**1a.**  Membrane structure is not a function of triacylglycerol

**b.**  Fatty acids are carboxylic acid

**2.** The sterol nucleus of steroid is called a cyclo-pentano-perhydro-phenanthrene ring

**3.** Chylomicrons transport triacylglycerol and cholesterol absorbed from the intestine to adipose, cardiac, and skeletal muscle tissue.

**4.** Characteristics of the following

A. Nucleus

The nucleus is the most prominent organelle in a cell.

The nucleus houses the cell’s DNA and directs the synthesis of proteins and ribosomes, the cellular organelles responsible for protein synthesis.

The nuclear envelope is a double-membrane structure that constitutes the outermost portion of the nucleus.

Both the inner and outer membranes of the nuclear envelope are phospholipid bilayers.

The nuclear envelope is punctuated with pores that control the passage of ions, molecules, and RNA between the nucleoplasm and cytoplasm.

The nucleoplasm is the semi-solid fluid inside the nucleus where we find the chromatin and the nucleolus.

Chromosomes are structures within the nucleus that are made up of DNA, the genetic material.

In prokaryotes, DNA is organized into a single circular chromosome. In eukaryotes, chromosomes are linear structures.

B. Mitochondria

They are sac like or pouch like structures.

They are double membrane in nature. The outer membrane is oval shaped without folding. While the inner membrane is folded to form partitions termed cristae. In the gap of these folding lies the matrix which encompasses all the enzymes and other substances which can help in production of energy as ATP.

They are present in almost all the cells of the body except in Red Blood Cells.

They are freely floating in the cytoplasm and and stay in the regions of high energy requirement.

Mitochondria are self replicable i.e. they can multiply on their own without the requirement of cell to divide. This characteristic feature helps replacement of old, worn out and damaged mitochondria with new and healthy mitochondria. This process happens many times in life cycle of a cell.

Mitochondria have their own genetic material as single stranded DNA. This DNA is unlike the double stranded one as in the cell nucleus.

They have capacity to generate mRNA which helps in formation of proteinacious enzymes required for the respiratory chain.,

C. Endoplasmic reticulum

Endoplasmic reticulum is an organelle found in both eukaryotic animal and plant cells.

It often appears as two interconnected sub-compartments, namely rough ER and smooth ER. Both types consist of membrane enclosed, interconnected flattened tubes.

The rough ER, studded with millions of membrane bound ribosomes, is involved with the production, folding, quality control and despatch of some proteins.

Smooth ER is largely associated with lipid (fat) manufacture and metabolism and steroid production hormone production. It also has a detoxification function.

These organelles form an interconnected network of flattened, sacs or tube like structures called as cisternae.

The endoplasmic reticulum helps to form a skeletal framework.

The endoplasmic reticulum is responsible for the synthesis of lipids, proteins, glycogen and steroids for example progesterone, cholesterol and testosterone.

**5.** Classes of glycolipids

* Glyceroglycolipids: a sub-group of glycolipids characterized by an acetylated or non-acetylated glycerol with at least one fatty acid as the lipid complex. Glyceroglycolipids are often associated with photosynthetic membranes and their functions. The subcategories of glyceroglycolipids depend on the carbohydrate attached.
* Galactolipids: defined by a galactose sugar attached to a glycerol lipid molecule. They are found in chloroplast membranes and are associated with photosynthetic properties.
* Sulfolipids: have a sulfur-containing functional group in the sugar moiety attached to a lipid. An important group is the sulfoquinovosyl diacylglycerols which are associated with the sulfur cycle in plants.
* Glycosphingolipids: a sub-group of glycolipids based on sphingolipids. Glycosphingolipids are mostly located in nervous tissue and are responsible for cell signaling.
* Cerebrosides: a group glycosphingolipids involved in nerve cell membranes.
* Galactocerebrosides: a type of cerebroseide with galactose as the saccharide moiety
* Glucocerebrosides: a type of cerebroside with glucose as the saccharide moiety; often found in non-neural tissue.
* Sulfatides: a class of glycolipids containing a sulfate group in the carbohydrate with a ceramide lipid backbone. They are involved in numerous biological functions ranging from immune response to nervous system signaling.
* Gangliosides: the most complex animal glycolipids. They contain negatively charged oligosacchrides with one or more sialic acid residues; more than 200 different gangliosides have been identified. They are most abundant in nerve cells.
* Globosides: glycosphingolipids with more than one sugar as part of the carbohydrate complex. They have a variety of functions; failure to degrade these molecules leads to Fabry disease.
* Glycophosphosphingolipids: complex glycophospholipids from fungi, yeasts, and plants, where they were originally called "phytoglycolipids". They may be as complicated a set of compounds as the negatively charged gangliosides in animals.
* Glycophosphatidylinositols: a sub-group of glycolipids defined by a phosphatidylinositol lipid moiety bound to a carbohydrate complex. They can be bound to the C-terminus of a protein and have various functions associated with the different proteins they can be bound to.



Glycosphingolipids