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.