London 2012: prescribing for athletes in ophthalmology

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Abstract

Aims Prescribing for athletes requires an up-to-date knowledge of the World Anti-Doping Agency's list of prohibited substances. As the London 2012 Olympic Games attract athletes from around the world, we review the current guidelines with respect to all medications licensed for ophthalmic use in the United Kingdom. We describe the process that an ophthalmologist can use to check for permissible medications and also highlight treatments that are contraindicated.

Methods We systematically reviewed all 77 drugs listed in Section 11 of the *British National Formulary* (Issue 63) for use in the treatment of ophthalmic conditions, and referenced these against the 2012 Prohibited List published by the World Anti-Doping Agency.

Results The majority of ophthalmic preparations are suitable for use in- and out-of-competition. Some preparations, such as glucocorticoids, are prohibited when administered systemically but permitted for topical administration. Beta-blockers are prohibited in-competition and oral carbonic anhydrase inhibitors are prohibited in- and out-of competition.

Conclusion The 2012 Prohibited List has important implications for the pharmacological treatment of ophthalmic conditions in athletes. Clinicians prescribing for athletes have a duty to familiarise themselves with the list in order to avoid causing significant damage to their patient's career and reputation.

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Introduction

Prescribing for athletes requires a unique knowledge base, with which many clinicians may be unfamiliar. In the build-up to the London 2012 Olympic Games this summer, clinicians should be familiar with the 2012 Prohibited List of the World Anti-Doping Agency (WADA),¹ before prescribing.

This study details how the attending ophthalmologist may check whether a drug is permissible for athletes, and further provides an update on permissible ophthalmic treatments.

To our knowledge this is the first such review in the ophthalmic literature.

Materials and methods

We performed a systematic review of all 77 medications currently licensed for ophthalmic use (Section 11: *Eye*) in the United Kingdom as listed in the *British National Formulary*, Issue 63.² This was then referenced with the WADA 2012 Prohibited List (published: 24 August 2011). 'Off-label' drugs have not been included in our review, nor have medications that are licensed abroad but not in the United Kingdom.

Results

Anti-infective eye preparations

All antibacterial and antiviral preparations are permitted for all routes of administration. The *British National Formulary* does not list specific antifungal agents suitable for ophthalmologic administration, but no antifungal agents are prohibited. Although the Azole antifungals are potential stimulants, they are exempted as imidazole derivatives for topical use. Povidone and iodine are both permitted.

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Glucocorticoids

Topical and intracameral glucocorticoids are permitted. All glucocorticoids are prohibited in-competition when administered by oral, intravenous, intramuscular, or rectal routes.

Anti-inflammatories

Non-steroidal anti-inflammatories, antihistamines, and mast cell stabilisers are permitted for all routes of administration.

Mydriatics and cycloplegics

Atropine, cyclopentolate, homatropine, and tropicamide are all permitted. Phenylephrine is listed in the 2012 Monitoring Programme as a stimulant with the potential for abuse, but it is not currently prohibited.

Treatment of glaucoma

Beta-blockers are prohibited by all routes in- and out-of-competition in the following sports: archery and shooting. They are prohibited in-competition only in the following sports: aeronautics, automobiles, billiards, boules, bridge, darts, golf, ninepin and tenpin bowling, powerboating, skiing and snowboarding (in ski jumping, freestyle aerials/halfpipe and snowboard halfpipe/big air).

All prostaglandin analogues and prostamides are permitted. The sympathomimetics apraclonidine and brimonidine are permitted.

Carbonic anhydrase inhibitors, including acetazolamide, are prohibited in- and out-of-competition. They are classed as masking agents, together with all other diuretics and plasma expanders. Topical preparations of brinzolamide and dorzolamide are exempted from this ruling and are not prohibited.

Topical pilocarpine is permitted. Although a potential stimulant, it is specifically exempted as an imidazole derivative for topical use.

Local anaesthetics

Lidocaine, bupivacaine, proxymetacaine, and tetracaine are permitted for all routes of administration. Cocaine is prohibited in-competition. Adrenaline is permitted only for local administration (for example, ophthalmologic, nasal) or when co-administered with a local anaesthetic; it is otherwise prohibited in-competition.

Tear deficiency, ocular lubricants, and astringents

All artificial tears, ocular lubricants, and astringents are permitted.

Other ocular preparations

Fluorescein is permitted for all routes of administration. Verteporfin is permitted. The biologics pegaptanib (Macugen, Pfizer, New York, NY, USA) and ranibizumab (Lucentis, Novartis Pharmaceuticals, Camberley, UK) are permitted.

Other considerations

All anabolic agents are prohibited in- and out-of-competition. All peptide hormones and growth factors, including insulin, are prohibited in- and out-of-competition. Hormone modulators and metabolic modulators are prohibited in- and out-of-competition. All diuretics and plasma expanders are prohibited in- and out-of-competition. All beta-2 agonists are prohibited in- and out-of-competition, except salbutamol (maximum 1600 µg over 24 h), formeterol (maximum 36 µg over 24 h) and salmeterol. Many opiate narcotics are prohibited in-competition, although codeine, dihydrocodeine, and tramadol are permitted. Cannabinoids are prohibited in-competition.

Alcohol is prohibited in-competition above blood concentrations of 0.10 g/l for the following sports: aeronautics, archery, automobiles, karate, motorcycling, powerboating. Nicotine and caffeine are included in the 2012 Monitoring Programme, and are not prohibited.

Discussion

The aim of this study was to clarify how the most recent WADA Prohibited List applies to current ophthalmic practice. We have highlighted that the majority of commonly used ophthalmic medications are permitted for competing athletes, although some commonly used preparations are prohibited. In addition, it should be noted that some drugs prohibited for systemic use are still permitted when administered as ophthalmic preparations.

Two categories of prohibited substances exist: those that are prohibited out-of-competition and those prohibited in-competition only. Athletes are required to present for random testing between competitive events (out-of-competition) to detect substances that confer long-term performance enhancement (for example, anabolic steroids), and on the day of an event (in-competition) to detect substances that confer short-term enhancement (for example, beta-blockers). Use of the latter group between competitions, although not explicitly prohibited, would be unusual without prior authorisation.

WADA operates a 'strict liability' policy, whereby any athlete testing positive for a prohibited substance is

judged to have violated an anti-doping rule violation regardless of whether the consumption was intentional or not. A first positive test most commonly results in a 2-year ban in the United Kingdom,³ which may end the competitive career of the athlete concerned. Prescribers must therefore be confident that they can advise athletes fully on the WADA status of all medications in their formulary in order to avoid both inadvertent doping (carrying the risk of liability for subsequent loss of an athlete's career and reputation) and unnecessary withholding of medications that are not prohibited. In particular, many ophthalmic topical drops have previously been shown to have significant systemic absorption⁴ and should not be overlooked when prescribing for athletes.

In the last decade there were reports regarding the Prohibited List for prescribing in patients within specialties such as rheumatology and otolaryngology.^{5,6} We can find no similar discussion in the published literature of the limitations imposed on prescribing for athletes with ophthalmic conditions.

We reviewed all medications listed in the *British National Formulary* that are licensed for ophthalmic use in the United Kingdom. However, some medications commonly used to treat ophthalmic conditions are used 'off-label'. These have not been included in our review. We have not sought to provide a comprehensive review of all substances listed in the WADA Prohibited List, and therefore many medications not directly used to treat ophthalmic conditions, have also not been included in our review. Finally, athletes arriving to the United Kingdom from overseas may present to health services, having used medications that are not licensed in the United Kingdom.

If an athlete is required to take a medication that is included in the Prohibited List, they must apply for a Therapeutic Use Exemption at least 30 days before an event, demonstrating that they would experience significant health problems without the medication, that they would not gain significant enhancement of performance from therapeutic dosage, and that there is no reasonable therapeutic alternative.

This study highlights that certain drugs used in ophthalmology are banned when used systemically, but permitted when used topically as an ophthalmic preparation, which includes glucocorticoids and carbonic anhydrase inhibitors. Those ophthalmologists managing glaucoma should pay particular attention

to the Prohibited List, as other drugs, including beta-blockers, are also prohibited.

We conclude that prescribing for athletes requires an up-to-date knowledge of the Prohibited List published by WADA. The list includes commonly used ophthalmic medications, and the ophthalmology community should be aware of this when prescribing for athletes.

Summary

What was known before

- Certain drugs, both systemic and topical, can improve athlete performance.
- The World Anti-Doping Agency lists certain ophthalmic drugs that are prohibited for use by athletes.

What this study adds

- This study reminds ophthalmic health-care workers of those medications that are prohibited, and also illustrates drugs that are permitted.
 - This study highlights that some medications are prohibited for systemic use but are permitted for topical ophthalmic use.
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Conflict of interest

The authors declare no conflict of interest.

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