Sports Nutrition for the Serious Youth Athlete

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Key Sports Nutrition Issues for Youth Athletes

- Consuming adequate calories
- Getting a good balance of foods/nutrients (carbohydrate, protein, & fat)
- Eating consistent meals
- Fuel timing
- Drinking enough & appropriate fluids
- Inappropriate use of sports/energy drinks and bars
Focus On Energy Balance

Calories In
Training Energy In:
• Carbs = 4 kcal/gram
• Protein = 4 kcal/gram
• Fat = 9 kcal/gram

Calories Out
Energy Out:
• Metabolism
• Digestion
• Basic movement
• Physical Activity
## Estimated Calorie Requirements by Age and Activity Level

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age</th>
<th>Sedentary Activity</th>
<th>Moderate Activity</th>
<th>Active</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young child</td>
<td>2-3</td>
<td>1,000</td>
<td>1,000-1,400</td>
<td>1,000-1,400</td>
</tr>
<tr>
<td>Female</td>
<td>4-8</td>
<td>1,200</td>
<td>1,400-1,600</td>
<td>1,400-1,800</td>
</tr>
<tr>
<td></td>
<td>9-13</td>
<td>1,600</td>
<td>1,600-2,000</td>
<td>1,800-2,200</td>
</tr>
<tr>
<td></td>
<td>14-18</td>
<td>2,000</td>
<td>2,000</td>
<td>2,400</td>
</tr>
<tr>
<td>Male</td>
<td>4-8</td>
<td>1,400</td>
<td>1,400-1,600</td>
<td>1,600-2,000</td>
</tr>
<tr>
<td></td>
<td>9-13</td>
<td>1,800</td>
<td>1,800-2,200</td>
<td>2,000-2,600</td>
</tr>
<tr>
<td></td>
<td>14-18</td>
<td>2,200</td>
<td>2,400-2,800</td>
<td>2,800-3,200</td>
</tr>
</tbody>
</table>

Institute of Medicine Dietary Reference Intakes, 2002
WHAT TO EAT?

- **Carbohydrates**: 45-65%
- **Proteins**: 25-35%
- **Fats**: 10-30%
Minimize THIS
Use healthy oils (like olive and canola oil) for cooking, on salad, and at the table. Limit butter. Avoid trans fat.

The more veggies—and the greater the variety—the better. Potatoes and french fries don’t count.

Eat plenty of fruits of all colors.

Drink water, tea, or coffee (with little or no sugar). Limit milk/dairy (1-2 servings/day) and juice (1 small glass/day). Avoid sugary drinks.

Eat whole grains (like brown rice, whole-wheat bread, and whole-grain pasta). Limit refined grains (like white rice and white bread).

Choose fish, poultry, beans, and nuts; limit red meat; avoid bacon, cold cuts, and other processed meats.

STAY ACTIVE!

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Harvard School of Public Health
The Nutrition Source
www.hsph.harvard.edu/nutritionsource

Harvard Medical School
Harvard Health Publications
www.health.harvard.edu
Take Carbs Seriously

• Major source of energy, particularly during high-intensity exercise
• Exclusive energy source for the nervous system
• Synthesized into muscle and liver glycogen
## Body Stores of Fuels and Energy

<table>
<thead>
<tr>
<th>Fuel</th>
<th>g</th>
<th>kcal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carbohydrates</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liver glycogen</td>
<td>110</td>
<td>451</td>
</tr>
<tr>
<td>Muscle glycogen</td>
<td>250</td>
<td>1,025</td>
</tr>
<tr>
<td>Glucose in body fluids</td>
<td>15</td>
<td>62</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>375</td>
<td>1,538</td>
</tr>
<tr>
<td><strong>Fat</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subcutaneous</td>
<td>7,800</td>
<td>70,980</td>
</tr>
<tr>
<td>Intramuscular</td>
<td>161</td>
<td>1,465</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7,961</td>
<td>72,445</td>
</tr>
</tbody>
</table>

*Note.* These estimates are based on an average body weight of 65 kg (143 lb) with 12% body fat.
Relationship Between Pre-exercise Muscle Glycogen Content and Exercise Time to Exhaustion

Exercise at 75% max

Carb Intake:
Lo: 15% CHO
Normal: 55%
High: 60-70%

Fuel Requirements During Exercise

- Rest
  - Protein: 60%
  - Carbs: 40%
  - Fats: trace

- Mild Intensity-Endurance (50% VO_2 max)
  - Protein: 50%
  - Carbs: 50%
  - Fats: trace

- High Intensity-Endurance (70-80% VO_2 max)
  - Protein: 5-8%
  - Carbs: 20%
  - Fats: 80%

- High Intensity-Short Duration (90-95% VO_2 max)
  - Protein: 5%
  - Carbs: trace
  - Fats: 95%

Legend:
- **Yellow**: Protein
- **Green**: Carbs
- **Light Blue**: Fats
Influence of Carbohydrate Intake on Muscle Glycogen Stores During Repeated Days of Training

D.L. Costill and J.M. Miller, 1980
Protein Needs

- **RDA for protein** is 0.8 g/kg per day
  - 70 kg person (154 lbs) = 56 grams of protein/day

- **Strength athletes** need 1.6 to 1.7 g/kg per day

- **Endurance athletes** need 1.2 to 1.4 g/kg per day

- Diets exceeding 1.7 g/kg per day have not been proven to provide additional benefits
### Protein Needs: 0.8-1.2 g/kg/day

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Grams of protein needed each day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children ages 1 – 3</td>
<td>13</td>
</tr>
<tr>
<td>Children ages 4 – 8</td>
<td>19</td>
</tr>
<tr>
<td>Children ages 9 – 13</td>
<td>34</td>
</tr>
<tr>
<td>Girls ages 14 – 18</td>
<td>46</td>
</tr>
<tr>
<td>Boys ages 14 – 18</td>
<td>52</td>
</tr>
<tr>
<td>Women ages 19 – 70+</td>
<td>46</td>
</tr>
<tr>
<td>Men ages 19 – 70+</td>
<td>56</td>
</tr>
</tbody>
</table>
Protein In Foods

10 g protein is provided by:

- 1 c breakfast cereal
- 1 c oatmeal
- 2 small eggs
- 1¼ c cow’s milk
- 1/3 c cheese
- 1 c yogurt (Greek ↑)
- 35-50 g meat, fish or chicken (1/2 chicken breast)
- 4 slices bread
- 2 c broccoli
- 2 cups cooked pasta
- 3 cups rice
- 1¾ c soy milk
- ½ c nuts or seeds
- ½ c tofu or soy meat
- ½ c legumes or lentils
- ¾ cup fruit smoothie
- 2 c spinach
- ½ c quinoa
- ¾ c farro
Help Your Athletes to Plan Meal and Snack Times Wisely
Foods Before Exercise

- Ensures a normal blood glucose concentration and prevents hunger
- ~200 to 500 kcal - mainly carbs that are easily digestible
- Consumed 1-2 hours before exercise
- Limit fat, fiber
- Tried & true familiar foods!!
Before Exercise:
Examples of Carbohydrate Foods
(Moderate-high Glycemic Index)

● Most breakfast cereals
● Whole-wheat breads
● Banana

_Foods usually not eaten in isolation – added fat/fiber/ protein to these contingent on:_
1. how much time prior to exercise foods eaten
2. intensity of exercise
3. exercise mode
Great Snack Ideas – Before Exercise or Between Games

• Milk and 12 crackers, 2 tbsp. peanut butter (54 g)
• Banana and yogurt (56 g)
• Bagel with jelly and juice (83 g)
• Cereal (1 oz.) and milk (34 g)
• Juice and pretzels (50 g)
• Sports drink, 16 oz (30 g)
• Sports bar or granola bar and water (20-50 g)
• Fresh fruits such as oranges or bananas (15-25 g)
• Vegetable soup, chicken noodle or tomato and crackers (40-50 g)
• Fig bars and milk (45 g)
Foods During Practice/Extended Games

Greater than 60 Min → 30-60 grams of Carbs/Hour

- 16 ounces of a sports drink (30 g)
- 1 packet sports gel (25 g)
- 1 block (24 g)
- ~ ½ sports bar (30 g)
- 1 large or 2 small bananas (30 g)
- 1 slice of bread and jam/honey (30 g)
- 1 Orange (17 g)
Carbohydrate Consumption After Exercise

- Improves glycogen re-synthesis rates
- May be enhanced by the addition of protein
- Most effective when given during the 30-60 minutes of recovery
Post-Exercise Recovery Snacks

*High CHO, moderate protein and nutrient dense*

- Yogurt, almonds and fruit
- Banana with peanut butter
- Sports bar + orange slices
- Nut butter on whole grain toast
- Veggies and hummus
- *Chocolate milk?*

**Meals**

- Whole-grain breakfast cereal, milk, and fruit
- Meat/cheese and veggie sandwiches on whole grain pita
- Salad and hard boiled egg
- Quinoa salad with roasted veggies
Hydration

BEFORE – Water!
• 1-2 hours before: 2-1/2 cups (20 oz.)
• 15-30 min before: 1-1/2 cups (12 oz.)

DURING 8 oz every 15-20 min
• diluted fruit juice, sports drinks (6-8%) IF exercise is >60 min

AFTER – Water is best
Drink 2 cups for each pound lost
• Weigh yourself before and after exercise
• Don’t trust thirst
• Avoid caffeine
Thermal Stress in Youth Athletes

- Children rely more on convection and radiation, which are enhanced through greater peripheral vasodilation.
- Evaporative heat loss is lower because of reduced sweat rates.
- Children have greater ratios of surface area to mass.
- Acclimatization to heat is slower kids than in adults.

![Image of children playing soccer](image-url)
Water is critical for endurance performance!
And What About All Those Drinks???
Sport Drinks

• Uniquely designed to meet both energy and fluid needs of athletes
  – for activity > 60 minutes in duration

• Composition influences gastric emptying
  – Carbohydrate solutions empty more slowly

• Most sports drinks contain:
  – 6-8% CHO in the form of glucose and glucose polymers
  – 20-60 mmol/L sodium

• Adding glucose stimulates sodium and water absorption

• Palatability
Who Really Needs Sports Drinks?

• American Academy of Pediatrics:  
  “If children are participating in prolonged vigorous physical activity in hot, humid conditions for more than one hour, small amounts of sports drinks may be appropriate”

• 2010 National Youth PA & Nutrition Study  
  - 16% drank at least one serving/day  
  - 9% drank at least two servings/day

• Participation in varsity sports: 33% (girls)  
  37% (boys)


USYOUTHSOCCER.ORG
Is Caffeine the Good Guy or Bad Guy?
Pros and Cons of Caffeine

Benefits
• Mental alertness
• ↑ Ventilation
• Antagonizes in adenosine receptors in brain
  – ↑ Catecholamine release
  – Decreases fatigue & perceived exertion
• Improves endurance performance

Potential side-effects
• Gastrointestinal distress
• Tremors
• Insomnia
• Nervousness/Anxiety symptoms
• Increased BP
• Irregular heart rate/rhythm
And What About All Those Bars???
# The Energy Bar/Snickers Bar Dilemma

- **What is your goal?**
  - Energy, recovery, meal

- **What to look for:**
  - Sugar - <10-12g
  - Protein – 5-10g
  - Great ingredients:
    - Seeds, nuts, peanut butter, whole grains, dried fruit

<table>
<thead>
<tr>
<th>Better Choice</th>
<th>Go With the SNICKERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIND Healthy Grains Bar</td>
<td>Chocolate Almond Fudge</td>
</tr>
<tr>
<td>Dark Chocolate Chunk</td>
<td>Calories: 250</td>
</tr>
<tr>
<td>Total Fat: 5g</td>
<td>Total Fat: 6g</td>
</tr>
<tr>
<td>Saturated Fat: 1.6g</td>
<td>Saturated Fat: 1.5g</td>
</tr>
<tr>
<td>Total Carb: 25g</td>
<td>Total Carb: 42g</td>
</tr>
<tr>
<td>Fiber: 2.5g</td>
<td>Fiber: 5g</td>
</tr>
<tr>
<td>Sugars: 8g</td>
<td>Sugars: 28g</td>
</tr>
<tr>
<td>Protein: 10g</td>
<td>Protein: 10g</td>
</tr>
</tbody>
</table>

| LUNA | Clif Bar |
| Chocolate Pecan Pie | Calories: 240 |
| Total Fat: 4g | Total Fat: 22g |
| Saturated Fat: 1g | Saturated Fat: 1.5g |
| Total Carb: 44g | Total Carb: 25g |
| Fiber: 1g | Fiber: 2.5g |
| Sugars: 28g | Sugars: 8g |
| Protein: 9g | Protein: 10g |

| Quest | PowerBar Performance Energy Bars |
| Coconut Cashew | Calories: 390 |
| Total Fat: 22g | Total Fat: 4g |
| Saturated Fat: 1.5g | Saturated Fat: 1g |
| Total Carb: 43g | Total Carb: 25g |
| Fiber: 8g | Fiber: 2.5g |
| Sugars: 28g | Sugars: 8g |
| Protein: 11g | Protein: 10g |

| PROBAR | Chocolate Chip Macaroon |
| Pure Ancient Grains | Calories: 270 |
| Total Fat: 13g | Total Fat: 6g |
| Saturated Fat: 6g | Saturated Fat: 1g |
| Total Carb: 39g | Total Carb: 19g |
| Fiber: 4g | Fiber: 2.5g |
| Sugars: 20g | Sugars: 8g |
| Protein: 10g | Protein: 10g |

| LARABAR ALT | Chewy Chocolatey Peanut |
| Triple Berry Nut | Calories: 210 |
| Total Fat: 8g | Total Fat: 3g |
| Saturated Fat: 1.5g | Saturated Fat: 3g |
| Total Carb: 26g | Total Carb: 23g |
| Fiber: 3g | Fiber: 5g |
| Sugars: 15g | Sugars: 8g |
| Protein: 13g | Protein: 10g |

- **Great ingredients:**
  - Seeds, nuts, peanut butter, whole grains, dried fruit
Nutrition Facts

• Athletes need:
  – to eat FOOD for FUEL
  – carbohydrate, protein and fat-containing foods daily

• Be supportive of your athletes needing to be selective about the foods they eat
  – Practice and game times
    • Refueling necessary during?
  – Foods on the road
MAXIMIZE Overall Good Nutrition
Bottom Line!!
To Have a Winning & Fueled Up Team....

- Food, fluid, and rest are essential for peak mind and body performance

- Food choices, timing, and amounts matter

- Foster POSITIVE environments
FUEL UP!

And THANK YOU!!