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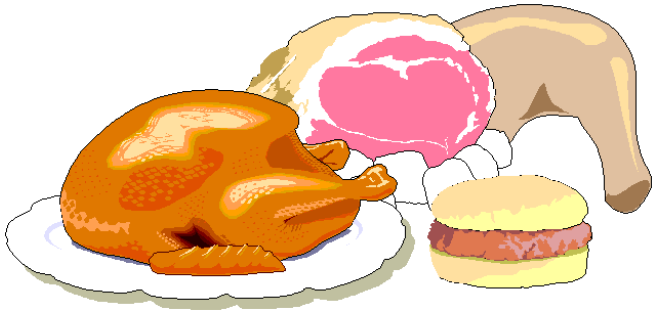

What Is Protein?

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Protein is one of the nutrients along with carbohydrate, fat, vitamins, minerals, and water. The source of all of these nutrients is good. Some foods contain much higher amounts of specific nutrients than others and sometimes we refer to certain foods as "protein foods." It is important to realize that all goods contain more than one nutrient and most foods contain substantial amounts of several nutrients. For example, meat, which is a good source of protein, carbohydrate, fat, riboflavin and calcium.

Protein is an essential nutrient. There is no life without protein. Protein is contained in every part of your body, the skin, muscles, hair, blood, body organs, eyes, even fingernails and bone. Next to water, protein is the most plentiful substance in your body.

Structure of Proteins

Proteins are composed of small units. These units are the amino acids which are called the building blocks of protein. There are about 20 different amino acids which are commonly known. Each different protein is composed of various amino acids put together in varying order with almost limitless combinations. Most proteins are large molecules that may contain several hundred amino acids arranged in branches and chains.

Quality of Proteins

The efficiency or degree to which dietary proteins can be used for building parts of the human body is determined principally by the type and relative amounts of amino acids present in the particular protein molecule. The body has the ability to interconvert and make some of the amino acids. However, there are eight of the amino acids which cannot be put together in the body and, therefore, must be supplied by the food we eat. These eight are called ESSENTIAL amino acids. The nutritive value of proteins is determined by the presence in adequate amounts of the eight essential amino acids. Most animal proteins contain all of the essential amino acids in sufficient amounts. The protein of cereals, most beans, and vegetables may contain all the essential amino acids, but the amounts in these plant foods is less than ideal. The plant protein is, therefore, of lower nutritive value than that of the animal protein. Some of the plant proteins

provide an excess of one or more of the essential amino acids while being short of some of the others. Thus, two plant proteins or one plant and one animal protein can complement each other. For example, black-eyed peas have a high lysine content (an essential amino acid) and when they are consumed along with wheat, which is low in lysine content, the combined protein is of improved nutritive value. Specific knowledge of the amino acid content of plant foods and complementary combinations can provide good quality protein. It should be pointed out that vegetable protein is less well digested and utilized than animal protein. If the main protein source is from vegetables, 65 grams per day is recommended as compared with 45 grams per day when animal products provide the primary protein source.

Functions

Protein has a critical physiological function. Protein is primarily used in the body to build, maintain, and repair body tissues. In the event that protein intake is greater than that required by the body for this primary function, excessive protein is converted to energy for immediate use or stored in the body as fat. Protein energy will be used only after other energy sources (carbohydrate and fat) are exhausted or unavailable.

Protein Requirement

The amount of protein needed varies for different age groups, size and growth stage. Even though an adult has achieved maximum growth, protein is required for maintaining body tissues. Periods of growth, including infancy, childhood and pregnancy, increase the protein need to provide building materials. Physiological states such as injury, surgery, or burns, increase the need for protein to provide repairing materials.

The following chart gives the recommended dietary allowances established by the Food and Nutrition Board, National Academy of Sciences, National Research Council. 1980 Revised.

Amount of Protein Needed Daily Grams					
Children		**Women**		**Men**	
Age	Gms	Age	Gms	Age	Gms
1-3 4-6 7-10	23 30 34	11-14 15-18 19-22 23 + Pregnant Lactating	46 46 44 44 + 30 + 20	11-14 15-18 19-22 23 +	45 56 56 56

Food Sources

Protein is available from both animal and plant sources. The typical U.S. diet is a mixture of protein sources. Variety in choices will provide an adequate diet. The following chart shows protein content in some typical foods.

Food	Amount	Protein in Grams
Chicken	3 oz.	20
Ground beef	3 oz.	21
Pork chop, lean	2 oz.	15
Mil,	1 cup	9
Egg	1	6
Cheddar cheese	1 oz.	7
Beans	3/4 cup	11
Peanut butter	2 Tbsp.	8
Bread	1 slice	2
Cooked cereal	½ cup	2
Dry cereal	1 oz.	1-4
Rice	½ cup	5
Nuts	2 Tbsp.	5
Soybeans	½ cup	10
Cooked vegetables	½ cup	1-2

Protein Consumption

Surveys have shown that Americans eat almost twice as much protein as their bodies need. This is probably because of ample supplies of high quality protein, and a preference for meat and other animal sources of protein. Food consumption surveys show an average protein intake of approximately 100 grams per day. About 70 percent of the protein is from animal products. The total protein intake supplies 12 percent of the total calories.

Even with average intakes which are high, some segments of our population may have marginal protein intakes including low-income, elderly, and pregnant and lactating women. In less developed countries the protein deficiency disease, Kwashiorkor, is seen in growing children.

Another factor of concern is the cost of protein. Meat represents the single food group which is most costly. The following chart lists the cost of several good protein sources.

Sources

U.S. Department of Agriculture, News Release: “Meats and Alternates—USDA Helps Find the Best Buys,” August 1985.

Recommended Dietary Allowances, Ninth Edition. National Academy of Sciences. Washington, D.C. 1980.

Designing Foods, Animal Product Options in the Marketplace. National Research Council. National Academy Press. Washington, D.C. 1988.

Cost of 20 Grams of Protein from Specified Meats and Meat Alternates at June 1985 Prices*

Food	Market Unit	Price per Unit	Cost
Eggs, large	doz	$0.72	$0.20
Peanut butter	18 oz	1.70	.26
Milk, whole, fluid	½ gal	1.14	.35
American process cheese	lb	2.50	.50
Cheddar cheese, natural	lb	3.08	.55
Yogurt, natural, fruit flavored	½ pt	.58	2.27
Bread, white, enriched	lb	.55	.38
Chuck roast of beef, bone in	lb	1.55	.45
Sirloin beefsteak, bone in	lb	3.08	.86
Rib roast of beef, bone in	lb	3.29	1.09
Ground chuck	lb	1.67	.42
Beef liver	lb	.98	.24
Round beefsteak, bone out	lb	2.84	.62
Round roast of beef, bone out	lb	2.40	.65
Port shoulder, smoked bone in	lb	.98	.31
Port loin roast, bone in	lb	1.50	.52
Half, half, smoked bone in	lb	1.24	.41
Ham, canned	lb	2.53	.66
Pork chops, center cut, bone in	lb	2.31	.74
Pork sausage, bulk	lb	1.73	.81
bacon, sliced	lb	1.89	.98
Chicken, whole, ready-to-cook	lb	.76	.32
Chicken breasts, bone in	lb	1.65	.45
Turkey, ready-to-cook	lb	1.03	.34
Tuna, canned	6.5 oz	.84	.35
Salmon, pink, canned	15.5 oz	2.32	.51
Ocean perch, fillet, frozen	lb	2.22	.60
Haddock, fillet, frozen	lb	3.00	.78
Frankfurters, all meat	lb	1.81	.71
Bologna	lb	2.12	.81
Pork and beans, canned	16 oz	.42	.36

*U.S. average retail price of food item estimated using information provided by the Bureau of Labor Statistics, U.S. Department of Labor, and the National Marine Fisheries Service, U.S. Department of Commerce.

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