Expanding the Understanding of Protein

What is so special about protein?

Protein is the only nutrient in our diet that can supply nitrogen, an indispensable element that is part of every cell in the body.

- Protein is needed for important body functions which include growth, defense of body tissues, the continuous process of repair of worn out body cells, the synthesis of enzymes (chemicals needed to digest and use nutrients from the diet) as well as a source of energy. Little excess protein can be stored in body tissues, therefore once storage capacity is met excess protein calories contribute to fat tissue.

What are amino acids?

Each protein can be broken down into smaller units known as amino acids. When protein is eaten it must be broken down by the enzymes in the stomach and intestine and then rebuilt within the cell. Everyone builds their own proteins which are distinct from another's proteins. There are 20 amino acids from which we build our proteins, but 9 of them must be obtained from our food because the human body can't make them.

What is protein quality?

A high-quality protein contains all the needed amino acids in the amounts that the body needs to support growth. If a food has proteins that are in short supply of one of the 9 amino acids required from our diet, then it is considered incomplete. It must be combined with another food that has the missing amino acids to make a complete protein. All proteins from animal sources are complete. A food with high biological value has complete proteins that are easily digested and in proportions that can be optimally used by the body.

What are complete vs. incomplete proteins?

Proteins from vegetable and grain sources are most often incomplete meaning they lack one of the 9 amino acids needed by the human body. A source of the missing amino acid must be eaten to get full benefit from the incomplete protein source.




What foods offer the most protein?

Foods found in the meat, fish, poultry, egg and bean group of the USDA MyPyramid[2] supply the most complete protein. The milk group also supplies complete proteins while the vegetable and grain groups supply incomplete proteins.

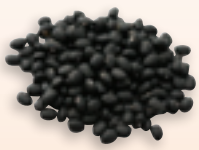
Aren't all protein foods expensive?

High quality protein sources don't have to be expensive. In fact, there are many ways to meet your family's protein needs on a tight budget.

Food Source	Protein (g/100cal)	Protein (g/100g)	Protein Quality	Cost ($/50gProtein)
Salmon filet	10.9g	19.9	Complete	$5.52
Ground Beef	8.2 g	17.2	Complete	$3.82
Beef Round	10.8g	20.7	Complete	$3.10
Pork chop	9.43g	19.9	Complete	$3.25
Chicken breast	12.1g	20.9	Complete	$2.85
Eggs	8.8g	12.6	Complete	$1.31
Almonds	3.7g	21.2	Incomplete	$0.26
Kidney beans	6.2g	5.22	Incomplete	$0.16
Black beans	6.6g	6.0	Incomplete	$0.15

Protein Source	Online Price/ December 07	Cost per ounce
Salmon filet	$9.99/pound	$0.62/ounce
Almonds	$2.33/6 oz	$0.39/ounce
Ground Beef	$5.99/pound	$0.37/ounce
Beef Bottom Round	$5.99/pound	$0.37/ounce
Pork Chop Bnls	$5.99/pound	$0.37/ounce
Chicken Breast Bnls	$5.49/pound	$0.34/ounce
Grade A Large Eggs	$1.99/dozen (24 oz)	$0.08/ounce
Canned Kidney Beans	$0.89/15.5 oz	$0.06/ounce
Canned Black Beans	$0.67/15.5 oz	$0.04/ounce

1 ounce = 28.35 grams
1 gram = 0.035 ounces
1 pound = 453.59 grams



How much protein is needed?

The National Academy of Sciences' Institute of Medicine made recommendations in 2006 that have been accepted as a standard for nutrient intake.[1] Their recommendation for protein intake was based on the need to prevent deficiency which resulted in a minimal amount of protein needed by the body to keep a balance between nitrogen intake and nitrogen output. These recommendations known as the Dietary Reference Intakes are divided by life stage groupings. (See chart below)

Dietary Reference Intakes for Total Protein by Life Stage Group
(g/kg/day), in milligrams a day

Life Stage group	RDA Males	RDA Females
0 through 6 months	1.52 (AI)	1.52 (AI)
7 though 12 months	1.2	1.2
1 through 3 years	1.05	1.05
4 through 8 years	0.95	0.95
9 through 13 years	0.95	0.95
14 through 18 years	0.85	0.85
19 through 30 years	0.80	0.80
31 through 50 years	0.80	0.80
51 through 70 years	0.80	0.80
> 70 years	0.80	0.80
Pregnancy		1.1
Lactation		1.3

Dietary Reference Intakes, Institute of Medicine, National Academies Press, 2006
(AI) Adequate Intake.

How does body growth affect protein needs?

During periods of rapid growth such as infancy, adolescence, muscle building and pregnancy the need for high quality protein increases. (See chart above)

Are there times when it's more important to get enough protein?

Research interest has grown in determining protein needs of athletes and seniors that are trying to build muscle tissue rather than just avoiding deficiency. The current Acceptable Macronutrient Distribution Range (AMDR) for protein is 5-20 percent of total calories for children 1 to 3 yrs, 10-30 percent for children 4-18 yrs and 10-35 percent of total calories consumed for adults older than 18 years of age.

What's important, an optimal amount or a minimal amount of protein?

The National Academy of Sciences' Institute of Medicine 2006 recommendation is to include 10-35 percent of daily calorie intake as protein. Recent research has indicated that muscle mass in older adults is better preserved when protein intake approaches the upper range of the recommendation.[3]

Are protein supplements necessary?

No, it is easy to meet one's protein needs through a balanced dietary intake. In fact, eating a food source that contains high quality protein offers the added value of nutrients found in the same food source. Once dietary protein needs are met, excess protein is broken down and stored while the nitrogen must be excreted by the kidneys.

How does illness affect dietary protein needs?

When illness causes an increase in body temperature (fever) or there is a trauma to body tissue due to infection, breakage or burns, protein needs will increase.

How can protein be good for immunity and cause allergies?

While it is true that a good immune response to foreign substances is dependent upon an adequate protein intake, for some unexplained reason certain dietary proteins are incorrectly interpreted by the body and signal defense mechanisms to protect the body. The proteins in foods such as milk, eggs, peanuts, fish, tree nuts, shellfish, soy and wheat are most often known to be responsible for allergic reactions however, as the body defense system matures these proteins often become better tolerated.

How does aging affect protein needs?

Protein needs are thought to remain the same as we age although our ability to absorb and utilize protein as efficiently may decline with age. Since energy needs are not as great as during growth periods, the quality and percentage of protein in the diet is important. This is an area of current interest. A recent study concluded that the elderly aren't able to synthesize protein as efficiently as younger subjects however, a slightly greater protein

How can I make meals quickly that can be eaten fast and still get enough high quality protein?

On special occasions you may choose to prepare slower cooking foods but, for a quick and balanced meal that includes high quality protein try the following suggestions:

Light and Quick meal for "too tired to cook days." Toss a spinach salad with 2 sliced hard cooked eggs, accompany with cup of fruit juice and sliced whole grain bread topped with melted low fat cheese.

intake can overcome the deficit. Studies suggest the most practical means of increasing muscle mass in the general population, as well as older adults, is to include a protein of high biological value during each meal.[4]

How does exercise affect protein needs?

Exercise causes the breakdown of muscle tissue leading to the rebuilding and growth of new muscle tissue. High-quality protein from the diet supports muscle repair and growth.

What is satiety and how can protein help?

Recent studies that look at consumer behavior have shown people tend to be less hungry and more energetic following a meal with a higher protein content.[5]

What about fat? Aren't protein foods high in fat?

Not all foods that are high in protein are high in fat. Choose foods such as skinless chicken, eggs, turkey cutlets, loin or round beef, tofu and most fishes which are all nutrient-dense protein sources.

Are the high protein diets any good?

A balanced intake that includes foods from all food groups in quantities that supports energy needs is the best diet.

Fast Fish meal for "healthy and delicious days." Heat a pan coated with olive oil. Add sliced onions, garlic and dried oregano. Add any flaky white fish such as tilapia, cod, flounder or turbot with a little white wine or tomato sauce. Cook 4 minutes on each side. Add sliced zucchini and cooked pasta for a quick meal full of nutrients.

"Goodness Anytime" Omelet meal. Heat medium skillet coated with cooking spray. Add any leftover meat, vegetables or potatoes. In a bowl, mix 2 eggs and 2 tablespoons of water and add to skillet. Tip skillet to spread egg mixture evenly. When bubbles form in middle of pan sprinkle with low fat cheese then cook until cheese melts. Slide egg from pan onto plate when no liquid remains in center of egg. Enjoy with rice and bean salad and fruit juice.

www.enc-online.org

1900 L Street, NW, Suite 725

Washington, DC 20036

Phone: 202-833-8850

E-mail: enc@enc-online.org

1 Dietary Reference Intakes, Institute of Medicine, The National Academies Press, 2006.

2 http://www.mypyramid.gov

3 Houston DK et al. 2008, Dietary protein intake is associated with lean mass change in older community-dwelling adults: the Health, Aging and Body Composition Study, Am J Clin Nutr, 87,150-5.

4 Symons, TB et al., 2007, Aging does not impair the anabolic response to a protein rich meal, Am J Clin Nutr, 86:451-6.

5 Apolzan, JW et al., 2007, Inadequate dietary protein increases hunger and desire to eat in younger and older men. J Nutr. 137: 1478-1482.