

Task Force 9: Drugs and Performance-Enhancing Substances

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GENERAL CONSIDERATIONS

Athletes commonly use drugs and dietary supplements because they hope to improve athletic performance. These performance-enhancing substances include ergogenic and thermogenic supplements, stimulants, anabolic steroids, peptide hormones, and others. Despite aggressive marketing and user testimonials, scientific studies assessing the benefits and risks of any of these substances have not been conducted (1-5). Clinical observations indicate some supplements may have serious side effects including fatal adverse reactions (6-8). Athletes should make informed decisions regarding the use of drugs and dietary supplements with careful consideration of what is known and unknown. Health care professionals should ask about drug and dietary supplements and serve as an educational resource for athletes and athletic organizations (9).

Many drugs and supplements are marketed to improve exercise duration or physical strength, to shorten recovery time from exertion, to reduce fat, or in other ways to improve athletic performance (1-3,10-13). These substances include anabolic-androgenic steroids and the more than 30 natural and synthetic derivatives including tetrahydrogestrinone (THG). Androstenedione, commonly referred to as "andro," and dehydroepiandrosterone (DHEA) are available in oral form and are sold as nutritional supplements. Stimulants include amphetamines, cocaine, dextrine, ephedra, ritalin, beta-2 agonists, and others (1-3,10-13). Peptide hormones and analogues, such as recombinant erythropoietin (EPO), are used as a pharmacologic alternative to "blood doping" or autotransfusion (1-3,10-13). Human growth hormone (hCG), chorionic gonadotropin, pituitary and synthetic gonadotropins (LH), and corticotropins (ACTH, tetracosactide) also are used because they are believed to improve athletic performance (1-3,10-13).

Dietary supplements are products, other than tobacco, containing vitamins, minerals, amino acids, herbs, or other botanical dietary substances (1-3,10-13). Some substances such as vitamins, minerals, bee pollen, caffeine, glycine, carnitine, lecithin, brewer's yeast, gelatin, creatine, protein supplements, and others probably have minimal toxicity when used in recommended doses. Based on serious concerns regarding the safety of a popular energy drink with taurine, caffeine, and glucuronolactone, multiple European countries have banned its sale (10). Like most dietary supplements this drink has not been assessed for efficacy or toxicity in rigorous scientific studies (1-3,10-13).

Other banned drugs that are not considered performance-enhancing would come under the designation of recreational

drugs (1-5,13). These include alcohol, cannabinoids, sedatives, narcotics, LSD, and others that have the potential to impair cognitive and physical function and are prohibited (1-3,12,13). The dietary supplement ephedra (ma huang) is associated with life-threatening toxicity and death resulting on a ban of its sale by the Food and Drug Administration (6-8). Inadequate labeling and insufficient quality control in the production of many nutritional supplements are also reasons to recommend that athletes not take dietary supplements. Contamination or poor labeling of nutritional supplements are not regarded as adequate defenses by athletic governing bodies. Recognizing that there may be exceptional circumstances where an athlete will require an otherwise prohibited substance for medical purposes, formal therapeutic exemption mechanisms are available with prior consideration and approval (11-13).

Athletic governing bodies should provide comprehensive lists of prohibited drugs and dietary supplements (1,11-13). They should develop a rigorous approach to prevent performance-enhancing and recreational drug and dietary supplement use. The crucial elements of any program should include education, counseling, treatment, detection, and enforcement. Governing athletic bodies should use all available resources to enhance, supplement, and coordinate existing efforts to educate athletes and reinforce the ethical principles inherent in athletic participation. Without such oversight, the integrity of athletics is threatened. Ultimately, athletes must accept responsibility for the decisions they make regarding the usage of drugs and performance-enhancing substances.

Athletes taking or considering the use of such substances should be aware that the safety and efficacy of supplements used for improving athletic performance have not been addressed in systematic scientific studies. Trainers, exercise physiologists, sports nutritionists, athletic governing bodies, or medical organizations should discourage the use of dietary supplements by athletes. Serious side effects may result from the use of these substances, including cardiac hypertrophy, myocyte necrosis, myocarditis, fibrosis, coronary thrombosis, and sudden death (even at recommended dosing) (2,3,6-8,10).

Recommendation:

- 1. Athletes should have their nutritional needs met through a healthy, balanced diet without dietary supplements.**

TASK FORCE 9 REFERENCES

1. Estes NAM III, Link MS, Cannom D, et al. Report of the NASPE policy conference on arrhythmias and the athlete. *J Cardiovasc Electrophysiol* 2001;12:1208-19.
2. Kloner RA. Illicit drug use in the athlete as a contributor to cardiac events. In: Estes NAM III, Salem D, Wang P, editors. *Sudden Cardiac Death in the Athlete*. Armonk, NY: Futura Pub. Co., 1998:441-52.
3. Cregler LL. Substance abuse in sports: the impact of cocaine, alcohol, steroids, and other drugs on the heart. In: Williams R, editor. *The Athlete and Heart Disease: Diagnosis, Evaluation and Management*. Philadelphia, PA: Lippincott Williams & Wilkins, 1998:131-54.
4. DeAngelis CD, Fontanarosa PB. Drugs alias dietary supplements. *JAMA* 2003;290:1519-20.
5. Stout CW, Weinstock J, Homoud MK, Wang PJ, Estes NAM III, Link MS. Herbal medicine: beneficial effects, side effects, and promising new research in the treatment of arrhythmias. *Curr Cardiol Rep* 2003;5:395-401.
6. Samenuk D, Link MS, Homoud MK, et al. Adverse cardiovascular events temporally associated with ma huang, an herbal source of ephedrine. *Mayo Clin Proc* 2002;77:12-6.
7. U.S. Food and Drug Administration. FDA announces plans to prohibit

sale of dietary supplements containing ephedra. December 30, 2003. Available at: <http://www.fda.gov/oc/initiatives/ephedra/february2004/>. Accessed October 1, 2004.

8. U.S. Food and Drug Administration. RAND report. Available at: <http://www.fda.gov/OHRMS/DOCKETS/98fr/95n-0304-bkg0003-ref-07-01-index.htm>. Accessed October 1, 2004.
9. Maron BJ, Thompson PD, Puffer JC, et al. Cardiovascular preparticipation screening of competitive athletes: a statement for health professionals from the Sudden Death Committee (clinical cardiology) and Congenital Cardiac Defects Committee (cardiovascular disease in the young), American Heart Association. *Circulation* 1996;94:850-6.
10. Ireland to review safety of energy drinks. Available at: <http://www.foodanddrinkurope.com/news/ng.asp?id=49957>. Accessed October 1, 2004.
11. The National Center for Drug Free Sport, Inc. Nutritional supplements. Available at: <http://www.drugfreesport.com/choices/supplements/index.html>. Accessed October 1, 2004.
12. NCAA Web site. Drug testing policy. Available at: http://www1.ncaa.org/membership/ed_outreach/health-safety/drug_testing/index.html. Accessed October 1, 2004.
13. World Anti-Doping Agency. Available at: <http://www.wada-ama.org>. Accessed November 30, 2004.

Appendix 1. Author Relationships With Industry and Others

Name	Consultant	Research Grant	Scientific Advisory Board	Speakers' Bureau
Dr. N. A. Mark Estes III	<ul style="list-style-type: none"> • Guidant • Medtronic 	<ul style="list-style-type: none"> • Guidant • Medtronic 	<ul style="list-style-type: none"> • Guidant (Executive Committee) 	None
Dr. Robert Kloner	<ul style="list-style-type: none"> • Bayer GSK • Lilly ICOS • Pfizer • Schering Plough 	<ul style="list-style-type: none"> • CV Therapeutics • Lilly ICOS • McNeill 	<ul style="list-style-type: none"> • Bayer GSK • Lilly ICOS • Pfizer 	<ul style="list-style-type: none"> • Bayer GSK • Lilly ICOS • Pfizer
Dr. Brian Olshansky	<ul style="list-style-type: none"> • Guidant • Medicorp 	<ul style="list-style-type: none"> • Medtronic 	None	<ul style="list-style-type: none"> • Astra Zeneca • Baxter • Bayer GSK • Reliant Pharmaceutical
Dr. Renu Virmani	None	None	None	None

Task Force 10: Automated External Defibrillators

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GENERAL CONSIDERATIONS OF CARDIAC ARREST RISK AMONG ATHLETES

The incidence of out-of-hospital cardiac arrest among the general population of adults is 1 to 2 deaths per 1,000 subjects per year; a figure that represents 50% of all cardiovascular deaths (1). For the adolescent and young adult subgroups, the estimated incidence is 1 per 100,000 per year or less. Available data suggest that among the younger population, competitive athletes account for a disproportionately higher-risk subset, compared to the gen-

eral population in a comparable age group (2-4). In addition, among the adult population performing conditioning activities in health clubs, the probability of cardiac arrest during exertion appears higher than the expected rate for comparable groups generally, especially among persons who exercise despite being habitually sedentary (5).

Within the subgroup of the population age 35 years and older, coronary heart disease accounts for approximately 80% of all sudden cardiac deaths (SCDs), with the cardiomyopathies accounting for another 10% to 15%. In the younger age groups, hypertrophic cardiomyopathy, anoma-