



# Fitness SUPPLEMENTS 101

# 101

Nutritional aids can help make you **better, stronger, faster.**  
Our experts explain what you need to know.

BY MICHAEL DREGNI

If you're confused when it comes to fitness supplements, you're not alone. We're inundated with online hype, blaring TV infomercials, and glossy magazine ads featuring spokespeople ripped like superheroes pumping the latest and greatest supplements to buff up our workouts. It can be tough to know which ones are right for you, if they're safe, or whether you actually need them at all.

The notion of a magic-bullet supplement conferring instant strength, weight loss, or athletic performance is really just the stuff of comic books. The truth is, eating right, getting plenty of sleep, and training well are still the not-so-secret secrets. But once that foundation is established, certain nutritional aids may help you excel.

"There are supplements that can enhance performance, plus give you more energy and stamina during training," explains Tom Nikkola, CSCS, vice president of nutrition and virtual training at Life Time. "They can also reduce muscle soreness so you recover faster from training sessions and are able to train more frequently."

But several factors — including your goals, gender, and health condition — determine what will work best for you.

## Food First

The key to supplement use lies in the very name: They're designed to supplement the food you eat, not replace it. Experts stress that a healthy diet and lifestyle come first.

"A lot of athletes think of supplements as ways to enhance fitness or performance, but you are better off taking a holistic look at what is hindering your performance in the first place," says Amy Eichner, PhD, special adviser on drugs and supplements for the U.S. Anti-Doping Agency. "Sometimes it's nutrition, and obviously you should optimize your nutrition. But if you're not getting enough recovery or sleep and your

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go-to is a preworkout supplement with stimulants to wake you up, then you're not dealing with the source of the real problem — you're just masking symptoms."

Make certain you're eating a mostly whole-foods diet that provides ample macronutrients: carbohydrates, healthy fats, and especially high-quality protein, which is key for supporting muscle health.

Nikkola then advises supplementing with micronutrients before even considering fitness supplements. "No supplement is so good that it offsets a lousy diet, and no diet is so good that it

doesn't benefit from the right supplementation," he explains.

"Bringing insufficient levels of micronutrients to optimal doses on a daily basis — which is basically taking you from less than your baseline to a standard optimal baseline — can alone have a performance-enhancing effect," says Nikkola. "For instance, a micronutrient such as magnesium is key for proper muscle contraction and relaxation. So optimizing your levels can make a significant difference, although magnesium is not specifically thought of as an ergogenic [performance-enhancing] aid."

He recommends the Foundational Five for leveling up micronutrients:

- **A multivitamin** that includes all-important B vitamins — including thiamin (B1), riboflavin (B2), niacin (B3), and folate (B9) — which are crucial to the release of cellular energy and metabolism.

- **Vitamin D3**, which boosts bone health and immunity while fighting inflammation.

- **Magnesium**, a key electrolyte that serves as a spark plug for your muscles.

- **Fish oil**, which contains omega-3 essential fatty acids that aid nutrient absorption and support overall health.

- **A digestive enzyme** to support gut health and immune-system function.

Once that foundation is in place, Nikkola says, "you can start looking at the range of muscle-building, energy-producing, performance-enhancing supplements."

# 4 Go-To Fitness SUPPLEMENTS

Among the many performance supplements and ergogenic aids, there are a select few that experts consider the safest – and most effective. This guide outlines factors to consider before taking these supplements. Still, our experts advise consulting with a sports nutritionist or a knowledgeable healthcare professional before supplementing.

## PROTEIN

**What It Is:** After water, proteins are among the most abundant molecules in your body, making up most of your skin, bones, organs, and muscle. Alongside fats and carbohydrates, proteins are one of the three macronutrients essential for energy production.

Protein is available in numerous whole foods, including meats, poultry, seafood, eggs, dairy, beans, and nuts. Supplements typically come in powder form that can be blended into shakes, smoothies, water, or milk.

Casein, a dairy-derived protein, can be hard for some people to digest. Whey, also from dairy, is easier on the gut and contains more branched-chain amino acids (BCAAs). Options for those avoiding dairy include soy, pea, egg white, rice, hemp, or even insect protein.

**What It Does:** Protein is essential for building, maintaining, and repairing muscle. To do this, it works with BCAAs and other essential amino acids, as well as glutamine and arginine. “If you’re not getting enough protein, you’re likely to suffer muscle soreness and you’re not going to be able to recover as quickly,” Nikkola explains. Clinical trials have consistently found that protein optimizes muscle-training response during exercise and recovery, according to the National Institutes of Health (NIH).

**Why You Might Use It:** You’re aiming to build muscle mass but aren’t getting enough protein from whole foods.

“Higher-protein diets consistently lead to improved body composition in studies,” Nikkola explains. “You’re better off focusing on eating more pro-

tein than less of the other two: When you eat enough protein, the carbs and fat take care of themselves.”

The International Society of Sports Nutrition and the National Academy of Sports Medicine offer the following guidelines:

- **Adults seeking to improve endurance:** 0.45 to 0.73 grams of protein per pound of body weight per day. This equates to 67.5 to 109.5 grams of protein daily for a 150-pound person.

- **Adults looking to build muscle and strength:** 1 gram of protein per pound of body weight, or 1 gram per pound of desired body weight, per day.

As you get older, Nikkola advises, make protein a priority: “Protein needs increase with age, making higher intake even more important.”

**Safety Concerns:** The NIH reports no safety concerns.

## GLUTAMINE

**What It Is:** The most abundant amino acid in your muscles and blood, glutamine is made by your body from amino acids found in foods, such as eggs and dairy, red meat, tofu, rice, and corn. The supplement form, L-glutamine, is available in capsules and as a powder.

**What It Does:** Glutamine plays many roles. It’s a building block for proteins and key to your metabolic function and energy production.

Depletion of your body’s stores can cause cellular damage and muscle wasting, and even spur overtraining syndrome, a rare condition in which an athlete experiences fatigue and declining fitness performance following a

period of extreme training or competition.

Glutamine helps stabilize blood sugar, contributes nitrogen for many critical biochemical reactions, and supports your immune system. The NIH notes, however, that research on its ability to enhance athletic performance has been inconclusive.

Glutamine also supports digestive health by restoring the lining of the small intestine. (For more on this, see [ELmag.com/leakygut](http://ELmag.com/leakygut).)

**Why You Might Use It:** If you’re following a rigorous training program, it can help you gain and maintain muscle. It may also help reduce body fat.

“Even when you’re eating enough protein, glutamine

may be used up faster than it can be consumed through whole foods,” explains Nikkola. “Glutamine isn’t necessarily ergogenic on its own: It’s beneficial when you’re experiencing higher stress levels, as stress reduces glutamine stores. This can have a negative impact on immune function and lead to gut-lining breakdown.”

**Safety Concerns:** The NIH reports no safety concerns or adverse effects. Experts advise pregnant women to avoid it, however, because not enough is known about its safety during pregnancy and breastfeeding.

## CREATINE

**What It Is:** Creatine is a nutrient your body creates from amino acids in meat and fish. The supplement form — creatine monohydrate — is a powder that can be added to shakes and smoothies.

**What It Does:** It helps your body make energy by supplying needed nutrients for muscles to create adenosine triphosphate, or ATP, the body’s stored energy. “Creatine increases the body’s potential to squeeze out a few more heavy reps or faster movement during high-intensity training,” explains Life Time sports nutritionist and personal trainer Jennifer Ahlberg, NASM-CES. “This increases the intensity of the workout and — with proper rest, recovery, and dietary nutrients — muscle gain will follow.”

Creatine is one of the most thoroughly studied supplements, according to the NIH.

**Why You Might Use It:** You’re striving to build strength, lean body mass, power, and speed. Study results suggest creatine boosts performance in high-intensity, intermittent sports, such as basketball, but offers less value for endurance sports.

To build up your body’s reserves, experts recommend starting with a loading dose of 20 grams per day for up to seven days, then settling at 3 to 5 grams every day for up to 12 weeks. “Supplementing with as little as 5 grams of creatine per day can boost muscle power and increase sprint performance, time to fatigue, and lean body mass,” says Ahlberg. It can be taken as a preworkout supplement or at any other time.

**Safety Concerns:** The NIH reports few safety concerns when used in a typical dose. Women, as well as some men, may experience creatine bloating due to water retention; to prevent this, consider reducing your dosage and make sure you’re well hydrated when supplementing. Some users have also reported nausea, diarrhea, muscle cramps, muscle stiffness, and heat intolerance.

## BRANCHED-CHAIN AMINO ACIDS (BCAAs)

**What They Are:** Essential BCAAs leucine, isoleucine, and valine are not produced by our bodies and must be acquired through diet; red meat, eggs, and whey protein are common sources. BCAAs also come in powdered form and can be added to water as a pre-, intra-, or postworkout drink.

**What They Do:** They’re called “branched-chain” because of their chemical structure, but they all aid protein synthesis and energy production, so they’re essential to metabolism.

Leucine stimulates muscle growth; isoleucine regulates blood sugar and cre-

## Caffeine: THE UBIQUITOUS SUPPLEMENT

Caffeine delivers a jolt of energy, and though our bodies don’t need the nutrient to function optimally, it is often used as a supplement itself or added to other supplements. It’s not strictly a nutritional supplement, nor does it offer longer-term benefits, but it can be effective and safe when used with care — and problematic if overused.

**What It Is:** Caffeine is an organic compound found in coffee, tea, cacao, the cola nut, and yerba mate. Natural caffeine is extracted and offered as a supplement in myriad forms, including tablets, powder, and liquids. Synthetic caffeine can spur a quicker spike and quicker crash, and is best avoided.

**What It Does:** Caffeine stimulates the central nervous system, increases blood flow to muscles and the heart, and helps burn fat for energy. It also stimulates the adrenal glands, which secrete fight-or-flight hormones, giving you additional energy. Caffeine also appears to reduce perceived pain and exertion. Study findings indicate it’s most effective for endurance activities (such as running and cycling) and activities of long duration with intermittent activity (soccer) rather than more anaerobic, shorter bouts of intense exercise (like weightlifting).

**Why You Might Use It:** You’re seeking a kick-start or burst of zing. But caffeine is more than just an energizer, reports Life Time’s Tom Nikkola, CSCS. “Caffeine significantly improves time to fatigue as well.”

Caffeine is considered safe at up to 400 to 500 mg per day for adults: A brewed cup of coffee and a commercial energy shot each contain about 190 to 200 mg. Regular caffeine drinkers whose bodies are more acclimated to it may find it less ergogenic. Ingest 30 to 60 minutes prior to an event.

**Safety Concerns:** “Heavy caffeine use (500 mg per day or more) might diminish rather than enhance physical performance,” according to the NIH. Note that the International Olympic Committee and National Collegiate Athletic Association consider caffeine consumed at certain high levels a “controlled or restricted substance.”

# A Closer Look at ERGOGENIC REGULATION

When Congress authorized the FDA in 1994 to regulate supplements under the Dietary Supplement Health and Education Act (DSHEA, pronounced “D-shay”), the \$4 billion industry offered just 4,000 products. Today, even the FDA can’t keep tabs on the number of dietary and ergogenic aids: It estimates there are somewhere between 50,000 and 80,000 on the market.

All of this raises concerns. “As the popularity of supplements has grown, so have the number of entities marketing potentially dangerous products or making unproven or misleading claims about the health benefits they may deliver,” warns former FDA commissioner Scott Gottlieb, MD.

But while the FDA oversees the industry, it’s not mandated under DSHEA to test or approve supplements as it does with drugs. The agency can investigate supplements only after reports of adverse reactions. (Canada and European countries regulate supplements much more stringently.)

The basis for this distinction winds back to the mandating bill’s chief author, Senator Orrin Hatch, whose home state of Utah is one of the prime producers of supplements and whose election campaigns received significant contributions from the industry. One critic, Peter Lipson, MD, wrote at the time that the bill “as it was written and as it was intended facilitates the legal marketing of quackery.”

This leaves the supplement industry to function largely on the honor system. While it costs millions of dollars to develop and substantiate a drug, no such investment is required to launch a supplement. And it’s easy to label products of many colors as “supplements”: The FDA defines them broadly as edible products “not intended to treat, diagnose, prevent, or cure diseases.”

So, items sold as supplements have exploded and include a range of things, such as vitamins and mineral formulas, and

cocktails derived from herbs, amino acids, glands, and enzymes of any and all sorts.

Though producers can’t advertise a supplement as directly reducing pain or treating heart disease, they can make other promotional claims in good faith — as well as promises that a supplement doesn’t contain illegal ingredients (such as anabolic steroids, testosterone, certain stimulants, or other substances banned by sport authorities). Ditto with claims of testing, efficacy, and results.

And manufacturers are not required to include any information about potential side effects. “Producers don’t have to establish the supplement’s safety or efficacy if it’s labeled as a ‘supplement’

**“The FDA estimates that approximately 50,000 adverse reactions to dietary supplements occur every year.”**

and not as a ‘drug’; the FDA has no role until there’s an injury,” says hepatology specialist Herbert Bonkovsky, MD, a professor at Wake Forest School of Medicine. “It’s the Wild West. When people buy dietary supplements, it’s anybody’s guess as to what they’re getting.”

This regulatory loophole was examined in a 2019 study by the U.S. Drug-Induced Liver Injury Network (DILIN). Researchers assayed 272 common herbal, dietary, and bodybuilding supplements and found that 51 percent of them either contained ingredients not listed on the label or didn’t contain what was promised. Performance- and appearance-enhancement products were most commonly mislabeled, followed by sexual-performance and weight-loss products.

The FDA has banned numerous

supplements and ingredients, including certain steroids, stimulants such as amphetamine-derived DMAA and DMBA, and the herbal supplement ephedra, which has contributed to numerous fatalities. But there are almost as many stories of unscrupulous producers popping up again with a rebranded or slightly altered product.

Consumers can pay the price. “The FDA estimates that approximately 50,000 adverse reactions to dietary supplements occur every year. And yet few consumers know this,” write Paul Offit, MD, and Sarah Erush, PharmD, BCPS, in the *New York Times*.

“Sometimes the product includes a contaminated ingredient and even the supplement company has no idea,” warns Amy Eichner, PhD, special adviser on drugs and supplements for the U.S. Anti-Doping Agency. “Sometimes a company will spike a supplement with a very high dose of a stimulant or steroid but not put it on the label, or use some new name for it that makes it unrecognizable. And sometimes the supplement companies just go right on out and state that they’re selling an ostarine supplement — which is illegal, banned, and dangerous.”

According to recent DILIN research, healthcare providers in hospitals spotted a spike in drug-related liver injuries starting in 2010. Two of the key culprits were athletic and bodybuilding aids and green-tea extracts, popular in weight-loss formulations. In total, dietary supplements accounted for 20 percent of these cases, versus 7 percent about 15 years ago.

“For too long, too many people have believed that dietary supplements can only help and never hurt. Increasingly, it’s clear that this belief is a false one,” Offit and Erush conclude.

In other words, a supplement is safe — unless it’s later proven that it isn’t. And this is why experts advise doing your homework.



## Learn More

For two more fitness supplements — and warning signs that you might be having a reaction to a supplement — see [ELmag.com/fitnesssupplements](http://ELmag.com/fitnesssupplements).

# Selecting Safe SUPPLEMENTS

Choosing a supplement can be daunting, so we asked our experts for their advice on what to look for when buying.

### Opt for products with gimmick-free marketing.

Don’t fall for a pumped-up product name or pitch. There’s little oversight of the outlandish claims made by many supplement producers, so instead of buying hype, do your research on the product itself.

### Read labels — but don’t necessarily believe them.

“Don’t take a label at face value. Many athletes have learned that lesson the hard way and been sanctioned even though they’ve used products that seemed totally innocuous, like an electrolyte replacement that was contaminated with a performance-enhancing drug,” warns Amy Eichner, PhD, of the U.S. Anti-Doping Agency.

Remember, the FDA doesn’t pretest supplements, and even the FDA’s own “good manufacturing practice” (GMP) and a Certificate of Analysis (COA) label are awarded on the honor system. Look instead for the “USP Verified” label, proving a supplement has been inspected under the U.S. Pharmacopeial Convention, or the NSF International Certified for Sport seal.

### Seek natural supplements.

Life Time’s Tom Nikkola recommends avoiding products that contain artificial sweeteners, synthesized folic acid instead of natural folate, or other synthetic ingredients or fillers. As you shop for products, focus on those with minimal ingredients — ideally ones that you recognize.

### Be wary of supplement cocktail mixes.

Some athletic aids are

potpourris of ingredients, often

including caffeine or sugar; make sure you know what you’re getting — and if you need it.

“Rather than finding a supplement with 40 ingredients and thinking *This must be awesome!*, look for the product that has just one or a few ingredients and an efficacious dose,” advises Nikkola. “That way there’s less possibility of contamination, and you’ll know it’s probably going to do what the research says it’s supposed to do.”

### Do your homework.

The FDA maintains a list of problematic products and ingredients at [www.fda.gov/food/dietary-supplements/dietary-supplement-products-ingredients](http://www.fda.gov/food/dietary-supplements/dietary-supplement-products-ingredients).

The National Institutes of Health (NIH) keeps detailed factsheets on supplements at [www.ods.od.nih.gov/factsheets/ExerciseAndAthleticPerformance-HealthProfessional](http://www.ods.od.nih.gov/factsheets/ExerciseAndAthleticPerformance-HealthProfessional).

The USADA has its Supplement 411 guide at [www.usada.org/athletes/substances/supplement-411](http://www.usada.org/athletes/substances/supplement-411) and a database of high-risk supplements at [www.usada.org/athletes/substances/prohibited-list/athlete-guide-to-the-2020-prohibited-list](http://www.usada.org/athletes/substances/prohibited-list/athlete-guide-to-the-2020-prohibited-list).

**Buy from a trusted source.** Look for a credible, knowledgeable supplier with ingredient information and research to back up its product. Seek out recommendations from your healthcare provider or accredited personal trainer, sports dietitian, or nutritionist. ☀

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