DRUGS IN SPORT

David R. Mottram
Liverpool John Moores University
and
UK Anti-Doping Accredited Tutor
Overview

- WADA
- The Prohibited List
- Testing
- Extent of use
- Supplements
- London 2012 Olympics
Performance Enhancement - A Recent Development?

- The ancient Greeks used mushrooms
- Roman wrestlers used mixtures of herbs
- In ancient Egypt, the rear hooves of the Abyssinian Ass was the prescription of choice.
WHY DRUGS ARE USED IN SPORT

- Therapeutic Use
  - Long-term conditions (e.g. diabetes)
  - Short-term conditions (e.g. common cold)
  - Treatment of sport’s injury

- “Recreational” Use

- Performance Enhancement
  - Supplements (nutritional and ergogenic)
  - Prohibited substances
Doping control is the responsibility of the World Anti-Doping Agency (WADA)

- Set up in 1999 to harmonise doping control
- WADA's Anti-Doping Code has been accepted by almost all stakeholders
Key Roles

- World Anti-Doping Code
  - Prohibited List of Substances and Methods
    - In-Competition
    - Out-of-Competition
  - Therapeutic Use Exemptions
  - Sanctions
THE PROHIBITED LIST

What are the criteria for including substances and methods on the Prohibited List?
PROHIBITED LIST

- Potential to enhance or enhances sports performance
- Actual or potential health risk to the player
- Use violates the spirit of sport
WADA Prohibited List (January 2012)

I Substances and Methods Prohibited at all Times (In- and Out-of-Competition)

S.0 Non-Approved Substances
S.1 Anabolic Agents
S.2 Hormones and related substances
S.3 Beta-2 Agonists
S.4 Hormone and Metabolic Modulators
S.5 Diuretics and other Masking Agents

II Substances and Methods Prohibited In-Competition

All the categories under Section I, plus:

S.6 Stimulants
S.7 Narcotics
S.8 Cannabinoids
S.9 Glucocorticosteroids

III Substances Prohibited in Particular Sports

P.1 Alcohol
P.2 Beta Blockers
Frequently used drugs from the Prohibited List
ANABOLIC AGENTS

Androgenic Anabolic Steroids (AAS)
  • Exogenous
    Nandrolone, Stanozolol
  • Endogenous
    Testosterone

Other Anabolic Agents
  • Beta-2 Agonists such as Clenbuterol

Effects
  Increased muscle mass and strength
  Normally taken during training
Androgenic Anabolic Steroids

● Side Effects
  – Acne, testicular atrophy, menstrual irregularities, breast shrinkage
  – Atherosclerosis, salt & water retention, liver & kidney tumours
The Dwain Chambers Case

- Tested positive for the “undetectable” “designer” steroid Tetrahydrogestrinone (THG) in June 2003
- Served a 2-year ban
- British Olympic Association will not allow him to compete in Olympics

- Athletes are prepared to take drugs that have not undergone safety checks
HORMONES AND RELATED SUBSTANCES

• Erythropoietin (EPO)
  • Increases red blood cells
  • Increases oxygen supply to muscles
Erythropoietin (EPO)

- There has been a validated test for EPO since the Sydney Olympics in 2000
  - Immunoassay can distinguish between endogenous EPO and recombinant EPO
BETA-2 AGONISTS

- All Beta-2 Agonists are prohibited, except:
  - **Salbutamol** (max 1600 micrograms over 24 hours)
  - **Formoterol** (max 36 micrograms over 24 hours)
  - **Salmeterol**

- When administered by inhalation.
- A urine concentration of Salbutamol greater than 1000ng/ml or Formoterol greater than 30ng/ml is considered an Adverse Analytical Finding.
BLOOD DOPING

- Effects
  - Increase oxygen carrying capacity of the blood

- Potential Problems
  - Infection (Septicaemia, Hepatitis, AIDS)
  - Allergic reaction (Anaphylaxis)
The Jan Ullrich Case

- Ullrich, along with 13 other riders was removed from the T-Mobile Team before the 2006 Tour de France
- They were among 58 riders caught up in the Spanish police investigation into blood doping (Operación Puerto)
WADA Prohibited Methods
CHEMICAL AND PHYSICAL MANIPULATIONS

Tampering with samples during testing

Examples:
- Urine substitution
- Sharing urine
- False bladders
- Inhibition of urine excretion
WADA Prohibited Methods
GENE DOPING

- **Gene Therapy** is the transfer of genetic material to human somatic cells (non-reproductive cells) for the treatment or prevention of disease or disorders

- **Gene Doping** is the use of this technology for the improvement of performance in sport
STIMULANTS

• Effects
  • Increased alertness and aggression
  • Delay in fatigue

• Examples
  • Amphetamine & Cocaine (recreational use)
  • Ephedrine & Pseudoephedrine (used in coughs & colds)
STIMULANTS
Drugs available Over-The-Counter (OTC)

Medicines that can be bought from a pharmacy have caused great problems for athletes
The Andreea Raducan Case

- At the 2000 Sydney Olympic Games she tested positive for Pseudoephedrine
- Given the drug by her team doctor
- Strict Liability rules were applied
- She was stripped of her Gold Medal
The Alain Baxter Case

- Tested positive for Levmethamphetamine in a US version of Vicks Nasal Inhaler at the 2002 Olympics in Salt Lake City
- Under Strict Liability rules, lost his bronze medal
- His appeal was upheld, acknowledging that he did not attempt to cheat
- IOC refused to give back his medal
- WADA subsequently introduced a new rule on “Specified Substances”
STIMULANTS
Drugs available Over-The-Counter (OTC)

- In January 2004, WADA removed many of these OTC drugs from the prohibited list
- However, they were placed on a Monitoring Program
STIMULANTS
Drugs available Over-The-Counter (OTC)

- Some OTC drugs remain on the prohibited list
- Urinary concentrations above which WADA laboratories must report findings:
  - Cathine > 5 micrograms/ml
  - Ephedrine > 10 micrograms/ml
  - Methylephedrine > 10 micrograms/ml
  - Pseudoephedrine > 150 micrograms/ml
“The Impact of Changes to the Prohibited Substances List on the use of OTC Medication by Athletes”

- Questioned 557 elite athletes in 10 sports in 4 countries
  - Extent of use
  - Knowledge & understanding
  - Views & opinions
  - Demographic differences
- Inform WADA on future policy
38% of athletes had used OTC products on the Monitoring List in the past 12 months.

There was a significant difference (p<0.001) between countries

- USA: 46%
- Australia: 43%
- Canada: 32%
- UK: 24%
Respondents’ primary reason for using OTC drugs:
- To treat symptoms of illness: 73.3%
- To enhance performance: 0.7%
- Both of the above: 2.7%
- Declined to answer: 23.3%
Athletes demonstrated limited knowledge about WADA rules concerning OTC medicines
  – Only 35.1% correctly identified whether drugs were prohibited or not
Athletes would seek advice but this was not always from a reliable source
Overall the trend of athletes’ opinion was that OTC stimulants:
– May be performance enhancing
– Posed a risk to health
– Their use was against the spirit of sport
– Should remain **off** the Prohibited List
CANNABINOIDS

- Actions of Cannabis
  - Affects almost every system in the body
  - It has anxiolytic, sedative, analgesic & psychedelic properties
  - It impairs cognitive and psychomotor performance; slows reaction time; produces motor incoordination; defects short-term memory
CANNABINOIDs

This is a performance enhancing drug?
CANNABINOIDS

Marijuana use – a hazard to others
Substances Prohibited In Particular Sports
SUBSTANCES PROHIBITED IN PARTICULAR SPORTS

ALCOHOL

Alcohol is prohibited in-competition in the following sports:

Aeronautic  Karate
Archery       Motorcycling
Automobile   Powerboating

These sports apply a blood threshold of 0.1g/L
BETA BLOCKERS

• Produce anti-anxiety effects and reduce heart rate and hand tremor
• Therefore banned in sports involving:
  • hand steadiness (e.g. archery, billiards, boules, bridge, golf)
  • extreme stress (e.g. ski jumping, powerboating)
THERAPEUTIC USE EXEMPTION
THERAPEUTIC USE EXEMPTION

- A process by which an athlete can obtain approval to use a prescribed prohibited substance or method for the treatment of a legitimate medical condition.
<table>
<thead>
<tr>
<th>Medical Condition</th>
<th>Prohibited Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention Deficit Hyperactivity Disorder</td>
<td>Methylphenidate; Dextroamphetamine</td>
</tr>
<tr>
<td>Arterial Hypertension</td>
<td>Diuretics; Beta Blockers</td>
</tr>
<tr>
<td>Asthma</td>
<td>Terbutaline</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>Insulin</td>
</tr>
<tr>
<td>Post-infection Cough</td>
<td>Pseudoephedrine; Oral Glucocorticosteroids</td>
</tr>
<tr>
<td>Musculoskeletal Conditions</td>
<td>Narcotics; Oral, Rectal, i.m or i.v. Glucocorticosteroids</td>
</tr>
</tbody>
</table>
Dope Testing
Dope Testing

- Controlled through 35 WADA-accredited laboratories
- UK testing is through UKAD
- Testing is within competition or out-of-competition (OOCT)
Drug Testing Procedure

- Selection of competitors
  - In-competition
  - Out-of-competition (National Registered Testing Pool)
- Sample collection (A & B samples)
- Declaration and Certification
- Transfer to the Laboratory (chain of custody document)
Drug Testing Procedure

- Analysis of Sample A (Gas Chromatography/Mass Spectrometry)
- Reporting results
  - Negative
  - Positive
    - Analysis of sample B
- Sanctions
WADA Consequences of Anti-Doping Rules Violations

Violations result in one or both of the following:

- **Disqualification**
  
  Results in a particular competition or event are invalidated (forfeit of medals, points, prizes)

- **Ineligibility**
  
  Athlete is barred from participating or funding. Normally:
  
  - First violation - 2 years
  - Second violation - Lifetime
WADA Consequences of Anti-Doping Rules Violations

For Specified Substances susceptible to unintentional use, where an athlete can establish that the use was not intended to enhance performance, the period of ineligibility is:

- First violation
  - Minimum - warning and reprimand
  - Maximum - 1 year
What is the extent of drug misuse in sport?
Extent of Drug Misuse in Sport

- Statistical evidence
  - Media speculation
  - Official data
- Published research
  - Surveys
    - self-reporting
    - perceptual reporting
<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anabolic Agents</td>
<td>3,374</td>
</tr>
<tr>
<td>Stimulants</td>
<td>574</td>
</tr>
<tr>
<td>Cannabinoids</td>
<td>533</td>
</tr>
<tr>
<td>Beta-2 Agonists</td>
<td>209</td>
</tr>
<tr>
<td>Glucocorticosteroids</td>
<td>234</td>
</tr>
<tr>
<td>Diuretics &amp; other Masking Agents</td>
<td>396</td>
</tr>
<tr>
<td>Peptide Hormones</td>
<td>86</td>
</tr>
<tr>
<td>Beta Blockers</td>
<td>30</td>
</tr>
<tr>
<td>Narcotics</td>
<td>20</td>
</tr>
<tr>
<td>Hormone antagonists &amp; Modulators</td>
<td>75</td>
</tr>
<tr>
<td>Manipulation</td>
<td>6</td>
</tr>
<tr>
<td>Enhancement of O₂ Transfer</td>
<td>-</td>
</tr>
<tr>
<td>Alcohol</td>
<td>9</td>
</tr>
</tbody>
</table>
STATISTICS FROM WADA ACCREDITED LABORATORIES (2010)

- A Samples Analyzed = 258,267
- Adverse Findings (includes TUEs = 4,817 & multiple measurements)

= 1.87%
Why Are Drugs Misused in Sport?

- Commercialism & Professionalism
- Peer pressure
- Availability
- Media speculation
- Culture of substance taking in sport
Culture of Substance Taking in Sport

- A UK Sport study indicated that 60% of respondents used supplements.
- Of these, 72% were taking “health maintenance supplements” (e.g. vitamins). 28% were taking “ergogenic aids” (e.g. protein powders, fat loss products).
Supplements

- Supplements are unregulated, aggressively marketed and easily obtainable
- Are they safe to use?
Steroids and Nutritional Supplements
(IOC sponsored study: W.Schanzer, Cologne (2002))

- 634 non-hormonal supplements were obtained
- 14.8% contained prohormones (mainly of Testosterone and Nandrolone) which were not declared on the label
- The prohormones produce similar metabolites to Testosterone & Nandrolone

<table>
<thead>
<tr>
<th>Variation by country</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands</td>
<td>25.8%</td>
</tr>
<tr>
<td>Austria</td>
<td>22.7%</td>
</tr>
<tr>
<td>UK</td>
<td>18.9%</td>
</tr>
<tr>
<td>USA</td>
<td>18.8%</td>
</tr>
<tr>
<td>Italy</td>
<td>14.3%</td>
</tr>
<tr>
<td>Spain</td>
<td>13.8%</td>
</tr>
<tr>
<td>Germany</td>
<td>11.6%</td>
</tr>
</tbody>
</table>
How to Check if Medication is Prohibited

Access:

www.globaldro.com