

## LIPIDS. SOAP-FORMING SIMPLE LIPIDS: CHEMICAL AND BIOLOGICAL SIGNIFICANCE IN MEDICINE

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Abstract: This article provides information about the general characteristics of lipids, the composition and biological role of soap-forming simple lipids. It also discusses the chemical structure of triglycerides and waxes, their primary functions in the body, and their involvement in metabolism. Additionally, the significance of lipids as an energy source, their role in thermal insulation, and their protective functions are highlighted. The article examines the role of lipids in medicine, including their relevance to cardiovascular diseases, fat metabolism, and cholesterol metabolism-related issues. Research findings and the importance of lipid balance for health are presented.

Keywords: Lipids, soap-forming, non-soap-forming lipids, energy, function, diseases, Triglycerides, Phospholipids, Cholesterol, Lipoproteins.

Lipids are essential biological compounds for living organisms, serving as an energy source, membrane components, and participants in signal transduction processes. Lipids include fats, waxes, phospholipids, and steroids. Based on their chemical composition, lipids are classified into two types:

1.

Soap-forming

lipids

2. Non-soap-forming lipids

Soap-forming lipids contain fatty acids, which, upon hydrolysis, break down into glycerol and fatty acids, resulting in soap formation. Their chemical and biological significance is considerable, playing a crucial role in disease prevention and treatment.

General Definition and Classification of Lipids: Lipids are organic substances with hydrophobic properties, primarily composed of carbon (C), hydrogen (H), and oxygen (O) atoms. They are insoluble in water but dissolve well in organic solvents.

## Lipids include:

Simple	lipids –	– fats	(triglycerides) and	d waxes.
Complex	lipids	_	phospholipids,	glycolipids.



Steroids – cholesterol, hormones, and vitamins.

Soap-forming simple lipids contain fatty acids, which, upon hydrolysis, produce glycerol and fatty acids. These primarily include triglycerides (neutral fats) and waxes.

**Triglycerides:** These are lipids composed of three fatty acid molecules and one glycerol molecule. They constitute the primary component of animal fats and vegetable oils, serving as the body's main energy source.

#### Key Properties of Triglycerides:

1.	Serve	as	an	energy	reserve.
2.	Protect	the	body	from	cold.
3. Shield	l internal organs from	n mechanical dan	nage.		

These consist of long-chain fatty acids and alcohol molecules. They have water-repelling properties and serve as protective coatings for the skin, plant leaves, and animal fur.



## Chemical and Biological Significance of Soap-Forming Simple Lipids in Medicine:

**Energy Role:** Triglycerides serve as the primary energy source in the human body, storing twice as much energy as carbohydrates. They provide energy during prolonged fasting or intense physical activity.

**Heat Insulation and Protective Function:** Body fats have the ability to retain heat, preventing heat loss in cold weather conditions. Additionally, they protect internal organs from external influences.

**Digestion and Metabolism of Fats:** Triglycerides are broken down in the body with the help of the enzyme lipase, converting them into fatty acids. These fatty acids are transported through the bloodstream to cells, where they are used for energy production. **Participation in Cholesterol and Hormone Synthesis:** Although triglycerides and waxes do not directly participate in cholesterol synthesis, lipids play a crucial role in the synthesis of steroid hormones (testosterone, estrogen, cortisol) and vitamin D, which are essential for the



body.

Chemical Structure: Triglycerides are formed by the esterification of three fatty acids with the three hydroxyl groups of a glycerol molecule. Fatty acids can be either saturated or unsaturated, which affects the physical properties triglycerides. of Biological Significance: Triglycerides serve as the body's primary energy reserve. They are stored in adipose tissues and are utilized as an energy source when needed. Additionally, triglycerides play an important role in providing protection against cold and shielding internal mechanical organs from impacts. Saponification Process: Triglycerides undergo hydrolysis, producing glycerol and fatty acids. If hydrolysis occurs in an alkaline medium, the fatty acids form their salts—soaps. This process is called saponification and is widely used in the soap manufacturing industry.

Excessive Amounts of Saponifiable Lipids May Lead to the Following Diseases:

Atherosclerosis Accumulation of fatty deposits in blood vessels. leading Obesity Excess fat accumulation to increased body mass. **Fatty Liver Dystrophy** – Excessive fat buildup in liver cells.

Additionally, omega-3 and omega-6 fatty acids are essential for the body, having a positive impact on the cardiovascular system and reducing inflammatory processes. Saponifiable simple lipids, particularly triglycerides and waxes, play a significant biological and chemical role in the human body. They serve as an energy source, provide heat insulation, and perform protective functions. However, an excessive amount of these lipids can be harmful to health, emphasizing the importance of  $\mathbf{a}$  balanced diet and a healthy lifestyle. Lipids also have great significance in medicine, particularly in studying cholesterol metabolism, lipid disorders, and cardiovascular diseases.

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