

SUPPLEMENT GUIDE

REDUCING
SUPPLEMENT RISK



TrueSport®

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INTRODUCTION & PURPOSE

Many athletes believe they need dietary supplements to perform at their best, but this trust in supplements is undeserved. While it's true that some supplements can be helpful in some circumstances, people regularly overestimate the benefits and safety.

Many use dietary supplements without understanding the supplement industry or talking to a dietitian, and they instead rely on advertisements and labeling. However, people can't trust what many supplements claim to contain or deliver because of ineffective regulation of the supplement industry.

It's easy to assume that if a product is on a store shelf, then it must be safe. However, dietary supplements are regulated in a post-market manner, meaning the Food and Drug Administration (FDA) does not evaluate the contents or effects of supplements before they are sold. Harmful or illegal dietary supplements can stay on store shelves for a long time, sometimes even years, before the FDA can remove them.

Because of this, it's important to be an informed consumer and understand the risks before deciding to use any dietary supplement.

This booklet is designed to help athletes decide if the potential benefits of dietary supplements outweigh those risks, and if so, how they can better choose a low-risk product.



Q: What is a dietary supplement?

A: The dietary ingredients found in supplements can also be found in foods. In fact, by law, dietary supplements can only contain ingredients that are already in the food supply. However, dietary supplements are highly processed, and there is always a chance of contamination during the manufacturing process. **Who would you rather have manufacture your calcium: a factory or mother nature?**

WHERE CAN I FIND CALCIUM?

PRODUCED IN A FACTORY



*Sold in bulk powder
as a dietary ingredient*

OR



Sold as a supplement

NATURALLY, IN FOOD



Seeds



Cheese



Yogurt



Sardines



Almonds



Beans & Lentils



Spinach & Kale



Milk

DEFINITION

DIETARY SUPPLEMENT: According to the Dietary Supplement Health and Education Act (DSHEA) of 1994, a dietary supplement is defined by law as a product taken by mouth (a patch or a cream is not legally considered a supplement) that contains a “dietary ingredient” and is intended only to supplement the diet. A supplement cannot advertise to treat or cure a disease or ailment of any type.

DEFINITION

DIETARY INGREDIENTS: The dietary ingredients contained in supplements may include vitamins, minerals, herbs or other botanicals, amino acids, and substances, such as enzymes, organ tissues, glands, and metabolites. Dietary supplements may also contain extracts or concentrates of dietary ingredients, and may be found in many forms, including tablets, capsules, softgels, gelscaps, liquids, or powders. They can also be found in other forms, such as a bar, if the label does not represent the product as a conventional food or as a replacement for a full meal or diet. A dietary supplement can also be a liquid if the information on the label makes it clear that it’s not a standard beverage or drink for the sole purpose of rehydration.

Regardless of the form, the DSHEA places dietary supplements in a special category under the general umbrella of “foods,” not drugs, and requires that every supplement be labeled a dietary supplement.

Excerpted and modified from the FDA: https://www.fda.gov/Food/DietarySupplements/UsingDietarySupplements/ucm480069.htm#what_is

Q: Do athletes need dietary supplements?

A: All athletes need good nutrition, but it is up to each individual to determine whether that nutrition is best obtained through foods or supplements. Under certain circumstances, some dietary supplements may be helpful to athletes.

It is important to first evaluate the nutritional needs of the athlete, and then identify whether increasing the intake of certain vitamins, minerals, or other ingredients is necessary. The steps below can be used to determine if an athlete might need a dietary supplement.

EVALUATING AN ATHLETE'S NUTRITIONAL NEEDS



CASE STUDY

In 2013, a Long Island doctor noticed that his patients were showing symptoms normally associated with anabolic steroid use, such as liver damage, blood clots, muscle pain, masculine features appearing in women, and even testicular shrinkage, infertility, and gynecomastia (breast tissue development) in men. These patients had all gone to the same chiropractor, who prescribed Healthy Life Chemistry vitamins by Purity First to each of them.

**REMEMBER, EVERY
“SAFE” SUPPLEMENT
CAN POSE A RISK.**

Although the label of these products appeared normal and didn't list unusual ingredients for a vitamin, regulators discovered anabolic steroids in the products after investigating health complaints. The ensuing warning letter from the FDA was initially ignored by Purity First, and the contaminated products remained on sale until they were finally recalled and destroyed after further federal pressure.

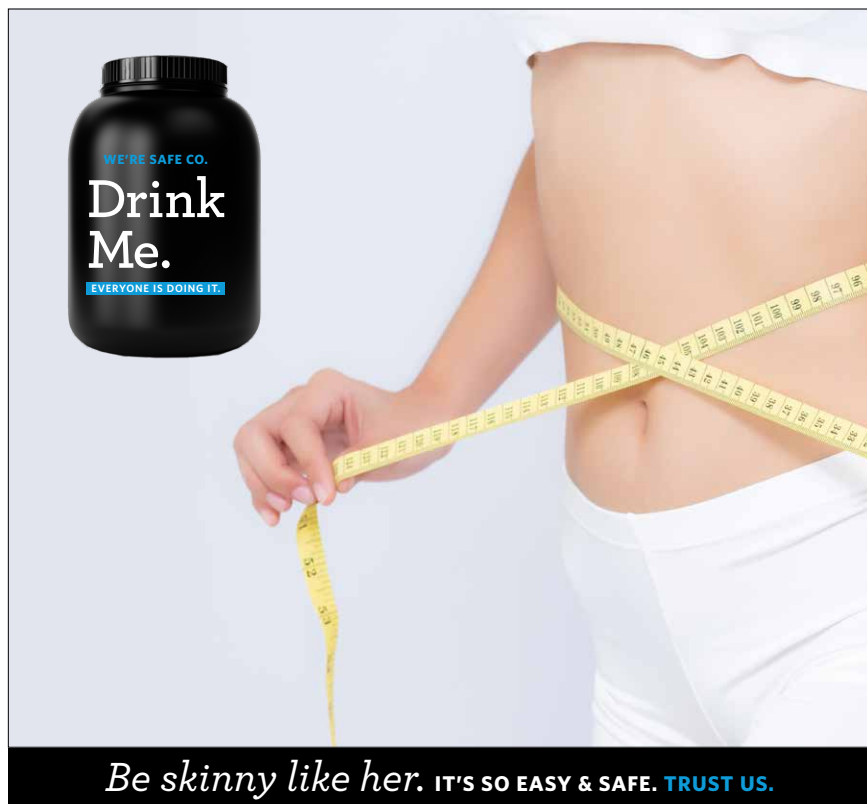
Although Purity First supplements are no longer on the market, stories like this are all too common, and the FDA's list of recalled supplements grows longer all the time. It's important for consumers to remember that the label does not always paint an accurate picture of what is, or isn't, in a supplement.

Even simple, safe-looking products from seemingly reputable companies can be contaminated with dangerous ingredients that can cause serious health problems and violate anti-doping rules.

Q: Should athletes buy supplements that advertise what they want to achieve?

A: Because the benefits of dietary supplements are often inflated, the decision to use a product should be based on nutritional needs and not the often wildly exaggerated promises the product makes.

Despite the claims a dietary supplement company might make in its advertising, there are no regulatory or enforcement agencies that check to make sure the advertisements are accurate. Federal law does not even require supplement companies to prove to the FDA that their products are safe or effective before they are sold. Because of this, athletes and consumers should ignore advertising and focus instead on the research about the individual dietary ingredients, such as basic vitamins and minerals.



WE'RE SAFE CO.
Drink Me.
EVERYONE IS DOING IT.

Be skinny like her. IT'S SO EASY & SAFE. TRUST US.



WE'RE SAFE CO.
Drink Me.
EVERYONE IS DOING IT.

Have muscles like him. IT'S SO EASY & SAFE. TRUST US.

DON'T FALL FOR FALSE ADVERTISING

Advertisements for dietary supplements often make extremely exaggerated claims. Sometimes dietary supplements with the exact same ingredients will claim to have completely different effects on performance.

For example, whey protein is advertised to be the key ingredient in both weight-gain and weight-loss products, implying that the same ingredient somehow has opposite effects. The benefits listed on supplement packaging and advertising sound nice, but it's important to remember that what a product can do for an athlete doesn't always match up with the label.

Athletes and the people who support them should carefully evaluate their diet and training regimen to figure out what ingredients aren't being obtained through food, and then choose a safer product that delivers that ingredient. Visit Supplement Connect at [USADA.org/Supplement-Connect](https://www.usada.org/Supplement-Connect).

BE SMART

Q: Is there evidence behind the benefits of using dietary ingredients?

A: To determine which, if any, dietary supplements can benefit athletes, it is necessary to first evaluate the athlete's metabolic needs and diet.

Since everyone is different, it is not possible to simply say “all athletes need fish oil/vitamin D/branched chain amino acids (BCAAs)” or that “creatine improves the sport performance of every athlete.” For example, creatine can help some athletes in a few specific instances (see Table 1) if they are not able to eat enough of the right foods, but there is no one-size-fits-all solution.

Table 1 shows some of the potential benefits and risks of commonly asked-about dietary ingredients.

To evaluate whether a specific ingredient would benefit an athlete, it is helpful to consult with a certified sports dietitian or other qualified healthcare provider. If you do not have access to someone with the credentials to help, you can also consult the TrueSport Nutrition Guide at [TrueSport.org/Nutrition-Guide](https://www.truesport.org/nutrition-guide) for information about dietary ingredients' effects on health and performance.

If an athlete has an identified nutrient deficiency, the question becomes how to address the cause of the deficiency and how to best increase the intake of that ingredient. The U.S. Anti-Doping Agency (USADA) recommends that athletes first try to modify what they eat. However, if it is determined that a food-first approach will not do the trick, then an athlete should undertake a thorough evaluation to minimize the risks around supplement use.



Table 1: POTENTIAL BENEFITS AND RISKS OF COMMON DIETARY INGREDIENTS

	Potential Benefits	Potential Risks
Vitamins & Minerals	Can provide necessary nutrition for adolescents who do not eat a balanced diet. There are no demonstrated performance benefits aside from general good health.	Mega-doses can cause toxicity leading to nausea, vomiting, organ damage, and other adverse effects.
Calcium	May benefit some female athletes between ages 13-18 or lactose intolerant athletes. Build bones and teeth.	High doses can cause kidney stones and heart problems.
Creatine	Can delay muscle fatigue in high-intensity training. In most studies, performance benefits are small and only experienced during short-duration, maximum-intensity resistance training. No benefit shown in aerobic activities or with “on-field” athletic performance.	High doses can cause kidney damage, nausea, diarrhea, cramping, and upset stomach.
Caffeine	Offers some energy and performance benefits to adults, but its effects are not well studied in adolescents.	Effects can be intensified if used with ADHD medications. The American Academy of Pediatrics recommends against kids using caffeine.
Nitric Oxide Boosters (beet juice, arginine, citrulline, and other vasodilators)	Results are mixed regarding potential benefits of high nitrate-containing foods on athletic performance. The evidence that arginine in normal doses actually causes vasodilation is debatable.	Vasodilation can cause a sudden loss of blood pressure, dizziness, lightheadedness, and a loss of balance.
Protein Powder	No performance benefit if diet provides adequate protein consumed at the appropriate times in relation to training.	High doses can cause thirst, bloating, cramps, diarrhea, reduced appetite, and fatigue.
Iron	Necessary for production of red blood cells. Signs of deficiency include fatigue and irritability. Once normal levels are achieved in the blood, additional iron provides no performance benefit.	High doses can be toxic and side effects include stomach pain, nausea, and vomiting.

(Source: American Academy of Pediatrics and LaBotz et al 2016)



Q: What are the risks associated with dietary supplements?

A: The use of unhealthy, low-quality, or unlisted ingredients, as well as manufacturers' failure to include all of a supplement's ingredients on the label, are big problems in the supplement industry.

Even though there are many high-quality and safe dietary supplements on the market, there is always the possibility that the supplement an athlete chooses could contain dangerous or illegal ingredients. There are often no warning signs that a product is unsafe and many athletes have suffered health problems or had positive drug tests from using products that are incorrectly labeled or contaminated with dangerous ingredients, such as anabolic steroids, pharmaceuticals, or research drugs.

Sometimes, risky or dangerous ingredients are even listed right on the label or identified by a confusing name. Supplements can also contain low-quality ingredients, or old or unstable ingredients that degrade very quickly.

Other supplements might not even contain the ingredients on the label. The FDA and other organizations list many examples of tested products containing zero amounts of a listed ingredient. In some situations, this could lead to malnutrition if the athlete stops eating foods with the ingredient because they relied solely on the supplement.

ARE YOU *SURE* IT'S WORTH THE RISK?



Q: If a dietary supplement is the most realistic way to obtain necessary dietary ingredients, how do athletes pick the safest one?

A: There is no risk-free way to choose a supplement, as the only way to have zero risk is to not use supplements. But, if athletes choose to use supplements, they can reduce the risk significantly by following the decision-making flow chart to the right.

If using a dietary supplement is necessary, the best way to reduce the risk of using a low-quality or contaminated product is to choose one that is certified by a USADA-recommended third party. Visit Supplement Connect at [USADA.org/Supplement-Connect](https://www.usada.org/Supplement-Connect) for the most current recommendations.

Q: What types of products should athletes avoid?

A: If athletes choose to use uncertified supplements in spite of the risks, they should avoid using products with red flags, which are listed in the Supplement Red Flags section of this booklet. Keep in mind that this is no guarantee. USADA is aware of several dietary supplements that, on initial inspection, did not exhibit any “red flags,” but testing revealed that they were contaminated with experimental drugs! Athletes have also tested positive for performance-enhancing substances from supplements that appear completely safe based on the label.

Because a supplement’s label and contents are not checked by the FDA or anyone else before a product is sold, it is completely up to the manufacturer to accurately list the ingredients and the amounts. While there are many companies that make high-quality supplements and spend a lot of time ensuring the labeling on their products is accurate, there are also companies that are sloppy during manufacturing or deliberately spike their products with illegal ingredients that are not on the label.

There have been many cases where seemingly safe or low-risk products ended up containing prohibited performance-enhancing drugs, even though there was nothing on the label that made the product appear unsafe.

DECISION-MAKING FLOW CHART



MORE OF WHAT YOU NEED...

Foods offer more nutrients than you may realize. As you'll see, foods outperform supplements in almost every case.



SALMON FILLET

FOOD:

Atlantic salmon half a fillet (approx. 150g)

NUTRITIONAL FACTS:

Proteins 39.3g (79% Daily Value)

Tryptophan 441mg	Valine 2028mg
Treonine 1725mg	Arginine 2353mg
Isoleucine 1812mg	Histidine 1159mg
Leucine 3197mg	Alanine 2380mg
Lysine 3614mg	Aspartic acid 4028mg
Methionine 1164mg	Glutamic acid 5871mg
Cystine 422mg	Glycine 1889mg
Phenylalanine 1536mg	Proline 1390mg
Tyrosine 1328mg	Serine 1606mg

Vitamins

Vitamin A 89.0IU 2%	Vitamin B 61.2mg 58%
Vitamin C 6.6mg 11%	Folate 60.5mcg 15%
Thiamin 0.6mg 40%	Vitamin B 125.0mcg 83%
Riboflavin 0.2mg 14%	Pantothenic Acid 2.6mg 26%
Niacin 14.3mg 72%	

Minerals

Calcium 26.7mg 3%	Sodium 109mg 5%
Iron 0.6mg 3%	Zinc 0.8mg 5%
Magnesium 53.4mg 13%	Copper 0.1mg 4%
Phosphorus 449mg 45%	Selenium 73.7mcg 105%
Potassium 683mg 20%	

Total Fat 22.0g (34% Daily Value)

Saturated Fat 4.5g 22%
Monounsaturated Fat 7.9g
Polyunsaturated Fat 7.9g
Total Omega-3 fatty acids 4023mg
Total Omega-6 fatty acids 1185mg



FISH OIL SUPPLEMENT

SUPPLEMENT:

Omega-3

Did you know that the fatty acids in many fish oil supplements are oxidized, reducing their nutritive value significantly?



ORANGE

FOOD:

Florida orange (approx. 150g)

NUTRITIONAL FACTS:

Vitamins

Vitamin A 317IU 6%	Choline 11.8mg
Vitamin C 63.4mg 106%	Calcium 60.6mg 6%
Vitamin E (Alpha Tocopherol) 0.3mg 1%	Iron 0.1mg 1%
Vitamin K 0.0mcg 0%	Magnesium 14.1mg 4%
Thiamin 0.1mg 9%	Phosphorus 16.9mg 2%
Riboflavin 0.1mg 3%	Potassium 238mg 7%
Niacin 0.6mg 3%	Sodium 0.0mg 0%
Vitamin B 60.1mg 4%	Zinc 0.1mg 1%
Folate 24.0mcg 6%	Copper 0.1mg 3%
Vitamin B 120.0mcg 0%	Manganese 0.0mg 2%
Pantothenic Acid 0.4mg 4%	Selenium 0.7mcg 1%

Carbohydrate 16.3g (5% Daily Value)

Dietary Fiber 3.4g 14%
Sugars 12.9g

Fats

Total Omega-3 fatty acids 15.5mg
Total Omega-6 fatty acids 43.7mg

VS



VITAMIN C SUPPLEMENT

SUPPLEMENT:

Vitamin C

Did you know there are no proven benefits to taking mega-doses of vitamin C? Research has proven it does not shorten the life of a cold. You can get all the vitamin C you need from a piece of fruit or juice.



YOGURT

FOOD:

Yogurt plain 8 oz container

NUTRITIONAL FACTS:

Proteins 12.9g (26% Daily Value)

Tryptophan 73.5mg	Valine 1063mg
Threonine 529mg	Arginine 387mg
Isoleucine 701mg	Histidine 319mg
Leucine 1296mg	Alanine 551mg
Lysine 1154mg	Aspartic acid 1019mg
Methionine 380mg	Glutamic acid 2519mg
Cystine 118mg	Glycine 311mg
Phenylalanine 701mg	Proline 1524mg
Tyrosine 649mg	Serine 796mg

Vitamins

Vitamin A 125IU 2%	Vitamin B 60.1mg 6%
Vitamin C 2.0mg 3%	Folate 27.0mcg 7%
Vitamin E (Alpha Tocopherol) 0.1mg 0%	Vitamin B 12 1.4mcg 23%
Vitamin K 0.5mcg 1%	Pantothenic Acid 1.4mg 14%
Thiamin 0.1mg 7%	Choline 37.2mg
Riboflavin 0.5mg 31%	Betaine 2.2mg
Niacin 0.3mg 1%	

Minerals

Calcium 448mg 45%	Sodium 171mg 7%
Iron 0.2mg 1%	Zinc 2.2mg 15%
Magnesium 41.7mg 10%	Selenium 8.1mcg 12%
Phosphorus 353mg 35%	Fluoride 29.4mcg
Potassium 573mg 16%	

Carbohydrate 17.2g (6% Daily Value)

Dietary Fiber 0.0g 0%
Sugars 17.2g

Total Fat 3.8g (6% Daily Value)

Saturated Fat 2.5g 12%	Total Omega-3 fatty acids 31.9mg
Monounsaturated Fat 1.0g	Total Omega-6 fatty acids 76.0mg
Polyunsaturated Fat 0.1g	

VS



CALCIUM SUPPLEMENT

SUPPLEMENT:

Calcium

Did you know calcium found in food is more easily absorbed than the calcium in a pill and is less likely to cause kidney stones or other side effects?





EGG

FOOD:

1 egg

NUTRITIONAL FACTS:

Proteins 6g (34% Daily Value)

Tryptophan 208mg	Valine 1043mg
Threonine 821mg	Arginine 1027mg
Isoleucine 933mg	Histidine 405mg
Leucine 1462mg	Alanine 952mg
Lysine 1230mg	Aspartic acid 1719mg
Methionine 533mg	Glutamic acid 2236mg
Cystine 397mg	Glycine 575mg
Phenylalanine 909mg	Proline 681mg
Tyrosine 698mg	Serine 1273mg

Vitamins

Vitamin A 797IU 16%	Vitamin B 60.2mg 8%
Vitamin E (Alpha Tocopherol) 1.4mg 7%	Folate 59.8mcg 15%
Vitamin K 0.4mcg 1%	Vitamin B 12 1.5mcg 25%
Thiamin 0.1mg 6%	Pantothenic Acid 1.9mg 19%
Riboflavin 0.7mg 41%	Choline 306mg
Niacin 0.1mg 0%	Betaine 0.8mg

Minerals

Calcium 68.0mg 7%	Sodium 169mg 7%
Iron 1.6mg 9%	Zinc 1.4mg 10%
Magnesium 13.6mg 3%	Selenium 41.9mcg 60%
Phosphorus 234mg 23%	Fluoride 6.5mcg
Potassium 171mg 5%	

Carbohydrate 1.5g (1% Daily Value)

Omega-3 fatty acids 106mg
Omega-6 fatty acids 1616mg

VS



CREATINE SUPPLEMENT

SUPPLEMENT:

Creatine

Did you know your body makes creatine from glycine, arginine, and methionine? Eggs provide a massive amount of these amino acids.

**LESS OF
WHAT YOU
DON'T NEED...**

Beware! Supplements may include contaminants that are banned in sport or other unhealthy ingredients.





COFFEE

FOOD:

Cup of brewed coffee

NUTRITIONAL FACTS:

Caffeine 100mg, and small amounts of:
 Riboflavin 0.2mg 11%
 Niacin 0.5mg 2%
 Folate 4.7mcg 1%
 Pantothenic Acid 0.6mg 6%
 Choline 6.2mg
 Magnesium 7.1mg 1%
 Phosphorus 7.1mg 1%
 Potassium 116mg 3%
 Manganese 0.1mg 3%

VS



ENERGY DRINK

SUPPLEMENT:

Energy drink

NUTRITIONAL FACTS:

Citrulline 4g
 Beta-alanine 2.5g
 Agmatine 1g
 Tyrosine 1g
 Dimethylaminoethanol 750mg
 Phenethylamine 550mg
 Caffeine 330mg
 2-aminoisoheptane 15mg
 Nefumblo necifera (standardized for higenamine) 75mg
 Huperazine A 300mcg
 Yohimbine 20mg



BANANA & WATER

FOOD:

1 average banana (approx. 100g) and 16 ounces of water

NUTRITIONAL FACTS:

Water 16 ounces
 Energy kcal 89
 Protein 1.09g
 Total lipid (fat) 0.33g
 Carbohydrate, by difference 22.84g
 Dietary Fiber 2.6g
 Sugars 12.23g
 Fatty acids, total saturated 0.112g
 Fatty acids, total monounsaturated 0.032g
 Fatty acids, total polyunsaturated 0.073g

Vitamins

Vitamin C 8.7mg	Folate DFE 20ug
Thiamin 0.031mg	Vitamin A 64iu
Riboflavin 0.073mg	Vitamin E 0.1iu
Niacin 0.665mg	Vitamin K (phylloquinone) 0.5g
Vitamin B-6 0.367mg	

Minerals

Calcium 5mg	Potassium 358mg
Iron 0.26mg	Sodium 1mg
Magnesium 27mg	Zinc 0.15mg
Phosphorus 22mg	

VS



SPORTS DRINK

PROCESSED DRINK:

Sport hydration drink

NUTRITIONAL FACTS:

Water 16 ounces
 Sugar 29g
 Sodium 230mg
 Potassium 65mg
 Protein 0
 Other ingredients: dextrose, citric acid, salt sodium citrate, monopotassium phosphate, gum arabic, glycerol ester of rosin, natural flavor #5.

Did you know that energy drinks can contain lots of sugar and stimulants (such as the stimulants in red above, which are banned in sport) that are not approved for use in supplements and can cause all kinds of unexpected side effects? In contrast, most people are familiar with how their bodies react to caffeine, and they can make an informed decision about how much coffee to drink.

Sports drinks are convenient for kids on the go and they may be appropriate for longer and/or higher intensity activities, but the flavorful drinks encourage young athletes to drink more sugar than necessary. Want to cut back on sugar? A banana and plain water deliver a powerful punch for recovery.





OLIVE OIL

FOOD:

Olive oil

NUTRITIONAL FACTS:

Pressed olives
Monounsaturated fat 10g
Saturated fat 2g

VS



GROWTH HORMONE

SUPPLEMENT:

Extreme growth hormone boost

NUTRITIONAL FACTS:

7-methoxyflavone
Fadogia agrestis
Epimedium extract
Mucuna pruriens

Did you know that all hormones are synthesized in the body from cholesterol? Eating healthy fats will tip the balance toward a healthy cholesterol level, and will allow your body to balance your hormones naturally. In contrast, some "hormone boosting" supplements either contain ingredients that have not been shown to work or contain drugs that mimic the effects of hormones.



JUICED BEETS

FOOD:

Fresh beet juice (from a juicer)

NUTRITIONAL FACTS:

Water 119.11g	Riboflavin 0.054mg
Protein 2.19g	Niacin 0.454mg
Carbohydrate 13g	Vitamin B-6 0.091mg
Fiber 3.8g	Folate DFE 148mg
Sugars 9g	Vitamin A 45iu
Calcium 22mg	Vitamin E (alpha-tocopherol) 0.05mg
Iron 1mg	Vitamin K (phylloquinone) 0.3mg
Magnesium 31mg	Fatty acids, total monounsaturated 0.044g
Phosphorus 54mg	Fatty acids, total polyunsaturated 0.082g
Potassium 442mg	
Sodium 106mg	
Zinc 0.5mg	
Vitamin C 6.7mg	
Thiamin 0.042mg	

VS



NITRIC OXIDE

SUPPLEMENT:

NO Boost (nitric oxide boosting supplement)

INGREDIENTS:

L-Citrulline
Hawthorne extract
Pomegranate fruit
Grape Seed extract
Red Pepper extract
Black Pepper extract
Other ingredients: aqueous coating, microcrystalline cellulose, stearic acid, croscarmellose sodium, magnesium stearate, silicon dioxide, FD&C Red #40, FD&C Yellow #6, titanium dioxide and FD&C Blue #2.

Did you know there is very little evidence backing the use of nitric oxide supplements? However, beets and other fruits and vegetables (arugula, celery, carrots, and rhubarb) are rich in nitrates, which your body naturally converts to nitric oxide to help with blood flow and stamina. Freshness matters. Once you grind something up into a powder and store it on a shelf, benefits may be reduced.



A USOPC DIETITIAN'S PERSPECTIVE ON “SUPPLEMENTS THAT WORK”

We asked Alicia Kendig Glass, Sports Dietitian at the United States Olympic & Paralympic Committee, to give us her opinion on some trending supplements.



What are your thoughts on the use of supplements for athletes?

I won't discuss or utter the word "supplement" until all the most important aspects of an athlete's lifestyle are addressed and optimized. It's crucial to evaluate an athlete's training program, their performance goals, their lifestyle habits, and how their diets can best support all of those factors.

What vitamins and minerals do you recommend?

Many athletes do fine without taking a multivitamin. With their increased caloric needs, they have more opportunities to get the nutrients they need in their food.

I don't usually recommend any kind of multivitamin, even to elite Olympians and Paralympians. My approach is always food first.

On the other hand, if an athlete has a clinically diagnosed deficiency, then we will treat it.

For example, numerous athletes are diagnosed with sport anemias, and we treat those with an oral iron supplement.

Our approach to supplements is very clinical. We don't ever dose an athlete with something unless there is a very good rationale for doing so, which means a blood test to confirm their current nutrients

status. There are some athletes who we find have hemochromatosis, a genetic condition where iron levels build to toxic levels in the body. We would never suggest iron for those athletes.

I will also recommend vitamin D to an athlete who has a low blood test value. Depending on the time of the year and if they're training inside or outside, I may recommend a low dose to get them through the winter months when sunlight exposure is limited. But, I warn them that more is not better.

To that point, I had a bobsled athlete who I was treating for low vitamin D. The next time I saw her she complained of tingling in her fingertips. I sent her for a blood test and she had toxic levels of vitamin D. She admitted that she had tripled her dose because her coach told her she should take more. Her symptoms resolved once we got her back on the correct dose.

Things like this can happen to anyone.

In another case, the father of one of our athletic trainers ended up in the ER because of vitamin D toxicity. He didn't realize it at the time, but all the supplements he was taking for his eyes and skin were adding up to a mega dose of vitamin D, which then exacerbated his symptoms of diabetes. Not only did he not realize vitamin D could be toxic, but he didn't realize how much he was taking.

This is common when people take more than one supplement. Things end up “stacking.”

Too much vitamin D can also block the absorption of other fat-soluble vitamins.

What about creatine and protein powder?

Many athletes ask me if they should take creatine. People just think this is a magic ingredient, but they don't know how it works or if their sport demands it. I always ask myself, “Are the demands of the sport going to be supported by what this active ingredient does?”

I did have a vegan athlete who was a sprinter, and she wasn't eating the food sources for creatine. She responded well to creatine. But, if I'm working with vegan or vegetarian athletes, I will often start with making sure they are getting enough quality protein in their diet first.

Another situation where more protein can be helpful is for older athletes who have an increased need for quick recovery and may have a more difficult time maintaining lean muscle mass. In some cases where an athlete must train smarter instead of harder, and they are having a hard time sustaining lean mass or consuming enough calories, a simple whey protein can help.

What is a nitric oxide booster? Would you recommend it to athletes?

Nitric oxide boosters advertise to increase blood flow to your muscles, therefore increasing your ability to perform and recover faster.

I steer clear of any supplement that advertises to be a nitric oxide (NO) booster. Those supplements are too risky for athletes to navigate, as their ingredients claim to deliver the same results as substances prohibited in sport.

On the other hand, there are great functional foods that can offer slight improvements in oxygen uptake and muscle efficiency. Beet juice, spinach, and celery are all rich in naturally found nitrates to improve muscle efficiency.

Caffeine and energy drinks are everywhere these days. What should an athlete do if they're fighting sluggishness and fatigue?

Caffeine can be beneficial for those athletes who tolerate it well. Some athletes are distracted or jittery when they ingest caffeine. It's not for everyone.

I do not recommend that athletes obtain caffeine through supplements or energy drinks though, because oftentimes, the caffeine dose is listed as part of a



‘proprietary blend,’ which doesn't list the individual doses. This makes it difficult to be certain how much caffeine is actually consumed.

Energy drinks are particularly bad because they can also contain hidden sources of caffeine or other stimulants like yohimbine. The cumulative effect of multiple stimulants can harm performance and health.

We know that supplement labels can be inaccurate or unclear, so if an athlete doesn't like coffee (and it's hard to control the dose), we will recommend a No Doz or other over-the-counter product with a known amount of caffeine.

What is carnitine? Can it help an athlete?

I don't actively recommend carnitine. Athletes ask about carnitine because they have heard that it may help the

body burn more fat. But a review of research is still not convincing and more evidence is needed to suggest that carnitine does indeed work for an elite athlete population - that principle applies for any dietary supplement ingredient. The evidence needs to be specific to an athlete's sport or discipline, and its effects on performance need to be convincing before actively recommending it.

Can you tell us more about beta-alanine?

When dosed properly, beta-alanine increases carnosine in the muscle, which then acts as a lactate buffer.

For athletes whose efforts last 40 seconds to about four minutes, it can help delay anabolic metabolism, which is when your muscle has too much lactic acid built up to function optimally.



Beta-alanine is no magic pill - it just delays this threshold slightly. It can also be beneficial for training. Beta-alanine is found in meats, but in relatively low amounts, so its therapeutic doses can really only be ingested in supplemental form. The most effective supplementation protocols require a loading phase of 3-4 weeks at higher doses, then backing off to a lower dose for numerous weeks. Given this long duration of time needed to dose beta-alanine effectively, taking a high quality beta-alanine product can become rather costly.

I had a high jumper once who was intrigued by beta-alanine because his teammates were taking it. I had to ask him, "How is this going to help you? You are not even doing a lactate-accumulating

sport!" For the high jumper, I didn't recommend that he waste his time or money on dosing beta-alanine.

Do you think athletes can benefit from taking probiotics?

I'm a big fan of probiotics. There are many good food sources like yogurt, kefir, ceviche, and other fermented foods.

I often recommend a probiotic supplement for athletes traveling internationally where finding trusted food sources overseas may be difficult.

There is still a lot of research to be done in this area though. We are not in a place where we can pull out a menu of recommendations for

probiotics. We have a lot to learn about all the different strains, how they are populated within various individuals, how high of a dose is required, and how long dosing of probiotics is necessary for various benefits.

Research is suggesting that improved gut health has very wide health effects on the whole body, both mentally and physically.

What is tart cherry? What can it do for athletes?

I'm asked often about antioxidant mega-dosing and the use of functional foods like tart cherry to reduce the stress on the body from heavy training.

Although there is evidence that tart cherry juice has benefits to fight inflammation for elite athletes, habitual consumption of it may not be necessary. I also remind athletes that tart cherry juice should not take the place of other recovery snacks that contain both carbohydrates and protein. There is no protein in tart cherry juice.

If athletes do want high doses of antioxidants during high stress times of training or competition, it's better to get it through foods. Mega-doses of antioxidants in dietary supplement form can actually shunt training responses. One of the many benefits of training is to apply stress to the various body systems so that the body has the opportunity to recover stronger. Mega-dosing nutrients takes that opportunity away.



Alicia Kendig Glass, MS, RD, CSSD

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Alicia Kendig Glass is an U.S. Olympic & Paralympic Committee sport dietitian. Since 2011, she has provided performance nutrition consulting to the summer strength

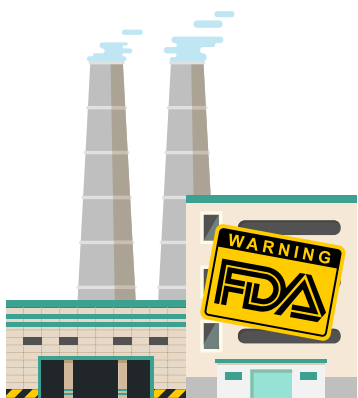
and power sports athletes, as well as the winter sport athletes. Throughout her career, Kendig Glass has worked with many National Governing Bodies and USADA to educate athletes on performance nutrition and dietary supplements. She continues to help athletes achieve performance goals through well-planned nutrition strategies. Kendig Glass holds a bachelor's in nutrition and a master's in public health nutrition from Case Western Reserve University in Cleveland, Ohio.



SUPPLEMENT RED FLAGS

Learning to recognize red flags is one way for athletes to reduce their risk if they decide to use supplements. Athletes should consider these red flags while evaluating and researching any supplement they might use. Before using any supplement, please also explore all of the educational materials available on TrueSport.org and USADA.org, including lists that identify many supplements and manufacturers that are known to be risky for athletes and consumers.

HIGH RISK COMPANIES



The manufacturer or company has received FDA warning letters or has been subject to other enforcement actions. Search for the company or product name on FDA.gov or FTC.gov.



Products sold exclusively on the internet may raise a red flag. While there are some legitimate dietary supplement companies that only have an online presence, some companies deliberately avoid regulatory agencies by opening and closing websites quickly, or selling products online to the U.S. from other countries.

RISKY INGREDIENTS OR UNUSUAL USE INSTRUCTIONS

1

Product lists unrecognizable ingredients that seem out of place, or it lists ingredients by chemical names rather than common names.

2

The supplement label or advertising includes substances on the WADA Prohibited List, or in a general category of the WADA Prohibited List, such as anabolic agents or stimulants.

1

Uses Chemical Name | Unrecognizable Ingredients

2

WADA Prohibited Substances

3

andro -ol -diol -dione -stene -stane

17a 17b 17d epi epithio gonado

*any other number with the alpha & beta symbols or other greek symbols

4

Skin Patches | Injections | Drops

*any extra steps to swallowing

5

No Nutritional Value Listed

3

Any of the following phrases or characters on a bodybuilding product label should be considered a red flag because they might indicate the presence of steroids:
andro, -ol, -diol, -dione, -stene or -stane, epi, epithio, gonado, or any ingredient that is listed as a chemical formula.

4

Any product that is taken or applied to the body in a way other than simply eating it or swallowing it, such as skin patches, creams, injections, and drops. Also be wary of extra steps before swallowing, including placing the product under the tongue or swishing it around in your mouth.

5

Ingredients have no clear, well-documented nutritional value. If you've never heard of an ingredient, then you should stop and do research first.

RED FLAG MARKETING

Product claims to be "FDA Approved," "WADA Approved," or "USADA Approved." These organizations do not approve dietary supplements.



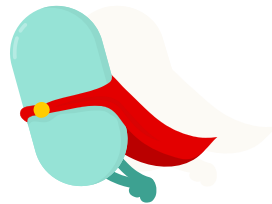
Advertising contains phrases like "newest scientific breakthrough," "secret formula," "money back guarantee," "quick fix," "used for thousands of years," or "what the experts don't want you to know."



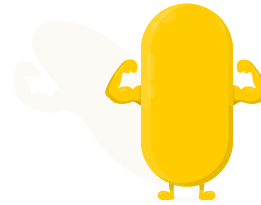
Product claims to be an "alternative to prescription medication."



The supplement is advertised to be a thermogenic or stimulant-based weight loss or energy product, a sexual enhancement product, or a hormonal or anabolic product. Companies often add stimulants, Viagra-like drugs, or steroids to their products so they "work," but they might not list those ingredients on the label.



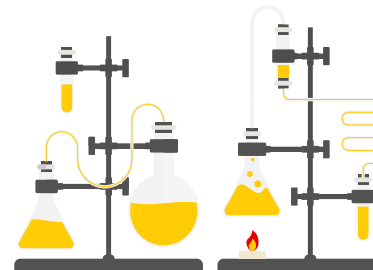
Product claims to treat or prevent a disease, such as hormone imbalances, the common cold, flu, diabetes, and inflammation.



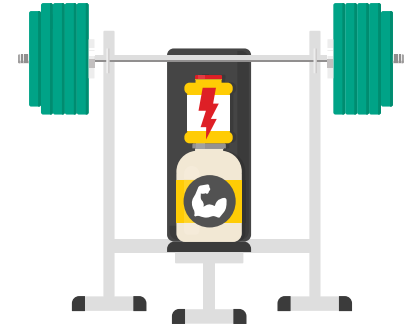
The product claims to deliver the same results as a performance-enhancing drug, such as increased or decreased hormone levels, or increased muscle mass.



The product is sold "for research purposes only." Some companies evade FDA scrutiny by telling consumers their products are not for human use so they can claim it's not their fault if a consumer gets sick from it.



Product is recommended by a gym trainer instead of a healthcare provider or dietitian.



Product is not certified by a third-party certifier recommended by USADA. See [USADA.org/Supplement-Connect](https://www.usada.org/) for the most current recommendations.



The company website or blog sites claim the products are legal because the ingredients are not on the Controlled Substances Act. For example, the company may market their products as "legal steroids" or "legal prohormones."

Bottom Line

While you may have picked up this guide hoping to get a simple yes or no as to whether you should use supplements, **there is not an easy answer.**

This resource has introduced the potential benefits and risks of using supplements, but at the end of the day, it is up to each individual to figure out if the benefits of using supplements outweigh the risks.

Regardless of whether you are a recreational athlete, elite-level athlete, or support an athlete, we encourage you to:

- *Be aware of everything you use and consume. You are responsible for everything that goes in and on your body, whether through the eyes, ears, nose, mouth, or skin.*
- *Start checking your medications, from cold medicines to asthma inhalers, on [GlobalDRO.com](https://www.globaldro.com) to see if they are permitted or prohibited in sport.*
- *Learn more about the risks associated with using supplements and visit Supplement Connect at [USADA.org/Supplement-Connect](https://www.usda.gov/supplement-connect) to find ways to reduce your risk.*

If you think incorporating a supplement into your routine could be helpful, do your due diligence to research that supplement and manufacturer. And, keep in mind that there are no guarantees. The use of any dietary supplement is at your own risk.

Resources

acsm.org American College of Sports Medicine

eatright.org Academy of Nutrition and Dietetics

USADA.org/Supplement-Connect USADA's supplement education resource

fda.gov/food U.S. Food and Drug Administration

fda.gov/safety/recalls FDA Recalls, Market Withdrawals, & Safety Alerts

fns.usda.gov/cnpp Center for Nutrition Policy and Promotion

dietaryguidelines.gov Dietary Guidelines for Americans, 2020-2025

nutrition.gov National Agricultural Library, U.S. Department of Agriculture

health.gov/nhic National Health Information Center - U.S. Department of Health and Human Services

scandpg.org Sports, Cardiovascular, and Wellness Nutrition, a dietetic practice group of the Academy of Nutrition and Dietetics

sportsrd.org Collegiate and Professional Sports Dietitian Association

opss.org Operation Supplement Safety, a Supplement Safety Initiative of the Department of Defense

Acknowledgement:



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Dr. Amy Eichner earned her PhD in neuroscience from Australian National University in 2001 and continued in neuromedical research at various institutions, including Harvard University and Massachusetts General Hospital. In

2008, she joined the Therapeutic Goods Administration in Australia to head up an ISO17025 laboratory in biocompatibility testing of medical devices. She has worked with the U.S. Anti-Doping Agency in the Drug Reference Department since 2009 on the Drug Reference Hotline, Global Drug Reference Online database, Therapeutic Use Exemptions, and supplement education resources. She is now the Special Advisor on Drugs and Supplements for USADA.

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