08-06-20

BCH 202

1.) Vitamins are organic molecules which are known to be essential micronutrients needed by organisms needed in small quantities for the proper functioning of its metabolism. Most vitamins are not single molecules but group of related molecules called vitamers. They are necessarily needed by the body system because of the diverse biochemical functions they carry out. Due to the necessity of different vitamins in the body, lack of vitamins can lead to various deadly diseases in the body. Vitamins are grouped into two categories

- Fat soluble vitamins
- Water soluble vitamins

* Fat soluble vitamins:- These vitamins are stored in the body's fatty tissue and they are four; Vitamin A, D, E and K. They are absorbed more easily by the body in the presence of dietary fat

* There are nine water soluble vitamins (Thiamine, Riboflavin, Niacin, panthothenic acid, biotin, B_6, B_{12} and folate). They are not stored in the body

b) Riboflavin also known as vitamin B_2 is an important component of the cofactors (FAD and FMN - Flavin adenine dinucleotide and Flavin mononucleotide). These cofactors form part of flavoproteins and are essential for many metabolic pathways which includes fatty acid metabolism, citrate cycle and electron transport chain. FAD is a crucial electron acceptor in addition to NAD+ and NADP+ in these pathways. Study shows that Riboflavin has an adverse effect in parasite growth

-Active forms- Flavin adenine dinucleotide & Flavin mononucleotide

8. a) Glycolipids are lipids with a carbohydrate attached by a glycosidic (covalent) bond. Their role is to maintain the stability of the cell membrane and to facilitate cellular recognition, which is crucial in the immune response and in the connection that allows cells to connect to one another to form tissues, they are found on the surface of all eukaryotic cell membranes, where they extend from the phospholipid bilayer into the extracellular environment

b)

Various form of glycolipids consists of:-

* Glycerogly colipids
* Glycosphingolipids

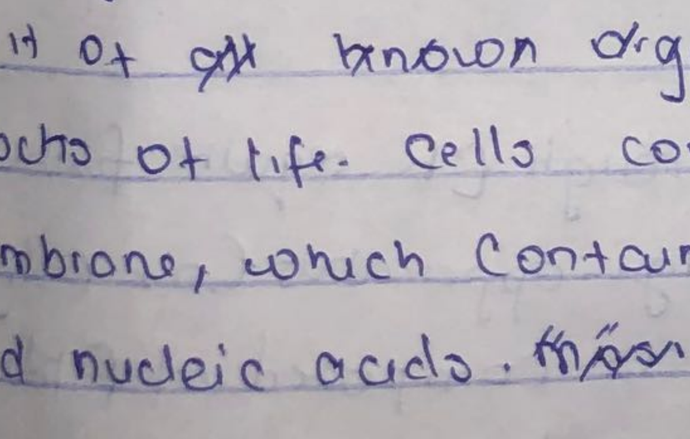
- Glycerogly colipids:- A sub-group of glycolipids characterized by an acetylated or non-acetylated glycerol with atleast one fatty acid as the lipid complex. Glycerogly colipids are often associated with photosynthetic membranes and their functions. They further consists of:- Galactolipids and sulfolipids.

- Glycosphingolipids:- A sub-group of glycolipids based on sphingolipid Glycosphingolipids are mostly located in nervous tissues and are known to be responsible for cell signaling they further consists of:-

* ~~Cerebrosides~~ * Galacto cerebrosides * Glucocerebrosides * Sulfatide.
* Gangliosides * Globosides * Glycophosphosphingolipids
* Glycophosphatidylinositols

Note: Cerebrosides are a group of glycosphingolipids involved in nerve cell membrane.

c) Structure of glycolipids



Glycolipids

3. Cell is known as the basic, structural, functional and biological unit of all known organisms. A cell is the smallest unit of ~~all~~ known organ. life. Cells are often called "the building blocks of life. Cells consist of cytoplasm enclosed within a membrane, which contains many biomolecules such as proteins and nucleic acids.

The Cells were discovered by Robert Hooke in 1665, who named them for their resemblance to cells inhabited by christen monks in a monastery.

The first cell theory was developed by Matthias Jakob Schleiden and Theodor Schwann in 1839 which states that all cells are composed of one or more cells, that cells are the fundamental unit of structure and function in all living organisms and that all cells come from pre-existing cells.

The number of cells in plants and animals varies from species to species; it has been estimated that humans contain around 40 trillion cells (4×10^{13}) cells and that the human brain accounts for around 80 billion of these cells.

Functions of important cell organelles

1. Nucleus :- It is known as the "command centre"; the nucleus is a large organelle that stores the cell's DNA - the nucleus controls all the cell's activities, such as growth and metabolism, using the DNA's genetic information.

2. Ribosomes:- Ribosomes are the protein factories of the cell. Composed of two subunits, they can be found floating freely in the cell's cytoplasm or embedded within the endoplasmic reticulum. Using the templates and instructions provided by two different types of RNA, ribosomes synthesize a variety of proteins that are essential to the survival of the cell.

3. Endoplasmic reticulum:- This is a membranous organelle that shares part of its membrane with that of nucleus. Some portions of the ER, known as the rough ER, are studded with ribosomes and are involved with protein manufacture. The rest of organelle is referred to as the smooth ER and serves to produce vital lipids (fats)

4. Golgi apparatus:- If the proteins from the rough ER require further modification, they are transported to the Golgi apparatus (or Golgi Complex). Like the ER, the Golgi apparatus is composed of folded membranes. It searches the protein's amino acid sequences for specialized "codes" and modifies them accordingly. These processed proteins are then stored in the Golgi or packed in vesicles to be

transported elsewhere in the cell

- Chloroplasts: In plants and some algae's, organelles known as chloroplasts serve as the site of photosynthesis. Chloroplasts contain a pigment known as chlorophyll, which captures the sun's energy to transform water and carbon dioxide into glucose for food.

Chloroplasts allow autotrophic organisms to meet their energy needs without consuming other organisms.

- Mitochondria: The "powerhouses" of the cell, mitochondria are oval-shaped organelles found in most eukaryotic cells. As the site of cellular respiration, mitochondria serve to transform molecules such as glucose into an energy molecule known as ATP (adenosine triphosphate). ATP fuels cellular processes by breaking its high-energy chemical bonds.