

Prescribing Medications and Nutritional Supplements for Athletes

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ABSTRACT

Athletes in the Caribbean depend heavily on their medical personnel to advise on the correct use of medications for their illnesses. Doctors, pharmacists and paramedical personnel that accompany or treat athletes must be knowledgeable of which commonly prescribed substances are banned in sport in order to correctly advise and treat the athletes under their care. The objective is to review the classes of banned substances, using common examples of medications, as defined by the World Anti-Doping Agency (WADA) in a simplistic manner in order to allow treating medical personnel to prescribe medications to athletes with the confidence of not violating doping regulations. The concept of Therapeutic Use Exemption (TUE) is introduced. Upper respiratory tract infections and asthma are discussed as they are both common in athletes. The use of corticosteroids and nutritional supplements are also discussed.

Prescripción de Medicamentos y Suplementos Nutricionales para Atletas

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RESUMEN

Los atletas del Caribe dependen considerablemente de su personal médico a la hora de recibir consejos para el uso correcto de medicamentos en caso de enfermedades. Los médicos, farmacéuticos y el personal paramédico que acompañan o tratan a los atletas deben conocer bien cuáles sustancias prescritas comúnmente están prohibidas en el deporte, a fin de poder aconsejar y tratar correctamente a los atletas bajo su cuidado. El objetivo es revisar los tipos de sustancias prohibidas, usando ejemplos comunes de medicamentos, tal como los define la Agencia Mundial de Antidopaje (AMA) de manera simple, de manera que el personal médico encargado del tratamiento pueda prescribir medicamentos a los atletas con la seguridad de no estar violando las regulaciones en cuanto al dopaje. Se introduce el concepto de exención por uso terapéutico. Se discuten las infecciones de las vías respiratorias superiores y el asma, por cuanto ambas son comunes en los atletas. Asimismo se discute el uso de los corticosteroides y los suplementos nutricionales.

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INTRODUCTION

With the adoption of the World Anti-Doping Agency (WADA) code by Caribbean countries, Caribbean athletes will now be subjected to doping controls at local, regional and international competitions, including out-of-competition testing. Infractions, including using prohibited substances, failing to provide a sample or attempting to manipulate a sample, will be punished usually with a ban of the offending athlete from the sport (1). WADA recommends a two-year ban of a first major offence but athletes may receive lesser bans depending on the nature of their offence.

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Athletes suffer from medical illnesses similar to the general population eg respiratory tract infections, gastrointestinal complaints, asthma and skin disorders (2) and may require treatment for such illnesses. In a Finnish study (3), a substantial number of athletes admitted to having used substances like caffeine and pseudoephedrine, found in cold and allergy medications which would have been banned at the time of that study. Interestingly, though no athlete admitted to using banned substances, 90% per cent of athletes believed that banned substances improve athletic performance. This makes it important to educate athletes, doctors and paramedical personnel on doping matters as athletes are ultimately responsible for all substances that they ingest.

In the Caribbean, Cuba has advanced programmes for education of athletes and testing for prohibited substances. It is the only country in the Caribbean with a WADA accredited laboratory. French territories, Martinique and Guadeloupe,

also have advanced systems which reflect the effects of France's fight against doping in sport. In the English-speaking Caribbean, the fight against doping is at an embryonic stage at present, there are no hotlines on doping matters as occurs in some European countries, and in some countries the internet service is not readily available or accessible to athletes to consult websites dedicated to doping matters, including the use of medications. Athletes therefore rely on health professionals to advise on doping issues.

A British study showed that most athletes would contact their team doctor to check whether a substance was banned or not (4). Not many athletes in the Caribbean have access to a Team Physician with whom they can readily consult. It is not uncommon for many sporting teams in the Caribbean to travel to competitions with a physiotherapist or physical trainer as the sole medical personnel advising the coaches and players. It is therefore imperative that any doctor, pharmacist or paramedical personnel prescribing medications to athletes have a working knowledge of the classes of commonly banned or restricted substances as required by the WADA (1). At least, the medical personnel should have ready access to information about the banned and restricted medicaments. There are changes which occur within the code from year to year *eg* caffeine was banned up to 2003 but in 2004 it was allowed in sport, so it is advised that medical personnel who are familiar with the general code review a summary of the major changes to the code on a yearly basis (5). If this is not done then inadvertent doping infringements are more likely or athletes may be advised wrongly about the use of common medications.

A United Kingdom study looking at general practitioners' knowledge of banned substances in sport concluded that GP knowledge of which substances are prohibited in sports is poor (6).

In a French study (7), 89% of general practitioners interviewed said that GPs have a role to play in preventing doping, but 77% considered themselves to be inadequately prepared to help in prevention. The majority of the 23% of doctors who considered themselves to be well-prepared to assist in doping prevention had some qualification in sports medicine. Sports medicine is a new specialty in the Caribbean and there are few doctors who have postgraduate qualifications in this area. The University of the West Indies has been offering a Masters programme in Sports Medicine to doctors since 2006 and this training should assist in the education of Caribbean athletes and administrative staff on doping matters, including doping prevention.

The aim of this article is to review the common classes of banned and restricted substances as well as prohibited methods of doping as outlined by WADA (1) so that medical professionals may prescribe and dispense medicaments with confidence to athletes. The use of corticosteroids, beta-agonists and medications for upper respiratory tract infections (URTI) require special mention as they are very

commonly prescribed or dispensed to athletes. The use of supplements by athletes is also discussed.

The Prohibited List of Medications

The prohibited classes of drugs for athletes (1) are stated below with brief explanations. The explanations added to the basic WADA list below are modified from a short review suitable for non-sports medicine personnel (8). Examples chosen represent the most commonly used medications or the ones that are most commonly abused in sport:

S1. Anabolic agents

These have been found to increase protein synthesis, muscle mass and force in individuals taking them.

a. Anabolic androgenic steroids

There are 2 classes:

- i. Exogenous steroids which are not produced in the body and include nandrolone, stanozolol and the long undetectable steroid THG (tetrahydrogestrinone) which had eluded laboratory detection for a long time). They may be taken orally or parenterally.
- ii. Endogenous steroids are produced in the body and include testosterone, dihydrotestosterone and 5-androstenedione among many other products.

b. Other anabolic agents

Clenbuterol really belongs to the beta-2 agonist group but causes increases in muscle mass and reduces fat content. All anabolic agents are prohibited by either oral or parenteral administration.

S2. Hormones and related substances

The following hormones and their releasing factors are prohibited:

- a. Erythropoietin (EPO) – this stimulates red cell production and is of benefit to endurance-type sport like long-distance cycling.
- b. Growth hormone (GH) could lead to increase in muscle mass and power; insulin-like growth factors and mechano growth factors – these reduce fat content in humans.
- c. Gonadotropins in male only
- d. Insulins – this could have some anabolic and anti-catabolic actions (9). The use requires a therapeutic use exemption by the player.
- e. Corticotropins

Erythropoietin (EPO) and GH are the most frequently abused in this class. Recombinant forms of both EPO (rEPO) and GH (rhGH) are now available. The great variability of individual human GH production and response to exercise and its short half-life in humans makes laboratory detection of rhGH difficult (10). There are now advances in rEPO detection but a definitive test with both high sensitivity and specificity is still to be established. These two recombinant preparations are therefore difficult to detect with great reliability.

S3. Beta-2 agonists

All are banned except formoterol, salbutamol, salmetrol and terbutaline when administered by inhalation. This requires a therapeutic use exemption for inhaled salbutamol, in concentrations < 1000 ng/ml from 2010 (11).

Beta-2-agonists have anabolic effects at high concentrations. A review on beta-2 agonists in sport concluded that “there is no ergogenic potential of inhaled beta-2 agonists in non-asthmatic athletes (12).

S4. Hormone antagonists and modulators *eg* aromatase inhibitors.

S5. Diuretics and masking agents.

Diuretics can cause rapid weight loss which is of benefit to persons performing in events with weight categories. Because of the diuresis, it can also be used to dilute the concentration of other banned substances in urine in an attempt not to be detected. Masking agents *eg* probenecid and plasma expanders are also banned.

Prohibited Methods

MI. Enhancement of oxygen transfer (this is of benefit in endurance-type sport):

1. Blood doping – this includes blood transfusions
2. Artificial enhancing of oxygen transport or delivery including modified haemoglobin products

M2. Chemical and physical manipulation: this includes any intravenous infusion. In acute medical situations, a retrospective therapeutic use exemption is required

M3. Gene doping. The non-therapeutic use of cells, genes, genetic elements or modulation of gene expression having the capacity to enhance athletic performance is prohibited. Gene therapy is advantageous over administration of recombinant proteins because it allows a “continuous production of the protein *in vivo*, one avoids the peak and trough pharmacokinetics associated with a series of injections.” Wells has an excellent review on this topic (13).

S6. Stimulants

These could cause enhanced athletic performance in theory, increased aggressiveness and strength. All are banned except imidazole derivatives for topical use. The following should be noted:

The use of adrenaline associated with local anaesthetic use or by local administration in nasal or ophthalmologic preparations is allowed. Pseudoephedrine is banned from 2010 but phenylephrine and caffeine are allowed (11). Ephedrine and methylephedrine are not allowed when the concentration in urine is > 10 micrograms/ml.

S7. Narcotics

All are prohibited *eg* pethidine, morphine but codeine is allowed. Narcotics can mask the pain of a mild to moderate injury in an individual. Competing with such an injury could lead to long term injuries. In addition, a player under the influence of narcotics is uncoordinated and may be a hazard to himself/herself and other players.

S8. Cannabinoids *eg* hashish and marijuana are prohibited

S9. Glucocorticosteroids – This is discussed in detail below

Substances prohibited in particular sports:

These include alcohol and beta-blockers. Beta-Blockers have been shown to have anti-anxiety properties and may be advantageous in sports like archery and billiards.

Therapeutic Use Exemption (TUE)

An athlete with a documented medical illness which requires the use of a medicament on the prohibited list may request a TUE. International athletes should apply to the medical committees of the specific sports federations and non-international athletes should be able to apply to their National Anti-doping Organization (NADO) for approval. The criteria for granting a TUE include (14, 15):

- C An application should be made at least 21 days before participating in an event
- C The athlete would experience a significant impairment to health if the prohibited substance or method were to be withheld to treat the condition
- C The therapeutic use of the medicament would produce no additional enhancement of performance other than what would be expected to occur by the athlete being able to return to normal health. The use of the substance or method to increase “low-normal” levels of any endogenous hormone is not allowed.
- C There is no reasonable therapeutic alternative to the use of the prohibited method or substance.
- C A retrospective approval will not be considered except for emergency treatment of an acute medical condition or exceptionally where there was inadequate time or opportunity to submit an application.

There is a standard form for TUE application and in most cases it is downloadable from each international sports federation’s website.

The Anti-Doping Administration and Management System (ADAMS) is a web based database provided free to all WADA compliant countries (16). Applications for TUEs can be submitted *via* ADAMS though

the signed applications are still required by the TUE committee and TUE certificates for athletes can also be issued *via* this means.

Asthma

Asthma is a respiratory disease characterized by episodic, reversible narrowing of the airways, leading to variable airflow obstruction, in response to a variety of stimuli including pollen, exercise and dust. Some athletes exhibit a variant of asthma referred to as exercise-induced asthma (EIA) which represents symptoms of asthma precipitated directly by exercise. Athletes applying for a TUE for asthma or EIA must have a lung function test. It is not sufficient to submit peak flow readings. It is recommended that the FEV1 is done for the athlete. A beta-2 agonist (bronchodilator) is administered *via* inhalation and a repeat FEV1 is done. A 12% increase in FEV1 in relation to the B2 agonist is considered the standard for reversibility of bronchospasm. If an athlete fails to make this criteria, she/he is then subjected to a bronchial provocation test *eg* metacholine aerosol challenge, mannitol inhalation or exercise challenge test. A decrease of 20% in FEV1 following the administration of the provocative agent is considered diagnostic (17).

In a review of the use of glucocorticosteroids in football, it was found that inhalational corticosteroids are the first-line treatment of asthma in players (18). It was also found that there was no proven performance enhancing effect of glucocorticoids based on the studies done to date. The use of beta-2 agonists is allowed by inhalational routes. It is not allowed by oral routes.

Corticosteroids, Beta-2-agonists and medications for Upper respiratory tract infection

All oral, rectal, intravenous and intramuscular use of corticosteroids are prohibited and when it is essential to have treatments administered by one of these routes then a standard TUE is required. Dermatological steroidal preparations are allowed but must be declared before competition. The use of glucocorticoids by all other routes including intra-articular, peri-articular and epidural is allowed but its use should be declared through Anti-doping Administration and Management System where reasonably feasible and must be declared on substances used on the doping control form (14). Upper respiratory tract infection is very commonly suffered by athletes (2). The use of medications for URTI should be considered carefully before being prescribed. There are many combination medications available including paracetamol with medications from the stimulant group. The use of ephedrine is not allowed above a certain urinary threshold of 10 micrograms/ml. Pseudoephedrine is not allowed from 2010 (11). It may be safer to prescribe the medications individually based on symptoms of the URTI. For example: paracetamol is prescribed for fever and body pains, and loratidine or chlorpheniramine for rhinorrhoea rather than a

combination pill with different medications aimed at treating fever, cough, runny nose.

Nutritional Supplements

Athletes use food supplements in an attempt to enhance performance. One study in the United Kingdom (19) found that 58.8% of high-performing athletes use at least one nutritional supplement. Supplements included vitamins, creatine, whey proteins, echinacea, iron, caffeine, magnesium and ginseng. Another study showed that 55% of high-performance British athletes used supplements (3).

Health professionals should be aware of the risk of the supplement being contaminated with metabolites of anabolic steroids. The International Olympic Committee (IOC) funded a study (20) looking at 634 nutritional supplements purchased from various sources (shops, telephone order and internet purchase) in 13 countries. It was found that 14.8% of the supplements were contaminated with pro-hormones of testosterone or nandrolone. Most of the products were from the Netherlands, Austria, United Kingdom and the United States of America. Due to the risk of contamination and until there are special labels on products making them safe for athletes, then prescribing supplements for athletes is risky. In addition, athletes should be advised that supplement taking is at their own risk.

In conclusion, care is required in prescribing common medications for athletes. The use of supplements is risky due to the chance of contamination with prohormones of anabolic steroids. The medications prescribed to athletes and the routes of administration should be within the WADA code. It is recommended that all doctors receive regular, updated information on the banned and restricted list of medications and have it available when treating athletes. Doctors who treat athletes regularly should have the TUE forms readily available. Doctors who do not treat athletes regularly should be able to readily access these forms.

Athletes in the Caribbean should also be updated regularly on doping by their governing bodies and if possibly be given a card stating commonly used generic medications for common complaints. Athletes should inform their treating physicians and pharmacists of their athletic status.

REFERENCES

1. World Anti-Doping Agency. The world anti-doping code. The 2008 prohibited list. (<http://www.wada-ama.org/en/prohibitedlist.ch2>) (accessed 2/4/08)
2. Robinson D, Milne C. Medicine at the 2000 Sydney Olympic Games: The New Zealand health team. *Br J Sports Med* 2002; **36**: 229.
3. Alaranta A, Alaranta H, Holmila J, Palmu P, Pietila K, Helenius I. Self reported attitudes of the elite athletes towards doping: differences between type of sport. *Int J Sports Med* 2006; **27**: 842-6.
4. Somerville SJ, Lewis M. Accidental breaches of the doping regulations in sport: is there need to improve the education of sportspeople? *Br J Sports Med* 2005; **39**: 512-16.
5. World Anti-Doping Agency. 2008 Prohibited List. Summary of Major modifications. http://www.wada-ama.org/rtecontent/document/Explatory_Note_2008_En.pdf (accessed 31/3/08)

6. Greenway P, Greenway M. General practitioner knowledge of prohibited substances in sport *Br J Sports Med* 1997; **31**: 129–31.
7. Laure P, Binsinger C, Lecerf T. General practitioners and doping in sport: attitudes and experience. *Br J Sports Med* 2003; **37**: 335–8.
8. De Rose EH, Da Nobrega ACL. Drug testing and doping. In Michell L, Smith A, Bachl N, Rolf C, Chan K eds. *FIMS Team Physician Manual*. Lippincott Williams & Williams Asia Ltd 2001: 188–204.
9. Evans PJ, Lynch RM. Insulin as a drug of abuse in body building. *Br J Sports Med* 2003; **37**: 356–7.
10. Saugy M, Robinson N, Saudan C, Baume N, Avois L, Mangin P. Human growth hormone doping in sport. *Br J Sports Med* 2006; **40** (Suppl 1): i35–9.
11. WADA. WADA Executive Committee approves 2010 Prohibited List September 2009. www.wada-ama.org/en/newsarticle.ch2?article ID: 3/115846 # (accessed 22/10/09).
12. Kindermann W, Meyer T. Inhaled beta2 agonists and performance in competitive athletes. *Br J Sports Med* 2006; (suppl 1): i43–47.
13. Wells DJ. Gene doping: the hype and the reality. *Br J Pharmacol* 2008; **143**: 623–31.
14. WADA. International Standards for Therapeutic Use Exemptions January: 2009. www.wada-ama.org/rtecontent/document/international_standard.pdf.
15. Dvorak J, Kirkendall D, Vouillamoz M. Therapeutic use exemption. *Br J Sports Med* 2006; **40** (Suppl 1): i40–i42.
16. WADA. ADAMS- Anti-Doping Administration & Management System. www.wada-ama.org/en/dynamic.ch2?pagecategory.id#265.
17. WADA. Medical Information to support the decisions of TUECs: Asthma www.wada-ama.org/rtecontent/document/asthma_TUEC.pdf. 2007.
18. Dvorak J, Feddermann N, Grimm K. Glucocorticosteroids in football: use and misuse. *Br J Sports Med* 2006; **40** (Suppl 1): i48–i54.
19. Petroczi A, Naughton DP. The age-gender-status profile of high performing athletes in the UK taking nutritional supplements: lessons for the future. *J Int Soc Sports Nutr*. 2008; **10**: 2.
20. Schanzer W. Analysis of non-hormonal Nutritional Supplements for Anabolic-Androgenic Steroids – an International Study. 2003 http://multimedia.olympic.org/pdf/en_report_324.pdf. (Accessed on 31/3/08).