

المادة/ الكيمياء السريرية النظري

قسم تقنيات المختبرات الطبية المرحلة الثانية

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المحاضرة : الدهون

Lec.7 (lipids)

-**Lipids** :the groups of organic substances which have two common properties:

1- in soluble in H₂O.

2-Soluble in ether, chloroform, benzene, acetone and boiling alcohol.

-they are found in plants ,animal tissues brain and nervous system.

-lipids acts as heat insulator in the body and used to produce energy.

Classification of lipids

1-simple lipids.

a-fats (solid)and oil (liquid) is ester of fatty acid and glycerol.

b-waxes are ester of fatty acid and with higher alcohol than glycerol.

2-**compound lipids**: fat + another groups.

a-phospholipids (fats + phosphoric acid + nitrogen base) in the skin.

b-glycolipids (fats +carbohydrates +nitrogen base) in the brain.

c-lipoprotein (fats + phospholipids +cholesterol + protein).

-there are three major classes of lipoproteins:

1- very low density lipoprotein (VLDL):Contains high conc. of fats and moderate or few conc. of the other.

2- low density lipoprotein (LDL):Contains high conc. of cholesterol and moderate or few conc. of the other.

3- high density lipoprotein (HDL): Contains high conc. of protein and moderate or few conc. of the other.

3-derived lipids: substance which are derived from the above groups by hydrolysis such as fatty acids, glycerol, fat soluble vitamin (A,D,E,K), cholesterol and ketone bodies.

Fatty acids : they are obtained by hydrolysis of fats.

A-Saturated fatty acid : such as palmitic and stearic acid.

B/Unsaturated fatty acids such as:

1-monounsaturated : contain only one double bond (found in nearly all fats).

2-poly unsaturated: contain more than one double bond (found in cotton and corn).

Alcohol : such as glycerol, cholesterol.

Digestion of lipids

1-physical alteration: by mechanical breakdown in the mouth and mixing with secretion in the stomach and intestine.

-lipids are emulsified in intestine by bile salts which are produced by **liver**.

2-chemical alteration : begins in the stomach and mainly in small intestine by pancreatic lipase to give fatty acids and glycerol which are absorbed by intestine then combined with another in the body to form fats or phospholipids or another .

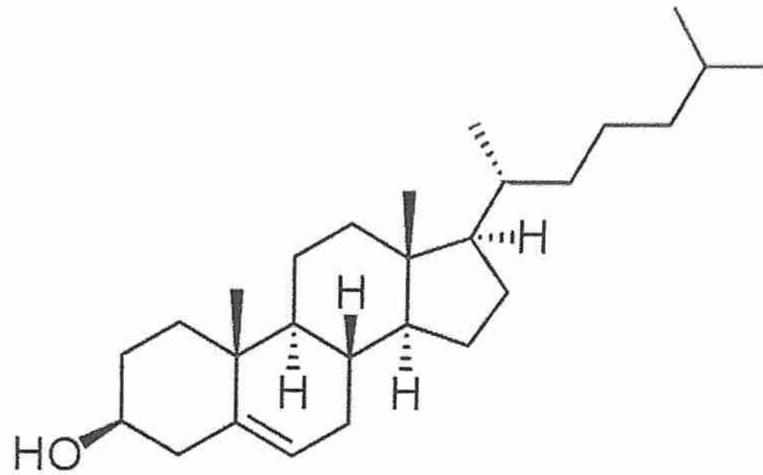
Metabolism of lipids : occurs in the **liver**.

1-analysis of free fatty acid to produce energy.

2-synthesis of fat from carbohydrates.

3-synthesis of other lipids such as cholesterol or phospholipids from fatty acids.

Cholesterol from derived lipids:



(C₂₇H₄₅ OH)

Occurrence of cholesterol :

- 1-in brain (14% of the structure of brain).
- 2-in nervous tissue (10% of the structure of nervous tissue).
- 3-in bile (1-5% of the structure of bile).

Classification of cholesterol in blood

- 1-free cholesterol (about 1/3 of the total chol.).
- 2- cholesterol esters (about 2/3 of the total chol.).

N.V of chol. = 140 – 280 mg/100 ml

Absorption and metabolism of cholesterol

-it is either obtained from the diet (0.8 g/day) from meat, egg yolk, dairy products, animal fats) or formed in the cells especially liver (1g/day).

-it is used either structural elements of the cell and its membrane or for formation of bile acids in the bile salts in the liver which are used for emulsification of fats in the

intestine 90% of bile salts are reabsorbed by the intestine then transport to the liver again (**enterohepatic circulation**).

Factors affect on chol. Level in the blood.

- 1-abnormal cases of each of liver and kidney.
- 2-thyroxine hormone from thyroid gland (reverse relation).
- 3-estrogen hormone (reverse relation)

Clinical significance of cholesterol

1-Hyper cholesterolemia

A-atherosclerosis ,B-heart diseases , C-diabetes mellitus ,D-nephrotic syndrome ,E-obstruction of bile tract.

2- Hypo cholesterolemia.

A- Severe hepatitis , B-hyperthyroidism