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MATRIC NUMBER: 18/MHS06/040

DEPARTMENT: MEDICAL LABORATORY SCIENCE

LEVEL: 200

1. Differentiate between DNA and RNA clearly.
2. Explain the biosynthesis of calcitriol.
3. Review vitamins and different form, write on metabolism of one known vitamin and its active form.
4. Detail write up on cell and functions of important cell organelles.

ANSWER

1.

DNA	RNA
DNA is double-stranded	RNA is single stranded
DNA contains deoxyribose as sugar	RNA contains ribose as sugar
DNA contains thymine	RNA contains uracil

Calcitriol is the active form of vitamin D which is normally produced in the kidney. A manufactured form is used to treat kidney diseases with low blood calcium, osteoporosis, osteomalacia and others. Calcitriol increases blood calcium mainly by increasing the uptake of calcium from the intestines. Calcitriol is produced in the cells of the proximal tubule of the nephron in the kidneys by the action of 25-hydroxyvitamin D_3 1-alpha-hydroxylase, a mitochondrial oxygenase and an enzyme which catalyzes the hydroxylation of 25-hydroxycholecalciferol in the 1-alpha position. Calcitriol maintains normal plasma levels of calcium and phosphorus by acting on intestine, kidneys and bones. In the intestine, calcitriol increases the plasma calcium and phosphorus concentration by stimulating the absorption of calcium and phosphorus from the intestine by enhancing the synthesis of calcium binding proteins calbindins. This protein increases the calcium uptake by the intestine.

2. Vitamins are organic nutrients required in small amounts for general biochemical processes and cannot be synthesized in the body but can only be gotten in the diet. Some vitamins can be synthesized by intestinal microorganisms but in quantities that are not sufficient to meet our needs. Classifications or forms of vitamins are;

- **Water soluble vitamins**: These vitamins are soluble in water which include B complex vitamins. Thiamine(B_1), Riboflavin(B_2), Niacin(B_3), Pantothenic acid(B_5), Pyridoxine(B_6), Biotin, Folic acid, Cobalamin(B_{12}) and Vitamin C.
- **Fat soluble vitamins** : These vitamins are soluble in fats. They include; Vitamin A, Vitamin D, Vitamin E, and Vitamin K.

METABOLISM OF FOLIC ACID TO ITS ACTIVE FORM

Folic acid→Dihydrofolate(DHF)→Tetrahydrofolate(THF)

4.Cells:

The cell (from the Latin word cella, meaning "small room") is the basic structural, functional, and biological unit of all known organisms. A cell is the smallest unit of life. Cells are often called the "building blocks of life". The study of cells is called cell biology , cellular biology, or cytology.

Cells were discovered by Robert Hooke in 1665, who named them for their resemblance to cells inhabited by Christian monks in a monastery. Cell theory, first developed in 1839 by Matthias Jacob Schleiden and Theodor Schwann, states that all organisms 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.

Cell Organelles and Function:

1.Mitochondria:energy production from the oxidation of glucose substances and the release of adenosine triphosphate.

2.Nucleus:DNA maintenance, controls all activities of the cell,RNA transcription.

3.Vacuole:storage, transportation, helps maintain homeostasis.