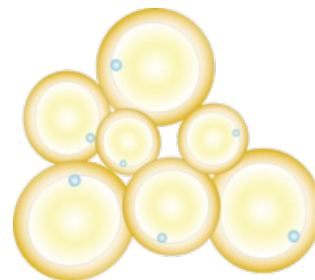


# Lipids

*Lipids* are important natural substances, which mainly include fats, oils, waxes, some vitamins and hormones. Chemically, they are mainly esters (most often triacylglycerols) higher fatty acids and alcohols. The group of substances classified as lipids is not exactly defined. The generally accepted common characteristic of these substances is **hydrophobic character**, which is conditioned by the content of a longer non-polar hydrocarbon chain, i.e. it does not dissolve in water, but in non-polar solvents.



Adipocyte

## Biological significance of lipids

Lipids are indispensable for living organisms. They form a component of cell membranes, where they are in the form of phospholipid bilayer, which is impermeable to water. They act as a solvent for the lipophilic vitamins A, D, E and K, which the body can use thanks to them. Lipids are stored in the human body in the form of adipocytes, so they serve as the most valuable source of energy. At the same time, it mechanically and especially thermally protects the internal organs, i.e. they act as the body's insulating layer. Another benefit of lipids is their use as part of transport lipoproteins. Also, the necessary myelin sheaths of neurons are mainly composed of phospholipids.

Lipid partitioning		
Simple lipids	acylglycerols	Alcohol forms glycerol: <ul style="list-style-type: none"> <li>saturated (fats) – solid, of animal origin;</li> <li>unsaturated (oils) – liquid, of plant origin; by hydrogenation, the so-called <i>solidification</i>, the multiple bonds of the acid (which are otherwise prone to oxidation, i.e. rancidity) are saturated and solidified fat is formed.</li> </ul>
	waxes	The alcohol is not glycerol, but, for example, cetyl alcohol, myricyl alcohol - examples can be beeswax or sheep lanolin, they often also cover the fruits of plants.
Complex lipids	sphingolipids	Ceramides, phosphosphingolipids and glycosphingolipids (cerebrosides and gangliosides).
	glycolipids	Galactolipids, sulfolipids and glycosphingolipids.
	lipoproteins	Chylomicrons, HDL, VLDL, LDL.
	phospholipids	It forms a double layer of the cell membrane.
Derived lipids	steroids, carotenoids, lipophilic vitamins and prostaglandins.	They are substances of a lipidic nature, but their structure cannot be classified as lipids.

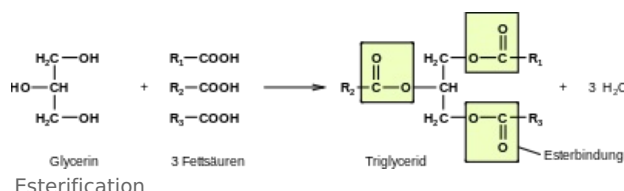
## Dietary fat intake

Fats should make up no more than 25-30% of the daily nutrient intake for adults. The total energy and fat intake depends on the sex, age, weight and physical load of the individual. <sup>[1]</sup>

*With a daily energy intake of 8500kJ, the amount of fat received would correspond to 70g.*

## Lipid reaction

- Acid hydrolysis;
- Alkaline hydrolysis – soap production;
- Catalytic hydrogenation;
- Neutralization;
- drying of oils - some vegetable oils (poppy, linseed,...) polymerize in the air and acquire the nature of a dry, impermeable film. These oils are used as so-called *fermes* – anti-corrosion coatings.



## Lipid metabolism

### Biosynthesis

The body can create fatty acids with a maximum of one double bond. Other necessary unsaturated fatty acids must be taken in food. Lipids are synthesized in the cytoplasm. Fatty acids are formed by the reaction of Acetyl-CoA and simple carboxylic acids, with the consumption of a greater amount of energy. The resulting fatty acids are subsequently esterified with glycerol.

 For more information see *Formation of fatty acids and triacylglycerols*.

## Demolition

Lipids are the most calorically valuable substances, 1 g contains up to 40 kJ. The mechanism of lipid degradation is referred to as  $\beta$ -oxidation. The overall principle is to shorten a long fatty acid chain by two carbons, ending with acetate and Acetyl-CoA residues, then entering the citrate cycle. The entire process of  $\beta$ -oxidation takes place in the matrix of mitochondria.

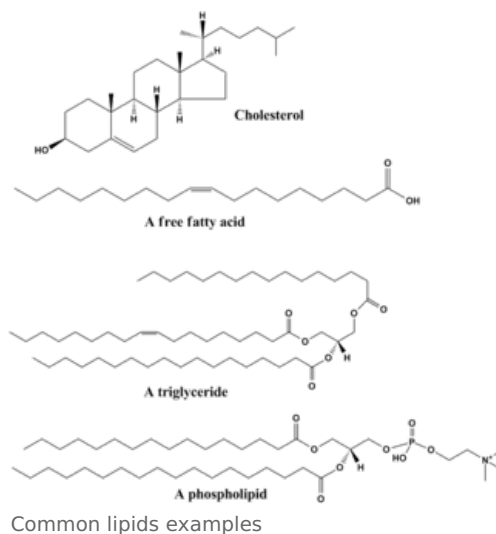
 For more information see *Beta-oxidation*.

## Links

- ws:Lipidy

## Related Articles

- Lipids and their metabolism
- Lipid breakdown and ketone body metabolism
- Dietary fats
- Classification and structure of lipids
- Formation of fatty acids and triacylglycerols
- Beta-oxidation



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