

Drugs in sport

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SYNOPSIS

Drugs in sport are a concern for medical practitioners because of the implicit risks to the health of the athlete. There are also ethical concerns about cheating by artificially enhancing athletic performance. The International Olympic Committee has prepared an Olympic Movement Anti-Doping Code.¹ This specifies prohibited substances, and prohibited methods of doping. Health professionals must be aware of the need to avoid giving ‘banned’ medications and the need to provide written notification when restricted substances are necessary. Sources of information about restricted substances include the *Drugs in Sport Handbook*² published by the Australian Sports Drug Agency.

Index words: anabolic steroids, stimulants, growth hormone, doping.

(Aust Prescr 2000;23:76–8)

Introduction

‘Drugs in sport’ receives daily attention in the media, the medical literature and in conversations across the country. In the twelve months 1998–99, the Australian Sports Drugs Agency (ASDA) conducted 4801 dope tests across 52 sports and events. Positive tests were recorded for drugs such as clenbuterol (a beta-agonist with anabolic properties), nandrolone and stanozolol (anabolic steroids), frusemide, pseudoephedrine, prolintane (a stimulant used in the treatment of attention deficit hyperactivity disorder) and cannabis. Sporting organisations imposed sanctions on the offenders ranging from ‘warning’ to ‘life ban’.

The problem of using performance enhancing agents is not new. Anecdotal reports go back to ancient Greece when meat and wine were prescribed for better performance in the marathon. A death from stimulant (amphetamine) abuse by a cyclist was reported in 1960.^{1,3} Cycling has more recently brought to light the problem of erythropoietin (EPO) abuse and this is the focus of research (using red cell markers) at the Australian Institute of Sport in Canberra and the Australian Sports Drugs Testing Laboratory in Sydney. Similarly, swimmers were recently caught with human growth hormone (HGH), and the International Olympic Committee (IOC) has now funded an international study on the detection of HGH abuse by athletes.

The use of drugs such as DHEA (dehydroepiandrosterone), which is banned by the IOC, and supplements such as creatine and hydroxymethylbutyrate (HMB), which are not banned,

add to the ever increasing complexity of performance enhancement in sport. This is a concern for the treating practitioner who may be asked to assist an athlete.

Doping

Doping is the application of chemical substances with the deliberate intention or effect of altering performance.⁴ It is opposed by the IOC and its member bodies and affiliates on ethical grounds (doping is cheating) and because doping poses a risk to the health of the athlete.

The IOC has produced a schedule which is updated annually and outlines the major classes of prohibited substances, prohibited methods of doping, and classes of drugs subject to certain restrictions (see Table 1). The prohibited substances include stimulants (e.g. ephedrine and amphetamine), narcotics, anabolic agents (e.g. testosterone and its related compounds, including nandrolone and DHEA), diuretics, hormones (including HGH and EPO) and hormone analogues.

The difficulty for medical practitioners is recognising prohibited substances in common usage and ensuring that their patients who are athletes do not inadvertently test positive to a dope test. By far the largest cause of ‘inadvertent positives’ is pseudoephedrine, which is available in many over-the-counter preparations.

Doctors and pharmacists can readily check any medication, to see whether or not it is permitted, by referring to the bimonthly

Table 1

International Olympic Committee guide to classes of prohibited substances and methods of doping

Prohibited classes of substances

- A. Stimulants
- B. Opioid analgesics
- C. Anabolic agents
- D. Diuretics
- E. Peptide hormones, mimetics and analogues

Prohibited methods

- A. Blood doping
- B. Pharmacological, chemical and physical manipulation

Classes of drugs subject to restrictions

- A. Alcohol
- B. Cannabinoids
- C. Local anaesthetics
- D. Corticosteroids
- E. Beta blockers

issue of MIMS. Against each entry is a symbol which indicates if the drug can be used in sport or if certain restrictions apply. There is no symbol for those substances which are totally banned. More information is available from ASDA or national sporting organisations.

Prohibited substances

Caffeine

Routine urine screening includes caffeine assay. A concentration above 12 microgram/mL is deemed a positive dope test. There are no acceptable excuses and athletes must be warned that caffeine excretion can vary from individual to individual. Approximately six cups of brewed or percolated coffee (drunk rather rapidly) or 6–8 cans of a cola soft drink may put the athlete at risk of a positive test.

Anabolic agents

The abuse of anabolic agents such as testosterone and its analogues, and of HGH and human chorionic gonadotrophin (HCG), is unfortunately endemic. Black market availability is widespread and athletes in sports which involve lifting, throwing, jumping and sprinting are particularly likely to be tempted. The dangers of anabolic androgenic steroids lie in their hepatotoxicity (in the 17 alpha-alkyl substituted forms), with resultant hepatitis, peliosis hepatis and risk of tumour. They can also virilise and produce permanent sequelae such as deepening of the voice, gonadal atrophy and clitoral hypertrophy.⁵ Some beta-agonists including clenbuterol and fenoterol are anabolic and are banned.

HGH abuse can produce acromegalic adverse effects and impaired glucose tolerance, while HCG is used to mimic the effect of testosterone. Polypeptide anabolic agents also include insulin, and because this drug is available without prescription it has become fashionable amongst body builders and strength-training athletes. Insulin injections are reportedly taken with high carbohydrate meals and exercise to produce gains in muscle bulk and strength.

A urine test for testosterone is positive if the ratio of testosterone to epitestosterone is greater than six. Testing for the polypeptide anabolics is still being developed.

Diuretics

Diuretics are banned. They are used by athletes to 'make weight'. Sports in which athletes are classed by weight include weightlifting, judo and boxing. Doping control checks routinely test for diuretics as the drugs can also be used to dilute the urine and mask prohibited drugs in the urine.

Glycoprotein and polypeptide hormones

A recent addition to the banned list of hormones is EPO. This injectable recombinant hormone promotes red cell production by the bone marrow and thus enhances aerobic (endurance) activity in athletes – hence its infamous popularity amongst competitive road cyclists. It carries a risk of thrombosis and has been implicated in a number of deaths amongst cyclists. A test for EPO is currently being developed in Australia and

it is the fervent wish of officials and honest competitors that the test be introduced at the Sydney Olympic Games.

Prohibited methods

There are a number of prohibited methods which are used for performance enhancement. These include blood doping (using homologous or autologous blood), the use of masking agents such as probenecid (which blocks the renal excretion of testosterone), providing substitute urine samples for testing and chemical manipulation of urine to be tested. Dope tests therefore screen for masking agents and analyse a range of chemical and physical properties of urine to detect manipulation of the sample.

Restricted use

The IOC also specifies a list of drugs subject to certain restrictions. Alcohol, for example, may be banned in certain sports, as are marijuana and beta blockers, because of specific pharmacological effects which may assist performance. For example beta blockers control tremor and heart rate, so they may be useful in target sports, such as shooting.

Local anaesthetics (excluding cocaine) are permitted for local and intra-articular use only, and written notification is requested by some sports at the time of competition. Similarly corticosteroids are permitted **only** for topical application, by inhalation for the treatment of asthma, or by local or intra-articular injection (including depot formulations).

Another important restriction is the use of beta-agonists. Only salbutamol, salmeterol and terbutaline are permitted and they can only be used for the treatment of asthma if they are given by inhaler. The sporting authorities require written notification of the athlete's asthma.

Permitted use of 'banned drugs'

In Australia, the Australian Sports Drugs Medical Advisory Committee (ASDMAC) has been empowered by Parliament to provide advice to national sporting bodies on the therapeutic use of IOC 'banned' drugs. If an athlete suffers ulcerative colitis, for example, and requires corticosteroid therapy, the treating medical practitioner may write to ASDMAC* and seek advice on this therapy. All medical details must be provided, with the athlete's permission. ASDMAC, in consultation with the relevant national sporting organisation, can grant permission for medication to be used in stated doses for particular conditions for a period of time. During this time sanctions will not be imposed if the athlete tests positive. The decision on whether or not to 'approve' therapeutic use is based on the necessity for such treatment to maintain health, the absence of alternatives in therapy and the decision that no unfair gains in sports performance may be obtained by using

* Australian Sports Drugs Medical Advisory Committee
PO Box 345
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such medication in prescribed doses. It should be recognised that ASDMAC 'approval' currently applies within Australia only and 'approval' to use outside Australia must be obtained either directly from the IOC (where Olympic Games are concerned) or from the appropriate national sporting body in the country of competition.

If there is any doubt, it is better for the athlete **not** to take the medication in question. If medication is necessary, the athlete should withdraw from competition.

Dope testing

Drug testing in Australia is conducted by the ASDA. The testing is strictly controlled to ensure that the athlete is guaranteed security, privacy and fairness. Guidelines cover notification of the athlete selected for testing, chaperoning and supervision while a urine sample is obtained, sealing of specimens, secure delivery of the sample to the IOC-accredited laboratory, sample analysis and notification of results.

There is a detailed process for appeals and hearings, should sanctions by a sporting organisation be considered. The penalties are severe for drug abuse, trafficking, doping and using prohibited methods. In many sports a second offence for anabolic steroid abuse results in a life ban from the relevant sport.

Supplements

There are countless enterprises in Australia touting supplements, vitamins, amino acids and herbal extracts to promote health and improved performance. Some supplements such as creatine and amino acids are not 'banned' but the purity of such products must be guaranteed before the athlete is safe from testing positive. The truly risky area is that of herbal extracts and compounds. Some include ephedra which is banned, and the botanic (or Chinese) name may not help the unwary. Similarly guarana contains caffeine, which is 'banned' above a level of 12 microgram/mL in urine.

Caution must also be exercised when buying any product over the internet, for the same concerns apply with respect to content and purity. What you buy may not necessarily be what you get, and you may get more than you bargained for.

Conclusion

Health professionals should not become involved in doping or prohibited procedures which are intended to enhance sporting performance. They also need to be aware that in treating an athlete's medical condition they can unwittingly prescribe a banned or restricted substance. Inappropriate prescriptions can prejudice an athlete's career, so checking that a drug is permitted before prescribing it is recommended.

REFERENCES

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Self-test questions

The following statements are either true or false (answers on page 87)

3. Some over-the-counter medicines are prohibited substances for athletes.
4. Athletes should not use hydrocortisone cream.

New telephone services

The National Prescribing Service (NPS) has launched a telephone service for health professionals wanting independent drug and therapeutics information. The Therapeutic Advice and Information Service (TAIS) will give immediate access to information and respond to patient-related enquiries such as:

- interactions with other drugs, foods or complementary therapies – and how to manage these
- adverse effects, especially unusual ones not included in the product information
- use of drugs for unlicensed indications – is there good evidence to support use?

General practitioners, community pharmacists and other

community-based health practitioners are expected to be the main users of the service.

Contact the Therapeutic Advice and Information Service for health professionals on **1300 138 677**, or the NPS on (02) 9699 4499.

The NPS is planning a parallel service for the general public, to be launched later this year. This consumer service will provide information about medicines in lay language, and aims to promote communication between patients and health professionals.

The service will not replace the counselling role of a health professional who knows the patient, however it may help the patient to identify issues that should be discussed with their doctor or pharmacist.