

Phosphatidylcholine

Natural Phospholipids



Natural Support
for a Healthy Liver

We Invest in Quality.

Natural Support for a Healthy Liver

The Liver – Central Organ of Lipid Metabolism

A healthy liver is essential for a well-functioning digestion of fatty acids and triglycerides. A disturbance of the metabolism can lead to the accumulation of fats in liver cells (hepatocytes) (Fig. 1). This so-called fatty liver disease can be divided into two types. Alcoholic fatty liver disease (AFLD) is a result of excessive alcohol consumption. In contrast, non-alcoholic fatty liver disease (NAFLD) is mainly caused by high energy intake combined with low energy expenditure. Obesity and type 2 diabetes are strong risk factors^[1]. It is the most common chronic liver disease in industrial countries with an increasing prevalence^[2]. As the storage of fat is reversible, choosing nutrients with a positive impact on fat metabolism is important in the context of the so-called Western Style Diet.

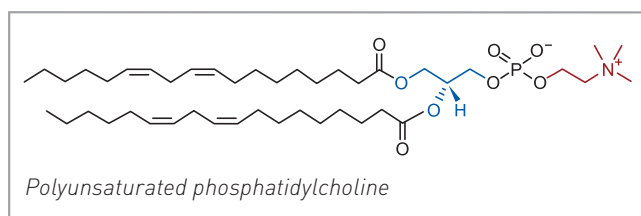


Fig. 1: Fatty liver disease is characterized by an increasing storage of fat in hepatocytes.

Phosphatidylcholine – The Active Substance in Lecithin

The phospholipid phosphatidylcholine (PC), contained in lecithin, contributes significantly to the role of the liver as central organ of the body's fat metabolism. PC supports the liver function as essential component of cellular membranes and lipoproteins (Fig. 2).

Lipoproteins are formed in the liver and transport water-insoluble lipids in the blood^[3]. The intake of PC helps to regulate the levels of lipoproteins and transported cholesterol and triglycerides^[4]. Therefore, dietary and supplemented PC supports liver function in a natural way.

Alcohol or a high-fat diet may cause liver cell damage, leading to compromised liver function. Polyunsaturated phospholipids (PPL), which also include essential phospholipids, are used for liver protection. PPL are characterized by a high content of unsaturated fatty acids and are abundant in natural phospholipid fractions, e.g., those derived from soybean^[5]. They exhibit antioxidative properties and the effects observed are reduction of inflammation and enhanced cell membrane integrity. Positive hepatoprotective effects of PPL could be demonstrated in several clinical studies^[6].

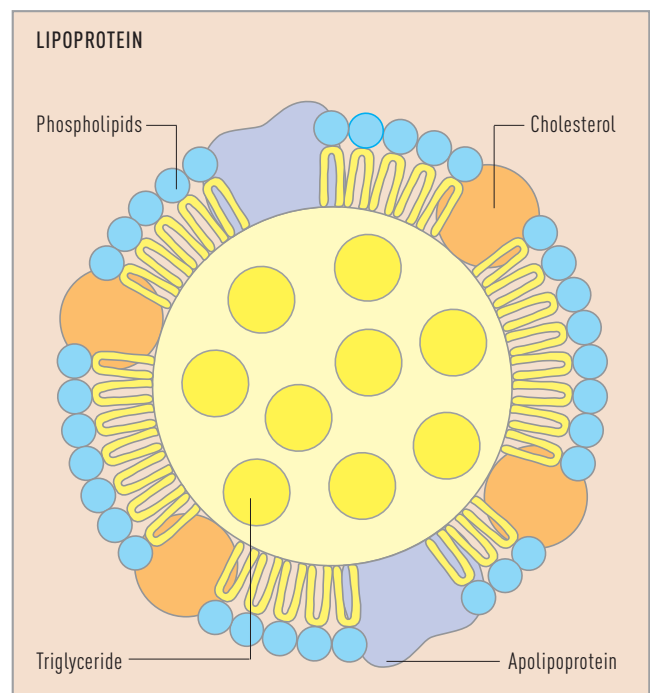

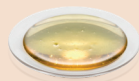



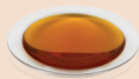








Fig. 2: Phospholipids are essential components of lipoproteins which are needed for fat metabolism.

A Selection of Products Enriched in Polyunsaturated Phosphatidylcholine (PC)

SOYBEAN			
PRODUCT	DESCRIPTION	APPLICATIONS	APPEARANCE
PHOSAL® 75 SA	Phosphatidylcholine (≥ 72.0 %) in safflower seed oil		
LIPOID PPL-400	Waxy formulation of phospholipids in hard-fat and soybean oil, enriched in phosphatidylcholine (≥ 53.0 %)		
LIPOID PPL-600	Fluid formulation of phospholipids in MCT oil, enriched in phosphatidylcholine (≥ 35.0 %)		
SUNFLOWER			
PRODUCT	DESCRIPTION	APPLICATIONS	APPEARANCE
LIPOID H 90	Phosphatidylcholine (≥ 90 %), agglomerates		
PHOSAL® H 50	Phosphatidylcholine (≥ 50 %) in sunflower oil		
PHOSAL® Curcumin	Phosphatidylcholine (≥ 50 %) and curcuminoids (7 %) in MCT oil		



Suitable for hard and/
or soft capsules



Suitable for
liquid products

The Importance of Choline

Choline is both a precursor and a metabolite of phosphatidylcholine. The vitamin-like substance has diverse functions in the body, including the maintenance of normal liver function. The EFSA-approved health claims illustrate the importance of the nutrient^[7,8]. However, the average diet contains levels below the recommended daily intake amounts^[9].

To provide a sufficient supply of choline, phosphatidylcholine is preferred as source. Unlike choline salts, e.g., choline bitartrate, phosphatidylcholine is not converted into trimethylamine oxide (TMAO), upon reaching the large intestine^[10,11]. High TMAO levels are associated

with an increased risk of cardiovascular diseases^[12]. Therefore, phosphatidylcholine is safe as a dietary supplement ensuring an adequate intake of choline.

Applications of Phosphatidylcholine

Lipoid offers a wide range of phospholipid raw materials or formulations enriched in phosphatidylcholine. Typical applications are hard or soft capsules. Also, combination with other hepatoprotective agents, e.g., plant extracts, and development of innovative liquid solutions, like shots, is possible in part. For more information or application tips please contact us.

**LIVER
PROTECTION**

**ESSENTIAL FOR THE
DIGESTION OF FATS**

**NATURAL SOURCE OF
CHOLINE**

Polyunsaturated phospholipids with high PC content are the natural solution for a healthy liver.

Regulatory (Further regulatory data upon request)

PHOSAL®	The PHOSAL® products contain ethanol as technical additive.
Safety	EFSA regards lecithin as safe and has not set any upper limit for consumption ^[13] . Because of their health safety, lecithins have been classified by the US Food and Drug Administration (FDA) as Generally Recognized as Safe (GRAS) ^[14] .
Vegan	The products can be declared as vegan.



References

- [1] Duseja, A., Chalasani, N., Epidemiology and risk factors of nonalcoholic fatty liver disease (NAFLD). *Hepatology International*, 7, 755 – 764 (2013).
- [2] Younossi, Z. M., Koenig, A. B., *et al.*, Global epidemiology of nonalcoholic fatty liver disease – meta-analytic assessment of prevalence, incidence, and outcomes. *Hepatology*, 64(1), 73 – 84 (2016).
- [3] Cole, L. K., Vance, J. E., *et al.*, Phosphatidylcholine biosynthesis and lipoprotein metabolism. *Biochimica et biophysica acta (BBA)-Molecular and Cell Biology of Lipids*, 1821(5), 754 – 761 (2012).
- [4] Küllenberg, D., Taylor, L. A., *et al.*, Health effects of dietary phospholipids. *Lipids in Health and Disease*, 11, 1 – 16 (2012).
- [5] Gundermann, K.-J., Gundermann, S., *et al.*, Essential phospholipids in fatty liver: a scientific update. *Clinical and Experimental Gastroenterology* 9, 105 – 117 (2016).
- [6] Gundermann, K.-J., Kuenker, A., *et al.*, Activity of essential phospholipids (EPL) from soybean in liver diseases. *Pharmacological Reports*, 63(3), 643 – 659 (2011).
- [7] EFSA NDA Panel, Scientific opinion on the substantiation of health claims related to choline. *EFSA Journal*, 9(4), 2056 (2011).
- [8] EFSA NDA Panel, Choline and contribution to normal liver function of the foetus and exclusively breastfed infants: evaluation of a health claim pursuant to Article 14 of Regulation (EC) No 1924/2006. *EFSA Journal*, 21(7), 1 – 12 (2023).
- [9] Vennemann, F. B., Ioannidou, S., *et al.*, Dietary intake and food sources of choline in European populations. *British Journal of Nutrition*, 114(12), 2046 – 2055 (2015).
- [10] Cho, C. E., Aardema, N. D. J., *et al.*, Effect of choline forms and gut microbiota composition on trimethylamine-N-oxide response in healthy men. *Nutrients*, 12(8), 2220 (2020).
- [11] Böckmann, K. A., Franz, A. R., *et al.*, Differential metabolism of choline supplements in adult volunteers. *European Journal of Nutrition*, 61, 219 – 230 (2022).
- [12] Roncal, C., Martínez-Aguilar, E., *et al.*, Trimethylamine-N-oxide (TMAO) predicts cardiovascular mortality in peripheral artery disease. *Scientific Reports*, 9, 15580 (2019).
- [13] EFSA ANS Panel, Re-evaluation of lecithins (E 322) as a food additive. *EFSA Journal*, 15(4), 4742 (2017).
- [14] U.S. Food and Drug Administration, 21CFR184.1400 revised as of April 1 (2013).

Lipoid GmbH
Frigenstr. 4
67065 Ludwigshafen
GERMANY
Phone: +49 621 - 5 38 19-0
info@lipoid.com
www.Lipoid.com



Representatives in many other countries.

Disclaimer: All data and recommendations made herein are based on our present state of knowledge. We disclaim any liability for risks that may result from the use of our products, including improper and illicit use. Product properties identified and highlighted by specific tests or studies are to be interpreted in the context of the test/study conditions only. The listed properties of products without claim data have been sourced from literature and should be used as value-added information only. Please be aware that the use of any claim is the sole responsibility of the customer and is regulated by your local Regulatory Body.

We Invest in Quality.