Lipoid

PRODUCT CATALOG

Phospholipids for Health Nutrition and Food Supplements

We Invest in Quality.

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Facing page: *A cross section through our extensive product portfolio*

"Lipoid GmbH" headquarters and production plant II at Ludwigshafen/ Rhine, Germany

R & D at Ludwigshafen/Germany

Production facility at Ludwigshafen/ Germany

Welcome to Lipoid

Expertise

Since its foundation in 1977, Lipoid has grown into the leading supplier of a wide range of phospholipids on an industrial scale for the global pharmaceutical, health care, and cosmetic industry.

Our phospholipids are sourced from natural and renewable resources like sunflower, soybeans, and eggs.

The products are manufactured at three independent facilities in Germany under the most stringent quality and environmental standards.

Quality

Our Quality Management System meets the highest standards set by the regulatory authorities and the health care industry.

All manufacturing sites for our products are GMP and ISO 9001 certified. Our facilities have been successfully inspected by the US FDA, local regulatory authorities, and customers.

Research & Development

We are constantly developing innovative products with phospholipids that meet the requirements of our customers. Furthermore, we support academic research on new applications and technologies using phospholipids through the Phospholipid Research Center. (www.phospholid-research-center.com)

Regulatory

Lecithin is "Generally Recognized as Safe (GRAS)" by the US Food and Drug Administration. In the EU, Lecithin is approved as food additive E 322.

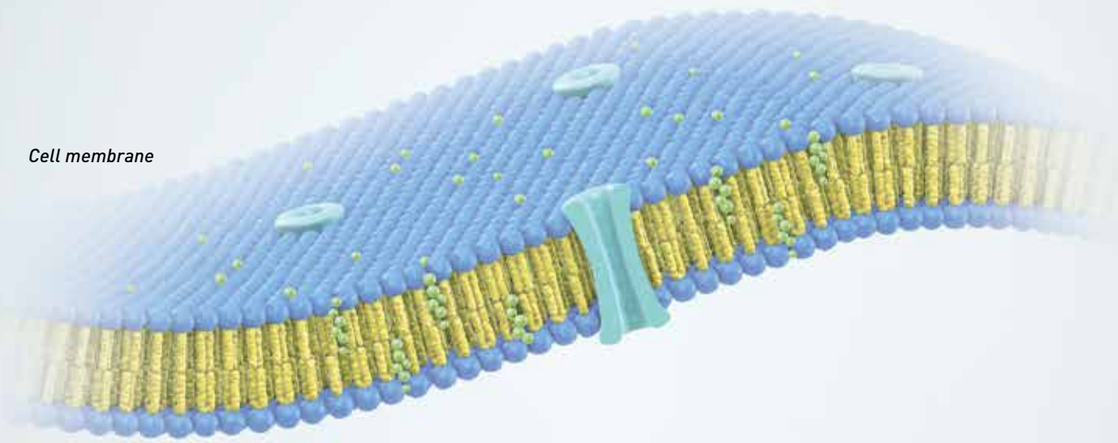
To meet the requirements of regulatory authorities, we offer professional support, advice, and documentation.

Sustainability

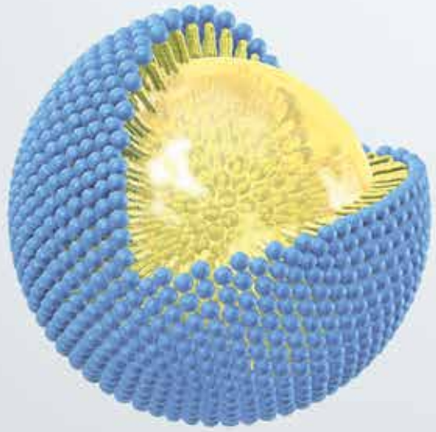
Lipoid is committed to the principles of sustainability and environmental protection. Our production processes have been optimized over many years to ensure a sustainable supply without the use of toxic solvents under the highest environmental standards.

The by-products of the production processes are sought after in the end market and the auxiliaries used are mostly recycled. Waste can therefore be entirely avoided or reduced to a minimum.

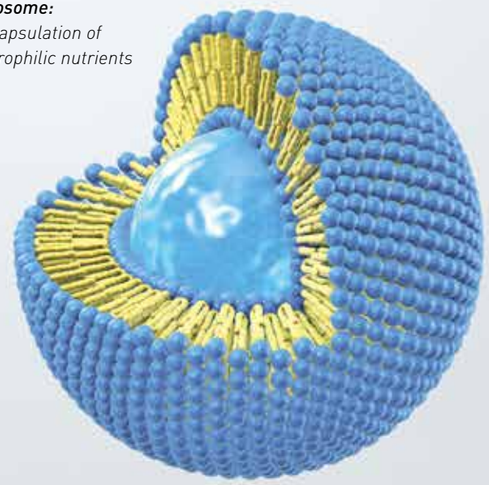
Phospholipids:
The molecules with a hydrophilic head and a lipophilic tail are essential parts of our cell membranes and are the main functional components of our formulations



Cell membrane



Emulsion oil droplet:
Solubilization of lipophilic substances



Liposome:
Encapsulation of hydrophilic nutrients

Facing page: Schematic diagram of phospholipids, a cell membrane, an emulsion droplet, and a liposome

We offer a wide range of special lecithins and phospholipids based on sunflower

Non-GMO soybeans serve as an excellent source of phospholipids

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Introduction to Phospholipids

Phospholipids, the main constituents of natural lecithin, are part of any cell membrane. They are essential for the digestion and absorption of fats and lipophilic compounds. By forming lipoproteins, lipids can be transported in the blood stream with the help of phospholipids. Furthermore, they are the natural source of the vitamin-like nutrient choline and of essential polyunsaturated fatty acids.

Due to their amphiphilic properties (hydrophilic head and lipophilic tail), phospholipids are multipurpose excipients for a wide range of applications.

Phospholipid-based formulations can solubilize lipophilic substances in aqueous media and encapsulate hydrophilic nutrients in the aqueous cavity of liposomes. Thereby, these formulations can help to enhance bioavailability.

Besides their versatile technical functions, phospholipids are essential components of the human body. Therefore they are also suitable for use as active ingredients in various health food applications.

FATTY ACID COMPOSTION [%]			
FATTY ACID	SUNFLOWER PC	SOYBEAN PC	EGG YOLK PC
Palmitic Acid	10	15	30
Stearic Acid	3	3	14
Oleic Acid	17	12	27
Linoleic Acid (Omega 6)	69	62	17
α-Linolenic Acid (Omega 3)	< 1	5	< 1
Arachidonic Acid (Omega 6)	–	–	4
DHA (Omega 3)	–	–	2

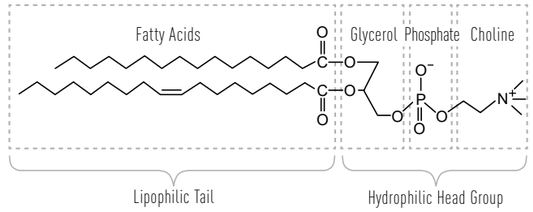

Fig. 1: Molecular structure of phosphatidylcholine (PC), a typical phospholipid.

Facing page: Phosphatidylcholine plays an important role in the formation of cell membranes and has various positive properties for human health

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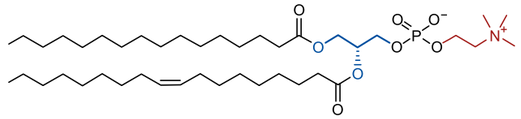
Our Phospholipids as Active Ingredients

Phosphatidylcholine (PC) is the most common phospholipid and has various positive properties for human health. Moreover, it is the natural form of choline in our diet that is related to a variety of health claims approved by the EFSA.[1]

Lipoid offers PC from different natural sources such as sunflower, non-GMO soybean, and egg yolk in diverse forms (solid, fluid) and concentrations.



Phosphatidylcholine (PC)
The phosphate group is esterified to choline

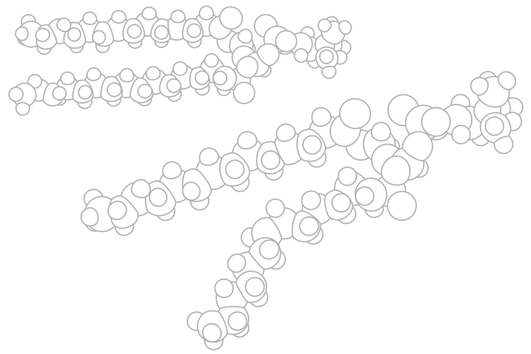
Anti-Inflammatory

Phosphatidylcholine plays an important role in the formation of cell membranes. It is part of the intestinal mucosa and an essential nutrient for it.[2]

PC supplementation is an appropriate measure against inflammatory diseases like ulcerative colitis to compensate for the lower phosphatidylcholine levels in the inflamed tissues in comparison to the healthy ones.[3]

Liver Protection

Phosphatidylcholine is significantly involved in the digestion of fats. By increasing the membrane fluidity, the risk of fat accumulation in liver cells – characteristic for fatty liver disease – is reduced. Thus, PC is attributed to liver protective properties.[4]

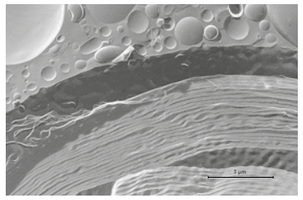


Cardiovascular Health

Cardiovascular diseases like atherosclerosis and ischemic heart disease are associated with a disordered fat metabolism.

Phosphatidylcholine has a positive impact on blood lipid levels, for instance by supporting the transport of cholesterol from the liver to the peripheral tissues. Hence, PC has beneficial effects on cardiovascular health.[5,6]

Facing page: Liquid phospholipids for enhancing the bioavailability of diverse actives by increasing their solubility



Electron micrograph of liposomes in a phospholipid formulation

Formulations with phospholipids are the perfect choice for the development of innovative dietary supplements.

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Our Phospholipid Formulations

PHOSAL® Phospholipid System

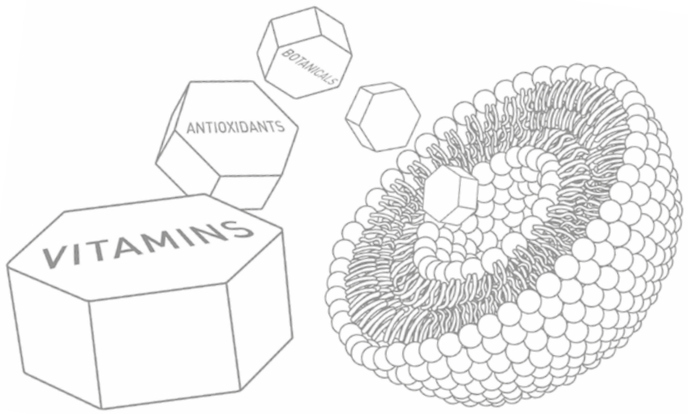
PHOSAL® is a liquid formulation of purified phosphatidylcholine and plant oil. PHOSAL® products are easy to handle and can be used to produce various types of formulations. Moreover, lipophilic and poorly soluble nutrients can be solubilized to increase their bioavailability. Typical applications are hard or soft capsules. An available example formulation is PHOSAL® Curcumin – a natural bioavailable solution for curcuminoids. [7]

LIPOID Liposomes

LIPOID Liposome Basic is an empty liposomal formulation. Hydrophilic ingredients can be easily mixed without the use of expensive technical equipment. Thus, customers can create their own liposomal products in a simple way. In addition, liposomal vitamin C is available as final formulation (LIPOID Liposome C). Due to the self-preserving properties of both products, no preservatives have to be added.

PhytoSolve® Emulsions

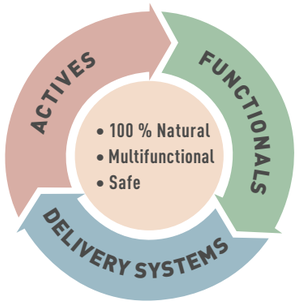
PhytoSolve® is a finished delivery system based on natural phospholipids. It is available with different lipophilic ingredients. The transparent emulsions enable a better absorption of the nutrients [8]. The self-preserving system can be mixed in any ratio with water/juice or directly bottled without further working steps. Pump dispenser, sachets, or oral sprays are suitable packaging possibilities.



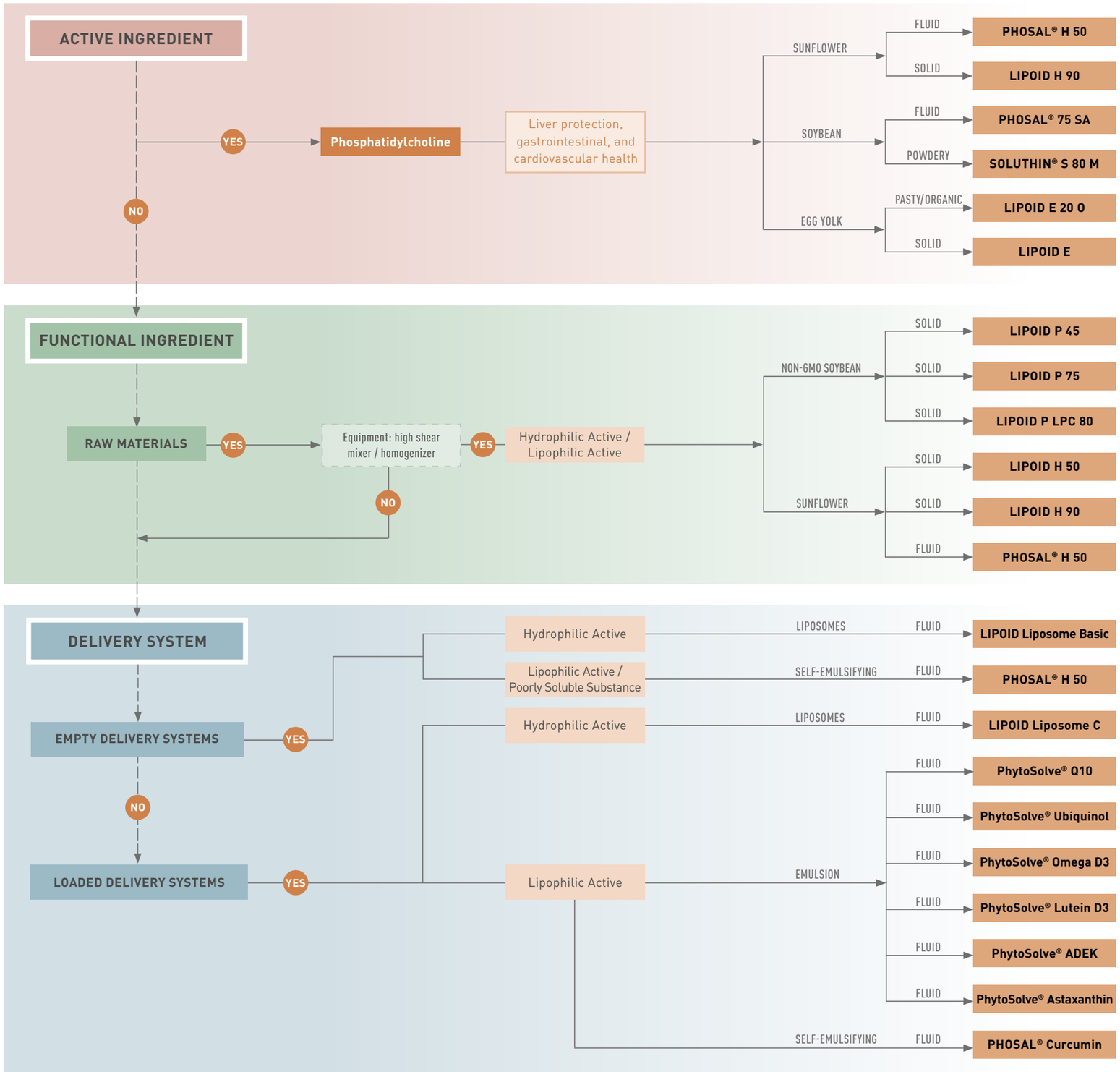
WHICH PRODUCT IS THE PERFECT FIT?

Multifunctionality is the Key

Phospholipids are multifunctional raw materials, that combine technical and physiological features.
This results in a unique versatility, and thus provides new oportunities for sophisticated health care formulations.



APPLICATION GUIDE	ACTIVE INGREDIENTS	FUNCTIONAL INGREDIENTS		DELIVERY SYSTEMS			
Main Application / Additional Application	Phosphatidylcholine	Solid	Fluid	Empty: Hydrophilic Active	Empty: Lipophilic Active	Loaded: Hydrophilic Active	Loaded: Lipophilic Active
LIPOID H 50		■					
LIPOID H 90	■	■					
LIPOID P 45		■					
LIPOID P 75		■					
LIPOID P LPC 80		■					
SOLUTHIN® S 80 M	■						
LIPOID E 20 O	■						
LIPOID E	■						
PHOSAL® H 50	■		■		■		
PHOSAL® 75 SA	■		■		■		
PHOSAL® Curcumin							■
LIPOID Liposome Basic			■	■			
LIPOID Liposome C						■	
PhytoSolve® Q10							■
PhytoSolve® Ubiquinol							■
PhytoSolve® Omega D3							■
PhytoSolve® Lutein D3							■
PhytoSolve® ADEK							■
PhytoSolve® Astaxanthin							■



ACTIVE INGREDIENTS

ORIGIN	PRODUCT	INGREDIENTS	DESCRIPTION	FORM	APPLICATIONS
Phosphatidylcholine (PC)					
SUNFLOWER (NON-GMO)	**PHOSAL® H 50**	Phosphatidylcholine, sunflower oil, ethanol, sunflower oil fatty acids, natural mixed tocopherols, ascorbyl palmitate	Phosphatidylcholine in sunflower oil, content ≥ 50 %	Fluid	
	LIPOID H 90	Phosphatidylcholine, natural mixed tocopherols	Phosphatidylcholine, content ≥ 90 %	Agglomerates	
SOYBEAN	**PHOSAL® 75 SA**	Phosphatidylcholine, safflower seed oil, ethanol, fatty acids, natural mixed tocopherols, ascorbyl palmitate	Phosphatidylcholine in ethanol and safflower seed oil, content ≥ 72.0 %	Fluid	
	SOLUTHIN® S 80 M	Phospholipids, magnesium chloride, D,L-α-tocopherol, ascorbyl palmitate	Powdered compound of phosphatidylcholine with magnesium chloride, content ≥ 64 %	Powder	
EGG YOLK	**LIPOID E 20 O**	Egg lecithin	Certified organic egg lecithin, phosphatidylcholine content ≥ 40 %	Pasty (fluid above 40 °C)	
	LIPOID E	Phospholipids, D,L-α-tocopherol	Phospholipids, phosphatidylcholine content ≥ 70 %	Agglomerates	

SOLUTHIN® S 80 M

LIPOID E

PHOSAL® H 50

Pictures of some delivery system products from pages 16 and 17.

PhytoSolve® ADEK

PHOSAL® Curcumin

LIPOID Liposome C

Suitable for powder products

Suitable for tablets

Suitable for hard/soft capsules

Suitable for liquid products

FUNCTIONAL INGREDIENTS

ORIGIN	PRODUCT	INGREDIENTS	DESCRIPTION	FORM	APPLICATIONS
Emulsifier and Bioavailability					
SUNFLOWER (NON-GMO)	**PHOSAL® H 50**	Phosphatidylcholine, sunflower oil, ethanol, sunflower oil fatty acids, natural mixed tocopherols, ascorbyl palmitate	Phosphatidylcholine in sunflower oil, content ≥ 50 %	Fluid	
	LIPOID H 50	Lecithin, natural mixed tocopherols	Lecithin fraction, phosphatidylcholine content ≥ 60 %	Agglomerates	
	LIPOID H 90	Phosphatidylcholine, natural mixed tocopherols	Phosphatidylcholine, content ≥ 90 %	Agglomerates	
NON-GMO SOYBEAN	**LIPOID P 45**	Lecithin, natural mixed tocopherols	Lecithin fraction, phosphatidylcholine content ≥ 45 %	Agglomerates	
	LIPOID P 75	Phospholipids, natural mixed tocopherols	Phospholipids, phosphatidylcholine content ≥ 70 %	Agglomerates	
	LIPOID P LPC 80	Lysophospholipids, natural mixed tocopherols	Lysophosphatidylcholine, content ≥ 80 %	Agglomerates	

LIPOID H 50

LIPOID H 90

LIPOID P 75

Pictures of some delivery system products from pages 16 and 17.

LIPOID Liposome Basic

PhytoSolve® Q10

PhytoSolve® Astaxanthin

Suitable for powder products

Suitable for tablets

Suitable for hard/soft capsules

Suitable for liquid products

DELIVERY SYSTEMS

ORIGIN	PRODUCT	INGREDIENTS	DESCRIPTION	FORM	APPLICATIONS
Empty Hydrophilic					
NON-GMO SOYBEAN	**LIPOID Liposome Basic**	Glycerol, water, phospholipids, natural mixed tocopherols	Pre-formulated liposomes with 15 % phospholipids in glycerol	Fluid	
Empty Lipophilic					
SUNFLOWER (NON-GMO)	**PHOSAL® H 50**	Phosphatidylcholine, sunflower oil, ethanol, sunflower oil fatty acids, natural mixed tocopherols, ascorbyl palmitate	Phosphatidylcholine in sunflower oil, content ≥ 50 %	Fluid	
Loaded Hydrophilic					
NON-GMO SOYBEAN	**LIPOID Liposome C**	Glycerol, water, sodium ascorbate, phospholipids, natural mixed tocopherols, citric acid, natural flavor	Liposomal formulation with phospholipids and 150 mg/mL vitamin C	Fluid	
Loaded Lipophilic					
SUNFLOWER (NON-GMO)	**PHOSAL® Curcumin**	Phosphatidylcholine, medium-chain triglycerides, curcumin extract, ethanol, sunflower oil fatty acids, natural mixed tocopherols	Phosphatidylcholine in medium-chain triglycerides, content 45 - 55 %, and 7 % curcumin	Fluid	
NON-GMO SOYBEAN	**PhytoSolve® Q10**	Glycerol, water, coenzym Q10, medium-chain triglycerides, lecithin, natural mixed tocopherols	Emulsion with lecithin and 5 % coenzyme Q10	Fluid	
	PhytoSolve® Ubiquinol	Glycerol, water, ubiquinol, medium-chain triglycerides, lecithin, natural mixed tocopherols	Emulsion with lecithin and 5 % ubiquinol (Q10 H)	Fluid	
	PhytoSolve® Omega D3	Glycerol, water, fish oil, lecithin, natural mixed tocopherols, vitamin D_3, natural flavor	Emulsion with lecithin, 150 mg/mL omega-3 fatty acids, and 7.5 µg/mL (300 IU) vitamin D_3	Fluid	
	PhytoSolve® Lutein D3	Glycerol, water, medium-chain triglycerides, carotenoid esters, lecithin, natural mixed tocopherols, vitamin D_3	Emulsion with lecithin, 15 mg/mL lutein, 1 mg/mL zeaxanthin, and 15 µg/mL (600 IU) vitamin D_3	Fluid	
	PhytoSolve® ADEK	Glycerol, medium-chain triglycerides, phospholipids, vitamin-A-palmitate, vitamin D_3, tocopheryl acetate, vitamin K_2, natural mixed tocopherols	Emulsion with phospholipids, 200 µg vitamin A, 25 µg (1000 IU) vitamin D_3, 12 mg vitamin E, and 50 µg vitamin K_2 (each per 0.25 mL)	Fluid	
	PhytoSolve® Astaxanthin	Glycerol, medium-chain triglycerides, phospholipids, astaxanthin-rich oleoresin, natural mixed tocopherols	Emulsion with phospholipids and 4 mg/mL astaxanthin	Fluid	

Suitable for powder products

Suitable for tablets

Suitable for hard/soft capsules

Suitable for liquid products

Facing page: A balanced diet contributes significantly to good health

References

[1] EFSA panel on dietetic products, nutrition and allergies (NDA), Scientific opinion on the substantiation of health claims related to choline. *EFSA Journal*, 9(4), 2056 (2011).
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