**Dietary Components**
- Starvation
- Lactose Intolerance

**FOOD PYRAMID**
- Fats, oils, and sweets: Use sparingly
- Milk, yogurt, and cheese group: 2-3 servings
- Vegetable group: 3-5 servings
- Bread, cereal, rice, and pasta group: 6-11 servings
- Meat, poultry, fish, dry beans, eggs, and nuts group: 2-3 servings
- Fruit group: 2-4 servings

**Protein**
- Composed of amino acids
- Necessary for the immune system, wound healing, tissue maintenance
- Proteins made of 22 amino acids
- 8 essential amino acids are found naturally in foods
- 40g or 2 oz of animal protein per day is adequate for humans

**Protein Quality**

**ENERGY SOURCES**
- Proteins
- Fats/Lipids
- Carbohydrates
- Vitamins
- Minerals
- Water
**Fats**
- Essential for energy storage
- Hard to dissolve in water
- Wide variety of substances
- Waxes, lipids, steroids
- 3 forms, saturated are the worst
- Over 10% of daily intake becomes dangerous

**Carbohydrates**
- Sugars
  - 3 main forms
    - Monosaccharides - simple sugars
    - Disaccharides - double sugars
    - Polysaccharides - complex sugars
  - Fuel for the body to break down to glucose
  - Glucose is the 1st source of fuel for body cells

**Carbohydrates**
- Monosaccharides
  - glucose, fructose, galactose
- Disaccharides
  - sucrose
  - lactose
  - maltose
- Polysaccharides
  - Polymers of glucose
  - Plant starches, cellulose, glycogen

**Vitamins**
- Vitamins help promote chemical reactions in the body
- Only source is the diet
- Water and fat soluble
  - B = seafood, cheese, egg yolks, nuts
  - C = citrus, berries
  - A = yellow/green veggies
  - E = whole grains, green leafy veggies
  - D = dairy, fish
  - K = liver, broccoli

**Minerals**
- Over 20 essential elements
- Inorganic
- Builds bones and teeth
- Found in a variety of foods
- Trace (ppm) elements
- Ultratrace (ppb) quantities
**Water**

- Human can only last 4 days without water under thermal normal conditions
- 60% of human body
- Fluid around brain & spinal chord, blood volume, mucous membranes, kidney function
- Active part in many chemical reactions
- Keeps fluid levels throughout the body at proper levels
- Body can’t store water, must be replenished

**Energy Requirements**

- Basal requirements for 60 kg male = 1,630 kcal/day
- With activity, approximately 2-3,000 kals
- Brain uses 1/4 and 1/3 of total basal needs
- Humans are one of the fattest mammals
- Fat provides insulation from the cold
- Very dimorphic feature in humans
- Approximately 15% males; 27% females
- No obesity in hunter/gatherers
- "Thrifty genotype"

### Energy Requirements Table

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Late Paleolithic</th>
<th>Contemporary American</th>
<th>Current Recs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein (%)</td>
<td>34</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Carbs (%)</td>
<td>45</td>
<td>46</td>
<td>58</td>
</tr>
<tr>
<td>Fat (%)</td>
<td>21</td>
<td>42</td>
<td>30</td>
</tr>
<tr>
<td>Fiber (g)</td>
<td>46</td>
<td>20</td>
<td>30-60</td>
</tr>
<tr>
<td>Sodium (mg)</td>
<td>690</td>
<td>2300-6900</td>
<td>1100-3300</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>1580</td>
<td>740</td>
<td>800-1200</td>
</tr>
<tr>
<td>Vit C (mg)</td>
<td>392</td>
<td>88</td>
<td>45</td>
</tr>
</tbody>
</table>
Pre-industrial diets shared tendency to periodic food shortages
particularly disadvantageous to women
growth patterns are altered
metabolically active tissues are reduced
slowed skeletal growth, shorter stature
more pronounced in males than females

Principal fuel is glucose
body at rest consumes 2/3 of circulating blood sugar
liver’s glycogen stores provide for the brain for only a few hours
once depleted, skeletal proteins are digested next to release alanine
fat is broken down to provide glucose for non-neural purposes
rapid water loss, along with Ca, Mg, & K

After 3-4 days, fat is burned for all energy needs; ketones released
BMR slows
muscle mass decreases
lethargy, loss of sex drive
less N loss, less urination
need for water goes down
by 25th day, fat burning is down to 100 g/day
fat cells aren’t lost, just emptied
LACTOSE INTOLERANCE

- milk is widely considered nature’s perfect food
- sent to developing nations
- lactose = glucose + galactose
- lactase = enzyme that breaks down lactose
- Mammalian pattern = lactase produced in fetus, high until weaning
- Myth: humans are the exception

6-15% white Americans
70% black Americans

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Fulani</th>
<th>Tussi</th>
<th>Ganda</th>
<th>Hausa</th>
<th>Ibo &amp; Yorba</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>20%</td>
<td>80%</td>
<td>70-80%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Fulani & Tussi herd cattle, milk & blood are the major components of diet thru life
Human tolerance seems connected to dairying