Best practices in nutritional supplementation and ergogenic aids: A scientific review

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Best practices in nutritional supplementation and ergogenic aids: A scientific review

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Supplements and Ergogenic Aids

Supplement

- By U.S. law a supplement is a product taken by mouth that contains a "dietary ingredient" intended to supplement the diet

Ergogenic Aid

- Any training technique, mechanical device, nutritional practice, pharmacological method, or psychological technique that can improve exercise performance capacity and / or enhance training adaptations

Supplements and Ergogenic Aids

International Society of Sports Nutrition (ISSN)

Catagorizations

- Apparently Effective: research indicates substance is apparently safe and effective
- Possibly Effective: initial studies support rationale for use but more research is needed
- Too early to tell: use is sensible in theory, but research is lacking to support current use
- Apparently Ineffective: lack evidence or have been found to be ineffective

(Krieder et al., 2010)

Protein

Athletes and Protein

- Average person needs 0.8 g/kg bodyweight per day
- International Society of Sports Nutrition Recommends
  - Athletes take in 1.4 - 2.0 g/kg bodyweight per day
    - Endurance athletes should stay to the low end of range
    - Intermittent sport (soccer, basketball) athletes should stay in the middle of the range
    - Resistance training athletes should stay at the high end of the range

Protein

International Society of Sports Nutrition Recommends (Cont.)

- Most protein should be taken through foods
  - If protein powders are used they should contain both whey and casein
    - Whey – fast acting
    - Casein – slow acting, longer lasting
- ISSN reports that consuming 3-6 grams of essential amino acids (EAA) prior to or following exercise may increase muscle mass gains
- Research has reported that BCAA may decrease muscle breakdown and increase muscle building

Protein

- Branch chain amino acids may be helpful (BCAA)
  - About 1/3 of skeletal muscle is made up of BCAAs
  - Leucine, isoleucine, and valine (exist in 2:1:1 ratio in meat)
  - Leucine seems to have the greatest effect
  - Look for combination of BCAA (2:1:1) in protein supplements
- Research has reported that BCAA may decrease muscle breakdown and increase muscle building
- Timing – athletes can benefit from taking some protein before, during and after exercise
  - Greatest benefit is after exercise (with some CHO)

Basic Supplementation

Milk the Natural "Super" Sports Drink

- Milk contains casein and whey protein, carbohydrates, amino acids, vitamins and minerals
- Milk has high levels of the electrolytes sodium and potassium
- When additional carbohydrates are added (like in chocolate milk) the ratio of carbohydrates to protein in mild falls in the ideal 3-4 to 1 range

Basic Supplementation

Carbohydrates

- Due to increased need for energy ISSN recommends athletes should ingest carbohydrates before, during and after activity
- ISSN recommends ingesting a combination of different forms of carbohydrates
  - Higher oxidizing: sucrose, maltose and maltodextrines
  - Lower oxidizing: fructose and galactose
  - Fructose does not cause insulin spike, but can cause GI distress

Basic Supplementation

Vitamins and Minerals

- Increasing vitamin and mineral intake has the greatest benefit when the vitamin or mineral was lacking in adequate intake in the original diet
- Antioxidants
  - Vitamins A, C, and E may help athletes tolerate exercise better and enhance recovery

Basic Supplementation

Vitamins and Minerals

- Electrolytes
  - Sodium, potassium, and calcium are often included with carbohydrates in sports drinks to help prevent dehydration and enhance prolonged endurance exercise capacity
  - Increasing sodium intake is recommended during the first couple days of training in heat and humidity to help maintain fluid balance and prevent dehydration

Ergogenic Aids

ISSN "Apparently Effective" Ergogenic Aids

- Creatine Monohydrate
  - Shown to be a safe way to increase high-intensity exercise capacity and lean body mass
  - Requires additional water intake, can dehydrate
- Creatine Supplementation Suggestions (ISSN)
  - Start by ingesting approximately 0.3 grams/kg/day for at least three days
  - Then take 3-5 grams/day afterwards to maintain adequate levels

Ergogenic Aids

ISSN "Apparently Effective" Ergogenic Aids

- Sodium Phosphate and Sodium Bicarbonate
  - Thought to increase anaerobic threshold with sodium bicarbonate enhancing the bloods ability to buffer acidity (enhance blood buffering)
- Caffeine
  - Stimulant that can increase energy expenditure, aid in weight loss, help reduce body fat and improve aerobic capacity

Basic Suggestions

Multivitamins

- ISSN suggests that a daily multivitamin be used to be sure all basic needs are met
- Antioxidants Vitamin A, C and E help to improve the immune system
- Electrolytes (sodium, potassium, and calcium) help prevent dehydration and enhance prolonged endurance exercise capacity

Basic Suggestions

- Omega-3 fatty acids (essential fatty acid)
  - recommended by the *American Heart Association* to promote heart health
- Glucosomine and Chondroitin
  - thought to help keep joints healthy and reduce joint pain

Fluids and Electrolytes

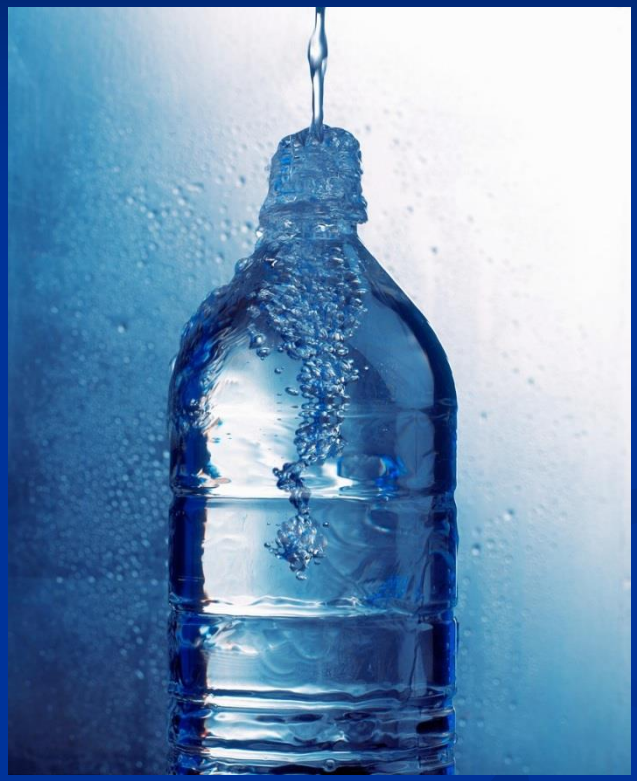
- GSSI
  - NFL Practice
    - 80-87 Degrees
  - Average Sweat Loss
    - 4.2 Liters = Over 1 Gallon
  - Range
    - 1.87-5.02 Liters
  - Average Fluid Intake-
    - 3.07 Liters
  - Athletes replaced
    - **39-120%** of sweat loss
- Electrolytes
  - Shirreffs et al., 2006
    - Soccer players
      - 90 minute match
      - 3-4g Na Losses

Fluid-Replacement Guidelines

- Encourage athletes to hydrate properly before exercise in a hot environment (16 fluid ounces of cool beverage 2 hours before workout).
- Athletes should drink fluid frequently during activity.
- Have fluids readily available, as thirst mechanism does not function adequately when large volumes of water are lost.
- Water is ideal fluid replacement, although flavored beverages may be more effective at promoting drinking. When significant weight has been lost through sweating, adding salt to the beverage can promote rehydration more effectively than plain water.
- Ideal fluid-replacement beverage depends on duration and intensity of exercise, environmental temperature, and the athlete.

Proper Hydration

- Before Activity: Drink 2-3 cups (500-750 ml)
- During: Drink 1 cup (250 ml) or more every 15-20 minutes or 1 qt (1 liter) per hour
- After: Replace fluid and carbohydrate after the event
  - It is good to eat some high glycemic foods such as bread, sweets, potatoes within 2 hours of completing an event



Prevention of Muscle Cramps

- Potential Causes
  - Dehydration
  - Electrolyte imbalance
  - Poor Conditioning
- Cramper vs. Non
  - Stofan et al., 2005
    - Sweat sodium losses 2x higher in crampers vs. non
- Cramper Protocol
  - Keep fluid intake High
  - Water Bottles on seats
    - 4 liters/day
    - 120-140 oz
  - Electrolyte (Na) Supplements
    - 1500-3000mg of Na

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Other Good Nutritional Resources

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