ephedra has been banned and should not be used under any circumstances.

## Garcinia Cambogia or HCA

<b>Claims</b>	Inhibits conversion of excess calories to body fat.
<b>Other Names</b>	Hydroxycitrate, Hydroxycitric Acid, Super Citri-Max, Citrimax, Citrilean, Citrinate and Malabar Tamarinda.
<b>How It Works</b>	Garcinia may interfere with fat production by inhibiting the formation of fatty acids. It may also lower the formation of LDL and triglycerides. In addition, HCA may suppress appetite by promoting glycogen synthesis.
<b>Dose</b>	Several different doses have been used: 300 mg three times daily; 500 mg four times daily; and 1000 mg three times daily. Doses up to 2800 mg/day appear to be safe for short periods of time (up to 90 days).
<b>Adverse Effects</b>	Can cause nausea, gastrointestinal distress and/or headache.
<b>Comments</b>	No conclusive evidence is available that Garcinia cambogia or HCA promotes any significant changes in weight.

## Digestion Inhibitors

Digestion inhibitors are typically high fiber products, such as psyllium, chitosan, glucomannan, guar gum, guggul and inulin.

<b>Claims</b>	Prevent weight gain by blocking the absorption or digestion of food.
<b>How It Works</b>	They may slow digestion and interfere with or prevent the absorption of fat and carbohydrates.
<b>Dose</b>	Each product promotes a certain dose. For example, chitosan has been used in doses ranging from 1–5 grams and with other inhibitors. A specific combination of 1.2 grams of chitosan combined with 1.2 grams of glucomannan daily has been used. Also, 2.5 grams of chitosan with 1 gram of psyllium have been used.
<b>Adverse Effects</b>	Major potential problems include gastrointestinal upset, nausea, gas, bulky stools, and constipation.
<b>Comments</b>	Chitosan appears to block the absorption of 5–9 grams of fat daily; which is equivalent to only 45–81 kcal/day. Therefore, these products may not be effective for weight loss.

## The Good, the Bad and the Ugly Facts

The following supplements are categorized as “good” due to the availability of data derived from scientific, controlled studies that have demonstrated safety and effectiveness of these products for specific conditions.

### The Good Facts

#### Multivitamins for Protection from “Vending Machine Malnutrition”

A daily multivitamin/mineral supplement providing less than 100% of the RDI for any one nutrient is reasonable for individuals that consistently fail to consume a balanced diet. However, it is important to avoid “mega” dose products that supply 1000% of the RDI for beta-carotene, vitamin A, vitamin E and other fat-soluble vitamins. Long-term use of high doses of fat-soluble vitamins can cause toxicity symptoms.

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## Chromium

- May be beneficial in lowering blood glucose and blood lipid levels in patients with diabetes.

## The Bad Facts

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None of the following products should be used.

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The following supplements are listed as “bad” due to serious health risks or adverse effects linked to use.

### Steroids and Steroid-Enhancers

These agents have been linked to liver toxicity, testicular shrinkage, breast enlargement in males, adverse effects on lipid levels and increased risk of heart attack and stroke.

### Andro and Andro precursors

- Banned for use by military personnel!
- Listed as Schedule III controlled substances (cocaine and heroin are also on this list).

### Hemp Oil

From the seed of the hemp plant.

- Widely used in body care products, lubricants, paints and industrial uses.
- Hemp oil is deliberately manufactured to contain no significant amounts of THC and is therefore not a psychoactive drug.
- Banned for use by Air Force personnel.
- Pop positive for marijuana on drug urinalysis.

### Ephedra (*Ephedra sinica*)

- Ephedra is a naturally occurring substance derived from botanicals. The principal active ingredient is ephedrine, an amphetamine-like compound that stimulates the nervous system and heart.
- Also known as ma huang, Chinese Ephedra, Ephedrine, Ephedrine Alkaloid, Herbal Ecstasy, Sea Grape, Teamster's Tea, Yellow Astringent, Yellow Horse.
- Ephedra is illegal: On August 17, 2006 the U.S. Court of Appeals for the Tenth Circuit in Denver upheld the FDA final rule declaring all

dietary supplements containing ephedrine alkaloids adulterated, and therefore illegal for marketing in the United States.

- Ephedra can cause life-threatening adverse effects in some people. Multiple case reports have linked ephedra to hypertension, myocardial infarction (MI), seizure, stroke, psychosis, and death.
- Ephedra is a stimulant that can cause heart arrhythmias and cardiac failure.

### **Syneprine Compounds: Bitter Orange (*Citrus aurantium*) and Country Mallow, or Heartleaf (*Sida cordifolia*)**

- Present in “ephedra free” compounds but the effects are comparable to ephedra.
- Effects on blood pressure and heart rate are enhanced when taken with caffeine-containing herbals such as guarana, kola nut, mate, green tea and black tea.

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No approved thermogenic agents have been shown to be safe and effective for weight loss!

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### **Valerian**

- Sold as a sleep aid and does have a sedative effect.
- Mixed with alcohol, it can be dangerous—increases sedative effect!

### **Kava Kava**

- Linked to liver damage and liver failure!
- Banned in European countries and Canada.

### **St. Johns Wort**

- Effective in treatment of mild depression.
- Interferes with a huge number of medications, including birth control pills, blood pressure medication, diabetes and cholesterol medications and anti-depressants.
- Safety warnings now posted in other countries.

### **5-HTP or 5-Hydroxytryptophan**

- Preliminary results indicate that 900 mg/day decrease carbohydrate consumption and causes early satiety and weight loss.
- Serious safety concerns due to cases of EMS (Eosinophilia myalgia syndrome).

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 Lysine  
 Melatonin  
 Nitric Oxide  
 Pycnogenol  
 Quercetin  
 St. John's Wort  
 Synephrine  
 Tribulus Terrestris  
 Tryptophan  
 Turmeric  
 Tyrosine  
 Whey Protein  
 Yohimbe

### Aristolochia

- Used as an aphrodisiac and immune stimulant.
- Contains aristolochic acid, which is nephrotoxic and carcinogenic.
- FDA considers all products containing aristolochic acid to be unsafe and adulterated.
- Although illegal, is still available for sale over the internet.

### Usnea or Usnic acid

- Used for weight loss and pain relief.
- A lichen or type of fungus found in a weight loss product called Lipokinetix.
- Linked to liver damage and liver failure.
- Warning issued by FDA on this product.

### Salvia

- A perennial herb from the mint family that is native to certain areas of Oaxaca, Mexico.
- Used by the Mazatec Indians for ritual divination and healing.
- Can induce hallucinations, changes in perception, and other psychological effects.
- Can provoke introverted feelings, mild paranoia, excessive sweating and confusion.
- Can induce unconsciousness and short-term memory loss.
- Could seriously undermine military missions.

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Herbal formulas with multiple ingredients  
 are risky because the quantities and  
 purity are unknown or measured!

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[Click for information about FDA warnings on herbals and dietary supplements.](#)

## The Ugly Facts

Popular products are considered “ugly” if no legitimate scientific research or supporting claim of safety and effectiveness are available or if adverse events are linked to the use of these products. A list of products with on legitimate evidence to support their claims is provided. Buyer beware!

### Products with No Legitimate Evidence to Support Claims

Boron	Garcinia Cambogia	Nitric Oxide
Branched Chain AA	Ginkgo Biloba	Pycnogenol
Carnitine	Ginseng	Pyruvate
Chrysin	Glutamine	Taurine
CoEnzyme Q10	Hoodia	Tribulus Terrestris
Conjugated Linoleic Acid	Hydroxycitric Acid/ HCA	Turmeric
Cordyceps	5-Hydroxytryptophan	Whey Protein
DHEA	Lysine	Yohimbe

## Energy Drinks

Energy drinks are beverages designed to give a burst of energy. Typically they contain a combination of sugars, caffeine, B vitamins, amino acids, and/or herbal ingredients. The amino acids may include taurine, carnitine, creatine, leucine and the herbals may include guarana (extracts from the guarana plant), ginseng, maltodextrin, and/or ginkgo biloba. Some energy drinks contain inositol and glucuronolactone. The FDA currently does not regulate energy drinks and minimal research has been done on them. The long-term effects of the various energy drink ingredient contaminations are unknown. Most claims are misleading and have not been proven. Potential side effects of energy drinks include an increase in heart rate and blood pressure, anxiety, and nervousness. Energy drinks should not be used while exercising, during training or missions or with alcohol because of the multiple combinations of ingredients, and the possibilities of gastrointestinal distress and disturbances in heart rhythms.

Caffeine is a common ingredient in energy drinks. The caffeine content of energy drinks ranges from 33 mg to nearly 80 mg per serving, with most

☀ Jump to:

Bitter Orange  
 Boron  
 Branched Chain Amino Acids  
 Caffeine  
 Carnitine  
 Choline  
 Chondroitin Sulfate  
 Chromium  
 Chrysin  
 CoEnzyme Q10  
 Conjugated Linoleic Acid  
 Cordyceps  
 Creatine  
 DHEA  
 Ephedra  
 Fish Oil  
 Ginkgo Biloba  
 Ginseng  
 Glucosamine  
 Glutamine  
 Guarana  
 HMB  
 Hoodia  
 Hydroxycitric Acid/HCA  
 Hydroxymethylbutyrate  
 5-Hydroxytryptophan  
 Lysine  
 Melatonin  
 Nitric Oxide  
 Pycnogenol  
 Quercetin  
 St. John’s Wort  
 Synephrine  
 Tribulus Terrestris  
 Tryptophan  
 Turmeric  
 Tyrosine  
 Whey Protein  
 Yohimbe

☀ Jump to:

Bitter Orange  
 Boron  
 Branched Chain Amino Acids  
 Caffeine  
 Carnitine  
 Choline  
 Chondroitin Sulfate  
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 CoEnzyme Q10  
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 Cordyceps  
 Creatine  
 DHEA  
 Ephedra  
 Fish Oil  
 Ginkgo Biloba  
 Ginseng  
 Glucosamine  
 Glutamine  
 Guarana  
 HMB  
 Hoodia  
 Hydroxycitric Acid/HCA  
 Hydroxymethylbutyrate  
 5-Hydroxytryptophan  
 Lysine  
 Melatonin  
 Nitric Oxide  
 Pycnogenol  
 Quercetin  
 St. John's Wort  
 Synephrine  
 Tribulus Terrestris  
 Tryptophan  
 Turmeric  
 Tyrosine  
 Whey Protein  
 Yohimbe

drinks providing more than the FDA recommended limit for colas. SoBe No Fear had 141 mg in a 16-oz. serving, in contrast to 55 mg, 46 mg, and 37 mg in 12 oz of Mountain Dew, Diet Coke, and Pepsi Cola, respectively.

Taurine is also a common ingredient in energy drinks. The amount of taurine obtained from these beverages is three or more times higher than what is typically obtained through the diet. Limited information from either animal or human studies is available to assess the risk of excessive taurine intake. Also, potential interactions between taurine and caffeine have not been adequately studied.

Glucuronolactone, an ingredient in many energy drinks, occurs naturally in the body when glucose breaks down. The glucuronolactone content of the drinks varies between 2000 mg/L and 2400 mg/L. The daily intake of glucuronolactone from a normal diet is only 1.2 to 2.3 mg and the intake of glucuronolactone from energy drinks is several hundred times higher. The potential effects of excessive glucuronolactone intake are unknown.

Table 2 on the following page presents the amounts of various ingredients in some popular energy drinks.

[Click for more information on energy drink ingredients.](#)

**“The resilience and determination of older operators beats the youthful use of untested supplements.”**

Warner D. “Rocky” Farr, COLONEL, U.S. ARMY,  
 Command Surgeon, USSOCOM

Table 11–2. Supplement Content of Energy Drinks

Beverage, Serving Size	Caffeine (mg)	Taurine (mg)	Ginseng (mg)	Guarana extract (mg)	L-Carnitine (mg)	GRL (mg)*
Red Bull, 8.3 oz	80	1000	–	–	–	600
Monster Energy, 8 oz	70	1000	200	*	*	Unknown amount
Arizona Green Tea, 8 oz	7.5	1000	100	100	–	100
Rockstar Original, 8 oz	80	1000	25	25	25	–
Rockstar Juiced, 8 oz	80	1000	25	25	25	–
Full Throt- tle, 16 oz	144	605	90	.70	14	–
SoBe No Fear, 8 oz	83	1000	50	50	25	–
SoBe Adren- aline Rush, 8.3 oz	78	1000	25	50	250	–
Amp, 8.4 oz	75	10	10	150	–	–
Crunk Juice, 8.3 oz	100	–	–	–	–	–
Spark, 8 oz	120	200	–	–	10	–
Rush, 8.3 oz	50	1000	–	–	Unknown Amount	1505
Redline, 8 oz	250	–	–	–	–	637
Bookoo, 8 oz	120	1000	–	–	–	–
Socko, 8 oz	80	1000	20	25	–	75