Amphetamines
Ephedrine (i.e., Ripped Fuel, Xenadrine RFA-1, Hydroxycut, Thermo Speed)

1. What type of athletic performance would this agent help (aerobic/anaerobic/strength)

- Power and speed types of events

2. What is the purported mechanism of action for the agent?

- Activates the SNS
- Thought to increase concentration and alertness
- Thought to improve performance by delaying fatigue, increasing speed and power

3. How does it actually improve performance?

- Increases strength, acceleration, HR_{max}, time to fatigue

4. Is it safe, legal and effective?

- Can elevate HR and BP
- Can trigger cardiac arrhythmia
- Addictive
- Legality depends on the sport (Banned in NFL and Olympics)
- Believed to have been the cause of death in a number of athletes

Caffeine

1. What type of athletic performance would this agent help (aerobic/anaerobic/strength)

- Power and speed types of events
- Aerobic Events

2. What is the purported mechanism of action for the agent?

- Activates the CNS
- Thought to increase concentration and alertness
- Thought to improve performance by delaying fatigue, increasing speed and power

3. How does it actually improve performance?

- Increases catecholamine release
- Increases Fatty Acid mobilization which can spare muscle glycogen

4. Is it safe, legal and effective?

- Addictive
- Can cause nervousness/restlessness and insomnia
- Can cause dehydration
- Legality depends on the sport

Anabolic Steroids

1. What type of athletic performance would this agent help (aerobic/anaerobic/strength)

- Power and speed types of events

2. What is the purported mechanism of action for the agent?

- Accelerates growth
- Increases FFM and muscle mass
- Facilitates recovery

3. How does it actually improve performance?

- Increases body mass, FFM, muscle size and strength

4. Is it safe, legal and effective?

- Illegal in most sports
- Many risks
  - Suppression of gonadotropic hormones
  - Early closure of epiphysis in children
  - Liver damage
  - Cardiomyopathy
  - Increased cholesterol levels
  - Changes in mood swings and violent behavior

Erythropoietin (EPO)

1. What type of athletic performance would this agent help (aerobic/anaerobic/strength)

- Endurance events

2. What is the purported mechanism of action for the agent?

- Increases RBC production

3. How does it actually improve performance?

- Increased RBC concentration which increases O_2 carrying capacity of the blood
- Increases Hct and Hb by ~10%
- Increases VO_{2max} by ~6-8%
- Increases time to fatigue by ~13-17%

4. Is it safe, legal and effective?

- Illegal in a number of sports (Olympic Sports, Cycling)
- New testing procedures can detect the use of EPO
- While effective, can increase blood viscosity
  - Can lead to clotting and heart failure

Oxygen Supplementation

1. What type of athletic performance would this agent help (aerobic/anaerobic/strength)

- Endurance events
- Recovery (?)

2. What is the purported mechanism of action for the agent?

- Increases O_2 content of blood

3. How does it actually improve performance?

- Can enhance blood O_2 content, but only if the oxygen is breathed during exercise

4. Is it safe, legal and effective?

- No effect if performed prior to exercise or to enhance recovery following exercise (possibly may be helpful at altitude)
- Effectiveness is doubtful in a “real-world” setting as one would have to carry an oxygen tank with them during exercise
- Legality ????

Bicarbonate Loading

1. What type of athletic performance would this agent help (aerobic/anaerobic/strength)

- Anaerobic events lasting 1-7 minutes in duration

2. What is the purported mechanism of action for the agent?

- Increases blood bicarbonate levels which increases blood buffering capacity

3. How does it actually improve performance?

- Decreases blood lactate accumulation which results in less $[H^+]$ in the blood. This will increase time to fatigue during high intensity, short duration events
- Time to fatigue can be increased by ~42% in these types of activities

4. Is it safe, legal and effective?

- Relatively safe and legal
- Can consume ~300mg of bicarbonate/kg body wt about 45 min to 1 hour prior to the event.
- Risks: Diarrhea, cramps, bloating

Creatine Supplementation

1. What type of athletic performance would this agent help (aerobic/anaerobic/strength)

- Power or sprint events that are repeated
- Does not increase strength

2. What is the purported mechanism of action for the agent?

- Increases skeletal muscle creatine (Cr) levels
- Increased muscle mass (???) and decreased body fat

3. How does it actually improve performance?

- CrP levels are increased which enhance the ATP-CrP energy system
- Aids in recovery of the ATP and CrP stores between repeated bouts of high intensity types of activity
- Allows for increased time to fatigue during subsequent bouts of exercise due to enhanced recovery
- Does not increase strength or muscle mass

4. Is it safe, legal and effective?

- Generally legal and believed to be safe
- Should not be used chronically (i.e., every day)
- Acute use: 20 g/d beginning 1 week prior to a competition
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