Nutrition for the Athlete

Outline

- Importance of Nutrition
- Making Energy/Fuel Sources
- What and When to Eat
- Hydration
- Supplements

Importance of Sports Nutrition
Importance of Sports Nutrition

- Good nutrition essential to athletic performance
  "It is the position of the American Dietetic Association, Dietitians of Canada, and the American college of Sports Medicine that physical activity, athletic performance, and recovery from exercise are enhanced by optimal nutrition."
  Position Paper from the Journal of the American Dietetic Association

- Provides fuel, aids with muscle and glycogen recovery, builds muscles, maintains clear thinking, prevents muscle and bone loss

Making Energy/Fuel Sources
Fuel Source for the Body

- All cells, including muscle cells, use ATP
- ATP (adenosine triphosphate) = main energy currency for cells. Energy comes from breaking of high energy bonds between phosphates

![ATP Diagram]

- Energy comes from breaking of chemical bonds between phosphates
  
  \[ \text{ATP} \rightarrow \text{Energy to do activity} + \text{ADP} + \text{Pi} \]

- ATP is formed from energy obtained from food or breakdown of body’s energy stores (glycogen, fat, muscle)
  
  \[ \text{ADP} + \text{Energy from food} + \text{Pi} \rightarrow \text{ATP} \]
Fuel Source for the Body

- Resting muscle cell contains only small amount of ATP
  - Keep muscle working at maximum capacity for ~2-4 seconds
- Muscles also contain PCr (phosphocreatine) = able to be quickly broken down to form more ATP for muscles to use
  \[ \text{PCr} + \text{ADP} \rightarrow \text{ATP} + \text{Cr} \]
- Energy from PCr lasts ~1 minute or less (i.e. jumping, lifting, throwing, quick sprint)

Anaerobic Glucose Breakdown

- Occurs when oxygen supply limited
- Fastest way to convert glucose to ATP
  - Needed for quick energy bursts from ~30 seconds – 2 minutes (i.e. 400m sprint or 100m swim)
- Disadvantages
  - Only produces ~5% of total possible ATP's from glucose
  - Produces lactic acid in muscles – leads to fatigue, sore muscles, potassium loss
Aerobic Glucose Breakdown

- Occurs when oxygen is plentiful supply
- Produces sustained energy for longer term activities
  - ~2 minutes to 3+ hours
    - (i.e. when jogging, swimming)

Anaerobic vs. Aerobic
What and When to Eat

Energy (Calorie) Requirements

- Priority to meet energy needs to have optimal performance

- Energy needs differ according to many variables
  - Sex, prior nutrition status, duration/frequency/intensity of exercise, body composition goals, etc

Best way to predict calories is track intake and watch weight.
Carbohydrate Needs

- General estimate ~60% of total calories from carbs for athletes
- Should be at least 5g carbs per kg body weight
  - People involved in aerobic and endurance activities more than 60 minutes per day may need up to 7g per kg
  - Athletes exercising at several hours per day may need up to 10g per kg
  - Triathletes, marathoners may need 500-600g per day!
- Kg body weight = body weight (pounds) ÷ 2.2
Protein Needs

- Protein important for rebuilding of muscles AFTER exercise (no benefit gained from protein loading on the front-end)

<table>
<thead>
<tr>
<th>Activity Group</th>
<th>grams/kg/m</th>
<th>Amount for a 70 kilogram (154 lb) Person (grams)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td>0.8</td>
<td>56</td>
</tr>
<tr>
<td>Strength trained, maintenance</td>
<td>1.5-1.7</td>
<td>105-119</td>
</tr>
<tr>
<td>Moderate intensity endurance activities</td>
<td>1.2</td>
<td>84</td>
</tr>
<tr>
<td>High-intensity endurance training</td>
<td>1.6</td>
<td>112</td>
</tr>
</tbody>
</table>

*Calculate kilograms by dividing pounds by 2.2.


Protein

Healthy Proteins

- Lean meat/poultry, fish - 3 oz = 27g
- Cheese - 1 oz, 1 slice = 6-8g
- Cottage cheese - 1/2 cup = 14g
- Eggs, egg whites - 1 egg, 2 egg whites) = 6g
- Greek yogurt - 6 oz = 14-18g
- Beans (black, kidney, lentils, etc) - 1/2 cup = 9g
- Hummus - 1/4 cup = 5g
- Nut butters (peanut, almond, cashew) - 2 Tbs = 7g
- Seeds, Nuts - 1/4 cup = 7g

Fat Needs

- In general, a diet of ~30% of calories from fats recommended for the athlete

- Focus should be on healthy fats (i.e. monounsaturated, omega-3’s, etc) with consuming saturated fats in moderation and avoiding trans-fats

- See Nutrition 101 webinar for more info!

- At this time, evidence does not support very high diets or “fat-training” with diets >70% calories from fat
**Micronutrient Needs**

- Vitamins and minerals athletes at greatest risk for deficiency:
  - Calcium
  - Vitamin D
  - B Vitamins
  - Iron
  - Zinc
  - Magnesium
  - Antioxidants (i.e. Vitamin C, Vitamin E)

- Most able to meet through balanced diet:
  - Athletes restricting foods/intake at greatest risk
  - Can take MVI not exceeding 100% RDA if concerned
  - See Nutrition 101 for food sources!

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**Eating Before Exercise**

- 2-4 hours before endurance exercise = Light meal
  - Up to 1000 kcal depending on exercise intensity
  - Carbohydrate rich (up to 200g) + small amount protein
  - Low-fat/fiber for optimal digestion
  - Ideas:
    - Peanut butter & honey on toast + instant breakfast drink
    - Fruit & yogurt smoothie + low-fat granola
    - Oatmeal with brown sugar & almonds + skim milk + banana
    - Low-fat cottage cheese + apple butter + crackers + grapes
    - Lean hamburger on bun w/ lettuce & tomato + side salad + yogurt parfait
    - Turkey & Swiss sandwich + fruit + sports drink
    - Low-fat tuna melt sandwich + fruit cup + fat-free yogurt

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**Eating Before Exercise**

- 30-60 minutes before endurance exercise = light snack
  - Ideally liquid, blended or easy to digest snack for optimal digestion
  - Ideas:
    - Sports drink
    - Sports gel, sport beans or gummies, sports bar
    - Piece of fruit or jam sandwich
Eating During Exercise

- **For exercise lasting 60+ minutes**
  - Carbohydrates during activity can replenish glycogen stores, prevent “hitting the wall”
  - Keep snacks small, easy to digest – too large can cause cramping, intestinal problems
  - Need to replenish carbohydrates, fluids, electrolytes
  - Ideas:
    - Sports drinks (6-8% carbs)
    - Sports/carbohydrate gels or gummy chews
    - Banana
    - Roll with jam or honey
    - Bite-sized pieces of low-fat granola bar or sports bar

Eating After Exercise

- **Begin recovery snack 15-60 minutes after completing exercise**
  - Goal of 1-2g carbs per kg body weight
  - Ratio of 3:1 (Carbs:Protein)

- **Important to eat for recovery**
  - Carbohydrates replace glycogen (muscle fuel) stores lost during exercise
  - Protein aids in repair of damaged muscles and stimulates growth of new muscles

Snack Ideas:
- Smoothie (yogurt + frozen berries)
- Sport bar (carbs/electrolytes)
- Graham crackers & peanut butter
- low-fat chocolate milk
- Banana + piece of cheese
- Greek yogurt (flavored or with fruit)
- Trail mix

Meal Ideas:
- Whole wheat pita sandwich + turkey & veggies + pretzels + low-fat milk
- Rice bowl with beans, cheese, salsa, avocado + whole grain tortilla chips or whole wheat tortilla
- Stir fry with lean steak, broccoli, bell peppers, carrots + brown rice
Table 10.07

Weight Loss for the Athlete

- Low-energy intake will not sustain athletic training
- Do not exceed decreases of energy intake by more than 10-20% of normal intake
- Strive to achieve weight loss through healthy choices of foods rich in fruits, vegetables, whole grains, nuts, seeds, and lean proteins
- Remember “low-fat” will not make you skinny (usually equal to or higher in calories)
- Dehydration of means of weight loss is dangerous and ineffective

Muscle Gain for the Athlete

- Eat balanced diet rich in carbohydrates, lean proteins and healthy fats to supply body with energy it needs to build new muscle
- Include up to 300-500 extra calories/day by adding snacks or increasing portion sizes
- Eat every 3-4 hours
- Have body composition assessed by a professional to ensure added weight is muscle, not fat
- Incorporate a strength training program into your program to stimulate muscle gain
Hydration

Hydration & Sweat Loss

- Sweat important to cool the body and prevent overheating
  - Loss influenced by many factors: genetics, gender, age, environmental temperature, exercise intensity, fitness level

- Monitor sweat loss
  - Weigh self before and after exercise without consuming fluids during
  - Goal no more than 2% body weight loss
  - Monitor urine color (aim for light yellow, dark = dehydration)
  - Remember sweat when swimming or cold weather activities too!

Hydration

Goals of Hydration:

- Begin activity well hydrated – drink fluids regularly in the 24 hour period before the activity
  - General goal 9 cups/day for women, 13 cups/day for men
  - Drink 1.5-2.5 cups fluid 2-3 hours before exercise
  - Fluids include water, diluted juice, sports drinks, broth

- Replace sweat losses by drinking fluids regularly during activity
  - Avoid excessive (>2% body weight loss) dehydration – can cause early fatigue, cardiovascular stress, increased risk of heat illness and decreased performance
  - With events lasting >30 minutes, consume 0.5-1.5 cups fluid every 15-20 minutes
Hydration

- **Goals of Hydration (continued):**
  - Rehydrate after performing to replace weight lost as a fluid during activity
    - Within 4-6 hours, drink 2.5-3 cups fluid for each pound lost during exercise
    - Do not rehydrate with caffeinated beverages
    - For those with longer activity or high sodium losses during activity, replenish after with sodium containing fluids (i.e. broths, vegetable juice, Gatorade)
  - For short duration activity (<60 minutes) – *hydrate with water* (before, during, after)
  - For longer activity (>60 minutes) – *hydrate with sports drinks* (6-8% carbohydrates) to replace carbohydrates and electrolytes lost
  - Avoid over hydration!!

Caffeine

- **Benefits:**
  - Evidence caffeine may enhance performance in endurance athletes (cyclists, runners, swimmers, rowers) and speed endurance athletes (mid-distance runners, soccer and hockey players)
  - May delay fatigue and improve mental sharpness

- **Potential Risks:**
  - Side effects include anxiety, jitteriness, rapid heartbeat, upset stomach and insomnia
  - Caffeine is an addictive substance. Tolerance may minimize benefits and withdrawal symptoms can negatively impact performance
  - In high amounts, caffeine is a banned substance (>15 ug/mL in the urine = ~500mg right before competition)

**Strategies for Consumption**
- Timing: ~1 hour before pre-competition (trial this during training first)
- Amount: Tolerance depends on the individual but ~2-6 mg/kg body weight (no more than 9 mg/kg)
- Type: Research suggests pill form may be more effective and better tolerated than coffee

**Tips for Caffeine Consumption**
- Know what you are putting in your body! Some caffeine containing products with additional additives could impair performance
- In moderation does not cause dehydration or electrolyte imbalance but utilize non-caffeinated beverages for rehydration
- Meet with RD to determine appropriate caffeine amounts for you
Caffeine

<table>
<thead>
<tr>
<th>Caffeine Source</th>
<th>Amount (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brewed Coffee (8oz)</td>
<td>60-150</td>
</tr>
<tr>
<td>Energy Drinks/Energy Bars (vary by type)</td>
<td>80-200+</td>
</tr>
<tr>
<td>Pills (1 tablet)</td>
<td>100</td>
</tr>
<tr>
<td>Soda/Tea (8 oz)</td>
<td>40-60</td>
</tr>
</tbody>
</table>

Alcohol & Performance

- Acts as a diuretic by increasing urine volume and interfering with rehydration
- Puts athletes at risk for dehydration, heat illness, muscle cramping
- Suppresses fat use as a fuel during activity
- Interferes with post-activity recovery by delaying carbohydrate repletion and muscle repair
- Increases risk for nutrient deficiencies by decreasing vitamin and mineral absorption
- Adds calories and acts as an appetite stimulate which can result in over consumption of calories
- Can interfere with sleep patterns by reducing time spent in deep, restful sleep

**Bottom Line:** Do not exceed recommended maximum of 1 drink/day for women, 2 drinks/day for men & fully rehydrate and refuel post-activity before drinking alcohol

Supplements
Supplements

- Use extreme caution if utilizing dietary supplements!!!
  - Not needed for majority of athletes
  - Many can be dangerous to health (see following slides)
  - Can cause adverse health effects and a positive test for banned substances
  - Especially supplements with multiple ingredients and/or unrealistic claims
  - Not regulated by the FDA
  - Find a trusted 3rd party source that verifies purity and potency
    - NSF International (www.NSF.org)
    - US Pharmacopeia (www.USP.org)
Questions??

THANK YOU!!