

Dietary Supplements for Exercise and Athletic Performance

Fact Sheet for Consumers



If you're thinking about taking a dietary supplement for exercise and athletic performance, talk with your healthcare provider.

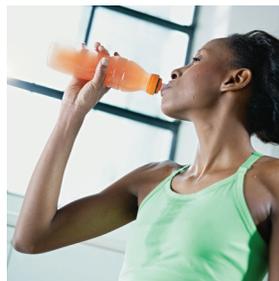
What are dietary supplements for exercise and athletic performance and what do they do?

If you get regular exercise—and especially if you're an athlete and compete in sporting events—you know that a nutritionally adequate diet and plenty of fluids are important for maximizing your physical performance. But you may wonder if dietary supplements could help you train harder, improve performance, or gain a competitive edge.

This fact sheet describes what's known about the effectiveness and safety of many ingredients in dietary supplements that are promoted to improve exercise and athletic performance. These products are sometimes called “ergogenic aids,” but this fact sheet simply refers to them as “performance supplements.” Sellers of these supplements might claim that their products improve strength or endurance, help you achieve a performance goal more quickly, or increase your tolerance for more intense training. They might also claim that their supplements can help prepare your body for exercise, reduce the chance of injury during training, or assist with recovery after exercise.

Performance supplements cannot substitute for a healthy diet, but some of them may have value, depending on the type and intensity of your activity. Other supplements don't seem to work, and a few might be harmful.

If you're thinking about taking a performance supplement, talk to your healthcare provider. If you have a trainer or coach with knowledge of sports medicine, ask them about performance supplements. Talking to an expert is important if you're a teenager or have any medical conditions. It's also important to find out whether medications you take might interact with the performance supplements you're considering.



What are ingredients in supplements for exercise and athletic performance?

Performance supplements can contain many ingredients—like vitamins and minerals, protein, amino acids, and herbs—in different amounts and in many combinations. These products are sold in various forms, such as capsules, tablets, liquids, and powders.

This fact sheet describes ingredients in performance supplements below in alphabetical order. You'll learn whether each ingredient is effective and safe and get expert advice about using it. But keep in mind that many performance supplements in the marketplace contain more than one ingredient, and ingredients can work differently when

they're combined. Because most ingredient combinations have not been studied, we don't know how effective or safe they are in improving performance.

You may be surprised to learn that makers of performance supplements usually don't carry out studies in people to find out whether their products really work and are safe. When studies on performance supplement ingredients and ingredient-combinations are done (mainly by researchers at colleges and universities), they often involve small numbers of people taking the supplement for just a few days, weeks, or months. Much of the research is done in young healthy men, but not women, middle-aged and older adults, or teenagers. And often, studies haven't looked at the use of supplement ingredients or combinations in people involved in the same athletic activity as you. For example, the results from a study in weightlifters might not apply to you if you are a distance runner.

Ingredients in supplements for exercise and athletic performance



Antioxidants (vitamin C, vitamin E, and coenzyme Q10)

You breathe in more oxygen when you exercise. As a result, free radicals form and damage muscle cells. Because antioxidants can reduce free-radical damage

to muscle, some people think that taking them in a supplement might reduce muscle inflammation, soreness, and fatigue.

Do they work?

No. The free radicals that form when you exercise seem to help muscle fibers grow and produce more energy. Antioxidant supplements might actually reduce some of the benefits of exercise, including muscle growth and power output. Also, they have little effect on aerobic fitness and performance in endurance activities like distance running.

Are they safe?

Everyone needs adequate amounts of vitamin C and vitamin E for good health. Getting too much of these nutrients can be harmful, but the amounts of vitamin C (about 1,000 milligrams) and vitamin E (about 500 IU) typically used in studies of performance supplements are below safe upper limits. The side effects from coenzyme Q10 can include tiredness, insomnia, headaches, and some gastrointestinal (GI) discomfort, but these effects tend to be mild.

Bottom line

There's little scientific evidence to support taking supplements containing vitamins C and E or coenzyme Q10 to improve performance if you're getting adequate amounts of these nutrients from a nutritious diet.

Arginine

Arginine is an amino acid in foods that contain protein, like meat, poultry, fish, eggs, dairy products, and legumes. A nutritious diet supplies about 4 to 5 grams a day. Supplement sellers claim that taking larger amounts of arginine in supplements improves performance, partly because the body converts it into nitric oxide, which expands blood vessels and increases blood flow. Increased blood flow helps deliver oxygen and nutrients to exercising muscle and speeds up the removal of waste products that cause muscle fatigue.

Does it work?

Although the research is limited, arginine supplements seem to have little to no effect on strengthening and muscle-building exercises (like bodybuilding) or aerobic activities (like running and cycling). Studies have used 2 to 20 grams a day of arginine for up to 3 months.

Is it safe?

Arginine supplements seem safe when users take up to 9 grams a day for several days or weeks. Taking more can cause GI discomfort and can slightly lower blood pressure.

Bottom line

There's little scientific evidence to support taking arginine supplements to increase strength, improve performance, or help tired and sore muscles recover after exercise.



Beetroot or beet juice

Beets and beet juice are among the best food sources of nitrate. Beet juice might improve athletic performance because the body converts some of this nitrate to nitric oxide, which expands blood vessels. This

blood vessel expansion increases blood flow and the delivery of oxygen and nutrients to exercising muscle. The expanded blood vessels also speed up the removal of waste products that cause muscle fatigue.

Does it work?

Many, but not all, studies have found that beet juice can improve performance and endurance in aerobic activities

like running, swimming, cycling, and rowing. But whether it helps with strengthening and bodybuilding exercises isn't known. Beet juice is more likely to improve the performance of recreational exercisers than highly-trained athletes. The usual approach in studies is for participants to drink 2 cups of beet juice about 2.5 to 3 hours before exercise.

Is it safe?

Drinking moderate amounts of beet juice is safe, but it can turn your urine pink or red.

Bottom line

Beet juice might improve aerobic exercise performance if you're recreationally active. But whether dietary supplements containing beetroot powder have the same effects as beet juice isn't known.



Beta-alanine

Beta-alanine is an amino acid in foods such as meat, poultry, and fish. People get up to about 1 gram a day of beta-alanine, depending on their diet. Your body uses beta-alanine to make carnosine in skeletal muscles.

When you exercise intensely for several minutes, your muscles produce lactic acid, which reduces muscular force and causes tiredness. Carnosine reduces the buildup of lactic acid. Beta-alanine supplements increase muscle carnosine levels by different amounts, depending on the person.

Does it work?

Some, but not all, studies have shown that beta-alanine produces small performance improvements in swimming and team sports, like hockey and football, that require high-intensity, intermittent effort over short periods. Whether beta-alanine helps with endurance activities like cycling isn't clear. It's also not clear whether beta-alanine mainly benefits trained athletes or recreational exercisers. In most studies, participants took 1.6 to 6.4 grams a day of beta-alanine for 4 to 8 weeks.

Is it safe?

Taking 800 milligrams or more beta-alanine can cause moderate to severe paresthesia, a tingling, prickling, or burning sensation in your face, neck, back of the hands, and upper trunk. This effect can last 60 to 90 minutes but is not considered serious or harmful. Taking divided doses or a sustained-release form of beta-alanine can reduce or eliminate this paresthesia. It isn't known whether it's safe to take beta-alanine supplements daily for more than several months.

Bottom line

Sports-medicine experts disagree on the value of taking beta-alanine supplements to enhance performance in high-intensity, intermittent activities. The International Society of Sports Nutrition recommends that if you are healthy and want to try beta-alanine supplements, take a daily loading dose of 4 to 6 grams per day (in divided doses with meals) for at least 2 weeks to see if it helps.



Beta-hydroxy-beta-methylbutyrate (HMB)

Your body converts a small amount of leucine, one of the amino acids in foods and protein powders, to HMB. Your liver then converts the HMB into another compound

that experts think helps muscle cells restore their structure and function after exercise. HMB also helps build protein in muscle and reduces muscle-protein breakdown.

Does it work?

It's hard to know whether you might benefit from using HMB supplements because the research on these supplements has included adults of very different ages and fitness levels who took widely varying doses for different amounts of time. Overall, HMB seems to speed up recovery from exercise that's intense enough and long enough to cause muscle damage. Therefore, if you're a trained athlete, you'll need to exert yourself more than recreationally active people to cause the muscle damage that HMB might help treat.

Is it safe?

Studies haven't reported any side effects in adults taking 3 grams per day of HMB for up to 8 weeks.

Bottom line

It's not clear whether taking HMB supplements will improve athletic performance. The International Society of Sports Nutrition recommends that if you are a healthy adult who wants to try HMB supplements, to take 3 grams per day in three equal servings of 1 gram for at least 2 weeks to see if it helps. HMB comes in two forms: one with calcium and one without. A dose of 3 grams of the type with calcium supplies about 400 milligrams of calcium.



Betaine

Your body makes betaine, and it is also found in foods such as beets, spinach, and whole-grain bread. You get about 100 to 300 milligrams a day of betaine when you eat a nutritious diet.

How betaine supplements might affect or improve your performance isn't known.

Does it work?

Only a few, mostly small, studies have evaluated betaine as a performance supplement. Most of these studies examined the use of betaine supplements to improve strength and power performance in bodybuilders. The studies found either no performance improvements or only modest ones. Participants in these studies took 2 to 5 grams a day of betaine for up to 15 days.

Is it safe?

The few studies in which athletes took betaine supplements didn't find any side effects. But there hasn't been enough research to know for sure whether it's really safe.

Bottom line

There's little scientific evidence to support taking betaine supplements to improve performance if you eat a nutritious diet.



Branched-chain amino acids (BCAAs)

The amino acids leucine, isoleucine, and valine are known as BCAAs. Animal foods, like meat, fish, and milk, contain BCAAs.

Your muscles can use these three amino acids to provide energy during exercise. Leucine might also help build muscle.

Do they work?

There's little evidence that BCAA supplements improve performance in endurance activities like distance running. BCAA supplements might help increase your muscle size and strength together with a weight-training program. But it isn't clear whether taking BCAA supplements will help you build more muscle than just eating enough high-quality protein foods.

Are they safe?

A nutritious diet with enough protein can easily provide 10 to 20 grams a day of the BCAAs. Taking up to another 20 grams a day of BCAAs in supplements seems to be safe.

Bottom line

There's not much scientific evidence to support taking BCAA supplements to improve performance, build muscle, or help tired and sore muscles to recover after exercise. Eating foods containing protein automatically increases your intake of BCAAs.



Caffeine

Caffeine is a stimulant in beverages (like coffee, tea, and energy drinks) and in herbs (such as guarana and kola nut). Caffeine is also added to some dietary supplements. Moderate amounts of caffeine might

increase your energy levels and reduce fatigue for several hours.

Does it work?

Caffeine might improve endurance, strength, and power in team sports. It's most likely to help with endurance activities (such as distance running) and sports that require intense, intermittent effort (like soccer and tennis). Caffeine doesn't help with short, intense exercise like sprinting or weightlifting. People have different responses to caffeine. It doesn't boost performance in everyone, or may only slightly boost performance.

The usual dose of caffeine to aid performance is 2 to 6 milligrams per kilogram of body weight, or about 210 to 420 mg caffeine for a 154-pound person. (By comparison, a cup of coffee has about 85 to 100 milligrams of caffeine.) Taking more probably doesn't improve performance further and can increase the risk of side effects.

Is it safe?

Caffeine intakes of up to 400 to 500 milligrams a day seem safe in adults. Teenagers should limit their caffeine intake to no more than 100 milligrams a day. Taking 500 milligrams or more a day can reduce rather than improve physical performance, disturb sleep, and cause irritability and anxiety. Taking 10,000 milligrams or more in a single dose (one tablespoon of pure caffeine powder) can be fatal.

Bottom line

Sports-medicine experts agree that caffeine can help you exercise at the same intensity level for longer and reduce feelings of fatigue. They suggest taking 2 to 6 milligrams per kilogram of body weight 15 to 60 minutes before you exercise. The National Collegiate Athletic Association and International Olympic Committee limit the amount of caffeine that athletes can take before a competition.

Citrulline

Citrulline is an amino acid that your body produces; it is also present in some foods. Your kidneys convert most citrulline into another amino acid, arginine. Your body then transforms the arginine into nitric oxide, which expands blood vessels. This expansion increases blood flow and the delivery of oxygen and nutrients to exercising muscles and speeds up the removal of waste products that cause muscle fatigue.

Does it work?

The research on citrulline as a performance supplement is limited. The few studies find that citrulline might help improve, hinder, or have no effect on performance. In these studies, participants took up to 9 grams of citrulline for 1 day or 6 grams per day for up to 16 days.

Is it safe?

There isn't enough research on citrulline to know for sure whether it's safe. Some users have reported that it can cause stomach discomfort.

Bottom line

There's not much scientific evidence to support taking citrulline supplements to improve exercise or athletic performance.



Creatine

Creatine is a compound that is stored in your muscles and supplies them with energy. Your body produces some creatine (about 1 gram a day), and you get some creatine from eating animal-based foods, such as

beef and salmon (about 500 milligrams in a 4-ounce serving). But it is only when you take much larger amounts of creatine from dietary supplements that it might improve certain types of performance.

Does it work?

Creatine supplements can increase strength, power, and the ability to contract muscles for maximum effort. But the extent of performance improvements from creatine supplements differs among individuals.

Use of creatine supplements for several weeks or months can help with training. Overall, creatine enhances performance during repeated short bursts of intense, intermittent activity (lasting up to about 2.5 minutes at a time), such as sprinting and weight lifting. Creatine seems to have little value for endurance activities, such as distance running, cycling, or swimming.

Is it safe?

Creatine is safe for healthy adults to take for several weeks or months. It also seems safe for long-term use over several years. Creatine usually causes some weight gain because it increases water retention. Rare individual reactions to creatine include some muscle stiffness and cramps as well as GI distress.

Bottom line

Sports-medicine experts agree that creatine supplements can improve performance in activities that involve intense effort followed by short recovery periods. It can also be valuable in training for certain athletic competitions. In studies, people often took a loading dose of about 20 grams per day of creatine (in four equal portions) for 5 to 7 days and then 3 to 5 grams a day. Creatine monohydrate is the most widely used and studied form of creatine in supplements.

Deer antler velvet

Deer antler velvet supplements are made from the antlers of deer or elk before the antlers turn into bone. Deer antlers might contain growth factors that could promote muscle growth.

Does it work?

There's been little research on use of deer antler velvet to improve performance in either strength or endurance activities. The few published studies have found no benefit from taking the supplement.

Is it safe?

Deer antler velvet hasn't been studied enough to know whether taking it is safe.

Bottom line

There's no scientific evidence to support taking deer antler velvet supplements to improve exercise or athletic performance.



Dehydroepiandrosterone (DHEA)

DHEA is a steroid hormone produced by the adrenal glands. Your body converts some DHEA into testosterone, the male hormone that enhances muscle size and strength.

Does it work?

There's been little study of the use of DHEA supplements to improve performance. The few published studies (all in men) have found no benefit from taking the supplement. Muscle size or strength and aerobic capacity didn't improve, and testosterone levels didn't rise.

Is it safe?

DHEA hasn't been studied enough to know whether it's safe to take. Two small studies in men found no side effects. But in women, taking DHEA supplements for months can increase testosterone levels, which can cause acne and facial hair growth.

Bottom line

There's no scientific evidence to support taking DHEA to improve exercise or athletic performance. The National Collegiate Athletic Association and the World Anti-Doping Agency prohibit the use of DHEA in athletic competitions.

**Ginseng**

Ginseng is the root of a plant used for thousands of years in traditional Chinese medicine. Some experts believe that *Panax* (also known as Chinese, Korean, Japanese, or American) ginseng might improve stamina

and vitality. Siberian or Russian ginseng has been used to fight fatigue and strengthen the immune system.

Does it work?

Several small studies have examined whether *Panax* or Siberian ginseng supplements can improve performance. This research provides little evidence that various doses and preparations of these supplements improve performance in athletes or recreational exercisers.

Is it safe?

Both *Panax* and Siberian ginseng seem to be safe. However, ginseng supplements can cause headaches or GI effects and disturb sleep.

Bottom line

There's little scientific evidence to support taking ginseng supplements to improve exercise or athletic performance.

**Glutamine**

Glutamine is an amino acid that your body uses to produce energy. Adults consume about 3 to 6 grams a day from protein-containing foods such as meat, poultry, fish, eggs, dairy products, and legumes. Your body

also makes some glutamine, mainly from branched-chain amino acids (BCAAs).

Does it work?

Only a few studies have examined the use of glutamine supplements for improving performance in strengthening and muscle-building exercises (like bodybuilding) and for recovering from these exercises (for example, by reducing muscle soreness). Glutamine has either no effect or provides only a small benefit.

Is it safe?

Studies haven't reported any side effects from the use of up to 45 grams a day of glutamine for several weeks in adults.

Bottom line

There's little scientific evidence to support taking glutamine supplements to improve exercise or athletic performance.

**Iron**

Iron is a mineral that delivers oxygen to muscles and tissues throughout your body. Cells also need iron to turn food into energy. Iron deficiency, especially with anemia, limits your ability to

exercise and be active because it makes you tired and reduces your performance.

The recommended amount of iron to get each day is 11 milligrams for teenage boys, 15 milligrams for teenage girls, 8 milligrams for men to age 50, 18 milligrams for women to age 50, and 8 milligrams for older adults of both sexes. Recommended amounts are even higher for athletes, vegetarians, and vegans. Teenage girls and premenopausal women have the greatest risk of not getting enough iron from their diets.

Does it work?

For people with iron deficiency anemia, taking an iron supplement will probably improve performance in both strength and endurance activities. But if you get enough iron from your diet, taking extra iron won't help. It's not clear whether milder iron deficiency without anemia reduces exercise and athletic performance.

Is it safe?

Taking less than 45 milligrams of iron in a supplement is safe for teenagers and adults. Higher doses can cause upset stomach, constipation, nausea, abdominal pain, vomiting, and fainting. However, doctors sometimes prescribe large amounts of iron for a short time to treat iron-deficiency anemia.

Bottom line

Taking enough iron in supplements to treat iron-deficiency anemia improves exercise capacity. But a health care provider should diagnose this condition before you start taking iron supplements. If you want to improve your athletic performance, you should eat a healthy diet containing foods rich in iron, such as lean meats, seafood, poultry, beans, nuts, and raisins. If needed, an iron-containing dietary supplement can help you get the recommended amount of iron.

**Protein**

Protein helps to build, maintain, and repair your muscles. It improves your body's response to athletic training and helps shorten the time you need to recover after exercise. Protein is made from amino acids. Your body makes

some amino acids but needs to get others (known as essential amino acids or EAAs) from food. Animal foods like meat, poultry, fish, eggs, and dairy products contain all of the EAAs. Plant foods like grains and legumes contain different EAAs, so eating a diet containing different types of plant-based foods is one way to get all EAAs. Most protein powders and drinks contain whey, a protein in milk that provides all the EAAs.

Does it work?

Adequate protein in your diet provides the EAAs necessary for making muscle proteins and reduces the breakdown of proteins in your muscles. Athletes need about 0.5 to 0.9 grams of protein per pound of body weight a day (or about 75 to 135 grams for a person weighing 150 pounds). You might need even more for a short time when you're training intensely or if you reduce your food intake to improve your physique or achieve a competition weight.

Is it safe?

High intakes of protein seem to be quite safe, but there is no benefit to consuming more than recommended amounts.

Bottom line

If you are an athlete, you can probably eat enough foods that contain protein to meet your needs for protein. If needed, protein supplements and protein-fortified food and beverage products can help you get enough protein. Sports-medicine experts recommend that athletes consume 0.14 grams of protein per pound of body weight (about 20 grams for a person weighing 150 pounds) of high-quality protein (from animal foods and/or a mix of different plant foods) every 3 to 5 hours, including before sleep and within 2 hours after exercising.

Quercetin

Quercetin is a compound found in fruits, vegetables, and some beverages (like tea). Some experts suggest that quercetin supplements increase energy production in muscle and improve blood flow throughout your body. A nutritious diet provides up to about 13 milligrams a day of quercetin.

Does it work?

There's limited research on the use of quercetin supplements to improve performance. The studies found that any benefits, when they occur, tend to be small. In these studies, participants took about 1,000 milligrams a day of quercetin for up to 8 weeks.

Is it safe?

The studies of quercetin supplements didn't find any side effects in the athletes who took them. But quercetin hasn't been studied enough to know whether it's really safe.

Bottom line

There's little scientific evidence to support taking quercetin supplements to improve exercise or athletic performance.

**Ribose**

Ribose is a natural sugar your body makes that helps with energy production in muscle. Some scientists believe that ribose supplements help muscles produce more energy.

Does it work?

There's been little study of the use of ribose supplements to improve performance. The few published studies in both trained athletes and occasional exercisers have shown little if any benefit from doses ranging from 625 milligrams to 10,000 milligrams a day for up to 8 weeks.

Is it safe?

The studies of athletes taking ribose supplements have found no side effects. But ribose hasn't been studied enough to know whether it's really safe when taken in large amounts for several months or more.

Bottom line

There's very little scientific evidence to support taking ribose supplements to improve exercise or athletic performance.



Sodium bicarbonate

Sodium bicarbonate is commonly known as baking soda. Exercising intensely over several minutes causes muscles to produce acids, such as lactic acid, that reduce muscle force and cause tiredness. Sodium bicarbonate can reduce the buildup of these acids.

Does it work?

Studies show that athletes who take sodium bicarbonate might improve their performance a little in intense, short-term activities (like sprinting and swimming) and in intermittently intense sports (like tennis and boxing). But different athletes respond differently to sodium bicarbonate. Sodium bicarbonate might actually hinder performance in some people. The usual dose taken is 300 milligrams per kilogram of body weight, or about 4 to 5 teaspoons of baking soda. Some people find this amount of sodium bicarbonate, dissolved in liquid, too salty to drink.

Is it safe?

Sodium bicarbonate can cause GI distress, including nausea and vomiting, and weight gain due to water retention. It is also high in sodium (1,260 milligrams per teaspoon).

Bottom line

Sodium bicarbonate might provide some performance benefit in strenuous exercise that lasts several minutes and in sports that require intermittent, intense activity, especially for trained athletes. However, in some people, sodium bicarbonate provides no performance benefit, and it can even reduce performance.



Tart or sour cherry

Tart or sour cherries of the Montmorency variety contain compounds that might help you recover from strenuous exercise. Specifically, these cherries might help to reduce pain, muscle damage from strength-related

activities, and lung trauma from endurance activities that require deep, heavy breathing.

Does it work?

There's limited research on tart cherry as a performance supplement. The studies that have been done suggest that it might help bodybuilders recover their strength faster and feel less muscle soreness after exercising. The supplements could also

help runners race faster and be less likely to develop a cold or respiratory problem after a marathon. The typical dose is about 2 cups of juice or 500 milligrams of tart-cherry-skin powder for a week before the exercise and for 2 days afterwards.

Is it safe?

Studies of tart-cherry products in athletes have not found any side effects. But the safety of tart-cherry supplements has not been well studied.

Bottom line

There's limited scientific evidence to support taking tart-cherry products to improve exercise and athletic performance.



Tribulus terrestris

Tribulus terrestris is a plant containing compounds that some sellers claim can improve performance by increasing levels of several hormones, including the male hormone testosterone.

Does it work?

There's limited research on the use of *Tribulus terrestris* supplements to increase strength or muscle mass. The few studies investigating it did not find that it had any benefit.

Is it safe?

Tribulus terrestris hasn't been studied enough to know whether it's safe. Studies in animals show that high doses can cause heart, liver, and kidney damage.

Bottom line

There's no scientific evidence to support taking *Tribulus terrestris* supplements to improve exercise or athletic performance. Some sports-medicine experts advise against taking any dietary supplements claimed to boost testosterone.

How does the U.S. government regulate dietary supplements for exercise and athletic performance?



The U.S. Food and Drug Administration (FDA) regulates dietary supplements for exercise and athletic performance differently from prescription or over-the-counter drugs. As with other dietary supplements, the FDA does

not test or approve performance supplements before they are sold. Manufacturers are responsible for making sure that their supplements are safe and that the claims on the product labels are truthful and not misleading.

When the FDA finds an unsafe dietary supplement, it can remove the supplement from the market or ask the supplement maker to recall the product. The FDA and the Federal Trade Commission can also take action against companies that make false performance-improvement claims about their supplements; add pharmaceutical drugs or other adulterants to their supplements; or claim that their supplements can diagnose, treat, cure, or prevent a disease.

For more information about dietary supplement regulations, see the Office of Dietary Supplements publication, *Dietary Supplements: What You Need to Know*.

Can dietary supplements for exercise and athletic performance be harmful?

Like all dietary supplements, performance supplements can have side effects and might interact with prescription and over-the-counter medications. Many of these products contain multiple ingredients that have not been adequately tested in combination with each another.

• Interactions with medications

Some dietary supplements for improving exercise and athletic performance can interact or interfere with other medications or supplements. For example, ginseng can reduce the blood-thinning effects of warfarin (Coumadin). Cimetidine (Tagamet HB, used to treat duodenal ulcers) can slow the removal of caffeine from the body and thus increase the risk of side effects from caffeine consumption.

If you take dietary supplements and medications on a regular basis, tell your healthcare provider.

• Fraudulent and adulterated products

The FDA warns that some products marketed as dietary supplements to improve exercise and athletic performance might contain inappropriate, unlabeled, or unlawful stimulants, steroids, hormone-like ingredients, controlled substances, prescription medications, or unapproved drugs. Using these tainted products can cause health problems and disqualify athletes from competitions.

The FDA prohibits certain ingredients that some performance dietary supplements used to contain. These prohibited ingredients include androstenedione, dimethylamylamine (DMAA), and ephedra. Not only are these ingredients unsafe, but there is no scientific evidence showing that they can improve performance.

Sellers of some performance supplements ask certain companies to evaluate their products and certify that they are free from many banned ingredients and drugs. The major companies providing this certification service are NSF (nsf.org) through its Certified for Sport® program, Informed-Choice (informed-choice.org), and the Banned Substances Control Group (bscg.org). Products that pass these tests may carry the certifier's official logo and are listed on the certifier's website.

Choosing a sensible approach to improving exercise and athletic performance



If you are a competitive or recreational athlete, you will perform at your best and recover most quickly when you eat a nutritionally adequate diet, drink enough fluids, are physically fit, and are properly trained. Only a

few dietary supplements have enough scientific evidence showing that they can improve certain types of exercise and athletic performance. Athletes might use these supplements, if interested, if they already eat a good diet, train properly, and obtain guidance from a healthcare provider or sports-medicine expert.

In most cases, only adults should use performance supplements. The American Academy of Pediatrics, for example, states that performance supplements don't improve the abilities of teenage athletes beyond those that come from proper nutrition and training.

Where can I find out more?

For general information on dietary supplements to improve performance:

- Office of Dietary Supplements Health Professional Fact Sheet on Dietary Supplements for Exercise and Athletic Performance

For more advice on buying dietary supplements:

- Office of Dietary Supplements Frequently Asked Questions: Which brand(s) of dietary supplements should I purchase?

For information about building a healthy diet:

- *Dietary Guidelines for Americans*
- MyPlate

Disclaimer

This fact sheet by the Office of Dietary Supplements provides information that should not take the place of medical advice. We encourage you to talk to your healthcare providers (doctor, registered dietitian, pharmacist, etc.) about your interest in, questions about, or use of dietary supplements and what may be best for your overall health. Any mention in this publication of a specific product or service, or recommendation from an organization or professional society, does not represent an endorsement by ODS of that product, service, or expert advice.



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