Sports Nutrition *from the desk of Dr. Stephen Green MS DC*

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Ergogenic Aids: Nutritional Supplements for Athletes

WHAT ARE THEY?

Ergogenic aids are substances, devices, or practices that enhance an individual's energy use, production, or recovery. The form an ergogenic aid may take can be quite varied. Stretching and weight training are physical ergogenic aids. Visualization and hypnosis are mental ergogenic aids. Lighter weight running shoes and better designed golf clubs are mechanical ergogenic aids. But perhaps the most commonly recognized form of ergogenic aids is the dietary supplement.

WHO USES THEM?

The availability and use of supplements as ergogenic aids have risen dramatically in the past decade. Some surveys have indicated that approximately 50% of the general population, 76% of college athletes, and 100% of bodybuilders take supplements. New products appear on the market every week.

ARE THEY SAFE?

Being labeled as a "supplement" means that the contents of the product and the claims put forth on the label have not been evaluated by the US Food and Drug Administration. The FDA inspects food and drug products to insure safety and truthful content before they can be marketed to the public. Anything labeled as a "supplement" can be marketed as such without prior FDA approval as provided for under the Dietary Supplement and Health Education Act of 1994. This should be a concern for anyone thinking about taking dietary supplements, as the burden of evaluating any claims made on the label by a manufacturer now falls on the consumer. Many such claims include a statement either that the FDA has not evaluated the claim or that the product is not intended to "diagnose, treat, cure or prevent any disease" (a type of claim that can only legally be made by a drug).

WHAT CAN I DO?

If you decide to take a supplement, there are many ways to go about evaluating its safety and efficacy:

- Look for supplements with the U.S. Pharmacopoeia (USP) or National Formulary (NF) notation. These mean the manufacturer has undergone voluntary evaluation of product purity, strength, labeling and weight variation.
- Ask a health care professional who is knowledgeable about nutrition and supplements.
- Do a literature search, being wary of articles or publications funded by the manufacturer of the supplement.
- Determine the reputability of the manufacturer. Have they been in business for a long time? Do they have quality control standards? Do they publish their own research? Is their research cited in peer-reviewed journals?
- Note any side effects associated with the supplement.
- Is the proposed benefit worth the cost or risk?
- Are there any illegal or banned substances contained within the supplement?
- Will the supplement interfere with or otherwise affect any medications or other supplements you may be taking?

Here is a quick roundup of some of the most popular supplemental ergogenic aids:

Supplement	Claimed Action	Research on action	Side Effects	Legality	
amphetamines	improve concentration, decreases fatigue and appetite	mixed, some support	significant, dangerous	banned for shooting events	danger!
anabolic steroids	increases strength, lean muscle mass, and motivation	supports	significant, dangerous	illegal	DANGER
androstenediol	same as steroids	limited, refutes	unknown	banned by Olympics	DANGER!
androstenedione	same as steroids	refutes, no benefits	significant	banned by Olympics and NCAA	DANGER

Supplement	Claimed Action	Research on action	Side Effects	Legality	
beta-hydroxy-beta-methyl butyrate (HMB)	Prevents breakdown and enhances synthesis of protein, increases strength, improves body composition	supports	long term effects unknown	legal	OK on + off
blood doping	increases aerobic capacity	supports	significant, dangerous	illegal	danger!
branched chain amino acids (BCAA)	enhance endurance performance, anti-catabolic (slows down muscle breakdown)	mixed, some support for anti-catabolic function	appears safe	legal	so-so
caffeine	increases muscle contractility and aerobic endurance, enhances fat metabolism	supports	mild	legal to certain urine levels	caution: 7+ cups of coffee
carnitine	increases fat metabolism	refutes, no benefits	none	legal	waste $
chromium	increase lean mass	refutes, no benefit unless prior deficiency	safe to 400 mg daily, potentially dangerous above this level	legal	only for pre-diabet.
coenzyme Q10	enhances function of electron transport chain, improves endurance performance	does not support use for athletes	appears safe	legal	only for heart patient
conjugated linoleic acid (CLA)	increases response to tissue growth factors, hormones, and cell messengers, increases muscle mass, weight loss, and fat loss	limited, animal studies	GI distress	legal	limited
creatine monohydrate	increases muscle energy, short term endurance, strength, and lean muscle mass	supports, insufficient data on long-term use	mild	legal	OK on + off
dehydroepiandrosterone (DHEA)	increases endogenous steroid production	no benefit in healthy athlete	potentially dangerous	banned by Olympics	DANGER
energy gels	quickly supply carbohydrates during endurance exercise	supports	none, if taken with water	legal	OK w/ H_2O
ephedrine	stimulates CNS, increases energy, delays fatigue, stimulates weight loss	no benefit	potentially dangerous	banned by Olympics, FDA and other organizations	DANGER
fluids	increases endurance	supports	mild	legal	yes
human growth hormone	increases muscle mass, strength and power, decrease fat mass	supports	causes enlargement of organs and increases risk of chronic disease	banned by world anti-doping agency	DANGER
leucine	decreases muscle breakdown, spares muscle glycogen stores	limited, no ergogenic effect	none	legal	waste of $
medium chain triglycerides (MCT)	increases energy and muscle cell mass, decrease fat mass, delay fatigue	limited	intestinal cramping and diarrhea	legal	little value
multivitamins	increases energy, endurance and aerobic capacity, enhance recovery	no benefit unless preexisting deficiency	none at RDA, some toxicities at high doses	legal	OK
phosphates	increases ATP production, energy and muscle endurance	limited support	mild at high doses	legal	little value

Supplement	Claimed Action	Research on action	Side Effects	Legality	
protein	optimizes muscular growth and repair	supports, increased need for protein with activity	none unless underlying medical condition	legal	limited to daily need
sports drinks	increases endurance performance, supply fluid, carbohydrate, and electrolytes	supports	none	legal	ok without fructose
zinc	increases physical endurance, mental alertness, concentration, free testosterone	limited	none if taken in recommended dosages	legal	useful to 30mg

Creatine is an amino acid in the skeletal muscle, as well as the liver, pancreas, and kidneys. Supplemental creatine is a popular ergogenic aid, but its benefits are limited. Research has shown creatine to be effective in increasing muscle strength and power during brief, high intensity exercise lasting about one minute or less (such as sprinting and weight lifting). It is believed to work by improving ATP metabolism. Creatine will not benefit endurance athletes. A common side effect is weight gain, which can make athletes feel sluggish. Other reported side effects include diarrhea, muscle cramps, and dehydration. For the most part, however, creatine is considered safe when taken in recommended dosages. Athletes often take creatine in phases. During the loading phase, athletes consume 20-25 grams (in 5 gram increments) per day for 4-7 days. During the maintenance phase, 2-5 grams per day are consumed. Creatine can be obtained through animal foods, such as meat and fish, but in amounts less than 2 grams. Creatine may be slightly more effective when combined with glucose; thus it is frequently sold in combination with carbohydrate. Individual responsiveness to creatine may vary. Vegetarians, who may consume little creatine in the diet, may experience a more pronounced response to creatine supplementation than non-vegetarians.

FOR MORE INFORMATION

American Council for Science and Health Web site, search for the topic or click on the nutrition/lifestyle link
The Physician and Sportsmedicine Web site, search for nutrition/lifestyle
Gatorade Sports Science Institute Web site, search for nutrition/lifestyle
Consumer Lab Web site, search for nutrition/lifestyle

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If you are concerned about any difference in your treatment plan and the information in this handout, you are advised to contact your health care provider.

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