

Test 2 Study Guide

Chapter 6

- Vocabulary

- Proteins: compounds composed of carbon, hydrogen, oxygen, and nitrogen and arranged as strands of amino acids. Some amino acids also contain the element sulfur.
- Amino acids: the building blocks of protein. Each has an amine group at one end, an acid group at the other, and a distinctive side chain.
- Amine group: the nitrogen-containing portion of an amino acid side chain the unique chemical structure attached to the backbone of each amino acid that differentiates one amino acid from another.
- Essential amino acids: amino acids that either cannot be synthesized at all by the body or cannot be synthesized in amounts sufficient to meet physiological need. Also called indispensable amino acids.
- Conditionally essential amino acid: an amino acid that is normally nonessential but must be supplied by the diet in special circumstances when the need for it exceeds the body's ability to produce it.
- Peptide bond: a bond that connects one amino acid with another, forming a link in a protein chain.
- Collagen: a type of body protein from which connective tissue, such as scars, tendons, ligaments, and the foundations of bones and teeth are made.
- Enzymes: proteins that facilitate chemical reactions without being changed in the process; protein catalysts.
- Hemoglobin: the globular protein of red blood cells, whose iron atoms carry oxygen around the body via the blood-stream
- Denaturation: the irreversible change in a protein's folded shape brought about by heat, acids, bases, alcohol, salts of heavy metals, or other agents.
- Polypeptides: protein fragments of many (more than 10) amino acids bonded together. A peptide is a strand of amino acids. A strand of between 4 and 10 amino acids is called an oligopeptide.
- Dipeptides: protein fragments that are two amino acids long
- Tripeptides: protein fragments that are three amino acids long
- Protein turnover: the continuous breakdown and synthesis of body proteins involving the recycling of amino acids.
- Catalyst: a substance that speeds the rate of a chemical reaction without itself being permanently altered in the process. All enzymes are catalysts.
- Hormones: chemical messengers secreted by a number of body organs in response to conditions that require regulation. Each hormone affects a specific organ or tissue and elicits a specific response.
- Thyroxine: a principle peptide hormone of the thyroid gland that regulates the body's rate of energy use.
- Serotonin: a compound related in structure to (and made from) the amino acid tryptophan. It serves as one of the brain's principal neurotransmitters.
- Antibodies: large proteins of the blood, produced by the immune system in response to an invasion of the body by foreign substances (antigens). Antibodies combine with and inactivate the antigens

- 0 Immunity: protection from or resistance to a disease or infection by development of antibodies and by the actions of cells and tissues in response to a threat.
- 0 Fluid and electrolyte balance: the distribution of fluid and dissolved particles among body compartments
- 0 Edema: swelling of body tissue caused by leakage of fluid from the blood vessels; seen in protein deficiency (among other conditions).
- 0 Acids: compounds that release hydrogens in a watery solution.
- 0 Bases: compounds that accept hydrogens from solutions.
- 0 Acid-base balance: equilibrium between acid and base concentrations in the body fluids.
- 0 Buffers: compounds that help keep a solution's acidity or alkalinity constant.
- 0 Acidosis: the condition of excess acid in the blood, indicated by a below-normal pH (osis means "too much in the blood").
- 0 Alkalosis: the condition of excess base in the blood, indicated by an above-normal blood pH (alka means "base")
- 0 Urea: the principal nitrogen-excretion product of protein metabolism; generated mostly by removal of amine groups from unneeded amino acids or from amino acids being sacrificed to a need for energy.
- 0 Legumes: plants of the bean, pea, and lentil family that have roots with nodules containing special bacteria. These bacteria can trap nitrogen from the air in the soil and make it into compounds that become part of the plant's seeds. The seeds are rich in protein compared with those of most other plant foods.
- 0 High-quality proteins: dietary proteins containing all the essential amino acids in relatively the same amounts that human beings require. They may also contain nonessential amino acids.
- 0 Amino acid pools: amino acids dissolved in the body's fluids that provide cells with ready raw materials from which to build new proteins or other molecules.
- 0 Limiting amino acid: an essential amino acid that is present in dietary protein in an insufficient amount, thereby limiting the body's ability to build protein.
- 0 Complementary proteins: two or more proteins whose amino acid assortments complement each other in such a way that the essential amino acids missing from one are supplied by the other.
- 0 Mutual supplementation: the strategy of combining two incomplete protein sources so that the amino acids in one food make up for those lacking in the other food. Such protein combinations are sometimes called complementary proteins.
- 0 Nitrogen balance: the amount of nitrogen consumed compared with the amount excreted in a given time period.
- 0 Protein-energy malnutrition (PEM): the world's most widespread malnutrition problem, including both marasmus and kwashiorkor and states in which they overlap; also called protein-calorie malnutrition (PCM).
- 0 Hunger: the physiological craving for food; the progressive discomfort, illness, and pain resulting from the lack of food.
- 0 Marasmus: the calorie-deficiency disease; starvation.
- 0 Kwashiorkor: a disease related to protein malnutrition, with a set of recognizable symptoms, such as edema.
- 0 Dysentery: an infection of the digestive tract that causes diarrhea.

- Homocysteine: an amino acid produced as an intermediate compound during amino acid metabolism. A buildup of homocysteine in the blood is associated with deficiencies of B vitamins and may increase the risk of diseases.
- Osteoporosis: a disease of older persons characterized by porous and fragile bones that easily break, leading to pain, infirmity, and death.
- Textured vegetable protein: processed soybean protein used in products formulated to look and taste like meat, fish, or poultry.
- Tofu: a curd made from soy beans that is rich in protein, often rich in calcium, and variable in fat content; used in many Asian and vegetarian dishes in place of meat.
- Key Points
 - The essential amino acids:
 - Histidine
 - Isoleucine
 - Leucine
 - Lysine
 - Methionine
 - Phenylalanine
 - Threonine
 - Tryptophan
 - Valine
 - Other amino acids important in nutrition:
 - Alanine
 - Arginine
 - Asparagine
 - Aspartic acid
 - Cysteine
 - Glutamic acid
 - Glutamine
 - Glycine
 - Proline
 - Serine
 - Tyrosine
 - NOTE: In special cases, some nonessential amino acids may become conditionally essential
 - Proteins are unique among the energy nutrients in that they possess nitrogen-containing amine groups and are composed of 20 different amino acid units. Of the 20 amino acids, some are essential and some are essential only in special circumstances.
 - Amino acids link into long strands that coil and fold to make a wide variety of different proteins.
 - Each type of protein has a distinctive sequence of amino acids and so has great specificity. Often, cells specialize in synthesizing particular types of proteins in addition to the proteins necessary to all cells. Nutrients can greatly affect genetic expression.
 - Proteins can be denatured by heat, acids, bases, alcohol, or the salts of heavy metals. Denaturation begins the process of digesting food protein and can also destroy body proteins.
 - Digestion of protein involves denaturation by stomach acid, then enzymatic digestion in the stomach and small intestine to amino acids, dipeptides, and tripeptides.