Nutritional Ergogenics
What is an ergogenic aid?

- **Ergo** = “work”
- **Genic** = “to generate”
- Substance or product that enhances performance
- Examples?
Types of Ergogenic Aids

• Physiological
• Biomechanical
• Psychological
• Pharmacological
• Nutritional
## Types of Ergogenic Aids (continued)

<table>
<thead>
<tr>
<th>Type of Ergogenic Aid</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutritional</td>
<td>Any supplement, food product, or dietary manipulation that enhances work capacity or athletic performance</td>
<td>Carbohydrate loading; creatine phosphate; amino acid supplementation; vitamin supplementation; glucose polymer drinks; sports gels; carbohydrate-loading drinks; liquid meals</td>
</tr>
<tr>
<td>Physiological</td>
<td>Any practice or substance that enhances the functioning of the body’s various systems (e.g., cardiovascular, muscular) and thus improves athletic performance</td>
<td>Bicarbonate buffering; any type of physical training (e.g., endurance, strength, plyometric); blood doping via transfusions; the practice of warming up</td>
</tr>
<tr>
<td>Psychological</td>
<td>Any practice or treatment that changes mental state and thereby enhances sport performance</td>
<td>Visualization; sessions with a sport psychologist; hypnosis; pep talks; relaxation techniques</td>
</tr>
<tr>
<td>Biomechanical</td>
<td>Any device, piece of equipment, or external product that can be used to improve athletic performance during practice or competition</td>
<td>Weight belts; knee wraps; oversize tennis rackets and golf clubs; clap skates; body suits (swimming/track); corked bats</td>
</tr>
<tr>
<td>Pharmacological</td>
<td>Any substance or compound classified as a drug or hormonal agent that is used to improve work output and/or sport performance</td>
<td>Hormones (e.g., growth hormone, erythropoietin, anabolic androgenic steroids); amphetamines; caffeine; beta-blockers; ephedrine</td>
</tr>
</tbody>
</table>
What are dietary supplements?

- Defined by The Dietary Supplements Health and Education Act of 1994 (DSHEA) Not a food, only “supplements” the diet

- Contain one or more of the following:
  - Vitamin
  - Mineral
  - Herb or other botanical
  - Amino acid
  - Dietary substance to supplement diet
  - A concentrate or combination of above
Dietary Supplements

- FDA approval not required before marketing
- Must be labeled as a “dietary supplement”
- “Supplement Facts” panel required
- Supposed to list all ingredients

**Supplement Facts**

<table>
<thead>
<tr>
<th>Amount Per Serving</th>
<th>% Daily Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>136</td>
</tr>
<tr>
<td>Calories from Fat</td>
<td>18</td>
</tr>
<tr>
<td>Total Fat</td>
<td>2g</td>
</tr>
<tr>
<td>Saturated Fat</td>
<td>1g</td>
</tr>
<tr>
<td>Trans Fat</td>
<td>0g</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>0mg</td>
</tr>
<tr>
<td>Sodium</td>
<td>50mg</td>
</tr>
<tr>
<td>Potassium</td>
<td>100mg</td>
</tr>
<tr>
<td>Calcium</td>
<td>130mg</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>0g</td>
</tr>
<tr>
<td>Protein</td>
<td>30g</td>
</tr>
</tbody>
</table>

**Ingredients:** whey protein concentrate and isolate, artificial flavors, maltodextrin, acesulfame potassium
Dietary Supplements (continued)

- May include health, nutrient content, or structure/function claims on label
- However, these claims are not closely monitored by FDA
Supplement Marketing

• Overseen by Federal Trade Commission
• Product endorsements
  – Athletes, movie stars, etc.
• Testimonials
• Claimed “scientific research” backing:
  – Studies/data is unpublished
  – Done in foreign country
• False or untested structure/function claims
Are supplements safe?

- Some are safer than others
- “Good Manufacturing Practices”
- Look for USP seal
- Buy from well-known companies
What is doping?

• Practice of enhancing performance using foreign substances or other artificial means
• Derived from Dutch word “dop”
• Is a problem of epidemic proportions in sport
• Oversight agencies
  – WADA
  – USADA
Inadvertent Doping

• Ingestion of substances that unbeknownst to the athlete can cause a positive test for doping.

• Causes
  – Ignorance of what substances are banned.
  – Names in ingredients list are not recognized.
  – Manufacturer may not list all ingredients.
  – Product could be contaminated in production.
Types of Commonly Encountered Doping Agents

- Anabolics
- Prohormones and hormone releasers
- Fat reducers
- Anticatabolics
- Vitamins and minerals
Anabolics

- Enhance the body’s ability to build tissue, particularly muscle
- Examples
  - Testosterone
  - Anabolic-androgenic hormones
  - Growth hormone
Prohormones and Hormone Releasers

• Substances touted to be converted to or increase production of anabolic hormones in the body

• Prohormone examples
  – Androstenedione; “Andro”
  – Beta-hydroxy-beta-methyl butyrate (HMB)

• Hormone-releaser examples
  – Ornithine and arginine
  – Clonidine
Fat Reducers

• Substances that:
  – Decrease appetite
  – Increase fat mobilization and utilization
  – Block absorption of ingested fats

• Examples
  – Caffeine
  – L-carnitine
  – Chitosan
  – Ephedrine
Anticatabolics

• Substances that decrease the breakdown of body tissues, thus slowing protein degradation
• Examples
  – Glutamine
  – Branched chain amino acids
  – Leucine
  – Whey protein
Vitamins and Minerals

• Micronutrients that may enhance enzyme activities and thus improve athletic performance

• Examples
  – B vitamins
  – Chromium
  – Iron
Nutritional Ergogenics Used by Endurance Athletes

- Branched chain amino acids
- Caffeine
- Coenzyme Q10
- Energy bars
- Energy gels
- Ginseng
- Glycerol

- L-carnitine
- Medium-chain triglycerides (MCT)
- Pyruvate
- Sodium/electrolyte tablets
- Sports beverages

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Nutritional Ergogenics Used by Strength/Power Athletes

- Chromium
- Creatine
- Conjugated linoleic acid
- Growth hormone
- Anabolic steroids

- Protein powders
- Protein bars
- Medium-chain triglycerides
- Beta-hydroxy-beta-methyl butyrate
Nutritional Ergogenics Used by Team Sport Athletes

- Same as other athletes
- Depends on physical demands of sport

What are examples of sports that might use both strength/power and endurance ergogenic aids?
Where can sport nutritionists learn more?

- NCAA
- Center for Food Safety and Applied Nutrition (CFSAN)
- ACSM
- NIH Office of Dietary Supplements
- U.S. Pharmacopoeia
- MedWatch

- Food and Nutrition Information Council
- Consumer labs
- Books
  - *Ergogenics Edge*
  - *Sport Supplements*
- Supplement Watch
- WADA and USADA

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Tools for Researching Nutritional Ergogenic Aids

• MEDLINE: Includes research/professional journals in the medical field
• CINAHL: Includes research/professional journals in nursing and allied health fields
• Sport Discus: Database that includes general media sources involving sport
Are Nutritional Ergogenic Aids Necessary?

• Your Ergogenic Quiz on Thurs., 4/7/11 this week base on these lecture notes

• Video Response for the following videos due on Thurs., 4/7/11 @ 11AM!