Lipoid

PRODUCT CATALOG

NEW EDITION 2022 NEW EDITION

Phospholipids for Pharmaceutical Applications

We Invest in Quality.

Facing page: "Lipoid GmbH" Headquarters and production plant 2 at Ludwigshafen/Rhine, Germany

Production plant 1 "Lipoid GmbH" at Ludwigshafen/Rhine, Germany

Manufacturing site "PHOSPHOLIPID GmbH" at Cologne, Germany

Manufacturing site "R&R Extrakte GmbH" at Cologne, Germany

03

Phospholipids – from Basic Research to Industry

Since its foundation in 1977, Lipoid has gained an outstanding reputation in the development and industrial production of high-quality lecithin, phospholipids, and other lipid products, meeting the high standards of the pharmaceutical industry.

Lipoid is the world's leading company for the production and supply of a wide range of natural and synthetic phospholipid excipients on an industrial scale. Our production processes have been optimized over many years to ensure a sustainable supply from renewable sources under highest environmental standards.

Quality Management System

Lipoid's quality management system meets the highest standards set by the regulatory authorities and the pharmaceutical industry. All manufacturing sites of Lipoid are GMP and ISO 9001 certified. Our facilities have been successfully inspected by the US FDA, local regulatory authorities, and customers.

Regulatory Support

Drug Master Files (US DMF Type II and IV) and Active Substance Master Files are available for a large number of products. Furthermore, Lipoid offers professional support, advice, and documentation to meet the requirements of regulatory authorities.

Analytical Support

As one of the leading companies in phospholipids, we provide our customers with in-house-validated analytical methods and qualified reference standards.

Research and Development

Lipoid develops customer-specific products in close cooperation with its partners and customers meeting their needs and demands. Furthermore, we support academic research on new applications and technologies using phospholipids through the Phospholipid Research Center. (www.phospholid-research-center.com)

Supply Guarantee

In order to assure the long-term consistent delivery of the products, Lipoid operates at three independent production facilities in Germany.

05

Facing page: Quality Control laboratory at Ludwigshafen

Introduction to Phospholipids

Phospholipids, also synonymously known under the wider term lecithin, are essential components of any cell membrane, contributing to the membrane's highly selective properties. They are components of lipoproteins and play an important role in the endogenous transport of lipids. They also contribute to blood coagulation and bone formation. Phospholipids can be found in bile in the gastrointestinal tract and are crucial for the digestion and uptake of lipophilic compounds. Furthermore, they are a source of essential nutrients such as choline and polyunsaturated fatty acids.

Based on their unique properties, phospholipids are multi-purpose excipients for a wide range of pharmaceutical applications, differing in physicochemical properties. Related to their endogenous nature and physiological function, they are biocompatible, biodegradable, and safe after administration. Phospholipids have a history as essential excipients in numerous worldwide marketed drug products which goes back many decades.

Therefore, based on these ideal and unique characteristics of phospholipids, they are suitable for broad use as excipients in state-of-the-art pharmaceutical dosage forms and innovative drug delivery systems.

Suitability of Phospholipid Excipients

Route of Administration	Dosage Form
Parenteral	Infusions Injections Depot formulations
Oral	Tablets Powders and granules Hard capsules Soft capsules Syrups and tonics
Dermal	Gels Creams Sprays
Pulmonary	Aerosols Dry powders
Ophthalmic	Eyedrops Sprays Contanct lenses

Facing page: A cross section through our extensive product portfolio

07

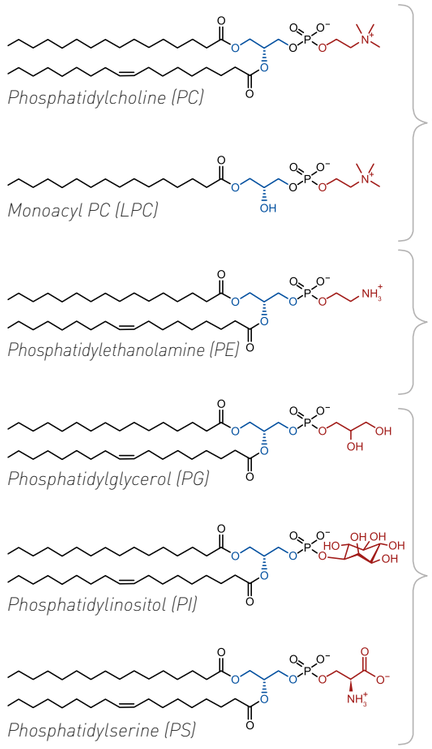
Chemical Structure of Phospholipids

The molecular structure of phospholipids comprises a glycerol backbone esterified with fatty acids and phosphate. The systematic designation of, e.g., phosphatidic acid (PA) is 1,2-diacyl-*sn*-glycero-3-phosphate. The phosphate group is further esterified, for instance in phosphatidylcholine (PC) with choline, in phosphatidylethanolamine (PE) with ethanolamine, in phosphatidylglycerol (PG) with glycerol, and in phosphatidylserine (PS) with serine.

Depending on the structure of the polar region and pH of the medium, phospholipids can be zwitterionic (neutral) or anionic. PC and PE are zwitterionic and have a neutral charge at physiological pH. PA, PG, and PS are examples of anionic phospholipids. Natural cationic phospholipids do not exist, but synthetic lipids such as DOTAP fill this gap and have a positive net charge.

Moreover, phospholipids show a high diversity of fatty acids attached to the glycerol backbone. The phospholipids may contain one or two fatty acids, which are saturated, mono-unsaturated, or polyunsaturated. The fatty acid chain length and degree of unsaturation, as well as the various possible head groups, affect the physicochemical properties of the phospholipids such as phase transition temperatures, formation of mesophases (e.g. micelles, inverted micelles, liposomes), appearance, solubility, and miscibility.

Combining the many different head groups and fatty acid tails, an almost unlimited number of possible phospholipids exists.



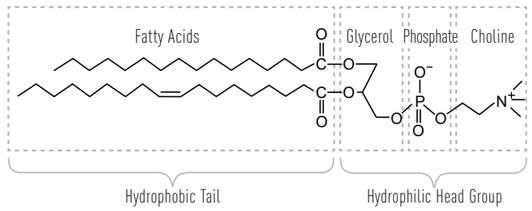


Fig. 1: Molecular structure of phosphatidylcholine, a typical phospholipid.

Facing page: Production plant at Ludwigshafen

09

Natural and Synthetic Phospholipids

Natural Phospholipids

Main sources of phospholipids of natural origin are hen egg yolk and vegetable seeds (mainly soybean and sunflower). The fatty acid and polar head group composition of natural phospholipids is defined by the origin and degree of purification. Natural phospholipids contain (poly)unsaturated fatty acids, which can be converted by hydrogenation into their saturated form.

FATTY ACID	SOY PC		EGG PC		SUNFLOWER PC	
	N	H	N	H	N	H
16:0	15	13	33	34	10	10
18:0	3	86	14	57	3	89
18:1	12	< 1	27	< 1	17	–
18:2	62	–	17	–	69	–
18:3	5	–	–	–	< 1	–
20:0	–	–	–	4	< 1	< 1
20:4	–	–	4	–	–	–
22:0	–	–	–	2	–	–
22:6	–	–	2	–	–	–

Fatty Acid Nomenclature

N = Natural, Unsaturated

16:0 = Palmitic Acid
18:0 = Stearic Acid
18:1 = Oleic Acid
18:2 = Linoleic Acid

H = Hydrogenated/Saturated

18:3 = Linolenic Acid
20:0 = Arachidic Acid
20:4 = Arachidonic Acid
22:0 = Behenic Acid
22:6 = Docosahexaenoic Acid (DHA)

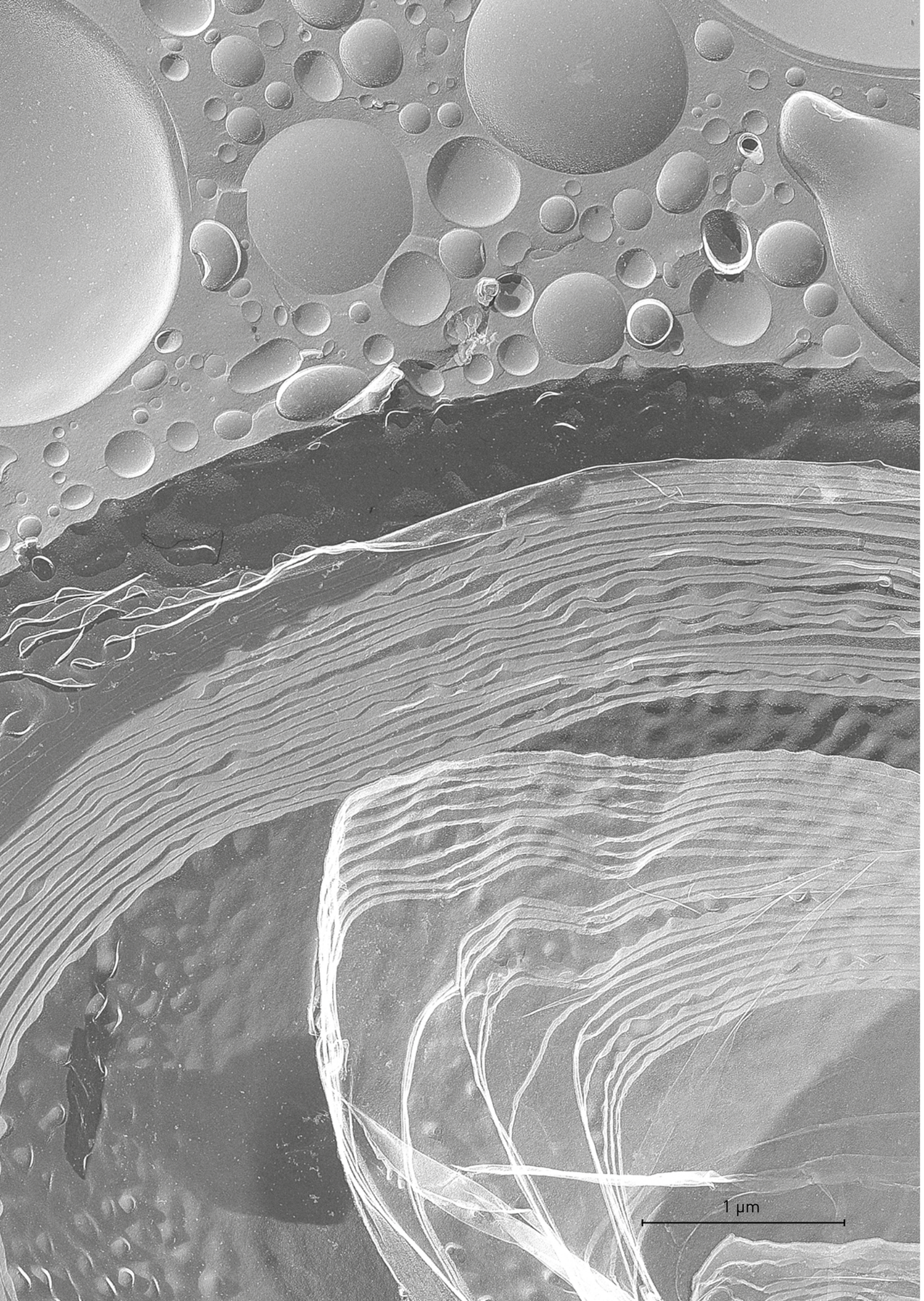
Typical examples of fatty acid composition of natural phospholipids from different sources and their hydrogenated versions.

Our Natural Phospholipid Brands

BRAND NAME	SOURCE
LIPOID E	Hen egg yolk
LIPOID S	Soybean
LIPOID P	Non-GMO soybean
LIPOID H	Sunflower (non-GMO)
PHOSPHOLIPON®	Soybean
PHOSAL®	Liquid non-aqueous phospholipid formulations from soybean or sunflower

Synthetic Phospholipids

Synthetic phospholipids have defined fatty acids and polar headgroups. They can be produced tailormade with specific properties. The highly selective structures are available in a range from di-acyl phospholipids to specific mono-acyl phospholipids or phospholipids with two different fatty acids at stereospecific positions (e.g. POPC).



Facing page: Electron micrograph of lamellar structures/liposomes in a phospholipid formulation

11

Application Benefits

Safety

Phospholipids are endogenous components that are biocompatible, biodegradable, and safe. The WHO states that there is no Acceptable Daily Intake (ADI) limit for the oral use of lecithin. Given parenterally, phospholipids show no toxic effects. That makes them suitable for many routes of administration. Hence, phospholipids are ideal excipients, without concerns regarding additional possible excipient-related toxicity.

Regulatory Status

The US FDA assigns GRAS (Generally Recognized as Safe)-status for lecithin. Monographs can be found in important pharmacopeias (e.g. USP, EP, or JP). In addition, Lipoid also offers numerous drug master files (DMF) for its products.

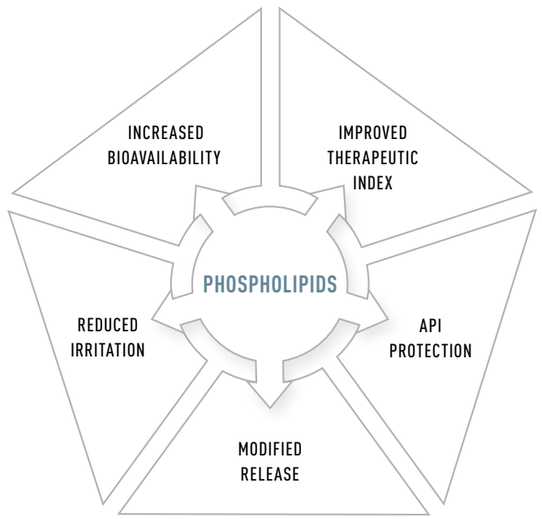
Performance

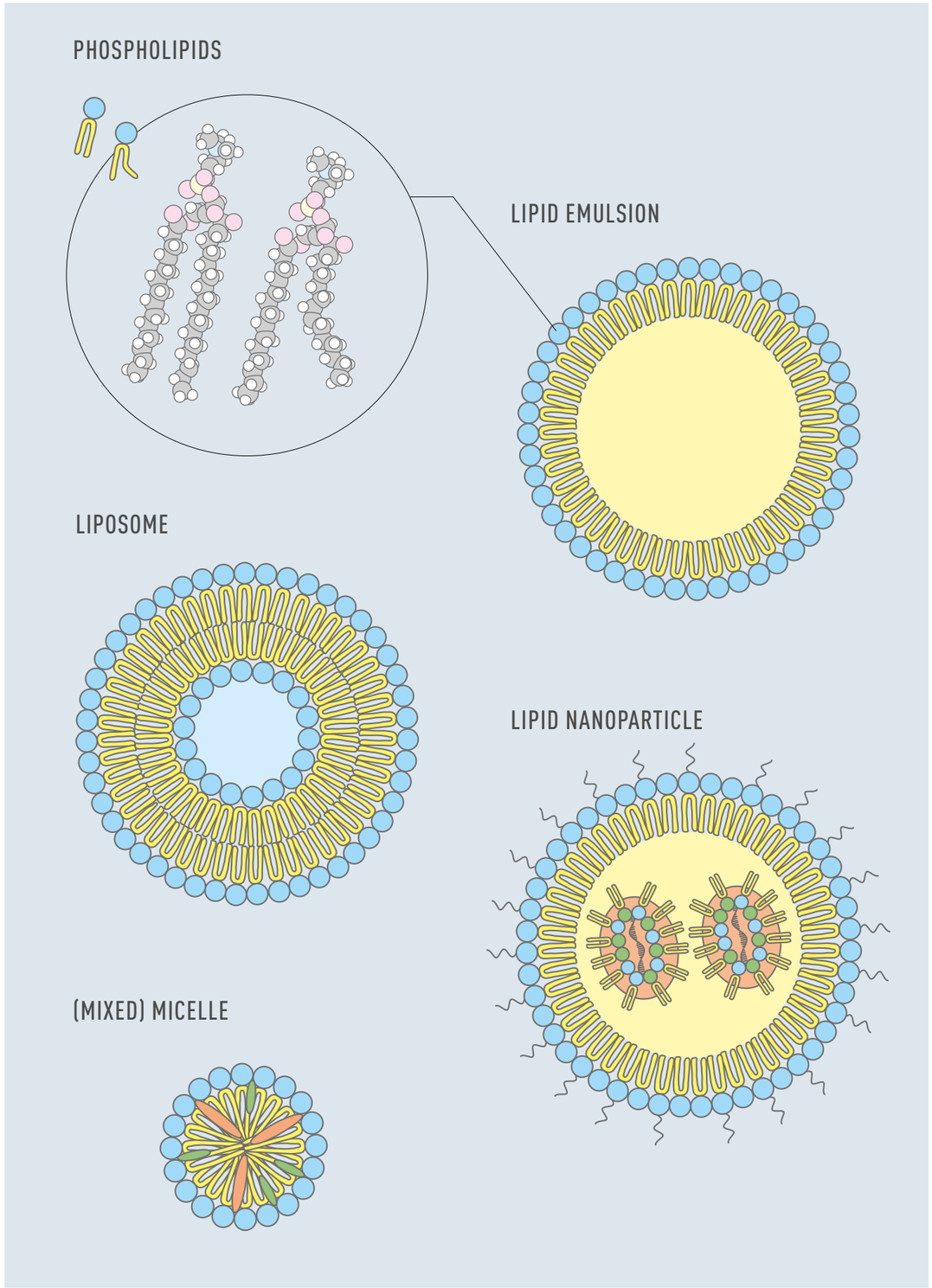
In parenteral applications they enable the intravenous administration of poorly water-soluble drugs and can prevent precipitation of these drugs at the injection site or in the blood circulation. They serve as viable non-toxic intravenous alternative solubilizer to synthetic detergents and organic solvents. They can encapsulate hydrophilic, lipophilic, and amphiphilic drugs and change the body distribution pattern, which results in an improved therapeutic index of the encapsulated drug. After subcutaneous and intramuscular administration, phospholipids are used to cause slow and extended release of drugs by means of encapsulation or dispersing of the drug.

In oral applications phospholipids can be used to enhance oral uptake and bioavailability of poorly water-soluble drug substances. They can reduce irritation of the stomach after oral intake or help to protect the Active Pharmaceutical Ingredient (API) from degradation.

In topical applications phospholipids can promote drug-skin interaction, strengthen the skin barrier, act as moisturizer, and increase the residence time of the drug substance at the skin surface. They are further topically used, e.g., in the lung or the eye etc., enabling administration of poorly water-soluble compounds or extending the drug release.

Biocompatibility, regulatory status, and performance make phospholipids a preferred type of excipient.





Facing page: Schematic illustration of phospholipids and phospholipid-based formulations

Formulation Benefits

Due to their amphiphilic character, phospholipids may function in formulations as:

- **Emulsifier**
- **Solubilizer**
- **Wetting agent**
- **Component of colloidal structures**

These technical features are exploited in many types of formulations and dosage forms for any route of administration:

Parenteral Applications

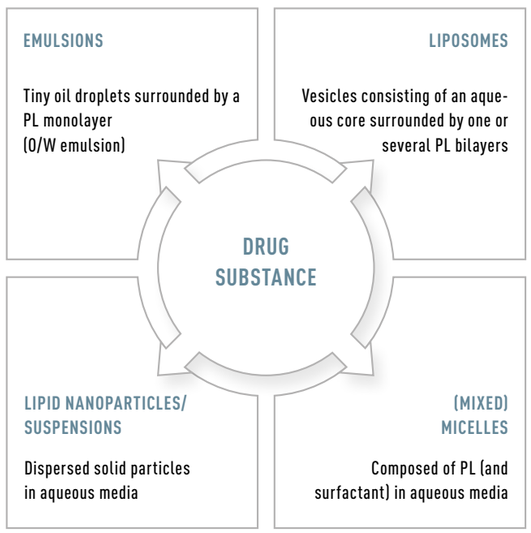
Phospholipids serve as emusifier in O/W emulsions, for solubilization of oil-soluble drugs, or parenteral nutrition. In liposomes, they can be used for drug targeting, extended drug release and solubilization, in lipid nano particles as building blocks and colloidal stability, in mixed micelles with bile salts for drug solubilization, or in aqueous drug dispersions as wetting agent. These formulations can be prepared in liquid injectable forms and may be filled into vials, ampoules, bottles, etc. For stability reasons, conversion into lyophilisate is possible.

Oral Applications

Phospholipids are employed in emulsions, dispersions, mixed micelles, (pro) liposomes, solid dispersions, and non-aqueous phospholipid formulations. The liquid forms may be filled, e.g., into capsules, sachets, or bottles or converted into dry formulations such as granules, powders, and tablets by addition of appropriate excipients.

Topical Applications

Phospholipids in O/W emulsions promote solubilization of poorly water-soluble compounds, which can be converted into creams. Liposomes are suitable for encapsulation of hydrophilic as well as lipophilic drug substances and are utilized in dosage forms such as gels, creams, and liquid sprays.



Selection of Phospholipids

The pharmaceutical formulator is able to choose from a wide range of phospholipids with versatile properties. Many of them have already been established in successfully marketed products.

Facing page: Parenteral nutrition in a hospital

Parenteral Applications

Phospholipids can be found in different types of formulations for parenteral administration.

Emulsions

The most prominent use of phospholipids in injectable formulations is as emulsifiers in O/W emulsions for parenteral nutrition. The abundant use of these systems at high dose levels, commonly based on egg phospholipids as emulsifier, demonstrates the excellent suitability of phospholipids as excipients for parenteral formulations and their unsurpassed safety profile. Phospholipid-based emulsions are also applied for delivery of oil-soluble drugs such as propofol.

Liposomes

Liposomes serve as drug carriers for improving the therapeutic index of APIs. They are able to enrich the carried drug after i.v. administration in, e.g., tumour tissue and/or to avoid organs, which are sensitive to the toxicity of the drug. The residence time in blood circulation can be tuned by means of addition of PEGylated phospholipids to the liposomes. Multivesicular liposomes are very suitable for extended release injectables for water-soluble compounds after local injection. Natural or synthetic phospholipids are used for manufacturing of liposomes.

Mixed Micelles

Mixed micelles comprising phosphatidylcholine and bile salts are suitable for solubilizing poorly water-soluble substances such as the fat-soluble vitamins. These systems often use high-grade soybean phosphatidylcholine or synthetic phospholipids.

Suspensions

Phospholipids can be added to drug suspensions in aqueous media, for subcutanous or intramuscular administration, as wetting agent to increase the dispersibility of the suspended drug.

Solid Lipid Nanoparticles

Lipid nanoparticles (LNPs) represent a promising platform, e.g., for RNA delivery. Phospholipids act as important building blocks for LNPs and PEGylated ones stabilize them in aqueous media.

Parenteral Applications

(Selection from our broad product range. Additional products on request.)

Natural Phospholipids

EGG YOLK		
LIPOID E 80	Phospholipids with 80 % phosphatidylcholine	CAS-No. 93685-90-6
LIPOID E 80 SN	Phospholipids with 70 % phosphatidylcholine	CAS-No. 93685-90-6
LIPOID E PC S	Phosphatidylcholine, content ≥ 96.0 %	CAS-No. 97281-44-2
LIPOID E PE	Phosphatidylethanolamine, content ≥ 97.0 %	CAS-No. 97281-50-0
LIPOID E PG	Phosphatidylglycerol, sodium salt, content ≥ 98.0 %	CAS-No. 92347-24-5
LIPOID E SM	Sphingomyelin, content ≥ 98.0 %	CAS-No. 85187-10-6
SOYBEAN		
LIPOID S 75	Phospholipids with 70 % phosphatidylcholine	CAS-No. 8030-76-0
LIPOID S 100	Phosphatidylcholine, content ≥ 94.0 %	CAS-No. 97281-47-5
LIPOID S PC	Phosphatidylcholine, content ≥ 98.0 %	CAS-No. 97281-47-5
SUNFLOWER (NON-GMO)		
LIPOID H 100	Phosphatidylcholine, content ≥ 94.0 %	CAS-No. 97281-49-7

Hydrogenated Phospholipids

LIPOID E PC-3	Phosphatidylcholine from egg yolk, hydrogenated, content ≥ 98.0 %	CAS-No. 97281-45-3
LIPOID S PC-3	Phosphatidylcholine from soybean, hydrogenated, content ≥ 98.0 %	CAS-No. 97281-48-6

LIPOID E 80

LIPOID S 100

LIPOID S PC-3

Purified Oils

LIPOID Purified Soybean Oil	Soybean oil, refined (Ph.Eur., USP)	CAS-No. 8001-22-7
LIPOID Purified Olive Oil	Olive oil, refined (Ph.Eur., USP)	CAS-No. 8001-25-0
LIPOID Purified Fish Oil	Fish oil (Ph.Eur.; Type 1)	CAS-No. 8016-13-5
LIPOID MCT	Medium-chain triglycerides (Ph.Eur., USP)	CAS-No. 73398-61-5

Purified Fatty Acids & Fatty Acid Salts

LIPOID Sodium Oleate	Oleic acid of vegetable origin, content ≥ 50.0 %, sodium salt	CAS-No. 143-19-1
LIPOID Purified Oleic Acid	Oleic acid of vegetable origin (Ph.Eur.), content 65.0 – 88.0 %	CAS-No. 112-80-1
LIPOID FA 18:1	Oleic acid of vegetable origin (USP), purity ≥ 98.0 %	CAS-No.112-80-1

Glycerophosphocholine (Choline Alfoscerate)

SOYBEAN		
LIPOID GPC	*sn*-Glycero-3-phosphocholine, content ≥ 98.0 %	CAS-No. 28319-77-9
LIPOID GPC 85 F	Fluid concentrate of *sn*-Glycero-3-phosphocholine (≥ 98.0 %) in water	CAS-No. 28319-77-9

LIPOID Purified Soybean Oil

LIPOID Purified Olive Oil

Synthetic Phospholipids

PHOSPHATIDYLCHOLINE		
LIPOID PC 14:0/14:0 (DMPC)	1,2-Dimyristoyl-*sn*-glycero-3-phosphocholine	CAS-No. 18194-24-6
LIPOID PC 16:0/16:0 (DPPC)	1,2-Dipalmitoyl-*sn*-glycero-3-phosphocholine	CAS-No. 63-89-8
LIPOID PC 18:0/18:0 (DSPC)	1,2-Distearoyl-*sn*-glycero-3-phosphocholine	CAS-No. 816-94-4
LIPOID PC 18:1/18:1 (DOPC)	1,2-Dioleoyl-*sn*-glycero-3-phosphocholine	CAS-No. 4235-95-4
LIPOID PC 22:1/22:1 (DEPC)	1,2 Dierucoyl-*sn*-glycero-3-phosphocholine	CAS-No. 51779-95-4
LIPOID PC 16:0/18:1 (POPC)	1-Palmitoyl-2-oleoyl-*sn*-glycero-3-phosphocholine	CAS-No. 26853-31-6

PHOSPHATIDYLGLYCEROL		
LIPOID PG 14:0/14:0 (DMPG-Na)	1,2-Dimyristoyl-*sn*-glycero-3-phospho-rac-glycerol, sodium salt	CAS-No. 67232-80-8
LIPOID PG 16:0/16:0 (DPPG-Na)	1,2-Dipalmitoyl-*sn*-glycero-3-phospho-rac-glycerol, sodium salt	CAS-No. 67232-81-9
LIPOID PG 18:0/18:0 (DSPG-Na)	1,2-Distearoyl-*sn*-glycero-3-phospho-rac-glycerol, sodium salt	CAS-No. 200880-42-8
LIPOID PG 18:1/18:1 (DOPG-Na)	1,2-Dioleolyl-*sn*-glycero-3-phospho-rac-glycerol, sodium salt	CAS-No. 67254-28-8
LIPOID PG 16:0/18:1 (POPG-Na)	1-Palmitoyl-2-oleoyl-*sn*-glycero-3-phospho-rac-glycerol, sodium salt	CAS-No. 202070-86-8

PHOSPHATIDYLSERINE		
LIPOID PS 18:1/18:1 (DOPS-Na)	1,2-Dioleoyl-*sn*-glycero-3-phospho-L-serine, sodium salt	CAS-No. 70614-14-1

LIPOID PC 18:0/18:0 (DSPC)

LIPOID PG 18:0/18:0 (DSPG-Na)

LIPOID PE 16:0/16:0 (DPPE)

PHOSPHATIDYLETHANOLAMINE		
LIPOID PE 14:0/14:0 (DMPE)	1,2-Dimyristoyl-*sn*-glycero-3-phosphoethanolamine	CAS-No. 998-07-2
LIPOID PE 16:0/16:0 (DPPE)	1,2-Dipalmitoyl-*sn*-glycero-3-phosphoethanolamine	CAS-No. 923-61-5
LIPOID PE 18:0/18:0 (DSPE)	1,2-Distearoyl-*sn*-glycero-3-phosphoethanolamine	CAS-No. 1069-79-0
LIPOID PE 18:1/18:1 (DOPE)	1,2-Dioleoyl-*sn*-glycero-3-phosphoethanolamine	CAS-No. 4004-05-1

PHOSPHATIDIC ACID		
LIPOID PA 16:0/16:0 (DPPA-Na)	1,2-Dipalmitoyl-*sn*-glycero-3-phosphate, mono-sodium salt	CAS-No. 169051-60-9

PEGYLATED PHOSPHOLIPIDS		
LIPOID PE 14:0/14:0-PEG 2000 (MPEG-2000-DMPE)	*N*-(methoxypolyethylene glycol-2000) 1,2-dimyristoyl-*sn*-glycero-3-phosphoethanolamine, sodium salt	CAS-No. 384835-59-0
LIPOID PE 18:0/18:0-PEG 2000 (MPEG-2000-DSPE)	*N*-(carbonyl-methoxypolyethylene glycol-2000)-1,2-distearoyl-*sn*-glycero-3-phosphoethanolamine, sodium salt	CAS-No. 147867-65-0
LIPOID PE 16:0/16:0-PEG 5000 (MPEG-5000-DPPE)	*N*-(carbonyl-methoxypolyethylene glycol-5000)-1,2-dipalmitoyl-*sn*-glycero-3-phosphoethanolamine, sodium salt	CAS-No. 384835-61-4

Cationic Lipids

LIPOID DOTAP-Cl	1,2-Dioleoyloxy-3-trimethylammonium-propane chloride	CAS-No. 132172-61-3

Synthetic Oils

LIPOID TG 8:0/8:0/8:0	Tricaprylin, purity ≥ 99.0 %	CAS-No. 538-23-8

21

Facing page: Hard capsule for oral application

Oral Applications

Phospholipids can be used in oral dosage forms as wetting agent, emulsifier, solubilizer, or lipid matrix forming excipient. They can improve the bioavailability of poorly water-soluble compounds after oral administration. Phospholipids can also reduce gastric irritation and can help to protect the API from oxidation.

Liquid Phospholipid Formulations

APIs can be dissolved in liquid, non-aqueous concentrates of phospholipids in combination with oils or a water-miscible solvent like propylene glycol – such as our PHOSAL® products. Diluted in water, they can help to disperse the API in the aqueous phase or can be directly filled into capsules, bottles, or sachets as dosage form. These formulation types may also be converted into a solid dosage form.

Emulsions

When the drug has sufficient solubility in oils, O/W emulsions or self-emulsifying systems can be prepared with phospholipids as emulsifier or co-emulsifier. This formulation type may also be converted into a solid dosage form.

(Mixed) Micelles

(Mixed) micelles comprising phospholipids and bile salts mimic natural gut solubilization systems and are valued solubilizers, even for paediatric use. This formulation type may also be converted to a solid dosage form.

Solid Dispersions

A poorly soluble API and a phospholipid can, for example, be spray-dried with or without polymers to form solid dispersions with the amorphous state of the drug. Upon hydration, the phospholipids act as wetting agent and solubilizer.

Phospholipids as API's

Polyunsaturated/Polyenyl Phospholipids (PPL) derived from soybean are used for the prevention and treatment of liver diseases. These phospholipids suppress the formation of detrimental Radical Oxygen Species (ROS). They are available either as soybean phospholipid raw material or as formulated liquid products.

Oral Applications

(Selection from our broad product range. Additional products on request.)

Natural Phospholipids

SOYBEAN		
LIPOID S 45	Lecithin fraction with 45 % phosphatidylcholine	CAS-No. 8030-76-0
LIPOID S 75	Phospholipids with 70 % phosphatidylcholine	CAS-No. 8030-76-0
PHOSPHOLIPON® 90 G	Phosphatidylcholine, content ≥ 94.0 %	CAS-No. 97281-47-5
NON-GMO SOYBEAN		
LIPOID P 45	Lecithin fraction with 45 % phosphatidylcholine	CAS-No. 8030-76-0
LIPOID P 75	Phospholipids with 70 % phosphatidylcholine	CAS-No. 8030-76-0
LIPOID P 100	Phosphatidylcholine, content ≥ 90.0 %	CAS-No. 97281-47-5
SUNFLOWER (NON-GMO)		
LIPOID H 90	Phosphatidylcholine, content ≥ 90.0 %	CAS-No. 97281-49-7
LIPOID H 100	Phosphatidylcholine, content ≥ 94.0 %	CAS-No. 97281-49-7

Hydrogenated Phospholipids

SOYBEAN		
PHOSPHOLIPON® 80 H	Phospholipids, hydrogenated, with 70 % phosphatidylcholine	CAS-No. 92128-87-5
PHOSPHOLIPON® 90 H	Phosphatidylcholine, hydrogenated, content ≥ 90.0 %	CAS-No. 97281-48-6

Lysophospholipids

NON-GMO SOYBEAN		
LIPOID P LPC 80	Lysophosphatidylcholine, content 80 % and ≤ 20 % phosphatidylcholine	CAS-No. 9008-30-4

PHOSPHOLIPON® 90 G

Liquid Phospholipid Formulations

SOYBEAN	
PHOSAL® MCT	30 % LIPOID S 75 (USP-NF) in medium-chain trigylcerides (USP-NF)
PHOSAL® 50 PG	Phosphatidylcholine in propylene glycol, content ≥ 50.0 %
PHOSAL® 53 MCT	Phosphatidylcholine in medium-chain triglyceride, content ≥ 53.0 %
PHOSAL® 75 SA	Phosphatidylcholine in ethanol and safflower oil, content ≥ 72.0 %
SUNFLOWER (NON-GMO)	
PHOSAL® H 50	Phosphatidylcholine in sunflower oil, content ≥ 50.0 %

PPL Products (Polyenyl-PLs and Formulations)

SOYBEAN		
LIPOID S 80	PPL Phospholipids with 73 – 79 % phosphatidylcholine	CAS-No. 8030-76-0
SOLUTHIN S 80 M	PPL Phospholipids with magnesium chloride, phosphatidylcholine content ≥ 64 %	CAS-No. 8030-76-0
LIPOID PPL-400	Waxy formulation of PPL phospholipids in hard fat and soybean oil, phosphatidylcholine content ≥ 53 %	CAS-No. 8030-76-0
LIPOID PPL-600	Fluid formulation of PPL phospholipids in hard-fat and medium-chain triglycerides, phosphatidylcholine content ≥ 37.0 %	CAS-No.8030-76-0

Glycerophosphocholine (Choline Alfoscerate)

SOYBEAN		
LIPOID GPC	*sn*-Glycero-3-phosphocholine, content ≥ 98.0 %	CAS-No. 28319-77-9
LIPOID GPC 85 F	Fluid concentrate of *sn*-Glycero-3-phosphocholine (≥ 98.0 %) in water	CAS-No. 28319-77-9

PHOSAL® H 50

25

Facing page: Cream for topical application

Dermal Applications

Phospholipids are excellent excipients for topical administration. Due to their non-toxic and non-irritating properties as well as their natural and renewable origin, they are well suited to meet the high-quality demands for dermal products.

In addition to their excellent excipient properties, they can also help to improve the dermal structure of irritated or damaged skin. They can replace missing or attenuated substances in the stressed skin (e.g. linoleic acid) via intrinsic metabolism pathways.

Formulations with unsaturated, natural phospholipids tend to penetrate deeper into the skin compared to formulations without phospholipids, thereby helping to deliver the drug to its target.

Hydrogenated (saturated) phospholipids increase retention times on the surface of the skin and help to keep the barrier function intact.

Emulsions

Phospholipids can be used as emulsifiers for O/W and W/O emulsions in cream-type formulations. Poorly water-soluble actives may be dissolved in the oily components of the formulations.

Liposomes

Phospholipids in the form of liposomes can help to improve the pharmaceutical profile of topical formulations. Based on either unsaturated or hydrogenated phospholipids, these liposomes can be further processed in diverse topical formulations, e.g. gel products.

Lamellar Systems

The lamellar arrangement of lipids effectively supports the recovery of the skin barrier. Our SLM Skin Lipid Matrix® is a base formulation of multi-lamellar structured hydrogenated phospholipids and can be easily formulated into topical products. The lamellar layers help to restore the protective layer of the skin barrier and can help to retain APIs at the site of action.

Sprays

Direct dissolution of APIs with phospholipids in a solvent can be used for topical sprays. This application form provides an easy and effective way of dermal drug delivery.

Dermal Applications

(Selection from our broad product range. Additional products on request.)

Natural Phospholipids

SOYBEAN		
LIPOID S 45	Lecithin fraction with 45 % phosphatidylcholine	CAS-No. 8030-76-0
LIPOID S 75	Phospholipids with 70 % phosphatidylcholine	CAS-No. 8030-76-0
PHOSPHOLIPON® 90 G	Phosphatidylcholine, content ≥ 94.0 %	CAS-No. 97281-47-5
NON-GMO SOYBEAN		
LIPOID P 45	Lecithin fraction with 45 % phosphatidylcholine	CAS-No. 8030-76-0
LIPOID P 75	Phospholipids with 70 % phosphatidylcholine	CAS-No. 8030-76-0
LIPOID P 100	Phosphatidylcholine, content ≥ 94.0 %	CAS-No. 97281-47-5
SUNFLOWER (NON-GMO)		
LIPOID H 90	Phosphatidylcholine, content ≥ 90 %	CAS-No. 97281-49-7
LIPOID H 100	Phosphatidylcholine, content ≥ 94 %	CAS-No. 97281-49-7

Hydrogenated Phospholipids

SOYBEAN		
PHOSPHOLIPON® 80 H	Phospholipids, hydrogenated, with 70 % phosphatidylcholine	CAS-No. 92128-87-5
PHOSPHOLIPON® 90 H	Phosphatidylcholine, hydrogenated, content ≥ 90.0 %	CAS-No. 97281-48-6
NON-GMO SOYBEAN		
LIPOID P 75-3	Phospholipids, hydrogenated, with 70 % phosphatidylcholine	CAS-No. 92128-87-5
LIPOID P 100-3	Phosphatidylcholine, hydrogenated, content ≥ 90.0 %	CAS-No. 97281-48-6
SUNFLOWER (NON-GMO)		
LIPOID H 100-3	Phosphatidylcholine, hydrogenated, content ≥ 90.0 %	CAS-No. 92128-87-5

Liquid Phospholipid Formulations

SOYBEAN	
PHOSAL® MCT	30 % LIPOID S 75 (USP-NF) in medium-chain trigylcerides (USP-NF)
PHOSAL® 50 PG	Phosphatidylcholine in propylene glycol, content ≥ 50.0 %
PHOSAL® 53 MCT	Phosphatidylcholine in medium-chain triglyceride, content ≥ 53.0 %
PHOSAL® 75 SA	Phosphatidylcholine in ethanol and safflower oil, content ≥ 72.0 %
SUNFLOWER (NON-GMO)	
PHOSAL® H 50	Phosphatidylcholine in sunflower oil, content ≥ 50.0 %

Lamellar Systems

SLM Skin Lipid Matrix® 2026	Base formulation with hydrogenated soybean phosphatidylcholine and skin identical lipids of the stratum corneum
SLM Eco®	Base formulation with hydrogenated sunflower phosphatidylcholine (non-GMO) and skin identical lipids of the stratum corneum

Pre-/Liposomal Formulations

LIPOID Liposome 0041	Aqueous liposome dispersion with soybean phospholipids
LIPOID Liposome Basic	Pre-formulated liposomes with soybean phospholipids (non-GMO) in glycerin

LIPOID P 75-3

PHOSAL® 53 MCT

SLM Skin Lipid Matrix® 2026

Facing page: Structural and analytical data submitted with reference standards

Analytical testing of our reference standards

Reference Standards

Lipoid offers fully characterized reference substances suitable as primary Reference Standards for the quality control of phospholipids and lipid formulations by pharmaceutical, clinical, research, or other analytical laboratories. The purity of the phospholipids is generally not less than 98.0 %.

The Reference Standards are established according to the USP and Ph. Eur. requirements. They are manufactured in Lipoid's GMP-certified facilities, analyzed by validated methods, and fully documented.

Packaging

The standard packaging of the Reference Standards is 1 g in tightly closed screw-cap glass vials. The vials are easy to handle for safe and proper storage and multiple uses. Shipping is done under cooling with dry ice.

Structural Data

Typical spectra of NMR (^{1}H, ^{13}C, ^{31}P), mass spectroscopy, IR, and GC and LC chromatograms are compiled specifically for each substance.

Characterization

The Reference Standards are labeled as RS and supplied together with a specific Certificate of Analysis including:

- **Physical description of the material**
- **Appropriate analytical data**
- **Characterization by spectroscopic methods**
- **Assigned content**
- **Retest date**

List of all Lipoid reference standards available on request.

Facing page: High bay warehouse at Ludwigshafen

Contact

GERMANY
Lipoid GmbH
Frigenstr. 4
67065 Ludwigshafen, GERMANY
phone: +49 621 538 190
email: info@lipoid.com

USA, CANADA & MEXICO
Lipoid LLC
The National Newark Building
744 Broad St., Suite 1801
Newark NJ 07102-3802, USA
phone: +1 973 735 2692
email: info-lipoidllc@lipoid.com

CHINA
Beijing Lipoid Trading LLC
Room 809, Floor 8, Silver Tower
No. 2, East 3rd Ring North Road
Chaoyang District
Beijing 100027, CHINA
phone: +86 10 8435 1892
email: china@lipoid.com

FRANCE
Lipoid
23 bd. Emile Zola
BP 43125
06131 Grasse Cedex, FRANCE
phone: +33 493 366 326
email: info@lipoid.fr

RUSSIA
Lipoid AG
Representative Office Moscow
Acad. Pilugina Str. 24
Office 105
Moscow 117393, RUSSIA
phone: +7 495 747 5942
email: moscow@lipoid.com

KOREA
Lipoid AG
Representative Office Seoul
#1109, 219, Gasan digital 1-ro
Geumcheon-gu
Seoul 08501, KOREA
phone: +82 2 335 1154
email: korea@lipoid.com

CONTACT FOR ALL OTHER COUNTRIES
Lipoid AG
Sennweidstr. 44
6312 Steinhausen, SWITZERLAND
phone: +41 41 741 7408
email: info@lipoid.com

Representatives in many other countries.

ISO 9001 GMP
CERTIFIED

NATURAL & SUSTAINABLE

REUSAGE OF WASTE

www.lipoid.com

We Invest in Quality.

Printed on 100 % RECYCLED PAPER

Klimaneutral Druckprodukt
ClimatePartner.com/11935-1902-1001

LP_CAT_062022