



GUIDELINES FOR PEDIATRICIANS

Performance-Enhancing Substances

Issue 12

American Academy
of Pediatrics



DEDICATED TO THE HEALTH OF ALL CHILDREN™

Visit the Sports Shorts Online @ <http://www.aap.org/family/sportshort.htm>

The temptation of using performance-enhancing drugs and supplements as shortcuts to improving athletic performance or even to enhance appearance is very seductive to adolescents. Pediatricians need to rely on research when available, stay current on trends in athletes' drug and supplement use, and discuss the individual athlete's concerns when they arise. A reasonable strength and conditioning program and a well-balanced diet must be presented as a sensible alternative to a riskier shortcut training approach. It is important to recognize that release and widespread use of new supplements often occur before significant clinical study of benefit and adverse effects takes place. Virtually no data are available on the efficacy and safety of widely used performance-enhancing substances in children and adolescents. **The American Academy of Pediatrics strongly condemns the use of performance-enhancing substances and vigorously endorses efforts to eliminate their use among children and adolescents.** To help you in your practice, we have provided the following table:

| NAME | PROPOSED EFFECT | ADVERSE EFFECTS | PHYSICAL EXAM FINDINGS | RULES/LEGAL ISSUES |
|---|--|---|--|--|
| Anabolic-androgenic steroids | <ul style="list-style-type: none"> Increase muscle strength and mass at high doses Do not increase endurance | <ul style="list-style-type: none"> Endocrine/reproductive – testicular atrophy and irreversible gynecomastia in males and irreversible virilization in females Cardiovascular – adverse changes in lipid profile and elevation of blood pressure, cardiomyopathy Hepatic – enzyme elevation, jaundice, and possibly malignancy Musculoskeletal – epiphyseal fusion and decreased tensile strength of tendons Psychiatric – multiple effects including potential addiction and dependence | <ul style="list-style-type: none"> Testicular shrinkage Male pattern balding Striae Gynecomastia Acne | <ul style="list-style-type: none"> Illegal and punishable as a felony Schedule III controlled substances Banned by major sports governing organizations |
| Prohormones, "natural steroids," androstenedione (Andro), dehydroepiandrosterone (DHEA) | <ul style="list-style-type: none"> Do not increase testosterone at moderate doses Might increase testosterone at higher doses May increase muscle strength and mass at high doses | <ul style="list-style-type: none"> Same as anabolic-androgenic steroids Increased estrogen effect May increase hormone-sensitive malignancies Can lead to adverse ratio of total cholesterol to high-density lipoprotein | <ul style="list-style-type: none"> Testicular shrinkage Male pattern balding Striae Gynecomastia | <ul style="list-style-type: none"> Banned by major sports governing organizations Food and Drug Administration (FDA) ban on manufacture, market, distribution of Andro (March 2004) |
| Ephedra | <ul style="list-style-type: none"> May burn fat (not proven by research) May delay fatigue (not proven by research) | <ul style="list-style-type: none"> Serious cardiovascular and central nervous system events including: <ul style="list-style-type: none"> Hypertension, heart attack, stroke, seizure (effects are potentiated by caffeine) | <ul style="list-style-type: none"> Feeling jittery Sweating Increased heart rate Increased blood pressure | <ul style="list-style-type: none"> Systematic use banned by major sports governing organizations FDA ban on sales of Ephedra (April 2004) |
| Creatine | <ul style="list-style-type: none"> Increases work capacity over brief, repetitive exertion May delay fatigue of workouts Does not improve endurance Does not increase strength or muscle mass Has responders/non-responders | <ul style="list-style-type: none"> Early weight gain from water retention Muscle cramping, stomach cramping, hydration issues Case reports of reversible renal problems Not tested in those younger than 18 years | <ul style="list-style-type: none"> Rapid early weight gain | <ul style="list-style-type: none"> Not banned from use The National Collegiate Athletic Association (NCAA) prohibits distribution in training facilities Purchased over-the-counter as dietary supplement |
| Protein supplements | <ul style="list-style-type: none"> Cause weight gain (especially in some "restricted diets") Increase strength/ power Increase lean muscle mass Require both carbohydrate and protein intake for strength and muscle gains | <ul style="list-style-type: none"> Anecdotal reports of renal problems with protein overload | <ul style="list-style-type: none"> Variable weight gain | <ul style="list-style-type: none"> Not banned by major sports governing bodies Cost can be prohibitive |

Doctor: This side of "Sports Shorts" is for your use; flip side is for photocopying and giving to your patient

- "Random" drug testing is a deterrent in the International Olympic Committee, NCAA, and some professional sports, but it is probably too costly for widespread use in high school.
- Human growth hormone and erythropoietin are currently used in the setting of elite athletes; however, their use may be filtering down to adolescents. At this point, they have been controlled and protected well by the medical community.

Recognizing that new supplements are constantly being developed and released, the following Web sites are provided as additional resources. These Web sites are not endorsed by the American Academy of Pediatrics.

World Anti-Doping Agency:
International Olympic Committee:
National Collegiate Athletic Association:
National Center for Drug-Free Sport:
Independent site for information on sport supplements:

www.wada-ama.org
www.olympic.org
www.ncaa.org
www.drugfreesport.com
www.supplementwatch.com

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Our society is founded on competition and places much value on success. This leads to pressures producing a “win-at-all-costs” mentality. Teenagers feel these pressures and often look for the “edge” from drugs and supplements, even if they are illegal or unsafe. Many coaches feel this leads to a “shortcut” type mentality rather than using hard work to improve. Athletes, parents, coaches, and trainers need to know that a sensible strength and conditioning program and a well-balanced diet with proper hydration are a reasonable alternative to a riskier shortcut training approach. Virtually no data are available on the efficacy and safety of widely used performance-enhancing substances in children and adolescents. **The American Academy of Pediatrics strongly condemns the use of performance enhancing substances and vigorously endorses efforts to eliminate their use among children and adolescents.**

| NAME | PROPOSED EFFECT | MEDICAL RESEARCH | MEDICAL RISK | RULES/LEGAL ISSUES |
|--|---|---|--|--|
| Anabolic-androgenic steroids | <ul style="list-style-type: none"> Build muscle Increase strength Improve performance | <ul style="list-style-type: none"> Not proven to improve performance Increase muscle strength and mass at high doses Do not increase endurance | <ul style="list-style-type: none"> Shrink testicles and cause increased breast tissue in males Deepen voice, increase facial hair in females Increase risk of heart attack by increasing blood pressure and cholesterol, possible effect on heart muscle Liver swelling, jaundice, and tumors Risk of tendon rupture Stunted growth in young athletes “roid rage”/aggression, addiction, depression Balding, acne, stretch marks | <ul style="list-style-type: none"> Illegal and punishable as a felony Schedule III controlled substances Banned by major sports governing organizations |
| Androstenedione (Andro), DHEA (dehydroepiandrosterone), “natural steroids” | <ul style="list-style-type: none"> Build muscle Increase strength Improve performance | <ul style="list-style-type: none"> Not proven to build muscle, increase strength, or improve performance May build muscle at high doses taken frequently | <ul style="list-style-type: none"> Same risks as steroids when taken frequently at high levels Increase female hormone estrogen Increase certain type of malignant tumors | <ul style="list-style-type: none"> Banned by major sports governing organizations Food and Drug Administration (FDA) ban on manufacture, market, distribution of Andro (March 2004) |
| Ephedra | <ul style="list-style-type: none"> Burns fat Delays fatigue in workouts Is a stimulant | <ul style="list-style-type: none"> Works as stimulant Effective in “fat burning” when combined with caffeine | <ul style="list-style-type: none"> Sudden death Heart attack Stroke Seizures High blood pressure | <ul style="list-style-type: none"> Systematic use banned by major sports governing organizations FDA ban on sales of Ephedra (April 2004) |
| Creatine | <ul style="list-style-type: none"> Delays fatigue in workouts Promotes weight gain | <ul style="list-style-type: none"> Increases workout capacity for certain weight lifting/sprinting type activity Increases weight (mainly “water” weight) Does not increase strength or build muscle Does not improve endurance (distance events) | <ul style="list-style-type: none"> May cause “kidney overload” in certain settings Dehydration Muscle cramps Stomach cramps | <ul style="list-style-type: none"> Not banned for use National Collegiate Athletic Association prohibits distribution in training facilities Purchased over-the-counter as dietary supplement Cost may discourage use Creatine can be obtained through diet |
| Protein supplements | <ul style="list-style-type: none"> Promote weight gain Build muscle strength/mass | <ul style="list-style-type: none"> Do not build muscle strength or mass Weight gain is variable and dependent on the athlete’s routine diet Also related to calorie and carbohydrate intake | <ul style="list-style-type: none"> “Kidney overload” when taken in high concentration | <ul style="list-style-type: none"> Not banned by major sports governing bodies Cost may discourage use May be expensive insurance policy for dietary deficiencies |

Problems with dietary supplements that may result in harm to the athlete:

- In 1994, the Dietary Supplement Health and Education Act stopped the FDA from directly monitoring dietary supplements. Medical concerns include questions that are difficult to answer without research, such as: Do these supplements work? What are the adverse effects/safety of use?
- Studies show that some supplements contain impurities and that they may not contain what the label states or may contain substances not on the label.
- Myths exist among young athletes that can be dangerous, such as: all-natural equals all-safe, and if some is good, more is better.

Web sites for additional information (these Web sites are provided as resources and not endorsed by the American Academy of Pediatrics):

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| World Anti-Doping Agency: | www.wada-ama.org |
| International Olympic Committee: | www.olympic.org |
| National Collegiate Athletic Association: | www.ncaa.org |
| National Center for Drug-Free Sport: | www.drugfreesport.com |

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