Androstenedione: Out of the park or out in left field?

The uproar surrounding the August revelation that Mark McGwire takes androstenedione was soon drowned out by cheers as the St. Louis Cardinals’ slugger broke the record for the most home runs in one season. Although the controversy has died down, it’s not over. Many people believe, as one C&EN reader recently wrote, that McGwire’s record is tainted (page 4).

Androstenedione is the current hot “performance-enhancing” substance. The companies that sell it over the counter at health and nutrition centers and via the Internet tout its ability to boost strength and muscle-building ability by raising the body’s level of testosterone. McGwire broke no rules by taking androstenedione; Major League Baseball does not forbid its use, although it is banned by the International Olympic Committee, the National Basketball Association, and the National Football League.

For reasons of both fairness and safety, virtually every sports-governing body bans the use of testosterone itself, as well as synthetic anabolic steroids. There’s no question that testosterone helps build lean muscle mass, says David Pearson, associate professor of physical education at Ball State University, Muncie, Ind., and a researcher at Ball State’s Human Performance Laboratory. But use of some anabolic steroids also brings well-documented detrimental side effects, including elevated blood lipid levels, liver problems, and—as the exogenous steroids confound the body’s natural feedback control mechanisms—testicular atrophy.

Androstenedione can indeed be converted to testosterone by the action of an enzyme that reduces the ketone at position 17 on the steroid skeleton. At this stage of the game, however, there’s no reliable evidence that it helps athletic performance, according to a new policy statement from the National Strength & Conditioning Association (NSCA)—the professional society for athletic trainers, sports medicine physicians and researchers, professional coaches, and physical therapists.

“There’s a 1960s study showing a very high spike of testosterone in women given androstenedione,” notes Pearson, who chairs the NSCA subcommittee that prepared the association’s statement. And there are reports of East German swimmers using androstenedione as a nasal spray in the 1980s. “But a healthy male taking it orally is a different story. That would be like putting a drop of ink in the ocean and expecting it to change color. I assume Mark McGwire, at 34 years old, has a normal level of testosterone.”

As-yet-unpublished research from Eastern Michigan University, Ypsilanti, also raises doubt about androstenedione’s effectiveness. Assistant professor of exercise Tim N. Ziegennuff undertook a series of studies with seven men given 100-mg doses of either androstenedione, androstenediol, or a placebo. “With androstenedione, we saw a mild 15% elevation of blood levels of testosterone, but that’s statistically insignificant,” Ziegennuff tells C&EN. “You can get a rise of 25% by working out in a weight room.”

With androstenediol—another substance available over the counter that is converted into testosterone by a different enzyme—the researchers saw a significant increase of 45%.

Both Pearson and Ziegennuff say what is needed are double-blind studies that track whether these compounds used in conjunction with training will boost strength or size. And their effects on other hormones need to be measured as well, Ziegennuff notes.

Unfortunately, as the NSCA policy statement points out, there are no hard data in the literature on the safety of using androstenedione and its relatives. And under the Dietary Supplement Health & Education Act of 1994, the Food & Drug Administration is powerless to prevent the sale of such compounds unless the agency itself proves they are unsafe. That means that impressionable young athletes following McGwire’s example may be at risk for serious side effects.

“It’s always my concern,” Pearson says, “that uninformed McGwire wannabes who don’t recognize the talent, time, and commitment he has demonstrated—whose bodies haven’t even begun to experience the maturation process it takes to become a professional athlete—will take the leap to using supplements.”

Did McGwire’s taking of androstenedione give him an unfair advantage that allowed him to set baseball’s new single-season home run record when he otherwise would not have? In this reporter’s opinion, almost certainly not. After all, it took the Chicago Cubs’ Sammy Sosa—who is reported not to take androstenedione—only five days longer than McGwire to break Roger Maris’ long-standing record.

Is McGwire wasting his money, potentially endangering his health, and setting a terrible example for younger athletes? Unfortunately, the answer to those questions is almost certainly yes.

But I place the blame not with McGwire or the companies that—following the great American capitalist way—are pushing the stuff. I lay the blame squarely on Congress, which handcuffed FDA with the Dietary Supplement Health & Education Act of 1994. Until some regulatory body is given the authority to require that the safety and efficacy of so-called nutritional supplements be proven before they can be sold to any teenager, we’re going to see a lot more of these controversies. I hope not too many people ruin their health in the meantime.

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