Editorials

Performance-Enhancing Drug Use in Recreational Athletes

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Family physicians may be surprised to learn the number of their patients who use performance-enhancing drugs, either deliberately to improve athletic performance or unknowingly through contaminated dietary supplements. Elite athletes account for only a small fraction of the approximately 3 million users of ergogenic drugs in the United States.[1] Sports organizations have broadened their efforts to detect and deter doping (i.e., the use of performance-enhancing drugs in competitive sports) at all levels of competition, resulting in a surprising number of positive doping test results in masters and recreational level athletes.[2] Recreational athletes who have been caught intentionally doping have reported many reasons for doing so, including keeping up with others in their age group in training and competition and for faster recovery from training and competitions so that they can continue to compete at a maximal level.[2-4]

The prevalence of performance-enhancing drug use among athletes and the general public has led the World Health Organization to recognize the use of these drugs as a public health issue.[3] Over the past decade, the emergence of novel doping agents (particularly drugs aimed at boosting endogenous hormone levels and anabolic agents), increased acceptance of complementary and lifestyle medications, and increased contamination of dietary supplements have contributed to this growing public health concern.

The physical and psychological adverse effects of anabolic-androgenic steroids (e.g., kidney and liver damage, acne, gynecomastia, suppression of normal testosterone production, aggression, depression) are well established. What physicians may not recognize are the potential adverse effects of novel, investigational drugs that are being used as doping agents. These include selective androgen receptor modulators (e.g., the investigational drugs ostarine [Enobosarm] and LGD-4033 [Ligandrol]), which have substantial anabolic effects on muscle and bone and significant potential for misuse in sports. These modulators are not approved for human use, and the adverse effects have not been well documented because they are still in clinical trials. Despite their experimental status, selective androgen receptor modulators have been found in dozens of dietary supplements and have caused more than 250 positive doping test results since 2010.[5-7] Growth hormone (GH) fragments (e.g., AOD-9604) and GH-releasing peptides, GH secretagogues (e.g., ibutamoren), metabolic modulators (e.g., meldonium), off-market drugs (e.g., sibutramine [Meridia]), and a handful of illegal designer stimulants (e.g., higenamine,[8] methylhexanamine,[9] octodrine[10]) and other small molecules have also emerged on the doping stage. Consumers can easily buy all of these on the internet.

Even for the astute family physician, it can be difficult to identify patients who are using performance-enhancing drugs. Patients taking dietary supplements may be unintentionally ingesting performance-enhancing drugs because of contamination, and patients commonly do not disclose use of dietary supplements to their physicians.[11] Patients are less likely to disclose supplement use if the physician does not ask about it or if they believe that their physician is not knowledgeable about supplements.[11] Despite anti-doping agencies' warnings to elite athletes about supplement contamination risks, nonelite athletes are rarely educated about these risks.

Patients who are deliberately using performance-enhancing drugs may not disclose use because of shame, legality concerns, or lack of trust. In fact, users of performance-enhancing drugs often are not candid with their physicians about their use of these drugs. In one study, 56% of anabolic steroid users reported that they had never disclosed their use to their physician.[7] The adverse effects of many of the novel performance-enhancing drugs are not well documented or understood and thus may not trigger red flag findings on clinical history and physical examination that would alert a family physician to potential users of these drugs.

Patronage of wellness and antiaging clinics may also put recreational athletes at risk of inadvertent positive doping test results because treatments prescribed at these centers often include hormone replacement. Athletes can apply for a therapeutic use exemption for certain prescribed medications that are prohibited in competition (i.e., $beta_2$ agonists for asthma, glucocorticoids for inflammatory diseases, hormones for endocrine deficiencies); no exemptions are typically given for medications prescribed solely for symptom relief, antiaging purposes, or other purported health and wellness benefits (i.e., testosterone to treat "low" testosterone levels or nonspecific symptoms).

The family physician is a critical player in addressing the use of performance-enhancing drugs in recreational athletes of all ages. Family physicians should continue to be alert to signs of use of traditional performance-enhancing drugs, such as anabolic-androgenic steroids and stimulants, and also be aware of the emergence and accessibility of novel doping agents. In addition to the potential health risks of the performance-enhancing drug itself, harms of a positive doping test result can include the negative health and social impacts of sanctions prohibiting participation

TABLE 1

Anti-Doping Resources for the Family Physician

Resources	Comments
Global Drug Reference Online https://www.GlobalDRO.com	Database for the anti-doping status of medications
U.S. Anti-Doping Agency	
https://www.usada.org/athletes/testing/tue/tue-faqs	Therapeutic use exemption: frequently asked questions and application process
https://www.usada.org/resources/healthpro	Online educational module for health care professionals (CME credits available through Stanford University)
https://www.usada.org/athletes/substances/supplement-411	Information on dietary supplements, including a list of dietary supplements at high risk of contamination
https://www.usada.org/drug-reference-phone-line/	Drug reference and email support for anti-doping and medication information
World Anti-Doping Agency https://adel.wada-ama.org/	Anti-doping e-learning platform, including a module for health care professionals

and the potential emotional damage related to being labeled a cheater.

Physicians should be aware of the competition status of athletic patients and consult the appropriate banned substances list (e.g., the World Anti-Doping Agency prohibited list) before prescribing medication and also understand the therapeutic use exemption process *(Table 1)*. Family physicians should also be aware of the emergence of novel performance-enhancing drugs and their use among the general population; screen patients for use; and be prepared to discuss the safety, effectiveness, legality, and ethics of performance-enhancing drug use.[12]

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