To Supplement or Not?

Meg Gibson, MD, CAQ Sports Medicine

Director, UMKC Primary Care Sports Medicine Fellowship
Head Team Physician UMKC
Department of Community and Family Medicine, TMC Lakewood
Department of Orthopedics Division of Sports Medicine, Children’s Mercy
Objectives

- Understand how nutrition supplements are regulated
- Know what supplements have shown performance benefits for athletes
- Understand and be able to explain potential side effects and adverse events associated with supplements
- Give patients and families resources to learn more about nutrition supplements
Sports Supplements

- Controversy about use
- Confusion about what is fact versus myth
- Dietary manipulation in an attempted to enhance athletic performance
Supplements have only recently been used by athletes to try to improve athletic performance. . .
False

- 776 BC Greek Olympians used dried figs, mushroom, strychnine
- 1889 Dr Brown-Sequard injected himself with extracts from animal testicles
- 1935 testosterone isolated
- 1959 first case high school football player using steroids
• Young athletes modeling themselves after professional athletes
• More pressure on amateur athletes to perform
• Rising cost of college education
My child doesn’t eat well and taking a supplement will help. . .
• Must have a balanced diet  
  – Will NOT correct poor diet

• Supplements only provide nutrients, not complete food sources  
  – Do NOT replace food
Athletes with poor nutritional habits will not reach full potential
Adequate nutrients are important for tissue growth and repair
Athletic activity requires high metabolic rates for extended periods of time
Dietary habits are learned at a young age and carried into adulthood
I got this supplement at GNC and it lists the ingredients, so I know exactly what I am taking. . .
Regulation of nutritional supplements in the U.S. changed in 1994

- Congress passed the Dietary Supplement Health and Education Act (DSHEA)
- Food not drugs

Not required to get FDA approval before producing or selling
- Manufacturers analyze identity, purity, and strength, not required to demonstrate safety or efficacy.
- Contamination of products with banned substances can occur.
  - IOC Medical Commission analyzed 634 nutritional supplements and 15-25% contained non-labeled substances that could lead to a positive drug test.
A supplement will make me a great athlete. . .
False

- No known food or supplement will allow an average athlete to become an Olympic athlete
Certain supplements have been shown to have ergogenic or performance enhancing effects
Ergogenic aids that perform as claimed

- Creatine
- Caffeine
- Sports drinks, gels, bars
- Protein and amino acid supplements
Creatine

- Most widely used ergogenic aid
- Build muscle
- Enhance recovery
- Effective in repeated shorts bursts of high-intensity sports
  - Sprinting, weight lifting
Aerobic recovery

Creatine $\xrightleftharpoons{CK}^*$ Phosphocreatine

Oral Cr supplementation

20% increase muscle pCr stores
Quicker pCr formation
Buffer lactic acid (delay fatigue)
Creatine

- **Doses**
  - 5g 4 times per day 4-6 days, 2g per day for 3 months. 1 month no use
  - 6-8 glasses water per day
  - May see an increased body mass of muscle and water

- **Hypo-responders:** 30%, do not respond

- **Contamination is a concern**
Creatine

- Increase strength short duration anaerobic events
- No improvement in endurance performance
Creatine Adverse Effects

- Weight gain
- Minor GI discomfort
- Muscle cramps
- Case reports of renal function compromise
• Legal supplement

• ACSM recommends that it not be used by anyone younger than 18 years old

• Use in HS athletes
  – 14-18 yo: 8.2%
  – 12th graders: 44%

Creatine
Creatine in Foods

- **Daily requirement 2 gm**
  - 8 oz pork - 1.1 gm creatine
  - 8 oz salmon - 1 gm creatine
  - 8 oz beef - 1 gm creatine
  - 8 oz cod - 0.7 gm creatine
Caffeine

- Most widely used stimulant in the world
- Quickly absorbed peak 1-2 hours

- Increase aerobic endurance and strength
- Improve reaction time
- Delay fatigue

CNS stimulant

Dec perception of effort
Caffeine

- 3-9 mg/kg body weight prior to exercise increases performance during prolonged endurance exercise and short-term intense exercise lasts 5 minutes in the laboratory in high level adults athletes

- NCAA limits <15μg/mL in urine
Caffeine Adverse Effects

- Used in moderation: no dehydration
- Don’t use in combination with other stimulants
- Side effects: anxiety, jittery, inc HR, GI distress, insomnia
- 2005 Poison Control Centers 4600 calls related to caffeine, 2600 patients <19 yo
Canadian Centre for Drug Free Sport

- 27% of Canadian youths (11-18 years old) had used a caffeine-containing substance in the previous year for the specific purpose of enhancing athletic performance

Gateway ergogenic supplement?
My starting quarterback missed lunch, but this energy bar will be enough for him eat. . . .
False

- Sports bars and gels should not replace meals
- Sports drinks should not be consumed at meals and should not replace milk or water
Drinks, gels, bars

- Sports drinks: carbohydrates, glucose
- Sports bars: high carbohydrate, less protein
- Gels, honey, sports beans
Sports Drinks

- Glucose stimulate sodium and water absorption
- Good for events >1 hour
- Replace factors loss through sweating
- Drinks: easy to transport, less GI upset
- 32 oz per hour
  - 5-10 oz every 15-20 minutes
Sports Drinks Adverse Effects

- Unnecessary calories
- Dental erosion
Sports Drink vs Energy Drinks

- Energy drinks not recommended <18 yo
- Contain caffeine and other stimulants
  - 500mg caffeine=14 cans caffeinated soft drink
- Amount of carbohydrates may be very low or very high
- Risk dependence and addiction
To increase muscle mass protein or amino acid supplements are the necessary . . .
Protein and amino acid supplements are no more or less effective than food

- Strength and endurance athletes:
  1.2-1.7 grams/kg body weight
  0.5-0.8 grams/pound body weight

Concern with unlisted ingredients and contamination
True

- **Pre-exercise protein**
  - Increases resting energy expenditure for 48 hr
    - Increase lean muscle mass
    - Reduce fat mass

- **Post-exercise protein + carbohydrate**
  - Skeletal muscle hypertrophy
  - Best within 1 hour of exercise
Protein

- Low-fat milk good recovery drink

- Whey protein
  - Rapid absorption
  - High concentration of amino acids
  - Can increase work capacity
  - Safe unless allergic to milk
Trying to educate high school athletes about supplements is a waste of time. They won’t remember anything we tell them and it will not change their minds if they plan to use a supplement. . .
False

- Two main categories to change drug use by athletes
  - Rule changes and testing
  - Education
True

- Education initiatives make a difference!
  - 3000 HS football players
    - Group interactive classroom sessions and exercise training sessions
    - Control group given a brochure
  - More knowledgeable about steroid and drug effects
  - Less likely to believe supplement ads
  - More able to reject drugs from peers
  - End of season and 1 yr later lower steroid and supplement use
Resources

- Supplements 411
  - http://www.usada.org/substances/supplement-411/


- Center for Drug Free Sport Resource Exchange Center
Supplement Summary

- Supplements should be used AUGMENT, not REPLACE the diet
- Natural does not mean SAFE
- Lack of purity-what you see is not always what you get
- Cost and taste!
References