

# TOP 100 SUPPLEMENTS

What You Need and What Works—  
From a Scientific Point of View

by Jerry Brainum

**N**o doubt you've seen the claims: "4,000 percent more potent than **creatine** monohydrate." In fact, so many farfetched claims have been made for supplements in recent years—particularly the ones that help you build muscle and lose bodyfat—that people have come to believe that all supplements are just expensive forms of snake oil. Others echo medical professionals who implore people to get their nutrients only from real food.

It isn't a bad idea to look to food first for your nutrients. The problem is, few people eat a large enough variety of foods to meet all nutritional requirements. Dieters limit or eliminate foods that contain vital nutrients. An example is the essential fatty acids: alpha-linoleic acid, or **omega-3**, and linoleic acid, or omega-6. Those who limit fat intake may not eat as much essential fats as they need for health and fitness.

Neveux \ Model: Barry Kabov



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While alpha-linoleic acid, or ALA, is listed as the essential form of the **omega-3** fatty acids, the body has to convert it into DHA and EPA, the actual elemental omega-3 fatty acids. They are present naturally in fatty fish such as mackerel, sardines and herring. If you don't get several servings of this type of fatty fish each week, you're probably deficient in omega-3 fats because your body can't efficiently convert ALA into EPA and DHA, especially if you're a man.

If you don't eat fatty fish, you need to take an **omega-3 food supplement**. Food supplements are a way of providing important nutrients that your daily diet doesn't supply. A broader definition would include performance supplements, which aren't necessarily required nutrients. When taken in excess

of what's found in food sources or synthesized in the body, however, they can provide ergogenic effects, improving your workouts as well as your muscle-building results, or help you lose excess fat.

## A Brief History of Food Supplements

The earliest known commercial food supplements were offered in the 1950s. Most were crude compared to present-day versions, but they proved popular. One of the first protein products was sold by Irvin Johnson in Chicago—a milk-and-egg protein formulation that was years ahead of its time. Johnson somehow figured out that milk and

eggs were two of the best proteins, perhaps because they served as the initial food for many animals and thus were associated with growth.

Johnson refined his formulation over the years and eventually moved to California, changing his name to Rheo Blair. His milk-and-egg protein was a sensation in bodybuilding and movie circles in the '60s. One of Blair's suggestions for those who found it hard to gain weight and muscle was to mix his protein with heavy cream and one of his flavored extracts; coconut was especially suitable. Some of Blair's followers were the preeminent bodybuilders of the era, including the first Mr. Olympia, Larry Scott, who won that title in 1965.

Around the same time Blair was selling his protein, Bob Hoffman and his York Barbell Company were

Studies show that **recovery drinks** can be used advantageously both before and immediately following training. A drink before training increases amino acid delivery to muscles because of the increased blood flow that exercise induces.



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Advertisement from the January 1967 issue of IRON MAN magazine.

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selling their soy-based protein formulas. None of them contained high-quality protein, despite the ads Hoffman ran in his magazines, *Strength & Health* and *Muscular Development*. Another York product was Protein from the Sea. Ostensibly made from some type of seaweed, it had the consistency of sawdust and tasted like dehydrated fish scales. Its highest and best use was as an emetic (vomit inducer).

As scientific research progressed, it became apparent that the best types of protein came from milk and eggs. That led to the next great revolution in sports nutrition, the engineered food, pioneered by Scott Connelly, M.D., a critical care specialist from Northern California who teamed with a young entrepreneur named Bill Phillips from Golden, Colorado. They marketed the product Met-Rx, a milk protein-based supplement that contained enough added nutrients to qualify as a meal replacement. Phillips' clever marketing led to a surge in Met-Rx's popularity, followed by the marketing of similar products that continues today.

The sports-supplement industry has burgeoned over the past decade, and countless products are on the market. While some have research to back up the many claims made for them, others are supported by little more than a well-known athlete's endorsement.

Because so many product labels list scientific references to back up the manufacturers' claims of performance and efficacy, or effectiveness, it's important to understand what constitutes a solid scientific study. A single study, even an optimally designed one, isn't considered scientific proof. The results have to be replicated several times before they're officially accepted as fact.

On the other hand, it's also unrealistic to expect food supplements to undergo the same rigorous testing the government mandates for approval of a drug. Drug companies spend millions on lab testing, animal studies and human field trials designed to provide safety and efficacy of drugs. The exorbitant expense of similar testing for supplements is beyond the resources of

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every company selling them. Pharmaceutical companies reap the rewards of their approval effort by obtaining exclusive rights to sell the drug for a price vastly greater than the cost of manufacture.

When looking at studies supposedly proving the efficacy of food supplements, you must first see who or what the experimental subjects were. For example, a study can feature isolated cells, animals or humans as subjects, and what happens in isolated cells isn't always what happens in the human body. Take the case of the relationship between vitamin B<sub>12</sub> and C. In a test-tube environment vitamin C destroys B<sub>12</sub>. That doesn't happen in the human body.

In another case supplements touted as "myostatin blockers" were formulated from a type of sea algae. In a test tube they effectively blocked the activity of the protein myostatin, which inhibits muscular growth in the body. The supplement ads implied that they'd enable you to develop unprecedented levels of muscular growth, but as it turned out, they didn't actually work in the human body.

Animal studies are also of questionable relevance. The practice of vivisection in animal studies raises serious questions of human morality, since it involves pure, unadulterated pain and torture of innocent animals. Even worse, much of what happens in animals doesn't occur in humans. Rats, for example, store large amounts of glycogen but have little capacity for fat storage. When lab rats get supplementary dietary fat, they show a considerable increase in endurance. The same just isn't true of humans. An article in the *British Medical Journal* noted that many animal studies are poorly controlled and designed, their major justification being to secure financial grants. At most, animal studies may suggest application to human experience, but nothing more.

Even human studies can be misinterpreted or manipulated. A few years ago a then-esoteric trace mineral called boron was found to increase testosterone, but only in older women, as it turned out. When boron was tested in young



men engaged in weight training, it proved worthless for increasing testosterone. That doesn't mean boron is useless; it helps the body use the minerals calcium and magnesium, and it appears to increase mental alertness.

Another typical flaw is applying information derived from a study of those with a deficiency or illness to healthy persons. The trace mineral vanadium, or vanadyl, acts like insulin in diabetes patients, helping control elevated blood glucose

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levels. It was marketed to body-builders as an “anabolic mineral” that would work like insulin to push amino acids into muscle, replenish depleted glycogen stores and lower bodyfat. In fact, vanadyl does none of those things in nondiabetics. In fact, some studies show that it can blunt amino acid entry into cells and promote bodyfat gain.

Studies of so-called smart drugs have also been taken out of context. Some “smart” nutrients, available over the counter, are marketed as a way to “increase mental focus and concentration during training.” The problem is that the studies they’re based on involved either animals or people with brain pathology. In normal people the effects of smart drugs remain unproven, except

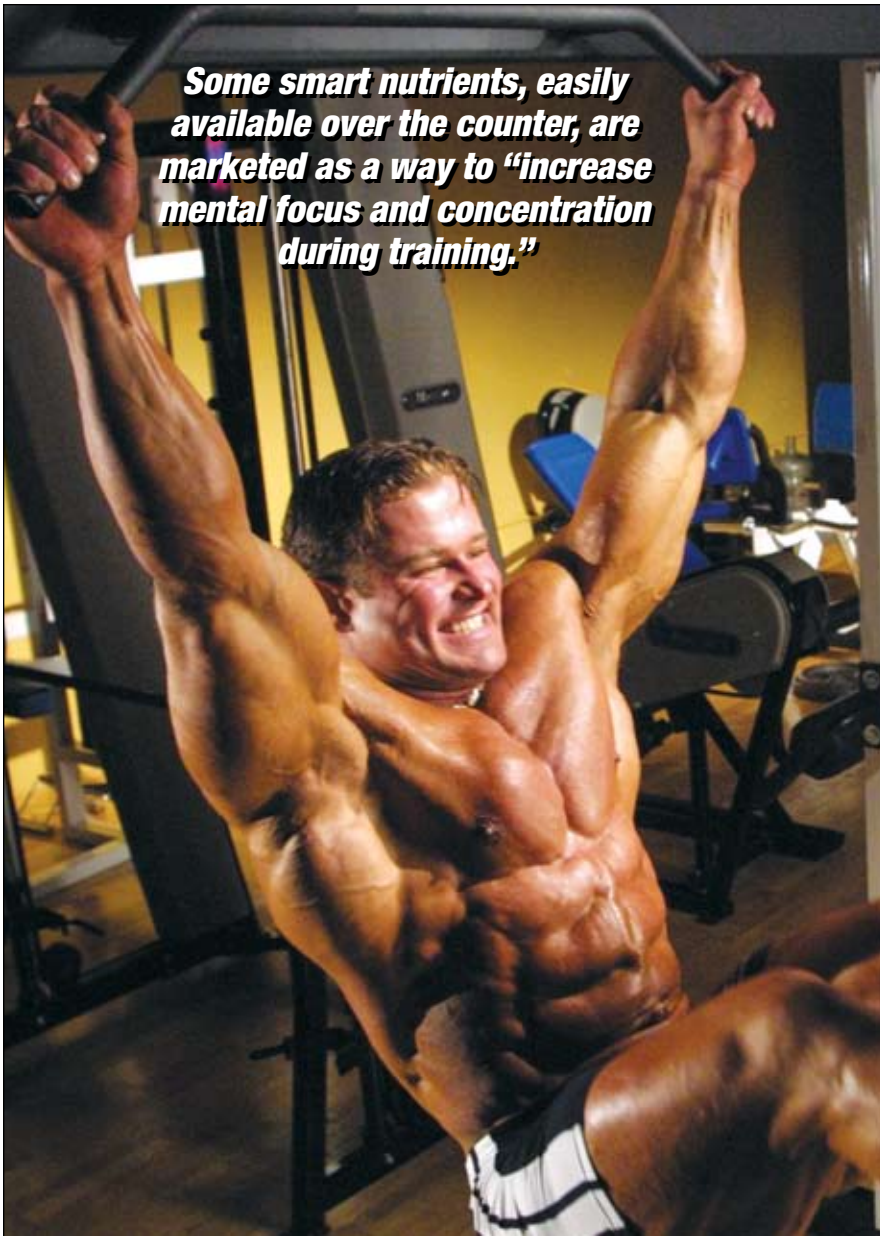
anecdotally.

Still another frequent error made by consumers is trusting the efficacy of a product because a “scientist” endorses it as being effective. While having an advanced education in science may enable a person to more easily separate sense from nonsense, it’s also true, as Howard Hughes is reputed to have said, that “everyone has a price.” Several men with legitimate degrees, including doctorate and medical degrees, have endorsed products that later proved worthless. Those guys were either on the payroll of manufacturers or owned the companies themselves.

*(continued on page 174)*

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## What Are the TOP 10?

Keeping these caveats in mind, let's survey the top 10 sports supplements. Remember, too, that what's best for one bodybuilder may be entirely unsuitable for another. A trainee who finds it difficult to eat enough food to gain lean body mass could use a quality weight-gain powder but probably not a meal replacement or a basic protein powder. **Creatine** is perhaps the most efficient supplement if you're doing a high-intensity activity (see the box below), but if

your primary exercise consists of aerobics and you're aiming for an increase in work capacity, **creatine** would be a complete waste of money.

### CASEIN-WHEY PROTEIN SUPPLEMENTS

Milk protein consists of **80 percent casein and 20 percent whey**, and **that's the** best combination for promoting a positive nitrogen balance in bodybuilders. That's because casein is a slow-acting protein that delivers its amino acids over a period of seven hours, and whey is a



### CREATINE

Few supplements have the solid scientific foundation that **creatine** has. Studies show that it's effective for 80 percent of those who use it. Since **creatine** is found naturally in meat, the more meat you eat, the less likely you'll need creatine supplementation. Vegetarians or those who rarely eat meat, however, can get huge boosts from most creatine supplements.

**Creatine's** primary use is as a backup phosphate donor for the replenishment of ATP, the most elemental form of energy and the source of energy for all muscular contractions. In other words, **creatine** acts like a second battery in your car. It's also a buffer, helping neutralize the acidity that blunts energy production in trained muscle.

The major controversies regarding **creatine** are its side effects and the best form to use. Nearly all side effects attributed to **creatine**, such as muscle cramps, kidney disease and gastrointestinal disturbances, haven't proved significant under controlled scientific scrutiny. Although various claims are made for a variety of creatine supplements, **creatine** monohydrate, which is 99 percent absorbed, is the best form to use.

By the way, the level of **creatine** in the blood is meaningless. What counts is how much gets delivered to muscle, which is controlled by the so-called **creatine** transport protein. It's activated by the sodium/potassium pump mechanism, which in turn is activated by insulin. Recent studies show that combining **creatine** with a fast-acting protein, such as whey, enable you to get the benefits of increased **creatine** uptake with-

fast-acting protein, peaking in 90 minutes. The faster a protein is absorbed, the faster the liver oxidizes its amino acids. That sounds bad, but whey's rapid delivery of amino acids also favors increased protein synthesis. A longer-acting protein, such as **casein**, prevents the excess breakdown of protein, an anticatabolic effect, which ultimately promotes an anabolic effect—growth.

Besides the high-quality protein content of **casein/whey**, the newer formulations have little or no lactose, or milk sugar, which some people have negative reactions to. The native milk proteins also provide a host of smaller proteins called peptides, many of which, such as lactoferrin, have vital health benefits. The rich cysteine content of whey acts as a precursor of glutathione, a primary endogenous antioxidant and liver detoxifier in the body.

### OMEGA-3 FATTY ACIDS

If you don't eat fatty fish at least **three times** a week, you'll be deficient in omega-3 fatty acids. Studies suggest that's the case with about 80 percent of people. Since the brain is composed of 40 percent DHA, one of the omega-3s, a long-term lack may cause aberrations in brain neurotransmitter function, resulting in depression (continued on page 178) and aggres-



(continued from page 174) sion.

**Omega-3s** provide numerous health benefits. Recent studies show that middle-aged people who eat diets rich in **omega-3** fats have a 75 percent decreased incidence of Alzheimer's disease. **Omega-3s** help prevent several types of cancer, including breast and prostate cancers. They improve insulin sensitiv-

ity and make cellular membranes more pliable so that hormones can more efficiently interact with cellular receptors. Some studies suggest that a generous intake of **omega-3**, at least five grams daily, blunts bodyfat synthesis and reduces inflammation, which can help relieve sore joints and muscles. You should know that there's an initial inflammatory feature of muscular hypertrophy, or growth, that can be blunted by **omega-3** fats and other drugs. The solution is simply not to take **omega-3s** before training.

The liquid form of **omega-3** supplements is preferred because of less "backup" after swallowing and because it takes so many capsules to give you the five-gram dosage. Capsules will do if you can stand to swallow them.

## ANTIOXIDANTS

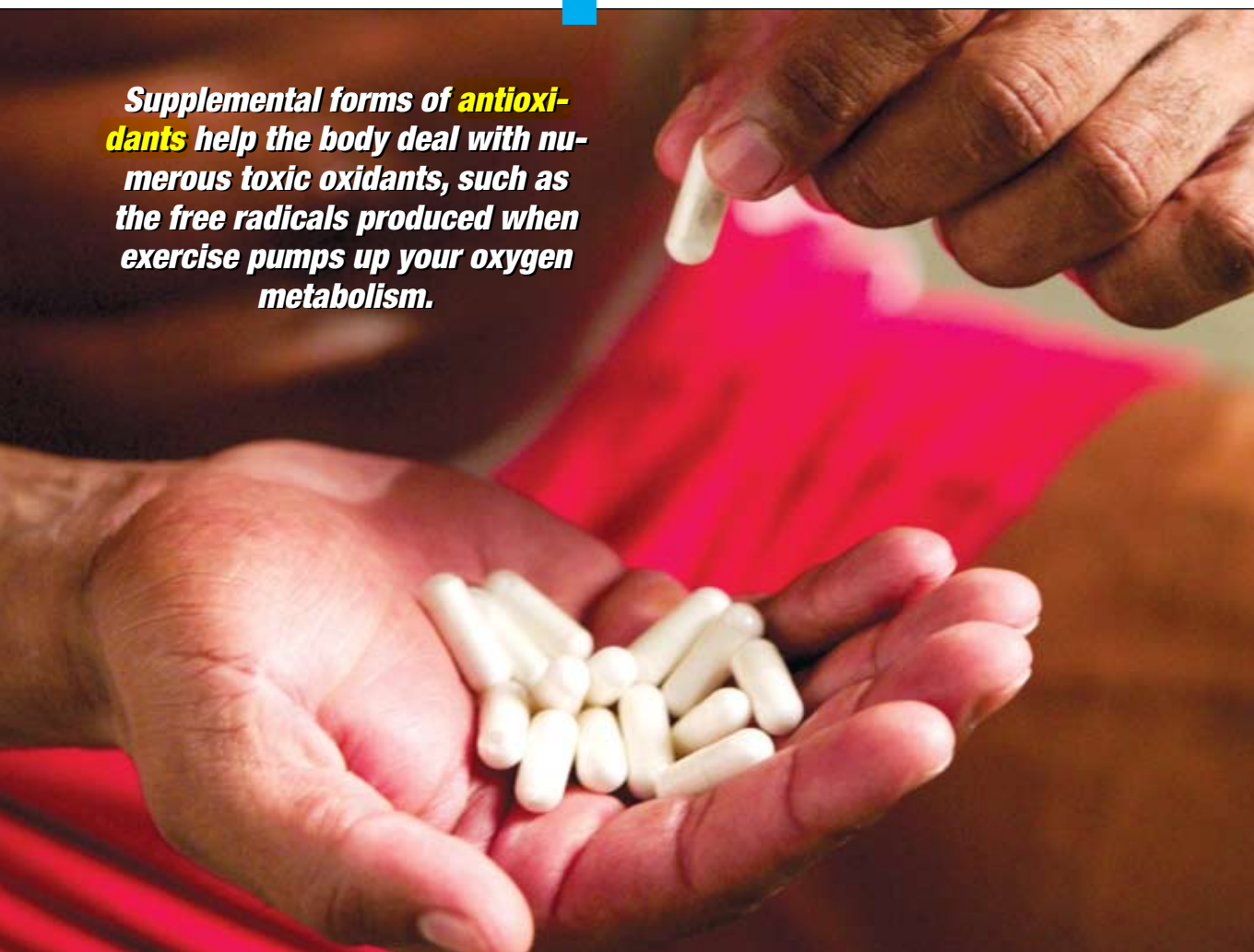
**Antioxidant** is an umbrella word encompassing thousands of nutrients, including vitamins, minerals and flavonoids. Many are found in fruits and vegetables, which are often not



included in sufficient quantity in typical bodybuilding diets, especially fat-loss diets. Exercise produces oxidative reactions that would normally be toxic to your body. The body's **antioxidant** systems that work against oxidation are often overwhelmed by exercise. Supplemental **antioxidants** help them deal with numerous toxic oxidants, such as the free radicals produced when exercise pumps up your oxygen metabolism.

Don't fall prey to alarmist studies that not only decry the health value of dietary **antioxidants**, such as vitamin E, but even allege that they're harmful. The truth is that all **antioxi-**

**Supplemental forms of antioxidants help the body deal with numerous toxic oxidants, such as the free radicals produced when exercise pumps up your oxygen metabolism.**



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dants work as a team. When neutralizing an oxidant, an **antioxidant** is often temporarily converted into an oxidant itself. Other **antioxidants**, however, donate an electron that converts the former **antioxidant** back to its “good guy” status. The studies that find fault with antioxidants always talk about just one **antioxidant**, which wrongly ignores antioxidant teamwork. Typical dietary **antioxidants** include vitamins E, C and B-complex as well selenium, zinc, manganese and green-tea and grapeseed extracts.

## POSTWORKOUT RECOVERY DRINKS

Although similar to protein drinks, these also contain simple carbs and other nutrients that good research shows help promote increased muscular recovery and growth. The best protein found in such formulas is whey, which is rapidly absorbed. Simple carbs are added because they promote glycogen replenishment and insulin release.

Studies show that **recovery drinks** can be used advantageously both before and immediately following training. A drink before training increases amino acid delivery to muscles because of the increased blood flow that exercise induces. Forget the notion that simple carbs will make you fat or inhibit fat burning. Any carbs taken within 90 minutes of training go directly toward glycogen replacement, with zero spillover into fat. [For more on postworkout-nutrient research, see the interview with John Ivy, Ph.D., on page 116.]

## MULTIMINERAL SUPPLEMENTS

It may seem odd to put such a common supplement as minerals on this list, but few people are aware that minerals are enzyme activators. Many vitamins, on the other hand, are coenzymes, which means that without minerals they're useless. Many **minerals**, such as zinc and chromium, also interact with various anabolic hormones, such as testosterone, growth hormone and insulin. Since most **vitamin-and-mineral combinations** have sufficient vitamin content but skimp

## GLUCOSAMINE AND CHONDROITIN

Both substances are found naturally in the body. They mollify the pain linked to sore joints and connective tissue and promote healing. The latter effect distinguishes the glucosamine-and-chondroitin combo from anti-inflammatory drugs, which relieve pain but do nothing to help repair tissue or retard further joint destruction.

Reports of side effects linked to **glucosamine** use, such as interference with normal glucose metabolism, aren't true. They were based on dosages that would never be used by any human. The one thing to keep in mind about **glucosamine** and **chondroitin** is that joints have relatively poor blood circulation. That means it takes time for supplements aimed at joint treatment to work. So plan not to feel anything for about two months after you start using **glucosamine**. After that, pain control with the supplement is comparable to what happens with drug use, according to various studies. The typical doses are 1,200 milligrams daily of **glucosamine** and 800 of **chondroitin**, which can be doubled initially.



on minerals, it's prudent to take a high-potency **multimineral** containing all the ones you need. That's particularly important if you're on a diet that restricts food groups, such as dairy products, which are the best source of calcium.

## GREEN TEA

Although **green tea** is an antioxidant, research on it is so impressive that I chose to list it alone. The active ingredients in green tea are a group of antioxidant compounds known as catechins. The most active catechin goes under the acronym of EGCG, and it's about 100 times more potent in antioxidant activity than vitamins E and C.

**Green tea** offers many health



About 20 percent of the free **testosterone** circulating in the blood is converted into estrogen by way of aromatase. So **blocking aromatase** will lead to an increase in testosterone, which translates into increased size and strength.

## OVER-THE-COUNTER ESTROGEN BLOCKERS

The last survivors of the pro-hormone supplements, which were removed from sale last January, estrogen-blocking supplements aren't pro-hormones but do inhibit the enzyme aromatase, which converts androgens into estrogens. In normal men that enzyme is ubiquitous, being present in such tissues as muscle, brain and skin. About 20 percent of the free testosterone circulating in the blood is converted into estrogen by way of aromatase. So **blocking aromatase** will lead to an increase in testosterone, which translates into increased size and strength.



Estrogen is also related to fat storage, especially fat that's subcutaneous, or just under the skin. That means lowering estrogen will also help increase muscular definition, especially with proper diet and training. The current **estrogen-blocking supplements** are safe but shouldn't be used year-round, since men do need some estrogen. Estrogen blockers should not be used by women. About one-third of their estrogen production comes from conversion of adrenal androgens into estrogen through aromatase activity.

benefits, such as inhibition of cardiovascular disease and cancer. It also has some mild thermogenic effects, independent of its caffeine content, that may assist fat loss. Some studies even show that green tea offers protection against joint degeneration. If you don't have the time or inclination to drink several cups of **green tea** daily, you can get







Model: Tommi Thervildsen

fiber (such as guar gum or psyllium) taken just before a meal containing simple or high-glycemic-index carbs will slow the entry of the carbs into the blood. That means less insulin release, less bodyfat and a stabilized blood glucose level.

Fiber comes in two forms: insoluble and soluble. A cheap and effective source of insoluble fiber is unprocessed wheat bran. Forms of soluble fiber include pectin, guar gum, psyllium and oatmeal. You need both forms to obtain fiber's many benefits.

Other supplements could easily have been included here, but these are considered the most useful and effective for the majority of bodybuilders and athletes. Although food should always come first, supplements offer an effective alternative for getting nutrients that either aren't available in sufficient quantity in food or are in foods that you may not be eating. **IM**

**The liquid form of omega-3 supplements is preferred because there's less "backup" after you swallow, and you don't have to take a lot of capsules to get the five-gram dose. Capsules will do if you can stand to swallow them.**



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the same or better effects by using standardized capsules or tablets of green tea.

## FIBER SUPPLEMENTS

Unless you eat the minimal five servings a day of various fruits and

vegetables, you are likely not taking in enough fiber. The popular low-carbohydrate diets are all deficient in fiber. Fiber helps lower total body inflammation and protects against elevated blood lipids and blood pressure. Soluble