CSP CONCORDIA SAINT PAUL

A SPORTS NUTRITION PLAYBOOK

FOR TRAINERS

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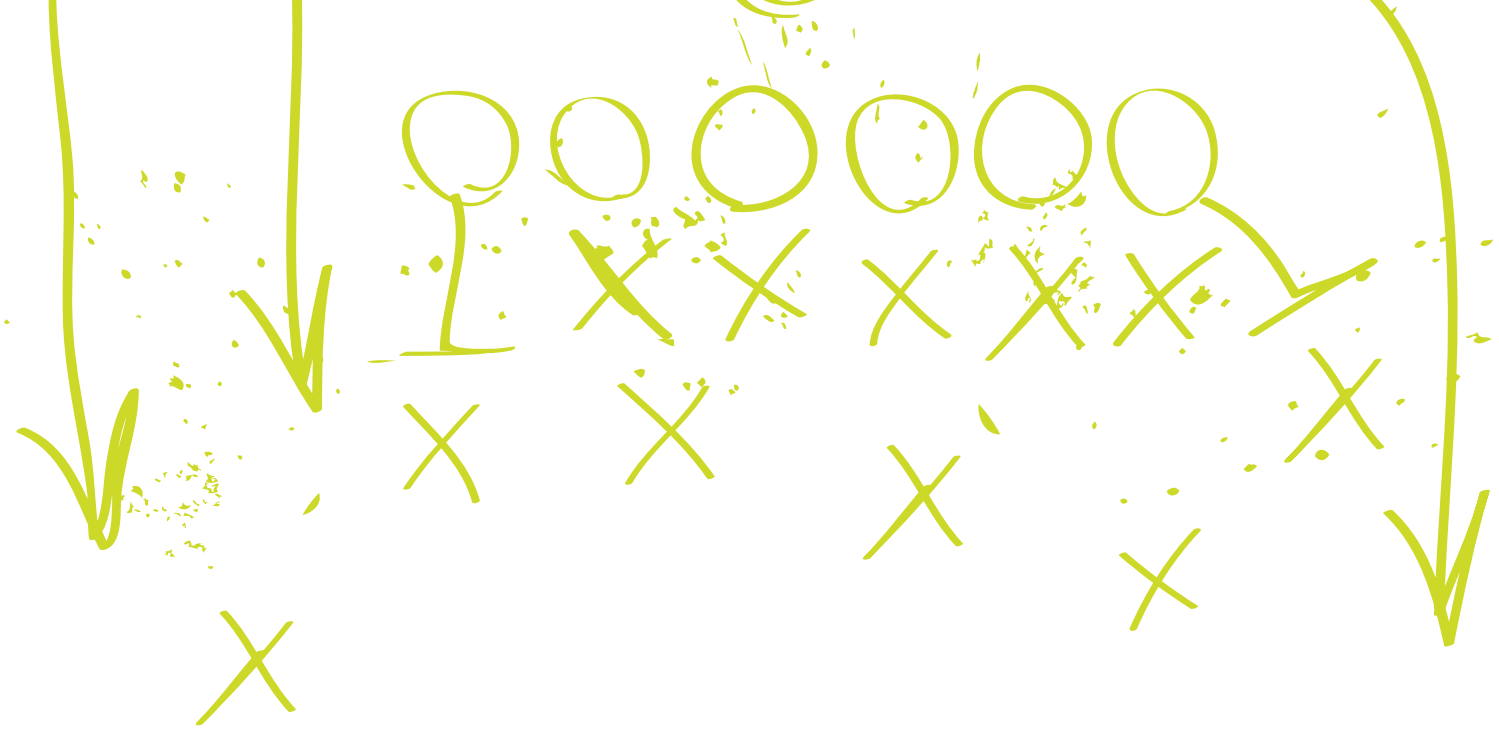
A SPORTS NUTRITION PLAYBOOK FOR TRAINERS

Sports performance isn't limited to athletic skill and fitness. As a trainer, you need to be aware of factors that influence your clients' performance and overall health.

One commonly forgotten piece of the puzzle is sleep. Multiple studies have demonstrated that athletes don't obtain the recommended amount of sleep and have issues with sleep quality, according to Current Sports Medicine Reports. Yet, sleep is an "integral part of the recovery and adaptive process between bouts of exercise, [and] accumulating evidence suggests that increased sleep duration and improved sleep quality in athletes are associated with **improved performance and competitive success**."

Sports nutrition also plays an important role in athletic performance at any level of competition. Researchers in the International Journal of Sport Nutrition and Exercise Metabolism had non-elite runners complete a time trial and then separated them into two groups, with one group of runners with a self-chosen nutritional strategy and another group of runners with a scientific nutritional strategy. Seven weeks later, the latter groups of runners completed a marathon nearly **5% faster** than the former group. A similar study in Applied Physiology, Nutrition, and Metabolism used endurance-trained cyclists and found that the self-chosen nutrition strategy offered an approximate **6% edge** over a self-chosen nutrition strategy.

CONT.



The link between nutrition and performance is embraced at the highest levels of sports. When six-time NBA All-Star Blake Griffin was with the LA Clippers, he was interviewed about how the their nutritionist, Meg Mangano, impacted the team. He was quick to credit taking nutrition seriously as vital for getting every advantage possible. "When guys might be gassed at the end of games and not have enough fuel left in the tank, I feel like the planning and the preparing [Mangano has done] . . . **definitely gives guys the advantage** going into that fourth quarter or going into overtime — whatever it is — when everybody's starting to run out [of energy]," Griffin added.

The athletes you help train can obtain that competitive advantage. When they take nutrition, hydration, recovery, and topics like supplements more seriously, their fitness and athletic performance should improve. They'll also reduce their risk of injury and illness.

CONT.

BASIC NUTRITION FOR ATHLETES: A LOOK AT FOODS

You'll need a strong foundation in sports nutrition to provide even basic advice to clients. Whether they're having trouble achieving a fitness goal or asking direct questions about sports nutrition, knowledge about energy and nutrition is essential to helping athletes perform their best in the gym and in competitions.

ENERGY REQUIREMENTS

Athletes need to get the proper energy and fuel to cover their individual needs. One of the first things to do when examining someone's eating habits is to ensure they're getting enough energy.

Some athletes frequently restrict their energy intake. It's most common in endurance sports, aesthetic sports (like gymnastics, diving, and ballet), and weight-category sports, according to Gillian Horgan in her chapter on sports nutrition in Sports Dentistry: Principles and Practice. The literature shows that those athletes — particularly female athletes — reduce their energy intake by up to 30% of what's recommended for them. If that happens, their total energy intake minus the energy used may result in insufficient energy needed for health, growth, and development. Reproductive and immune systems can be harmed, and eating disorders can develop as well. Note that eating disorders impact athletes at a higher rate than non-athletes and risk is highest in aesthetic and weight-category sports.

Energy requirements can vary for each athlete. Or, in even more nuanced

language, energy requirements can vary for athletes in different sports, for athletes in the same sport, and in different times of an athlete's systematic training program, according to Louise Burke in Present Knowledge in Nutrition, 10th Edition. In her chapter on sports nutrition, she illustrated what the extremes in energy intake look like for various athletes.

- **LOW END OF THE ENERGY SPECTRUM:** Sports focusing on brief moments of skill or technique instead of prolonged movement (e.g., archery or shooting), those that require maintaining low body mass or fat levels (i.e., weight-division sports or physique-conscious sports), and those involving both of the previous characteristics (e.g., gymnastics or horse racing).

- **HIGH END OF THE ENERGY SPECTRUM:** Athletes in sports that involve prolonged sessions of high-intensity exercise (e.g., cyclists in a stage rage), those needing growth, large muscle mass, or intentional muscle-gain programs (e.g., football and adolescent basketball players), and those involving both of the previous characteristics (e.g., heavyweight rowers).

Determining the amount of energy for different athletes should be calculated by a skilled, experienced sports nutritionist. The **energy reference values** from the Scientific Advisory Committee on Nutrition can be used in that process. Higher-level athletes can benefit from prediction equations for basal metabolic rate (BMR) and physical activity level (PAL), and then energy intake can be calculated from body size, age, and gender.

For athletes not competing at high levels, accurate measurements of values previously mentioned may not be necessary. For reference, basic examples of daily carbohydrate requirements are provided in the section on carbohydrates. But overall, for lower-level athletes, sufficient energy intake can be indicated by a stable body weight. If the weight is in the right range and the athletes is consuming a wide range of healthy foods, the energy intake is likely appropriate. A change in weight higher or lower can indicate a difference between energy consumed and expended.

SPECIFIC NUTRIENTS

Nutritious foods containing macronutrients (carbohydrates, proteins, and fats) provide energy, and micronutrients (vitamins and minerals) optimize health. When they're brought together with the proper fluids in a healthy diet, it results in optimal training and performance for athletes.

Your primary goal here is to understand nutrients' role in the body and being able to recommend foods and strategies to support nutritional requirements for those nutrients. The following sections will serve as a primer to the common macronutrients and micronutrients.

Carbohydrates

The most important foods for fueling the body during exercise are carbohydrates. They're the only way to support moderate- to high-intensity exercise, and carbohydrates (glucose) also fuel the brain.

Carbohydrates are stored in the liver and muscles. The body has a limited supply of carbohydrates, and the body quickly uses that supply during exercise. As a result, it's important for athletes to concentrate on carbohydrates before, during, and after training and competitions. Extra fuel consumption is typically necessary for prolonged exercise — endurance events lasting more than 90 minutes and team or multi-sprint sports lasting more than 60 minutes.

Prior to training and competitions, athletes should begin with an appropriate amount of carbohydrates. For events lasting more than an hour, athletes should try to begin competition with the right amount of carbohydrates, according to the International Olympic Committee's (IOC) **statement** from the third Consensus Conference on Sports Nutrition. During exercise, consuming carbohydrates made up of different

types of sugars (given maximum oxidation rates for glucose and fructose, at 60 grams and 30 grams per hour, respectively) can help provide extra energy and boost physical and cognitive performance.

Athletes and people who exercise regularly need to achieve daily carbohydrate amounts. Instead of using a percentage of total energy intake, recommendations follow grams of carbohydrates per kilogram of the individual's body weight. General guidelines are available from the IOC, which should be used alongside total energy needs, training needs, and feedback from training.

- **LOW-INTENSITY OR SKILL-BASED ACTIVITIES:** Three to five grams/ kilogram of body weight per day.

- **MODERATE EXERCISE PROGRAM (AROUND ONE HOUR PER DAY):** Five to seven grams per kilogram of body weight per day.

- **ENDURANCE PROGRAM (ONE TO THREE HOURS PER DAY OF MODERATE-HIGH INTENSITY):** Six to 10 grams per kilogram of body weight per day.

- **EXTREME COMMITMENT (FOUR TO FIVE HOURS PER DAY OF MODERATE-HIGH INTENSITY):** Eight to 12 grams per kilogram of body weight per day.

Several foods are rich in carbohydrates, including pasta, potatoes, rice, cereals, along with other grains like quinoa, barley, and wheat. Those foods are high in B vitamins that help with B vitamins used for energy production. Additionally, a lot of fruits and some vegetables are high in concentrates as well as vitamin C (for the immune system). "Carbohydrates are not all created equal," warned Jeffrey Bytomski in Sports Health. "Whole grains, fruits, vegetables, and legumes are highly nutritious foods **that are rich** in antioxidants, fiber, vitamins, and minerals, while processed sugars abundant in the Western diet can be quite detrimental to health."

Protein

Protein supports metabolic adaptation, repair, and remodeling. It also can be used for energy after carbohydrates stores are used up. Protein is a major focus for athletes wanting to increase muscle mass and strength, as it along with resistance training stimulates muscle protein synthesis.

Athletes need more protein than the general public. Sedentary individuals need about 0.8 grams per kilogram of body weight per day. Athletes need 1.2 to 2.0 grams per kilogram per body weight, but higher values are not uncommon for strength training, recovering from injury, and other circumstances. Approximately 15% to 30% of athletes' calories should come from protein sources, Bytomski added.

Good protein sources include lean meats and fish, eggs, dairy products (cottage cheese, Greek yogurt), cereals, and some vegetables. Vegan athletes can consider lentils, chickpeas, tempeh, black beans, quinoa, and almonds.

Fats

Fats serve a wide range of functions. They give the body energy, support cell growth, protect organs, factor into brain health, and produce hormones, among other reasons.

Fat requirements for athletes are similar to that of the rest of the population. Generally, athletes should aim for healthy fats to comprise 20% to 35% of total daily calories. Trans fats should be avoided, and saturated fats should be less than 10% of total consumption.

The focus should be on omega-3 fats and other unsaturated fats. Those foods include seeds, nuts, and oily fish like salmon, fresh tuna, sardines, and mackerel, in addition to spreads and oils that use predominantly unsaturated fat sources.

Micronutrients

Micronutrients are involved in energy production, bone health, the immune system, synthesis of hemoglobin, and defending against oxidative damage. Most athletes

don't need higher levels of micronutrients than the general population, so they should be able to obtain enough micronutrients as part of their eating plan.

Athletes should be evaluated if a deficiency is suspected. Some athletes can benefit from a micronutrient supplement, and some athletes may look at supplements of a certain vitamin to correct a clinical deficiency — typically iron, calcium, and vitamin D. Those micronutrients join antioxidants as the most important micronutrients for sports nutrition.

- **IRON:** Iron is needed for forming hemoglobin and myoglobin, two important proteins responsible for oxygen transport. Iron depletion is the most common nutrient deficiency in female athletes, especially is they are vegetarian or vegan. Feeling unusually tired is a symptom of iron deficiency.

- **CALCIUM:** Calcium is involved in bone health, muscle contraction, and blood clotting. Most people get enough calcium, but female athletes are prone to low bone mineral density, especially if they avoid dairy foods that contain calcium. Calcium and vitamin D help prevent low bone mineral density and potential stress fractures.

- **VITAMIN D:** Vitamin D is important for calcium absorption and bone health. Children and adults should have 10 micrograms of vitamin D every day, but there aren't many foods containing vitamin D — oily fish, some breakfast cereals, and fortified margarines and milks. Vitamin D synthesis occurs when sunlight hits the skin, which makes a vitamin D supplement something to consider for athletes in northern regions or those who often train indoors (especially gymnasts, swimmers, and ice skaters).

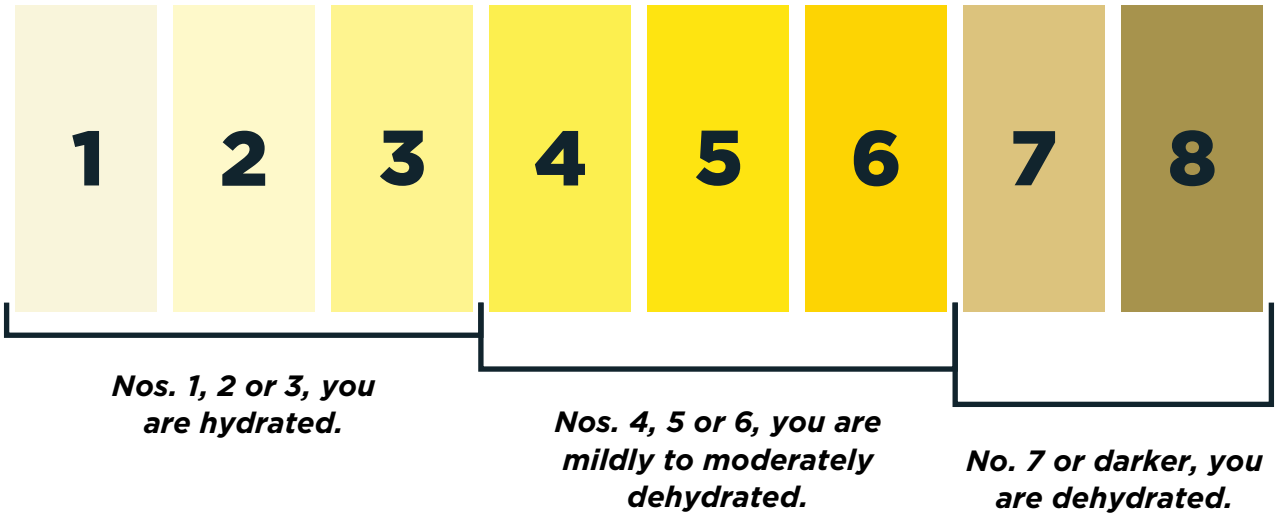
- **ANTIOXIDANTS:** When oxygen is consumed in muscles during exercise, free radicals (unstable atoms that can damage cells) can overwhelm antioxidants, which are compounds that prevent related cell damage. Common antioxidants include glutathione, vitamins C and E, ß-carotene, and selenium, which are found in a number of fruits and vegetables. Athletes may be at risk of poor antioxidant intake if they limit their consumption of fruits, vegetables, and whole grains, follow a low-fat diet, or restrict their overall energy intake. There's limited evidence that antioxidant supplements enhance athletic performance, but they may be beneficial for athletes who are recovering from an injury.

PROPER HYDRATION FOR ATHLETES

Obtaining enough fluids and electrolytes is a major concern during exercise and athletic competition. Proper hydration for athletes optimizes performance and helps for physiological functions like transporting nutrients around the body and thermoregulation. If athletes don't receive proper hydration, performance suffers and risk of heat illness increases.

Losing more than 2% of body weight through sweating impairs performance and cognitive function. Care should be taken in cold climates where heavier breathing and insulated warm clothing can increase sweat loss. Additionally, cold drinks are consumed less, and athletes may avoid urination due to the need to take off layers of clothing. Higher fluid loss is also more common when training at altitude.

Practical measures can help ensure adequate hydration for athletes. The simplest may be monitoring acute changes in body weight. As long as athletes are getting enough to eat and drink, weight changes can indicate possible degree of hydration. Another practical way to monitor proper hydration for athletes is through a urine index, such as a color chart. Some variation of the chart below is used in many elite sports bathrooms across collegiate and professional facilities. If athletes' pee is in the range of No. 1 through No.3, hydration is adequate.



According to Bytomski, athletes should aim for 12 to 20 ounces of water or a sports drink before exercising and eight ounces just prior to events. During exercise, six to 12 ounces of water or a sports drink should be consumed every 15 to 30 minutes. After exercise, 16 to 24 ounces of fluid should be consumed for every pound lost during the event.

RECOVERY NUTRITION FOR ATHLETES

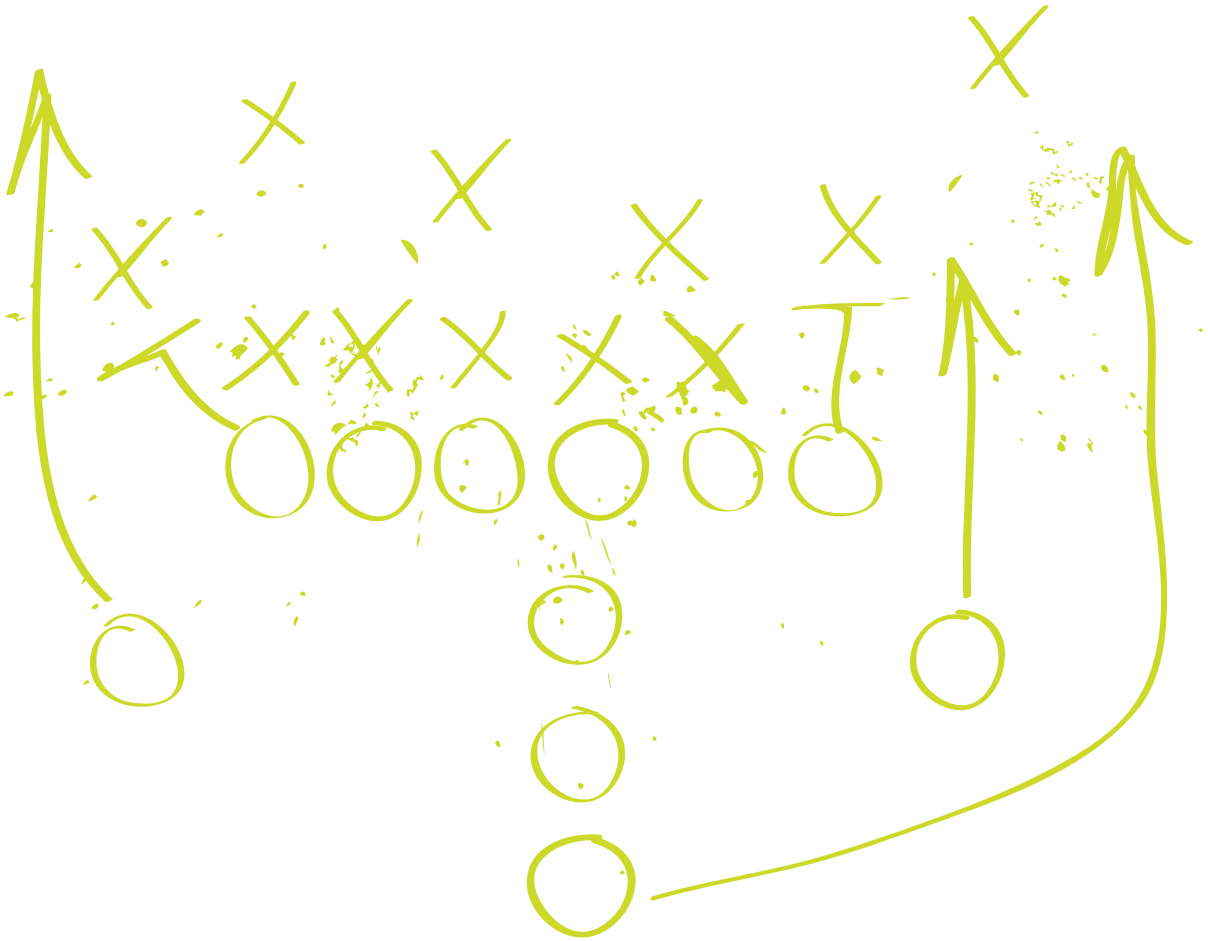
Recovery is a broad subject that, like everyday nutritional needs, can vary based on specific athletes. Higher-level athletes should have recovery plans that are developed by experienced sports nutritionists. But even recreational athletes who undergo training once or twice a day to train for an endurance event like a marathon will need to approach recovery strategically.

Generally speaking, the most important consideration for athletes is carbohydrate and protein supply. Timing dictates whether athletes need to replace those nutrients immediately. It's not necessary if the next workout or event is within eight hours away. But if time between exercises is shorter, recovery food and drinks are recommended. Athletes should aim for 1 and 1.2 carbohydrates per kilogram of body weight and around 20 grams of protein for recovery.

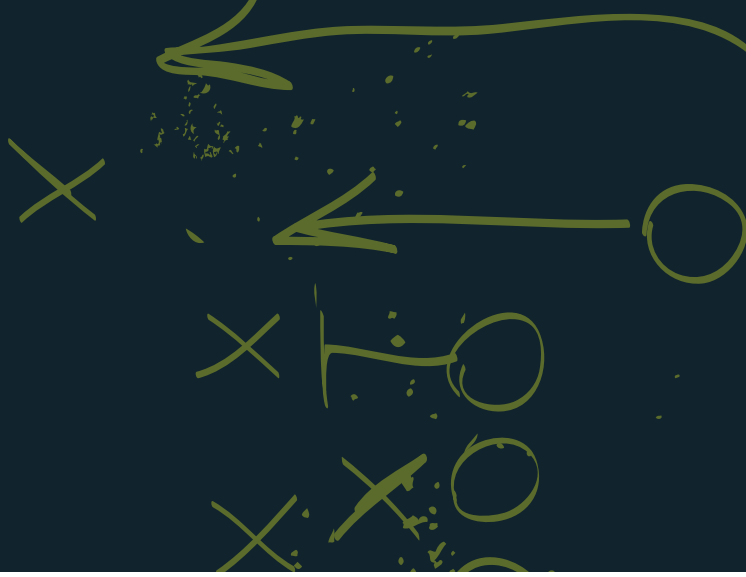
Athletes should consider milk-based protein after resistance exercise for building muscle strength and achieving desirable changes in body composition. Nutrition Bulletin pointed out that based on growing research, **milk-based proteins** like casein and whey are most effective for stimulating muscle protein synthesis, and they offer an anabolic advantage over soy protein due to a higher proportion of essential

amino acids. Several studies have demonstrated the value of milk over soy protein, carbohydrate drinks, sports drinks, or water for objectives like gains in lean muscle mass, recovery from muscle-damaging exercise, and performance in peak torque and total force. Milk also has high electrolyte content to aid fluid retention and other benefits after exercise.

"Overall, the evidence increasingly shows milk to be an effective natural sports drink and as such there is great potential for the development of the role of dairy products in nutritional strategies for athletes and sportspeople," Nutrition Bulletin added. "Furthermore, milk also provides positive nutrition and health benefits for active children and teenagers in terms of calcium intake and bone health, and could replace the consumption of sugar sweetened beverages around exercise such as energy and sports drinks."



SUPPLEMENTS FOR ATHLETES



It's true that some supplements — caffeine, sports drinks/gels, and creatine — can be effective for athletes in conjunction with a healthy eating plan. However, the use of supplements for athletes should be monitored carefully by an experienced sports nutritionist or dietician.

In many cases, supplements aren't needed, and the IOC has said their use for youth athletes should be discouraged. Many athletes can receive the nutritional value they need from a well-chosen eating plan. Athletes at various levels should also be aware of the reality of the supplements' effectiveness and the dangers involved.

The NCAA added that

15% to 25%

of over-the-counter supplements

contained a banned ingredient

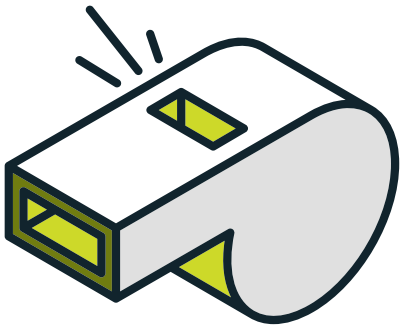
not on the product label.

"Of the many different dietary ergogenic aids available to athletes, a very small number may enhance performance for some athletes when used in accordance with current evidence under the guidance of a well-informed professional," according to the IOC. "Athletes contemplating the use of supplements and sports foods should consider their efficacy, their cost, the risk to health and performance, and the potential for a positive doping test."

The NCAA added that **15% to 25%** of over-the-counter supplements contained a banned ingredient not on the product label. There's an even greater risk for products marketed toward sports performance that can undermine athletic eligibility in collegiate sports and athletes' health.

APPROACHING SPORTS NUTRITION AS A TRAINER

Helping the athletes you work with goes behind working out. You're in a great position to provide insight into sports nutrition basics that can help athletes — even children, adolescents, and casual athletes — get that extra boost to their performance and overall health.



Focus on the basics. Encourage athletes to get enough energy for their needs and to concentrate on healthy eating habits. From proper hydration and recovery to avoiding supplements in most situations, you can be there to provide guidance in an area that is easily overlooked. Always be sure to recognize when athletes need specific advice from a trained, experienced nutritionist or dietician.

You can enhance your effectiveness as a current or prospective trainer by learning more about sports nutrition. Start by earning your **exercise science degree online** from Concordia University, St. Paul. The fully online program will prepare you for positions in coaching, fitness and wellness centers, health and wellness education, personal training, and rehabilitation sciences.

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