Use of the Dietary Supplement and Androgenic Steroid Hormone Androstenedione

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During the past year, the public was exposed to a barrage of drug scandals in sports. These involved Olympic champions in track and field, swimming, and snowboarding, as well as elite cyclists, a 3-time winner of the Boston Marathon, and a professional tennis player. However, while King and colleagues have conducted a well-designed study that has provided valuable information, several questions remain and indicate the need for further investigation. For example, of the young men enrolled, only 2 had ever engaged in resistance training, and that training had been more than 1 year earlier. Such inexperienced weight trainers generally make significant gains in the early phase of resistance training programs. These large strength gains could overshadow, statistically, any potential gains from androstenedione.

Conversely, individuals experienced in resistance training have "plateaued" and their incremental gains in strength are smaller as they continue training. In these experienced weight trainers, possible androstenedione-assisted increases, which might be small compared with initial gains by inexperienced lifters, would more likely be statistically significant compared with strength gains by experienced trainers who are not using androstenedione.

King and colleagues’ observations that androstenedione decreased high-density lipoprotein concentrations and increased estrone and estradiol concentrations suggest a potential link of this androgenic steroid hormone to heart disease and stroke, and even aggressive behavior.

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quently, these findings should not only raise public concern but also bolster the need for an epidemiologic evaluation of the long-term health implications, especially with long-term high doses.

Future studies may need to focus on the effects of a higher dose of androstenedione administered over a period longer than 8 weeks. While the study by King et al used a daily dose of 300 mg, recent advertisements for androstenedione recommend a daily dose of 500 to 1200 mg. Further complicating this issue is the propensity of many who use supplements or performance-enhancing drugs to believe that, “if 1 pill works, 10 will do wonders.” Other investigations also are indicated to assess the safety and efficacy of the sublingual spray and percutaneous gel versions of androstenedione, as well as related products such as 5-androstenedione, 4-androstenediol, 5-androstenediol, 19-norandrost-4-enedione, 19-norandrost-5-enediol, and 19-norandrost-4-enediol.

Given the adverse acute health effects of androstenedione and the lack of knowledge of its long-term effects, a critical question arises: “Why is over-the-counter sale of this androgenic steroid hormone permitted, even to children?” In part, the answer lies with 2 federal laws: the Anabolic Steroid Control Act of 1990 and the Dietary Supplement Health and Education Act of 1994. The Anabolic Steroid Control Act classified testosterone and a number of its derivatives as Schedule III drugs under the Controlled Substance Act. However, androstenedione is not one of the substances specifically designated by the Act. To so designate androstenedione, and, therefore, force its removal from store shelves, the following criteria must be met: (1) the substance must have a molecular structure related to testosterone; (2) the substance must have a pharmacology related to testosterone; (3) the substance cannot be an estrogen, progestin, or corticosteroid; and (4) the substance must promote muscle growth. While there is a reasonable amount of evidence to support, at least in part, criteria 1 through 3, the findings presented by King and colleagues show that androstenedione does not meet the fourth criterion. However, based on a comparison of the different effects of oral vs injectable testosterone, one could legitimately hypothesize that if androstenedione were administered by injection at a substantially higher dose, muscle growth would be observed.

The Dietary Supplement Health and Education Act, which was overwhelmingly approved by both houses of Congress, allows manufacturers to call almost any agent a supplement as long as they do not make unsubstantiated claims that the substance treats, cures, mitigates, diagnoses, or prevents a disease. Even when scientifically untenable claims are made, the burden of proof is on the federal government to establish that a claim is false or misleading. Consequently, the power of the Food and Drug Administration (FDA) to regulate dietary supplements—even substances like the steroid hormone androstenedione—has been dramatically reduced.

Confounding the issue is the fact that much of society prizes both winning and an athletic body. This, in turn, creates a huge demand for products for which marketers boast the user will effortlessly acquire superhuman strength or speed. However, this sales strategy will only flourish among those who believe that, “if it sounds too good to be true, buy it.” These same consumers also may believe that “natural” means harmless and that the FDA is the guarantor of the safety and efficacy of various supplements—which in both instances is untrue. The FDA can intervene after it has proven the product is unsafe. By that time harm may have already taken place.

Should tax dollars be used to evaluate claims that to most people must seem clearly exaggerated, if not outrageous? No amount of government regulation will outweigh the lure of such a product for a hopeful but uninformed consumer. However, if a supplement is in fact what most medical professionals consider to be a potentially harmful drug, action is needed to protect the public. In the case of androstenedione, the study by King et al contributes to the evidence suggesting that the government should carefully consider intervening and remove androstenedione and its derivatives from the market.

REFERENCES