

# Performance Enhancing Drugs Overview

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Performance Enhancing Drugs

Ernest Boyd, PharmD (Hon),  
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Performance Enhancing Drugs (PED)

- PEDs are substances used by athletes to improve their performance.
- The term can also be referenced by military personnel seeking to enhance combat performance.
- Although anabolic steroids are the most commonly thought of PEDs, there are a number of different classes.
- Most of these are prescription medications which are not being utilized for their intended purpose.

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World Anti-Doping Agency's (WADA) Prohibited Classes of Drugs (in-and-out-of-competition)\*

- Anabolic Agents
- Peptide Hormones, Growth Factors and Related Substances
- Beta-2 Agonists
- Hormone Antagonists and Modulators
- Diuretics and Other Masking Agents
- Stimulants (Prohibited in-competition only)
- Non-approved Substances

\*The United States Anti-Doping Agency (USADA) utilizes the same list of prohibited substances.

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## World Anti-Doping Agency (WADA)

- WADA, established in 1999, is an international independent agency funded by the governments of the world to promote, coordinate, and monitor the fight against doping in sports.
- Activities include scientific research, education, development of anti-doping capacities, and monitoring of the World Anti Doping Code (Code).
- Each year on the 1<sup>st</sup> of January, WADA releases an update with regards to the prohibited list portion of the Code.
- WADA website available at <http://www.wada-ama.org/>

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## Substances Prohibited Both In-and-Out-of-Competition

- These substances are prohibited at all times.
- Any athlete, including elite athletes (registered testing pool) or non-national level (Masters, juniors, etc.) can be tested for these substances at any time.

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## Substances Prohibited In-Competition

- These substances are not tested for out-of-competition.
- "In-competition" may vary by definition based on different events. For example, some events may define in-competition as "12 hours before the start of the competition".
- Athletes must ensure that all substances prohibited in-competition have completely cleared from their body before competition.
- If total drug clearance is not possible, or the chronic use of a medication is needed, the athlete must apply for a Therapeutic Use Exemption (TUE).

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## Anabolic agents

- Normally are referred to as steroids or testosterone.
- Anabolic agents are substances similar to natural male sex hormones. They are only legally available with a prescription.
- Anabolic steroids are prescribed for the treatment of delayed male puberty and for individuals with low levels of testosterone.
- Steroids can come in a variety of different dosage forms including:
  - Creams, lotions, injections, dissolvable tablets, and capsules.

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## Anabolic agents

- Why are they abused?
  - Increase muscle size, strength, and endurance
  - Improve muscle recovery time
- Steroids are injected prior to training to reduce fatigue and increase recovery.
- Detrimental effects of steroids
  - Acne and cysts
  - Breast growth and shrinking of testicles in men
  - Voice deepening and growth of body hair in women
  - Heart problems, including heart attack
  - Liver disease, including cancer
  - Aggressive behavior
- Able to be detected by a urine sample. Will stay in the body for six months to a year.

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## Peptide Hormones, Growth Factors and Related Substances (Peptide Hormones)

- Peptide hormones include human growth hormone (hGH) and human chorionic gonadotropin (hCG), etc. that are normally used to treat adult growth hormone deficiency and female infertility, respectively.
- These hormones are sometimes referred to as lean muscle builders due to muscle production (anabolic) properties.

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## Human Growth Hormone (hGH)

- A hormone naturally found in the body that increases growth effects of cells within the body.
- Why is it abused?
  - Thought to increase muscle mass, reduce body fat, and increase injury resistance
  - Currently no clinical evidence
- Detrimental effects include:
  - Increased risk of diabetes
  - Retention of fluids
  - Joint and muscle pain
  - High blood pressure
  - Osteoporosis
- Blood tests have been used to detect hGH since 2004.
- Agents available as injections.

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## Questions?

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## Peptide Hormones, Growth Factors and Related Substances (Peptide Analogues)

- Peptide analogues include erythropoietin (EPO), darbapoetin, etc. that are normally used to treat anemia from chronic kidney disease.
- These analogues are referred to as blood boosters because they increase the oxygen-carrying capacity of blood.
- Practice is referred to as blood doping.
- Agents available as injections.

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## Erythropoietin (EPO)

- Naturally produced by cells in the kidneys and liver, this analogue is involved in several biological functions including wound healing and red blood cell production.
- Why is it abused?
  - Increased number of red blood cells
  - Improved oxygen delivery to muscles, which directly improves their endurance capacity
- Detrimental effects include:
  - Heart disease
  - Stroke
  - Blood clots
- Since 2002, tests performed by US sports authorities have consisted of urine or "direct" tests while at the Olympics both blood and urine tests are done.

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## Beta<sub>2</sub> Agonists

- Beta<sub>2</sub> agonists are drugs that cause smooth muscle relaxation resulting in the opening of the lungs for greater oxygen delivery.
- Examples include albuterol, salmeterol, formoterol, terbutaline, etc. administered by injection or tablet.
  - Agents may be permitted with an approved Therapeutic Use Exemption (TUE)
- Normally used to treat asthma and pulmonary disorders.
- Why are these abused?
  - Reduce recovery time from an injury
  - Increase muscle mass
  - Increased endurance
- Detrimental effects include:
  - Insomnia
  - Anxiety
  - Increased heart rate
  - Tremors

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## Hormone Antagonists and Modulators (Anti-Estrogens)

- Approved for use in the treatment of breast cancer and the prevention of recurrent breast cancer.
- It works in the body by preventing the formation of estrogen or by blocking estrogen from binding to estrogen dependent cancers.
- Common anti-estrogen agents include tamoxifen and anastrozole available as tablets.

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## Anti-Estrogens

- Why are they abused?
  - Typically used to negate some adverse effects from steroids.
    - Reduce excess fluid accumulation
    - Prevent the development of breast
  - Also used from a misconception that less estrogen in the body will help athletes recover faster after a workout.
- Detrimental effects of anti-estrogens
  - Weakening of bones
  - Increased cardiovascular risk
  - Increased likelihood of the development of blood clots
- Anti-estrogens are only available as a prescription and are detectable in a urine drug test

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## Diuretics and Masking Agents

- Diuretics aka "water pills" such as furosemide, triameterene, hydrochlorothiazide, etc. are used in heart failure and high blood pressure to quickly eliminate excess body fluid.
- Why are they abused?
  - Meet weight restrictions (wrestlers, boxer, etc.)
  - Increase urine volume making it more difficult to detect other PEDs in doping tests
- Detrimental effects include:
  - Dehydration
  - Muscle cramps
  - Dizziness upon standing
- They are detected using urine analysis.
- Agents available as tablets

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## Stimulants

- Most abused stimulants for increased athletic performance are prescription medications.
- Stimulants are prescribed for the treatment of ADHD and narcolepsy.
  - Examples of stimulants include:
    - Adderall, Ritalin, Concerta, ephedrine, methylphenidate, and amphetamine.
- Why are they abused?
  - Stimulants are used to increase physical and mental processes.
  - Stimulants increase
    - Concentration
    - Alertness
    - Confidence
    - Reaction time
  - Stimulants decrease
    - Feeling of fatigue
    - Perception of pain

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## Stimulants

- Detrimental effects of stimulants include:
  - Heat stroke
  - Cardiac arrest
  - Heart rhythm abnormalities
  - Ruptured blood vessels in the brain
  - Increased heart rate
  - Increased blood pressure
- Most stimulants are CII controlled substances, the most highly regulated medications within a pharmacy. CII substances are defined by DEA as having a high potential for physical or psychological addiction.
- Stimulants are included in standard athletic drug testing protocols. Stimulants are used predominantly for performance enhancement during competition, as opposed to training. Stimulants are detectable for 48 hours after use in the urine.

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## Non-Approved Substances

- This "open" section addresses the abuse of pharmacological substances not included in other sections of the Prohibited List.
- This includes substances that are not approved by any governmental regulatory health authority for human therapeutic use.
- Examples include drugs under pre-clinical or clinical development, veterinary drugs, or street drugs (heroin, MDMA, PCP, LSD, etc.).
- These substances are prohibited at all times.

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## Special Mention – Creatine

- Creatine is a naturally occurring molecule in the body that helps supply energy to all cells in the body, primarily muscle.
- Creatine has been tried as a supplemental treatment for Parkinson's disease, heart failure, and muscular dystrophy.
- Why are they used?
  - Increased muscle mass
  - Increased exercise performance
- Detrimental effects include:
  - Kidney damage
  - Muscle cramping
  - Dehydration
- Use is not banned by the NCAA but colleges are prohibited from providing creatine to players.

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## Questions?

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## State Medical Board's Perspective on Performance Enhancing Drugs

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**William J. Schmidt, Esq.**  
Senior Counsel  
State Medical Board of Ohio  
October 25, 2013

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## Medical Board Overview

12 Board members appointed by the Governor – 7 MD, 1 DPM, 1 DO and 3 consumers; five year terms, Board meets monthly

Regulate over 65,000 licensees: MD, DO, DPM, Physician Assistants, Anesthesiologist Assistants, Radiologist Assistants, Cosmetic Therapists, Massage Therapists, Acupuncturists, Oriental Medicine Practitioners, and Genetic Counselors regulated by Medical Board.

Agency supports 79 positions; Agency funded by licensure fees

*Protecting the public through effective medical regulation*

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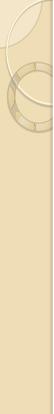
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## Drugs of Interest

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### Steroids and related agents

- Testosterone
- Human Growth Hormone (HGH)
- Human Chorionic Gonadotropin (hCG)

### Controlled substance stimulants

- Amphetamines

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## Concerns for Prescribing Physicians

### Grounds for Medical Board disciplinary action:

- 4731.22 (B)(6) Minimal standards of care
- 4731.22 (B)(10) Acts constituting a felony
- 4731.22 (B)(12) Acts constituting a misdemeanor in the course of practice
- 4731.22 (B)(20) Violations of Board statutes or rules

Section 4731.22, Ohio Revised Code

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## Medical Board Rules

**4731-11-03** Schedule II controlled substance stimulants

**4731-11-05** Use of drugs to enhance athletic ability

**4731-11-09** Prescribing to persons not seen by the physician (a.k.a. Internet Rx)

Chapter 4731-11, Ohio Administrative Code, Controlled Substances

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## Criminal Law Concerns

### Section 2925.03, O.R.C. – TRAFFICKING

- (A) No person shall ...
- (1) sell or offer to sell a controlled substance ...
- (B)(1) Does not apply to prescriber whose conduct was in accordance with Chapter 3719. and 4731. of the Revised Code
- (B)(2) Exception for FDA approved research

Ohio Revised Code Chapter 3719., Controlled Substances; Chapter 4731., Medical Board

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## Criminal Law Concerns

### Section 2925.11, O.R.C. – POSSESSION OF CONTROLLED SUBSTANCES

- (A) No person shall knowingly obtain, possess or use a controlled substance or a controlled substance analog
- (B)(1) Does not apply to prescriber whose conduct was in accordance with Chapter 3719. and 4731. of the Revised Code
- (B)(2) Exception for FDA approved research

Ohio Revised Code Chapter 3719., Controlled Substances; Chapter 4731., Medical Board

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## Contact Information



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