

Roles of Lipids in the body



1- Energy storage :

Lipids contain a lot of calories in a small space. Since Lipids are generally insoluble in polar substances such as water, they are stored in special ways in your body's cells . Lipids are broken down in the body to release glycerol and free fatty acids. The glycerol can be converted to glucose by the liver and thus used as a source of energy .

2- Lipids can also function as structural components in the cell membrane. Phospholipids are the major building blocks of cell membranes

3- Lipids are also used as hormones that play roles in regulating our Physiology (metabolism).

4- Cholesterol is the starting synthesis of all steroid hormones and plays a role in fluidity and increases the permeability to ions.

5- Fats play a vital role in maintaining healthy skin and hair .

6- Vitamins A, D, E, and K are fat-soluble, meaning they can only be digested, absorbed, and transported in conjunction with fats .

7- They insulate the body against temperature . Lipids are a poor conductor of heat , so the layer of fat beneath the skin helps keep the body warm .

8- lipids protect against shock ... by providing a cushion for bones and vital organs .



The Essential Fatty acids

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our body can make all the fatty acids that it needs. but, there is only two fatty acids that the body can not make at all or can not make in sufficient amount to meet physiological needs ..

Those fatty acids are called essential fatty acids .

They are the (linoleic fatty acid) and (linolenic fatty acid)the

1- The linoleic fatty acid

The Omega 6 fatty acids are a family .
the 18 carbon polyunsaturated fatty acid
(linoleic fatty acid) is one primary member of this
family .

When you receive the linoleic fatty acid from
the diet . From sunflower , safflower , corns or
poultry fat, it can make other member of the
omega 6 family.

For making this member there is a process that
requires 3 stages :

ESSENTIAL FATTY ACIDS

Linoleic acid (18:2) ○

Desaturation

(18:3)

Elongation

(20:3)

Desaturation

Arachidonic acid (20:4)

2- the linolenic fatty acid

The omega 3 fatty acids are also a family , where it has the linolenic fatty acid as a member .

The essential fatty acid (linolenic acid) is an omega3 , 18 carbon polyunsaturated fatty acid ..

When we obtain the linolenic acid from the diet . From flaxseed , fish or walnuts , it will use the same process that the linoleic acid uses (desaturation + elongation + desaturation) to make the 20 carbon polyunsaturated fatty acid (EPA) and the 22 carbon polyunsaturated fatty acid (DHA) .

Eicosanoids

The body uses Arachidonic acid and EPA to make substances known as Eicosanoids .

Eicosanoids are a diverse group of compounds that are sometimes described as hormonelike.

There are many different types of Eicosanoids and they have a wide variety of functions.

Three types have been the focus of the majority of eicosanoid research - the leukotrienes, the thromboxanes, and the prostaglandins

Functions of Eicosanoids

- 1- the EPA eicosanoids helps lower the blood pressure
- 2- prevent blood clot formation
- 3- protect against irregular heart beats
- 4- reduce inflammation
- 5- regulate nerve transmission
- 6- Regulate the functions of the kidneys and gastrointestinal tract.

A diet rich with omega 3 sources is very important to the heart because your body will use the linolenic acid found in these foods to make the EPA . And then it will make from the EPA the eicosanoids which have an anti-inflammatory functions and they play an important role in the prevention and treatment of heart diseases ..

Essential Fatty Acids Deficiency

Signs and symptoms :

- 1- dry skin , eyes , hair and mouth .
- 2- painful joints .
- 3- growth retardation .
- 4-reproductive failure .
- 5- kidney and liver disorders.
- 6- neurological and visual problems .

Lipid metabolism

The body simply breaks down fats , absorbs their parts and puts them together again in storage , it requires very little energy to do this ..

To store fats :

- 1- An enzyme (Lipoprotein Lipase) hydrolyzes triglycerides from lipoproteins .producing glycerol, fatty acids and monoglycerides .
- 2- The glycerol molecule , fatty acids and the monoglycerides enter the adipose cells .
- 3- Inside the cells , the enzymes reassemble the pieces into triglycerides again for storage .
- 4- The triglycerides fill the adipose cells , storing a lot of energy in a small space .

Using Fat for energy

How does our body use the fat stored in the adipose tissue ??

1- When cells demand energy , an enzyme (hormone-sensitive lipase) inside the adipose cells responds by dismantling stored triglycerides and releasing the glycerol and fatty acids directly into the blood .

2- Energy-hungry cells any where in the body can then capture these compounds and take them through a series of chemical reactions to yield energy , carbon dioxide and water .

Thank you

