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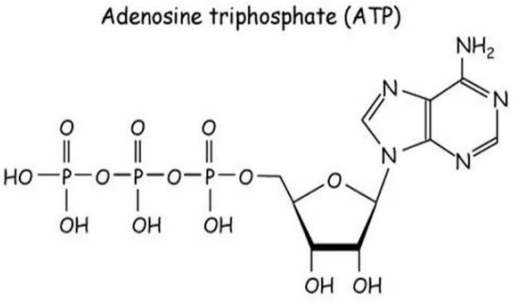
18/mhs01/301
MEDICAL LABORATORY SCIENCE

Question
REVIEW AND PRACTISE
1.Draw the structures of the ffg; ATP , GDP, CDP,UTP, double stranded DNA
2.Differentiate between DNA and RNA clearly
3.Explain the biosynthesis of calcitriol
4.write on coenzymes.and the coenzyme form of riboflavin
5Write on the characteristics components of nucleotides and the nucleoside units on RNA
6.Structure of cholesterol and cortisol

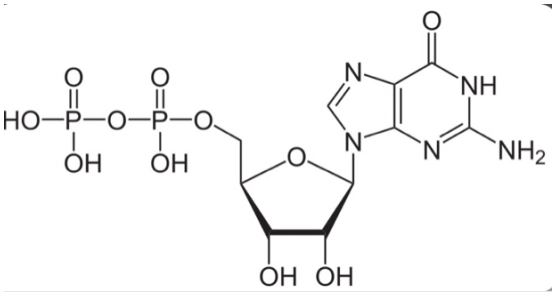
Answer

1. Adenosine

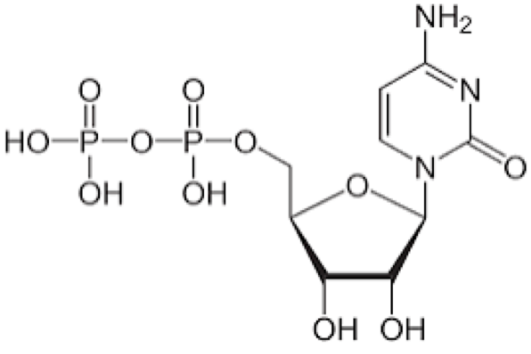
triophosphate



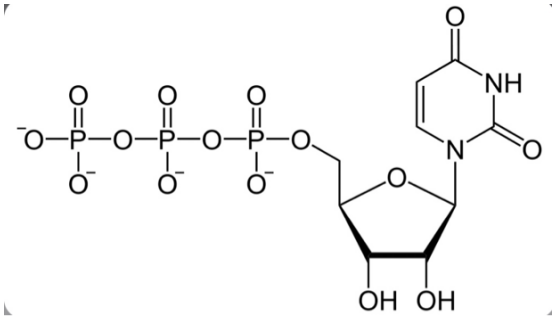
Guanosine diphosphate



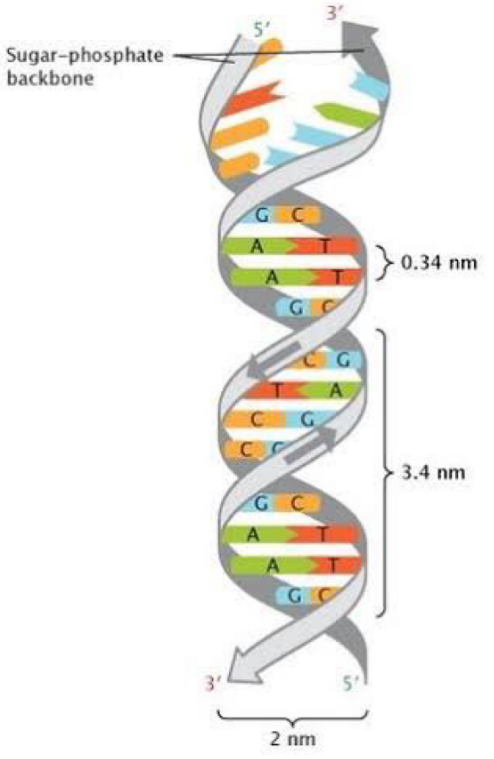
Cytidine triophosphate



Uratidine triophosphate



Double stranded dna



2.

DNA	RNA
DNA contains the sugar deoxyribose	RNA contains the sugar ribos
DNA is double stranded molecule	RNA is a single-stranded molecule.
DNA is stable under alkaline conditions	RNA is not stable
DNA is responsible for storing and	RNA directly codes for

storing and transferring genetic information	amino acids and acts as a messenger between DNA and ribosomes to make proteins.
DNA uses the bases adenine, thymine, cytosine, and guanine	RNA uses adenine, uracil, cytosine, and guanine

3.

Calcitriol is produced in the cells of the pronates tubule of the nephron in the kidneys by the action of 25-hydroxyvitamin D3 1-alpha-hydroxylase, a mitochondrial oxygenase and an enzyme which catalyzes the hydroxylation of 25-hydroxycholecalciferol (calcifediol) in the 1-alpha position.The activity of this enzyme is stimulated by PTH. This is an important

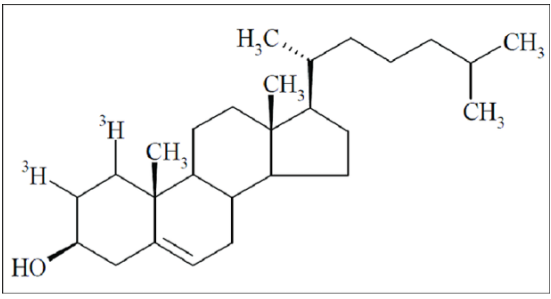
control point in Ca2+ homeostasis.[20] Additional effects on the production of calcitriol include an increase by prolactin, a hormone which stimulates lactogenesis (the formation of milk in mammary glands), a process which requires large amounts of calcium.[23] Activity is also decreased by high levels of serum phosphate and by an increase in the production of the hormone FGF23 by osteocyte cells in bone. Calcitriol is also produced outside the kidney in small amounts by many other tissues including placenta and activated macrophages When the drug alfacilis used, 25-hydroxylation in the liver will produce calcitriol as the active metabolite. This

will produce greater effects than other vitamin D precursors in patients with kidney disease who have loss of the renal 1-alpha- hydroxylase

4. A coenzyme is an organic non-protein compound that binds with an enzyme to catalyze a reaction.

The active forms of riboflavin, vitamin B2, are the coenzymes flavin mononucleotide (FMN; Figure 2) and flavin adenine dinucleotide (FAD). These coenzymes serve as hydrogen carriers for oxidation reactions that affect energy nutrients in the citric acid cycle and in the electron transport system

5. Cholesterol



7.A vitamin is an essential compound of organic molecules that cannot be synthesized in the body but acquired through the diet that the person intakes. It is taken in sufficiently small amounts and is beneficial in many metabolic processes of the body.

Fat-Soluble Vitamins: These vitamins bind to fat in the stomach and is then stored in your body for later use. Examples of these vitamins are A, D, E and K.

Water-Soluble Vitamins: These vitamins can be directly absorbed by the cells. These vitamin are biotin, vitamin C, niacin,

folic acid, pantothenic acid and the four B complex vitamins. They need to be restored more frequently than the fat-soluble vitamins.

Vitamin A

This vitamin is important for a better eyesight and an improved immune system. It also promotes healthy skin, maintenance of different organs, healthy growth of muscle tissues and a healthy reproductive system.it is found in eggs, fish and different milk products. If the vitamin A is not present in sufficient amount, it could lead to a disease known as xerophthalmia.

Vitamin B

This is a diverse form of vitamin and further divided into B1, B2, B3, B5, B6, and B12. It is important in maintaining

nerve cell function, producing RBC's, synthesizing fats and carbohydrates into energy and potentially producing cholesterol, different kinds of hormones and also aiding in the replication of DNA. It is found in bread, liver, eggs, beans, nuts, fish and many fruits and vegetables. The deficiency of the said vitamin could lead to weakness, disturbance in the gastrointestinaltract, fatigue, nausea, dermatitis etc.

Vitamin C

It is an anti-oxidant i.e it produces an inhibiting effect onthe aging process. It is also responsible for the healing of injuries by producing collagen eventually leading up to a better immune system and the formation of iron which is

an essential component in driving the oxygen into different parts of the body. It is found in citrus fruits and many vegetables like Brussels, tomatoes, potatoes, spinach, andcabbage etc. Its deficiency in the body could lead to scurvy or anemia.

Vitamin D

It is an essential vitamin that can be obtained from the sunlight and helps in the growth of bone tissues by absorbing the calcium from different sources. The deficiency of vitamin D can lead to osteoporosis. Vitamin D can be acquired through the external environment but since many people work indoors, it can be consumed through other sources. It is found in fish, dairy products like yoghurt, cheese and milk

and fish oils.

Vitamin E
It is also a type of anti-oxidant and also helps the body to produce better defense against diseases. It is found in wheat, margarine, nuts, oils, corn etc. Its deficiency could lead to neuropathy and breakdown of the red blood cells in the body.
Vitamin K
It is the main factor that helps in the coagulation of blood. It is found in leafy and green vegetables like cabbages, kale, spinach, broccoli etc. The deficiency of Vitamin K can lead to serious internal bleeding and internal clot formation.
To conclude this, there are many uses of vitamins and they are considered to be vital for the body as they play a much significant

part in the metabolism and immunity of the body of a living organism. That is why one should take foods which are high in vitamins because they cannot be directly produced in the body and their deficiency could lead to a number of diseases which may become harmful in the future.

Metabolism of vitamin A:

Vitamin A (retinol) is ingested as either retinyl esters or carotenoids and metabolized to active compounds such as 11-cis-retinal, which is important for vision, and all-trans-retinoic acid, which is the primary mediator of biological actions of vitamin A.

Active form: In foods of animal origin, the major form of vitamin A is an ester, primarily retinyl palmitate, which is

converted to retinol (chemically an alcohol) in the small intestine. The retinol form functions as a storage form of the vitamin, and can be converted to and from its visually active aldehyde form, retinal.

8. 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 to the immune response and in the connections that allow cells to connect to one another to form tissues. Glycolipids are found on the surface of all eukaryotic cell membranes, where they extend from the phospholipid bilayer into

the extracellular environment.
The essential feature of a glycolipid is the presence of a monosaccharide or oligosaccharide bound to a lipid moiety. The most common lipids in cellular membranes are glycerolipids and sphingolipids, which have glycerol or a sphingosine backbones, respectively. Fatty acids are connected to this backbone, so that the lipid as a whole has a polar head and a non-polar tail. The lipid bilayer of the cell membrane consists of two layers of lipids, with the inner and outer surfaces of the membrane made up of the polar head groups, and the inner part of the membrane made up of the non-polar fatty acid tails.
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.

9.) **Cell** is the smallest structural and functional unit of an organism, which is typically microscopic and consists of cytoplasm and a nucleus enclosed in a membrane.

Cell organelles

Plasma membrane: The plasma membrane surrounds the cell to create a barrier between the cytosol and the extracellular matrix. Plasma membranes also enclose lumens of some cellular organelles. The structure of the membrane resembles a fluid mosaic made up of phospholipids, cholesterol, and membrane proteins. Phospholipid molecules, the main structural components of the membrane, form an

amphipathic bilayer.
Cell wall: Present only in a plant cell.
Hard and rigid.
Fully permeable.
Made up of Cellulose in plant and peptidoglycan in bacteria

Cytoplasm: Contains 80-90% water and many organic and inorganic compounds.
Colloidal, Viscous, Jelly like fluid inside the cell.

Nucleus: Covered by a double membranous nuclear membrane in a Eukaryotic Cell.
Contains DNA, RNA, Protein, nucleolus, and Chromatin network.

Endoplasmic reticulum: A network of membranes.
RER bears ribosomes and appears rough . SER does not have ribosomes