



ERGOGENIC AIDS AND DIETARY SUPPLEMENTS

(Position Statement from the National Sport Centre in Calgary, Jan. '97)

There are no short cuts to reaching the top in international sport. Optimal physical performance requires a well designed training and nutrition program, commitment plus working as hard or harder and as smart or smarter than your competitors! Once these basic elements are in place nutritional supplements may provide an edge or slight advantage over your competition. Many athletes may not even perceive any potential physiological benefit(s) from taking dietary supplements, unless they already have a high level of fitness. Consideration must be given to the monetary costs, the possible side effect(s) and any potential danger involved with using various nutritional ergogenic aids. If there are not sufficient disadvantages linked to the use of a supplement, the psychological or placebo effect alone may be beneficial.

The attached tables describe some of the more popular nutritional ergogenic aids that are "claimed" to improve performance. Even if a product has been proven to be beneficial to enhance performance, these benefits may not even be realized without the existence of a foundation complete with critical basic elements (i.e. hard work, commitment, good nutrition, top-notch training programs, etc.).

Products and fads come and go, therefore it is virtually impossible to present the most up-to-date listing. This information is simply an alphabetical presentation of different dietary supplements (which may or may not have been proven to be beneficial), it is not meant to be an endorsement. Because brand name products may frequently change their composition, these supplements are presented as ingredients, not product names. If in doubt, seek professional advice from your team's physiologist, physician or dietician.

NUTRITIONAL ERGOGENIC AID	CLAIM	COMMENTS AND CONSIDERATIONS
Antioxidants (Beta Carotene, Vitamin C, Vitamin E, Selenium, CoEnzyme Q10)	Reduce muscle soreness Promote rapid recovery from intense exercise	<p>May help to neutralize or detoxify free radicals, which themselves may cause cell damage (lipid peroxidation); possibly effective to enhance performance during heavy training periods, including altitude training.</p> <p>500 mg Vit C (equivalent to: 900 ml fresh orange juice or 6 oranges or 6 cups fresh strawberries). 400 I.U. Vit E (equivalent to: 16.5 cups of wheat germ or 40 ounces/1.1 kg almonds). 10,000 – 25,000 I.U. Beta Carotene (equivalent to: 1 carrot or 1.5 cups/375 ml winter squash or 1 sweet potato).</p> <p>Vitamin A Supplementation is NOT recommended, appropriate supplementation levels have not been established for Selenium and CoEnzyme Q10.</p>
Bicarbonate Salts (e.g. sodium bicarbonate)	Buffer lactic acid, thereby delay fatigue Improve VO ₂ , reduce lactic acid production, better race performances	<p>Conflicting research whether enhanced performance. Side effects: explosive diarrhea and dehydration. Most research use 300 mg per kg body weight, taken 2 hrs pre-event.</p>
Boron	Increase serum testosterone Increase muscle growth and strength	<p>Is a non-essential mineral which may help prevent osteoporosis Possibly beneficial for post-menopausal women; no benefit to men.</p>
Branched Chain Amino Acids	Reduce perception of fatigue, improve endurance	<p>Minimal positive effects observed in research. Side effects: unpalatable, reduced water absorption in the gut.</p>
Caffeine	Enhance endurance	<p>May increase fatty acid oxidation, thereby sparing muscle glycogen. May improve pain tolerance. Side effects: increase heart rate, may cause diarrhea & dehydration.</p> <p>Is a Banned/Illegal substance in large quantities; best not to exceed 5 mg per kg of body weight, taken 1 hour pre-event; (e.g. a 70 kg or 154 lb athlete not to exceed 350 mg caffeine).</p>
Carbohydrate Loading	Maximize energy reserves for endurance events & multi-event competitions & tournaments.	<p>Conclusive research supports carbohydrate loading to build extra glycogen/energy reserves. Consume a high carbohydrate diet (70% of calories, or 10 grams carbohydrate per kg body weight per day) for 3 days pre-event, must simultaneously reduce/taper training during these 3 pre-event days to boost glycogen energy reserves.</p>
Carbohydrate Supplements	Faster recovery from exercise	<p>A concentrated source of carbohydrate may speed up glycogen repletion and also be useful during the carbohydrate loading phase.</p> <p>A typical serving should contain 70-100 grams of</p>

		carbohydrate OR 1 gram carbohydrate/kg body weight every hour, for 5 hours after exercise.
L-Carnitine	Reduce body fat & enhance endurance	<p>Conflicting research whether enhances performance. Is found in meals; also synthesized in humans. May increase the transport of fatty acids into mitochondria for oxidation</p> <p>The D and D, L forms of carnitine have toxic effects, therefore should be avoided.</p>
Chromium	Helps build strength & muscle mass	No supporting research for performance enhancement Chromium is an essential component of blood glucose control, as it improves the action of insulin.
CoEnzyme Q10	Enhance aerobic capacity & endurance	<p>Conflicting research whether enhances performance</p> <p>Is a lipid-soluble carrier of electrons into the mitochondrial inner membrane; used for post-myocardial infarction (heart attacks).</p>
Creatine	Increases power output during repeated maximum efforts	<p>Effective for repeated bouts of maximal efforts because of greater ATP and CP production/resynthesis & often useful for maximal performance lasting approximately 4 minutes duration. Ineffective for endurance exercise</p> <p>Dosage: (consult with a physiologist; dosages are event and athlete specific), maximum 30 grams in 5 gram dosages taken for 5 days pre-event; 2 g/day maintenance dosage.</p> <p>Side effects: weight gain and possibly muscle stiffness.</p>
Fat Loading	A high fat diet will increase fat oxidation	<p>No supporting research for performance enhancement.</p> <p>A high fat diet may limit carbohydrate consumption; 25-30% of calories should come from dietary fat.</p>
Ginseng	Reduce fatigue & enhance aerobic performance	<p>Ginsenosides (from ginseng root) have been shown to spare muscle glycogen & increase fat oxidation in animal studies at 200 mg ginsenoside fractions per kg body weight.</p> <p>Caution: Ma Huang (a Banned Substance) is found in herbal ginseng supplements.</p>
Glandular Extracts of adrenals, pituitary, testes	Enhance human glandular function	Glandular extracts are degraded/broken down during digestion into an inactive, useless form, therefore does not enhance performance.
Herbal Supplements	Various claims to enhance performance	Caution: in general, the ingredient lists of herbal supplements may be incomplete, therefore the athlete may not be 100% aware of what they are consuming.
Individual Amino Acids (arginine, lysine, ornithine, etc.)	<p>Increase muscle mass</p> <p>Reduce body fat</p>	<p>Are not effective in small quantities to enhance performance, unless taken through an intravenous in large quantities, therefore not recommended</p> <p>In large quantities may increase human growth hormone secretion and stimulate insulin release; most studies in this area have used poor research designs.</p>
Inosine	Increase ATP synthesis	No supporting research for performance enhancement Inosine is a nucleoside involved in the formation of

	Increase strength & improve recovery	purines (i.e. DNA)
Iron	Increase aerobic capacity & endurance Is a component of hemoglobin, myoglobin and cytochrome oxidative enzymes that transport oxygen. May enhance aerobic performance if iron deficient (serum ferritin < 12 ng/ml)	Vegetarian diets may be inadequate in iron, females require 13 mg/day, males require 9 mg/day, (where necessary, consult a dietitian/physiologist/physician for food list & additional information). Ferrous fumarate or ferrous gluconate are the best absorbable forms for iron supplementation.
Medium Chain Triglycerides (MCT)	Improves muscularity Lowers body fat	MCT are water soluble, easily absorbed and metabolized. No supporting research for performance enhancement.
Phosphate Salts	Buffer lactic acid, thereby delay fatigue Improve VO ₂ , reduce lactic acid, better race performance Absorb hydrogen ions (acid production) which may interfere with energy production.	Phosphorous is a component of several B vitamins & is found within high energy phosphagens (ATP, CP) Conflicting research whether enhances performance. Dosage: sodium triphosphate taken in 1 gram dosages, 4 times a day for 6 days prior to training camps, tournaments, competition
Protein Supplements	Increase muscle mass and spare the use of protein (muscle mass) for energy	Athletes require more protein than sedentary individuals; athletes should aim for 1.2 to 2.0 grams of protein/kg body weight/day. (e.g. a 70 kg/154 lb athlete would require up to 140 grams of protein per day, equivalent to the amount of protein from all of the following foods: 2 cups cereal, 4 slices bread, 2 cups pasta, 1 dinner roll, 2 glasses juice, 3 pieces fruit, 1 cup vegetables, 1 cup tossed salad, 3 cups milk, protein sandwich filling for 2 sandwiches, 2 breasts of chicken.) Protein requirements can be met through dietary intake, protein will not be used for energy during exercise, as long as adequate calories (in the form of carbohydrates) are consumed.
Sport Drinks	Enhance endurance by providing available carbohydrate Provides available carbohydrate into the bloodstream.	Useful during endurance training session and competition (> 90 minutes); also useful for athletes who train twice daily. Ideal sport drink concentrations are individual, anywhere from 3% - 10% carbohydrate are well tolerated. Side effects: if the drink is too concentrated, the athlete will experience cramps, diarrhea and dehydration.

Vanadyl Sulfate	Increase muscle growth & strength May increase cellular uptake of amino acids and glucose.	Side effects: some individuals experience excessive fatigue during & after training, gastrointestinal upset may occur. Conflicting and limited research as to whether enhances performance.
Vitamin B12 and Dibencobal	Increase muscle growth and strength	Vitamin B12 is essential for DNA synthesis; dibencobal is a coenzyme of Vitamin B12. No supporting research for performance enhancement.