

# PROTEIN

Protein is an essential nutrient which we eat in animal products like meat, poultry, fish, dairy products, eggs, and from plant sources like nuts and nut butters, seeds, beans, legumes, and some grains. No matter from which source you eat protein it is important to eat what is called a “complete” protein. This simply means that the protein food must contain a complete array of its simplest parts called “amino acids”. These amino acids are the actual essential nutrients since we cannot live without them and they must be obtained from food. The highest measure of quality of protein is the egg. It has the highest “biological value” or the highest number of essential amino acid and can be used efficiently within our bodies. Not all essential amino acid are contained in the right amount in all protein foods. Animal foods tend to have a more complete array of amino acids than plant foods BUT with a bit of planning it is easy to get all the essential amino acids and thereby good quality protein from plant sources.

Most plant foods are missing one or more essential amino acids which means that the body won't have all the building block it needs unless the person uses a simple method of “complementing” plant protein foods. This allows the absent amino acid in one plant food to eaten in another food providing all the essential amino acids and making a “complete” protein. Protein from plant sources is generally low in fat and the fat present is ‘heart-healthy’ mono- and polyunsaturated fatty acids.

Protein that comes from animal foods is usually accompanied by lots of fat. Some of the fat is on the surface, like the ‘rind’ of fat around the edge of a steak, some is under the skin like on poultry and some of the fat is streaked throughout the flesh of the animal, poultry or fish food. In fact, this fat is what makes the texture of protein foods smooth, tender, and flavorful. Since these fats tend not to be ‘heart-healthy’ as it tends to be saturated fat. It is best to cut off as much as possible and use cooking methods which limit fat content of the end product such as baking, broiling, grilling, or moist cooking where excess fat can be removed.

Protein is the nutrient that people eat thinking it will make them build bigger muscles. However, it is a long way from protein we eat to building muscles...and very complex. Dietary protein is different from carbohydrate because it supplies needed nitrogen. The body needs nitrogen to make its own protein. This is why protein is an essential nutrient. We cannot get nitrogen from other nutrients. The smallest protein substance is called an amino acid. Each amino acid has parts that are exactly the same, the nitrogen and the acid parts, and parts that are completely different making each amino acid able to work in unique ways. Amino acids are hooked together in a chain to eventually form a protein. The sequence of amino acids in the chain will determine the shape of the protein and how it functions. For instance, the proteins that are made to function in the blood are round or globular whereas the proteins that make up muscle tissue or hair are long and linear. These are the exact shapes which work for each task.

If you change the shape of a protein it can no longer perform its function. This happens when the body makes a mistake by putting an incorrect amino acid in the chain. When the shape of a protein is wrong, it will not be able to work in the way in which it should. For example, this happens when the protein hemoglobin is made incorrectly in the disease Sickle Cell Anemia. The hemoglobin ends up in the shape of a sickle rather than a circle and cannot carry oxygen throughout the body efficiently.

Our bodies break down the protein that we eat into the individual amino acids and some small chains of amino acids. Using these building blocks protein is produced which is perfectly matched to our individual needs and genetic make-up. Protein is used to build most of the structures of the body, not just muscle tissue but also bones, skin, blood components such as those for clotting, immune system components, hair, nails, enzymes, hormones, transport systems, proteins which control fluid and acid/base balance, and many more.

The protein in food produces the same amount of energy as carbohydrate which is 4 calories per gram. Once our bodies have enough protein to meet the demand for amino acids (nitrogen) the extra protein can be stripped of the nitrogen groups and the rest of the protein can be used as an energy source. This occurs when we eat too much protein and is a simple way to use this excess intake. When we do not eat enough food to meet our energy (calorie) demands the protein in our muscles and organ tissue may be broken down to be used as energy. This happens in starvation or anorexia nervosa.