

TABLE 1 *Biological Functions of Proteins*

Type of Protein	Function	Examples
Storage	storage of amino acids	<i>Casein</i> protein in milk supplies amino acids for baby mammals. Egg white protein, or <i>ovalbumin</i> , is a source of amino acids for developing embryos. Plants store proteins in seeds.
Transport	transport of substances	Proteins transport molecules across cell membranes. <i>Hemoglobin</i> in blood transports oxygen.
Structural	support	Spiders produce silk fibers, which are proteins, to make webs. <i>Collagen</i> and <i>elastin</i> give connective tissues strength and flexibility. <i>Keratin</i> is found in hair, feathers, horns, hooves, and nails.
Contractile	movement	<i>Actin</i> and <i>myosin</i> fibers cause movement in muscles. Contractile fibers in cilia and flagella help propel single-celled organisms.
Enzymatic	catalysis of chemical reactions	Enzymes break down large molecules in food within the digestive system.
Hormonal	coordination of processes in an organism	Pancreatic insulin helps regulate blood-sugar levels.
Receptor	response of cell to chemical stimuli	Nerve cell membranes have chemical receptors that detect chemical signals released by other nerve cells.
Defensive	protection against disease	Antibodies attack pathogenic viruses and bacteria.

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From **Table 1**, you can see that almost everything that occurs in a living organism depends on one or more proteins. Scientists have discovered that the specific function of a protein is related to the protein's shape. The shape of a protein can generally be described as fibrous or globular. *Fibrous proteins* are insoluble in water and are long, thin, and physically strong. *Globular proteins* are generally soluble in water and are twisted and folded into a globe-like shape.

Fibrous proteins give strength and protection to structures in living things. *Keratin* is a fibrous protein whose secondary structure is almost entirely alpha helical in shape. The keratin in nails and hooves is much stiffer than the keratin in fur or wool because of the large number of side-chain interactions that occur between the nail and hoof proteins. *Collagen*, found in bone and tendons, is a triple helix of three intertwined alpha helices, which gives these tissues their strength. *Fibrin* found in silk has a beta-pleated sheet structure. *Elastins* in blood tissue, *fibrins* in blood clots, and *myosins* found in muscle tissue are other kinds of fibrous proteins.

Globular proteins regulate body functions, catalyze reactions, and transport substances. The regulatory hormone *insulin* is a small protein of 51 amino acids in two polypeptide chains. *Myoglobin* transports oxygen in the muscles, and *hemoglobin* transports oxygen in the blood. *Casein*, found in milk and used for food, is also a globular protein. It contains phosphorus, which is needed for bone growth.