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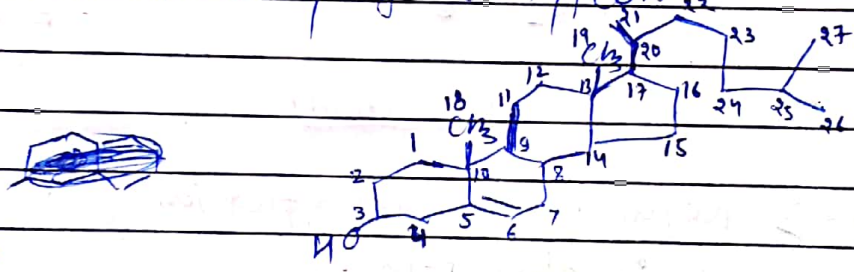
Biological significance of cholesterol :

Cholesterol also called animal sterols ie. they are only biosynthesized by the animal cells. plant cell donot capable to synthesize Cholesterol but they produce phytosterol.

The dietary source of cholesterol are eggs, meat fish etc.

⇒ Animal cell also produce Cholesterol from excess availability of acetyl CoA.



Chemically Cholesterol is C_{27} carbon Chemical ~~Steroid~~ Compound which have steroid nucleus (cyclopentano-perhydrophenanthrene ring nucleus).

The major site for cholesterol biosynthesis are liver & Intestinal cell. but in minor form all the cell have capability to synthesize this.

The enzyme for cholesterol biosynthesis are present in cell cytoplasm & endoplasmic reticulum.

Acetyl CoA → HMG CoA → Mevalonate → Isoprenoid unit

Cholesterol ← Lanosterol ← Squalene ←

Biological Significance

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(1) For synthesis of bile acids
(2) Steroid Hormons
(3) Vitamine D

(1) **Bile salts**:- The primary bile acids Cholic acid & Chenodeoxycholic acid are synthesized by liver cell using Cholesterols.

Cholesterol —(7-α-Hydroxylase, O_2, H_2O)→ 7-α-hydroxy cholesterol → Bile acids

Importance of bile acids

→ Required for emulsification of dietary lipids & their absorption.

→ excess cholesterol is dangerous. so ~~bile~~ Conversion of bile acid helps body from overloading with Cholesterol

→ excretion of Cholesterol in form of bile acids are good. because animal cell can not degrade Cholesterol as such.

(2) **Formation of steroid Hormones**: Cholesterol is precursor of many steroid Hormons in our body.

Cholesterol → Progesterone → Glucocorticoids
Progesterone → Mineralocorticoids
Progesterone → Androgens → Estrogens

(3) Formation of Vit-D :⇒ Cholesterol is precurser of Vitamin D which regulate calcium & phosphorus metabolism.

Cholesterol —(dehydrogenation)→ 7-dehydrocholesterol —(UV light)→ Cholecalciferol (Vit D_3)

Disorder of Cholesterol metabolism :.

Hypercholesterolemia :⇒
Normal blood Cholesterol conc. ⇒ 150-250mg/100ml

If this conc. rises from 250mg/100ml to higher is called hypercholesterolemia.

Reasons for hypercholesterolemia

(1) Diabetes mellitus :. ↓ insulin → ↑ lipolysis → ↑ β-oxidation → ↑ acetyl CoA → ↑ Cholesterol

(2) Hypothyroidism :- Condition favors ↓ HDL receptor & ↓ synthesis of 7-α-Hydroxylase enzyme resposible for bile acid formation.

(3) Obstructive Jaundice :⇒ obstruction in hepatic duct ⟶ so ↓ excretion of Cholesterol through bile

(4) Familial Hypercholesterolemia :. Genetic defect in deficiency of LDL receptor ⟶ ↓ uptake of LDL by liver → ↓ feedback inhibition of cholesterol biosynthesis