Uses of Carbohydrate in the Body

1. Primary energy source. 4/kcal/g

2. Secondary energy storage - glycogen.

3. Helps prevent ketosis from incomplete fat oxidation.

4. Spares protein for energy use. (gluconeogenesis)

5. Excess stored at fat.

6. Fiber promotes healthy digestive system function.

Need about 100-150g cho/day to spare protein, prevent ketosis, and support CNS.
Classification of Carbohydrates

**Simple** = monosaccharides
disaccharides

**Complex** = polysaccharides, starch
glycogen.
fiber, cellulose

*The Simple Carbohydrates*
**Monosaccharide**
Glucose
Galactose
Fructose

**Disaccharides**
Sucrose (fructose and glucose)
Lactose (galactose and glucose)
Maltose (glucose and glucose)
Lactose Intolerance

- Affects 70% population
- Elderly, Asians, African Americans
- Symptoms: gas, cramps, diarrhea, bloating, abdominal pain.
- Caused by lack of enzyme LACTASE.

Treatment:
- Individualize diet
- Use of fluid milk restricted
- Moderate use yogurt, cheese.
- Acidophilus milk
- Lactaid Milk and Lactaid milk products
- Soymilk.
### Forms of Sugar on Food Labels

<table>
<thead>
<tr>
<th>Barley malt syrup</th>
<th>Brown sugar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confectioners sugar</td>
<td>Corn syrup</td>
</tr>
<tr>
<td>Date sugar</td>
<td>Dextrose</td>
</tr>
<tr>
<td>Fructose</td>
<td>HFCS</td>
</tr>
<tr>
<td>Honey</td>
<td>Invert sugar</td>
</tr>
<tr>
<td>Lactose</td>
<td>Levulose</td>
</tr>
<tr>
<td>Maltodextrin</td>
<td>Mannitol</td>
</tr>
<tr>
<td>Maple syrup</td>
<td>Molasses</td>
</tr>
<tr>
<td>Powdered sugar</td>
<td>“Raw Sugar”</td>
</tr>
<tr>
<td>Sorbitol</td>
<td>Sorghum</td>
</tr>
<tr>
<td>Sucrose</td>
<td>Turbinado sugar</td>
</tr>
<tr>
<td>Xylitol</td>
<td></td>
</tr>
</tbody>
</table>
### Fiber – Nonstarch Polysaccharides

<table>
<thead>
<tr>
<th>Soluble</th>
<th>Insoluble</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gums</td>
<td>Cellulose</td>
</tr>
<tr>
<td>Hemicellulose</td>
<td>Hemicelluloses</td>
</tr>
<tr>
<td>Mucilages</td>
<td>Lignin</td>
</tr>
<tr>
<td>Pectins</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Food Sources</th>
<th>Food Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit (apples, citrus, grapes)</td>
<td>Wheat bran</td>
</tr>
<tr>
<td>Oats</td>
<td>Whole-grain cereal</td>
</tr>
<tr>
<td>Barley</td>
<td>Vegetables</td>
</tr>
<tr>
<td>Legumes</td>
<td>Corn bran</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Health Effects</th>
<th>Health Effects</th>
</tr>
</thead>
</table>
Fiber

Positive Health Effects of Fiber

1. Weight control.
2. Preventing colon cancer.
3. Lowering blood cholesterol.
4. Control glycemic response.
5. Decrease in diverticular disease.
6. Decline in hemorrhoids.

Negative Health Effects of Fiber

1. Bulk effect may prevent adequate kcalories
2. Abdominal discomfort
3. Low nutrient availability
Carbohydrate Recommendations

- AMDR = 45-65%  
  (Acceptable Macronutrient Distribution Range)

- Sugar < 10% of kcal

- Fiber
  - AI 38 g for men
  - AI 25 g for women
  - Based on 14g/1000 kcal
  - 20-35 g / 2000 kcal (ADA)
    Child = 5 g + age in years
Sugar Myths & Reality

- Sugar causes obesity.
- Sugar causes heart disease.
- Sugar causes diabetes.
- Sugar causes behavior changes.

Sugar and Health

- Sugar contributes to dental caries.
- Sugar contributes little nutrient value to diet.
- Lactose intolerance
- Hypoglycemia
**Alternative Sweeteners**

1. Saccharin  *Sweet N’Low*
   1901 Approved; 1977 Ban moratorium; 2000 released.

2. Aspartame  *NutraSweet, Equal*
   Made of phenylalanine & aspartic acid & methanol
   1981 Approved - Nutritive sweetener

3. Acesulfame-K  *Sunette*
   1988 Approved

4. Sucralose  *Splenda*
   1998 Approved

5. Neotame
   2002 Approved

6. D-tagatose

7. *Alitame and *Cyclamates  *pending approval.

8. Sugar Alcohols
   - Xylitol, sorbitol, mannitol
Stevia

- Shrub (herb) used in So. America
- Main ingredient is stevioside
- No FDA approval
- Not an additive, sold as a nutritional supplement (no testing required)
- Kcalorie free, hundred times sweeter than sugar
- Used in Japan; not in Canada or Europe.