

Welcome to module on significance of steroids from Unit 8 lipids from the paper Animal Physiology and Biochemistry. Myself Dr. K. K. Therisa, Assistant Professor from Dhempe College of Arts and Science Miramar, Goa.

The outline of this presentation includes Significance of various steroids, such as sterols, bile acids, sex hormones, adrenal hormones, steroids of insects, and other organisms.

The learning outcome expected at the end of this module, is the student will be able to understand the significance and importance of various types of steroids found in animals.

To start with, the significance, in the previous module, we have learnt the structure of steroids and sterol is one of the most common types of steroids. Besides, steroid, have a common structure of A-17 carbon atom which is known as a steroid molecule and with another group attached to it. It forms into a chemically different types of steroids.

So let us see the significance of each of this type of steroids. To begin with significance of sterols, the most abundant steroids are these sterols, which occurs in all animal tissues, green plants and fungi, such as yeast. In Mammalian skin, one of the precursors of the cholesterol, that is 7-dehydrocholesterol, which is converted to cholecalciferol. Cholecalciferol is vitamin D3 and because of the solar UV light, the vitamin D3 is being synthesized in the mammalian skin and for that cholecalciferol is very important which is another type of steroid. Vitamin D controls the calcification of bone by regulating the absorption of calcium from Intestine. Also, ergosterol is another precursor of Vitamin D, a derivative of it that is ergocalciferol (Vitamin D2) which is usually administered to treat Rickets and rickets is a condition seen in children who don't have or who are deficient in vitamin D.

This steroid also has got a negative impact as well. In the disease atherosclerosis, cholesterol form plaques in the walls of the major blood vessels and thus blocking the vessels and impairing their vascular functions. There are free sterols which are equally important component of cellular and intracellular membranes. For example, the sheet of nerve fibers contains lots of cholesterol. Cholesterol is converted to a variety of steroids in plants and animals which have essential functions. Besides, cholesterol is one of the very important components in the membrane lipid and helps to maintain the membrane fluidity of a cell.

So let us see different types of cholesterol, such as bile acid hormones, sex hormones, adrenal hormones and their significance.

To begin with, significance of bile acid. These are the conjugates forms, or conjugates in higher vertebrates and thereby alcohols in lower animals, assist in the emulsification and absorption of dietary fat. It combines with the sodium salt and forms the bile salts, which helps in the process of digestion. The abnormal bile secretion causes liver disease and jaundice. Therefore, while acid has a very important significance as far as our Physiology is concerned.

Significance of sex hormones, which are also being formed from cholesterol sex hormones such as estrogen, testosterone, progesterone plays a very important role to maintain a normal reproductive function in animals, especially in mammals.

Estrogens maintain the female reproductive tissues in a fully functional condition. Progesterone in combination with estrogen regulates the metabolism of the uterus permitting implantation during pregnancy and also development of fertilized ovum in mammals. In male vertebrates, the androgens secreted by the testes maintain spermatogenesis and male reproductive functions.

The important function of the adrenal hormones. The adrenal cortex produces oxygenated progesterone derivatives. Also, they produce glucocorticoids, which are known to promote the deposition of glycogen in liver and protein breakdown. Mineralocorticoids, another important adrenal hormone, which is a steroid in structure, stimulate retention of sodium in the extracellular body fluids. Glucocorticoids are responsible for metabolic adaptation to stressful condition when an Organism, especially vertebrates, are under stress.

There have been researchers which tells that the amount of glucocorticoids released are high. Failure of adrenal cortex in humans give rise to a disease called Addison's disease. Besides, there are important steroids found in insects and other organisms, like amphibians. For example, ecdysones are known as a molting hormone. In Insect, this steroid hormone promotes the molting and development in insect. They have been released by the thoracic glands in insect.

Holothurinogenin is a group of lanosterol derivatives found in sea cucumbers and known as Nerve tissue toxin. Bufanolide in the skin of Toads, cause vomiting, visual disturbances, slowing of the heart invertebrates.

The skin of poison frog produces batrachotoxin used by tribal people in olden days as an arrow poison during the time of hunting. The skin of salamander secretes very important poisonous steroid hormone called Samandarin which is highly poisonous.

The pharmacological action of steroids is dealing with the use of steroid in various therapeutic purposes and pharmacological purposes. So let us see the important steroids that has got the pharmacological role to play. Hypogonadism in male and eunuchoidism, which are being seen remedied by administration of the androgenic steroids. Synthetic estrogen and progesterone used for the method of contraception. Cardiotonic steroids such as digitalis, ouabain and Strophantin glycosides are used in the heart related treatment. They act as or the act for a smooth functioning of heart muscle. Cortisol analogues, such as dexamethasone, are used to suppress the immune response in allergies. Also emerged as the key therapy during COVID-19 pandemic as it could improve the survival in critically ill patients and this was observed globally in this year itself that dexamethasone has saved so many lives in this pandemic. Because the steroid is known to improve this survivability in critically ill patients who were suffering from COVID-19.

These are the references that has been used to prepare this module. Thank you.