PROTEINS – STRUCTURE AND FUNCTION

Proteins are:
- Most abundant biomolecules
- Constitute about 50% of cell dry weight
- Are present in all parts of cells
- Are the most diverse molecules in terms of structure and function

Amino acids

- Are the building blocks of proteins
- Are organic compounds containing amino group (–NH2) and acidic group (–COOH)
- Are 20 in number
- Are linked to each other by peptide bonds

Peptide bond

- Is a covalent bond between two amino acids
- Is formed between the amino group of one amino acid and the carboxyl group of another amino acid
- Is formed by a dehydration reaction (loss of water)

Structure of proteins

- Primary structure
- Secondary structure
- Tertiary structure
- Quaternary structure

Primary structure

- Is the sequence of amino acids in a polypeptide chain
- Is determined by genetic information
- Is stabilized by peptide bonds

Secondary structure

- Is the local folding of the polypeptide chain into regular patterns
- Is stabilized by hydrogen bonds between amino acids
- Includes alpha helix and beta pleated sheet

Alpha helix

- Is a right-handed coil
- Is stabilized by hydrogen bonds between every fourth amino acid
- Is found in many proteins

Beta pleated sheet

- Is a sheet-like structure
- Is stabilized by hydrogen bonds between adjacent strands
- Is found in many proteins

Tertiary structure

- Is the overall three-dimensional shape of a polypeptide chain
- Is stabilized by hydrogen bonds, ionic bonds, disulphide bonds, and hydrophobic interactions
- Is responsible for the biological activity of the protein

Quaternary structure

- Is the arrangement of two or more polypeptide chains
- Is stabilized by hydrogen bonds, ionic bonds, disulphide bonds, and hydrophobic interactions
- Is found in many proteins

Functions of proteins

- Enzymes
- Hormones
- Antibodies
- Structural proteins
- Transport proteins
- Storage proteins
- Contractile proteins

Enzymes

- Are biological catalysts
- Are proteins
- Are specific to their substrates
- Are not consumed in the reaction
- Are affected by temperature and pH

Hormones

- Are chemical messengers
- Are produced by glands
- Are transported by blood
- Are specific to their target cells

Antibodies

- Are proteins
- Are produced by plasma cells
- Are specific to antigens
- Are part of the immune system

Structural proteins

- Are proteins
- Are found in cell membranes
- Are found in connective tissue
- Are found in muscles

Transport proteins

- Are proteins
- Are found in blood
- Are found in cell membranes
- Are specific to their substrates

Storage proteins

- Are proteins
- Are found in seeds
- Are found in eggs
- Are found in milk

Contractile proteins

- Are proteins
- Are found in muscles
- Are found in cilia and flagella
- Are responsible for movement

Denaturation

- Is the loss of the biological activity of a protein
- Is caused by heat, pH, and chemicals
- Is irreversible

**Denaturation of proteins

knowledge has helped man to treat diseases like epilepsy, paralysis.

Answer

a) Different sensory information is collected by the sensory receptors and ultimately transmitted to the central nervous system. Here, the signals are integrated: that is they are brought together, creating a sensation (perceptions), adding to the memory or helping to produce thoughts. As a result of this integrative function, conscious or subconscious decisions are made and then acted upon by effector, i.e., muscles that contact when stimulated by impulses. Thus hand and fingers move, so that we may play a piano or write alphabets.

b) Electronic computers have input circuits that are comparable to the sensory input and output circuits are comparable to the motor output of the nervous system. In simple computers, the output signals are controlled directly by the input signals, operating in a manner similar to that of simple reflexes of the spinal cord. In complex computer, there is a unit called central processing unit (CPU), which determines the sequence of all operations. This unit is analogous to the mechanism in our brain. The basic components of the general-purpose computer are analogous to those of the human nervous system. With the help of modem knowledge of computer, several diagnostic technique have now been developed such as CT scan, MRI scan. EEG and it has now become possible to diagnose and treat many diseases like epilepsy, paralysis etc..

KEY POINTS

- Nervous coordination in higher animal consists of reception of stimulus, processing/analysis of information and response to stimulus.

  Receptors are classified into different types on the basis of stimuli.
- Those parts of the body which produce an appropriate response are called effectors (muscles and glands).
- Although more than 50% of nervous system consists of neurgilal (neuroglia) cells, but the neuron is considered as chief structural and functional unit of nervous system.
- Neuron having only one fiber radiating from cell body is called unipolar neuron, while those having two fibers called bipolar and those having many fibers arc called multipolar.
- The pathway of nerve impulse during reflex action is called reflex arc.
- Nerve impulse is a wave of electrochemical change that travels along the length of neuron, from one end to the other. Fp conduction it uses electricity made with chemical ions and molecules (Na^+, K^+, and charge bearing organic molecules).
- Nerve impulses are of two types: continuous impulse and saltatory impulse.
- Synapsess is the junction between axon terminal of one neuron and the dendrite of another neuron, where information from one neuron is transmitted or relayed (handed over) to another neuron.

- Sensory receptors receive stimuli and keep the central nervous system informed of any change in the surroundings and in our own bodies.
- Heroin is processed from morphine, a naturally occurring substance extracted from the seed pod of certain varieties of poppy plants.
- Inhalants are chemical vapours or gases that produce psychoactive (mind-alerting) effects when abused or misused by concentrating and intentionally inhaling these fumes.
- Neurological disorder are classified into vascular (Stroke), infectious (Meningitis), structural (Brain Tumour), functional (Headache), degenerative) (Alzheimer's disease).