- Chapter 2
- Carbohydrates
- Chapter 2

Lesson 2.1

- Key Concepts
- Carbohydrate foods provide practical energy (calorie) sources because of their availability, relatively low cost, and storage capacity.
- Carbohydrate structures vary from simple to complex to provide both quick and extended energy for the body.
- Nature of Carbohydrates
- Relation to energy
  - Basic fuel source
  - Energy production system
  - Dietary importance
- Classes of Carbohydrates
- Monosaccharides
  - Simple sugar
  - Simple carbohydrate
    - Glucose
    - Fructose
    - Galactose
- Classes of Carbohydrates, cont'd

- **Disaccharides**
  - **Double sugar**
  - **Simple carbohydrate**
    - **Sucrose**
    - **Lactose**
    - **Maltose**

- **Classes of Carbohydrates, cont'd**
- **Polysaccharides**
  - **Starch**
  - **Glycogen**
  - **Dietary fiber**

- **Starch**
- **Most significant polysaccharide in the diet**
- **Whole grains retain the bran layer, inner germ, and endosperm, including the nutrients naturally found in the plant**
- **Enriched grains are refined grains that have nutrients added back to them**
- **Kernel of Wheat**
- **Other Sweeteners**
- **Nutritive sweeteners**
  - **Sugar alcohols (sorbitol, mannitol, xylitol)**

- Nonnutritive sweeteners
  - Artificial sweeteners in food
- Sweetness of Sugars and Artificial Sweeteners
- Chapter 2

Lesson 2.2

- Key Concept
- Dietary fiber, an indigestible carbohydrate, serves separately as a body regulatory agent.
- Focus on Dietary Fiber
- Not digestible
- Important in health promotion and disease prevention
- Three types important in human nutrition:
  - Cellulose
  - Noncellulose polysaccharides
  - Lignin
- Focus on Dietary Fiber, cont'd
- Cellulose
  - Remains undigested in the gastrointestinal tract and provides bulk to a diet
  - Bulk helps move the food mass through the intestine
  - Examples:

- Stems, leaves of vegetables
- Coverings of seeds and grains

- Focus on Dietary Fiber, cont'd
- Noncellulose polysaccharides
  - Absorb water and swell to a larger bulk
  - Examples: pectins, gums, mucilages, algal substances
- Lignin
  - Only noncarbohydrate type of dietary fiber
  - Woody parts of plants
- Focus on Dietary Fiber, cont'd
- Divided into two groups based on solubility
  - Insoluble
  - Soluble
- Many health organizations recommend increasing intake of dietary fiber
  - 38 g/day for men
  - 25 g/day for women

- Focus on Dietary Fiber, cont'd
- Sudden increases can result in gas, bloating, constipation
- Excessive amounts of dietary fiber can trap small amounts of minerals and prevent absorption into the gastrointestinal tract
- Summary of Dietary Fiber Classes

- Energy Function of Carbohydrates
- Basic fuel supply
  - Energy for physical activities and all work of body cells
- Reserve fuel supply
  - Provided by glycogen
  - Maintains normal blood glucose level
- Special Tissue Functions of Carbohydrates
- Liver
  - Glycogen reserves protect cells from depressed metabolic function
- Protein and fat
  - Carbohydrates regulate proteins and fat

- Special Tissue Functions of Carbohydrates, cont'd
- Heart
  - Glycogen is vital emergency fuel for heart muscle
- Central nervous system
  - Brain dependent on minute-to-minute supply of glucose

- Digestible Food Sources of Carbohydrates
- Starches
  - Provide fundamental complex carbohydrates
- Sugars

- High-sugar diets carry health risks

- Teaspoons of High-Fructose Corn Syrup Consumed
- Digestion of Carbohydrates
- Mouth
  - Mechanical or muscle functions break food mass into smaller particles
- Stomach
  - Peristalsis continues mechanical digestive process
- Digestion of Carbohydrates, cont'd
- Small intestine
  - Peristalsis continues mechanical digestion
  - Pancreatic secretions
  - Intestinal secretions
- Summary of Carbohydrate Digestion
- Body Needs for Carbohydrates
- Dietary Reference Intakes
  - 45% to 65% of adult's total caloric intake should come from carbohydrate foods
  - Limit sugar to no more than 25% of calories consumed
- Dietary Guidelines for Americans, 2005
  - Does not provide a specific caloric number or percentage, but does provide recommendations
- Summary

- Carbohydrates are the primary source of energy for most of the world's population.
- Carbohydrates are distributed as plant sources as grains, legumes, vegetables, and fruits.
- The two basic types of carbohydrates are simple and complex.
- Simple carbohydrates are composed of single- and double-sugar units (monosaccharides and disaccharides)
- Summary, cont'd
- Complex carbohydrates are composed of many sugar units.
- Dietary fiber is a complex carbohydrate that is not digestible.
- Dietary fiber is found mainly in the structural parts of plants.
- Carbohydrate digestion begins in the mouth, continues in the stomach, moves to the small intestine, and finally arrives in the large intestine and exits through the anus.