



## Binding Phospholipids To Life



LECITHINS AND PHOSPHOLIPIDS FOR  
**PHARMACEUTICAL** APPLICATIONS

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  - Natural, saturated, mixed acyl (Soybean)
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## VAV AT A GLANCE

We are an innovation driven company manufacturing 'Lecithins and Phospholipids' for cosmetic, nutrition and pharmaceutical applications. We offer plant phospholipids (LECIVA), egg phospholipids (LIPOVA), synthetic phospholipids and neutral lipids.

VAV has been honored with India's Best SME (Innovation) 2013 by Yes Bank & Business Today. We also won the national award for business excellence (Chemicals and Pharmaceuticals) by Dun & Bradstreet in 2015.

## QUALITY - OUR PRIORITY

Phospholipids are produced at our WHO GMP approved plant, manned by technical qualified scientists who guarantee each process is governed by rigorous quality control standards. We have cleared many audits successfully from our global customers and different regulatory bodies like CDSCO to grant Written Confirmation Letter (WCL) & WHO GMP, making us the ideal ally for businesses and operations in the world, exporting our products globally.

Incorporating the necessary technology, our company has achieved high levels of quality in customer service, seeking the development and commitment of our employees, constantly taking care of compliance with GMP and environmental standards.

## TECHNICAL SUPPORT & DEVELOPMENT

Understanding the complexity of Novel Drug Delivery, we provide our customers start to end technical support which includes the selection of right grade of lecithin or phospholipids and guidance on formulation, stability, analytical and application aspects. VAV Lipids offer the products that are compliant to global pharmacopoeia and are supported by Drug Master Files.

Our techno-commercial team works in close relation with the customers to help them achieve the targeted benefits from our products.

## RESEARCH & DEVELOPMENT

Innovation at VAV is backed by strong chemistry, analytical expertise and the advanced knowledge of the domain, acquired over the years. Experimentation and ingenuity is built into the fabric of our organization which has resulted in novel products and processes, increasing efficiency and reducing risks associated with our products.

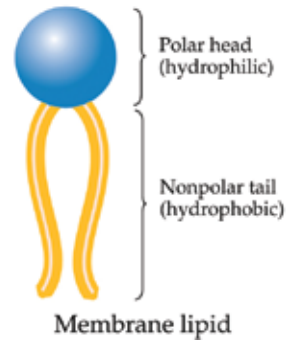
We actively support academic researchers at top institutions worldwide by providing study products and technical expertise. These efforts have resulted in a continuous output of publications in top scientific journals and patents.



# BIOFRIENDLY EXCIPIENTS

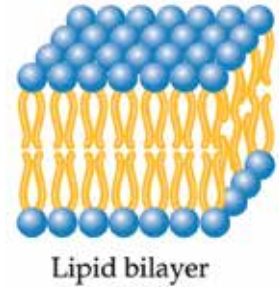
## UNDERSTANDING PHOSPHOLIPIDS

- ✔ Cells are surrounded by a bilayer of polar lipids called 'Phospholipids'.
- ✔ They are most essential lipids of all biological membranes.
- ✔ Classified by US FDA as Generally Regarded as Safe (GRAS), natural (non chemical) origin.
- ✔ Diverse applications.



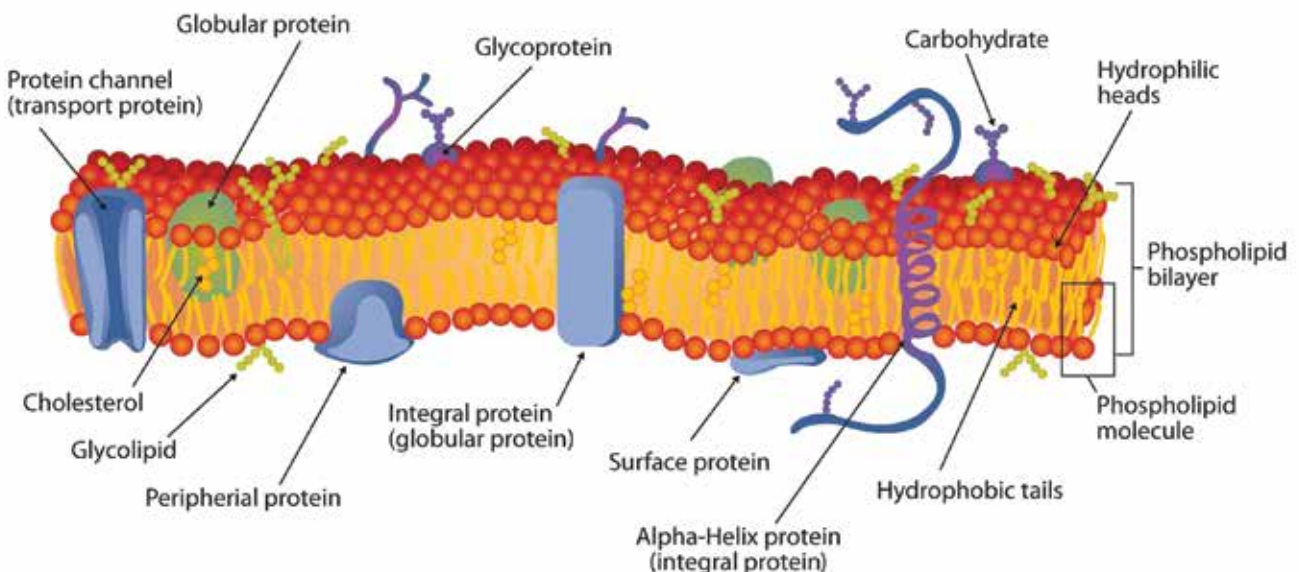
## BIOCHEMICAL SIGNIFICANCE

- ✔ Play an important role for signal transduction cascades in nerve cells.
- ✔ High propensity as drug carriers and excellent biocompatibility.
- ✔ Used for therapeutic agents who have poor BIOAVAILABILITY, RAPID CLEARANCE and TOXIC EFFECTS.
- ✔ Phospholipid based drug delivery systems have proved to be more efficient and provide appropriate systemic effect.
- ✔ They act as surface-active wetting agents in the pleura and alveoli of lung, pericardium, joints etc.



## PHYSIOLOGICAL PROPERTIES

- ✔ They assemble the circulating lipoproteins, which mainly transport lipophilic triglycerides and cholesterols through blood.
- ✔ Together with cholesterols and bile acids form mixed micelles to enhance absorption of fat soluble substances in gallbladder.



## CHALLENGES IN CONVENTIONAL DRUG DELIVERY

### CHALLENGES

- Poorly soluble drugs pose many biopharmaceutical challenges.
- The bio-efficacy of a drug depends primarily on its solubility and permeation.
- Poorly soluble, yet highly potent drugs have failed to reach effective therapeutic concentrations due to limited absorption i.e. bio-efficacy.



**PHOSPHOLIPIDS** can solve these as drug carriers, increase bio-adhesiveness, aiding absorption as well as targeting the drug to specific sites.

## PHOSPHOLIPIDS: AID IN FORMULATION DEVELOPMENT

- ✔ Emerging platform for drug delivery due to their amphiphilic character.
- ✔ Facilitate the absorption of drugs
- ✔ Improves the bioavailability of drugs
- ✔ Ideal for drugs with poor solubility and permeability (BCS class III, IV)
- ✔ Improves the physical characteristics resulting into more convenient and effective functionalized product for the consumer.
- ✔ Reduces toxic effects of drugs

## ROUTES OF ADMINISTRATION

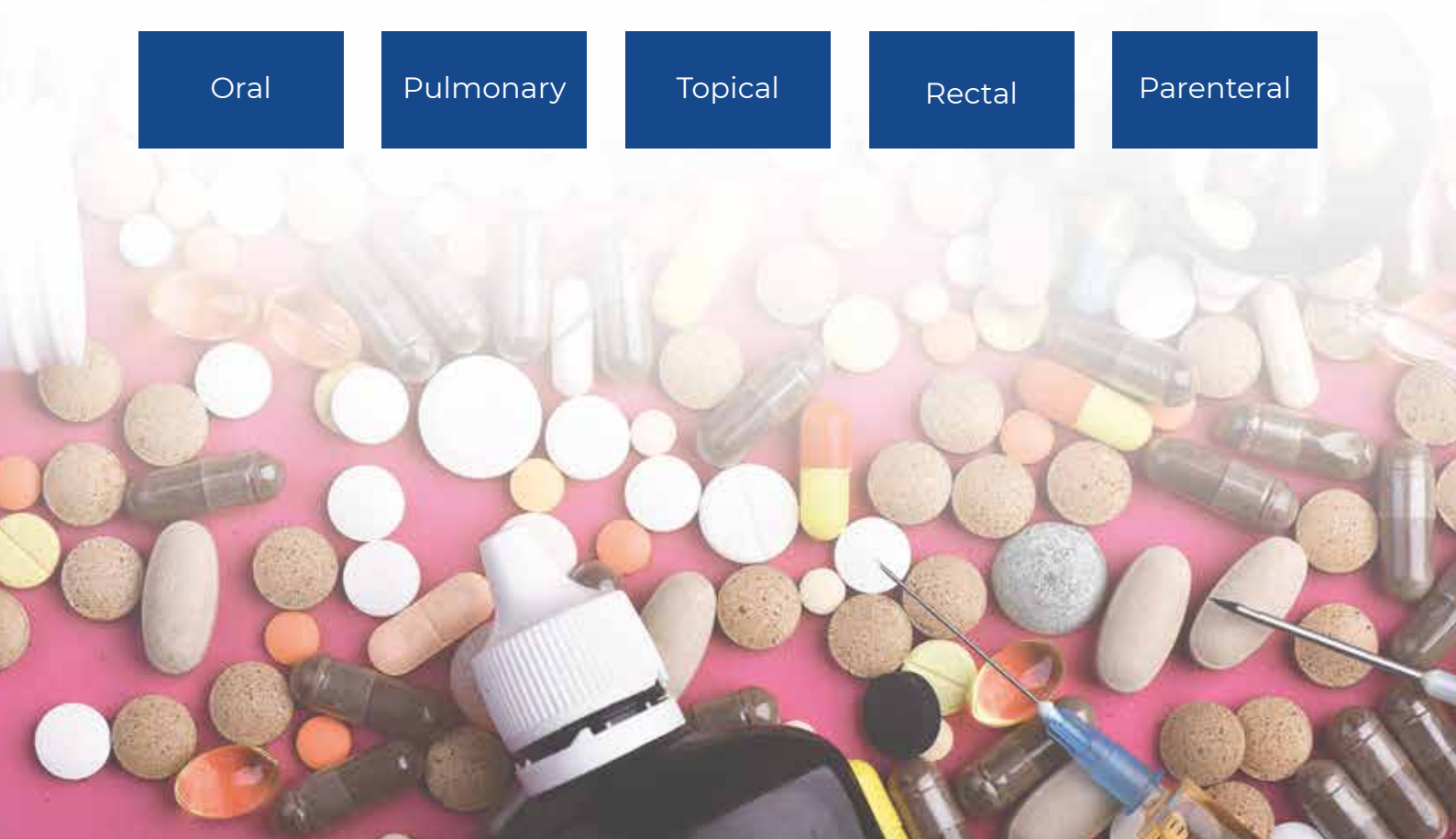
Oral

Pulmonary

Topical

Rectal

Parenteral

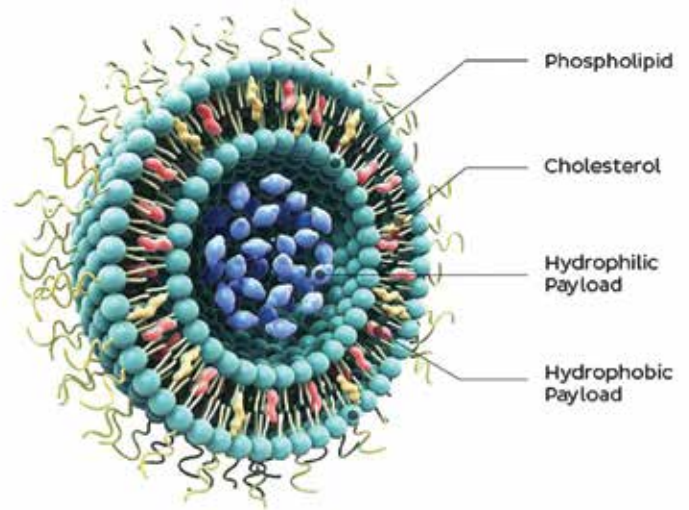


# APPLICATIONS

## AS EMULSIFIERS

The lipophilic fatty acids and hydrophilic phosphoric acid based esters together contribute an amphiphilic character. They are bipolar and act as an emulsifying agent.

- ✔ Natural emulsifiers.
- ✔ Have self emulsifying property.
- ✔ Far better tolerated than ethoxylated emulsifiers or any other alternatives.
- ✔ They are multifunctional and can be used in both o/w and w/o emulsions.
- ✔ Form stable emulsions.



## AS LIPOSOMAL AGENTS

Phospholipids when hydrated have a unique property of self assembling into vesicles. These vesicles known as LIPOSOMES are promising systems for drug delivery and can be unilamellar (single phospholipid bilayer) or multilamellar (two or more phospholipid bilayers). They can encapsulate both, drugs and phyto-actives or phytonutrients.

They are highly biocompatible, biodegradable with no toxicity & high aptitude to entrap both hydrophilic and hydrophobic drugs and have site specific drug delivery.

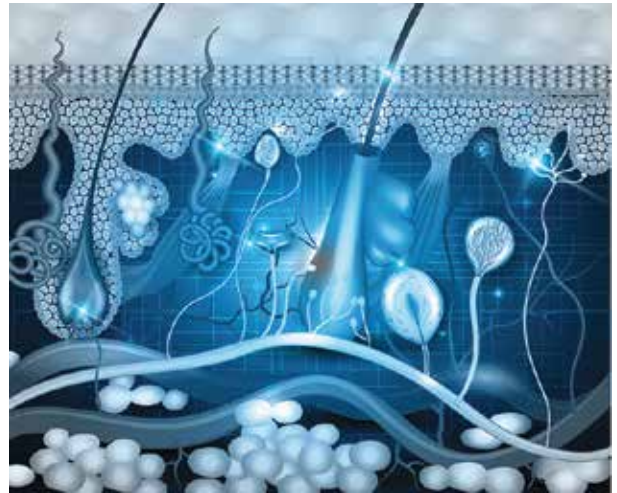
## TOTAL PARENTERAL NUTRITION

The infusion of lipid emulsions allows a high energy supply, facilitates the prevention of high glucose infusion rates and is indispensable for the supply with essential fatty acids. Egg phospholipids are used to emulsify 10-30% oil-in-water emulsions for parenteral nutrition. The major components of lipid emulsions are essential omega-3 fatty acids (alpha-linolenic acid, DHA, EPA) and omega-6 fatty acids (linoleic acid, arachidonic acid).



## DERMATOLOGY

- ✔ Phospholipids improve skin condition by increasing hydration level of skin and integrity of the stratum corneum.
- ✔ They do not disrupt the skin defence mechanism and structure.
- ✔ Enhances penetration of individual lipid components into stratum corneum and subsequent alteration of the intercellular lipid matrix within the skin.
- ✔ Improves the stability of unstable compounds.
- ✔ Localized skin delivery



## OLEOVA

OLEOVA is natural premium egg (Ovum) oil extracted from chicken eggs using modern technology. It contains triglycerides, cholesterol, phospholipids, biotin, omega-3 fatty acids and antioxidants, xanthophylls like lutein and zeaxanthin. It is widely used in skin and hair care applications. It has anti-ageing, anti-acne, for treating burns and wounds, sores care etc

**Anti-ageing:** OLEOVA influences the production and sequestering of free radicals or reactive oxygen species (ROS). In a scientific study done on human skin cells, it was found that after 24 hrs, Egg Oil-treated cells produced less ROS. OLEOVA increases the production of catalase which acts as a scavenger of free radicals. OLEOVA also stimulates breathing of cells and re-epithelization. In an experiment, skin cells were grown to confluence and a rim was left free of cells. On incubating with OLEOVA for two days, this previously cell-free area was covered by growing cells and speeding up of cell growth was observed. Thus, OLEOVA is a potent anti ageing active.

Recommended dosage ≈ 8-10%

**Anti-acne:** Since OLEOVA has natural anti-microbial properties due to the presence of immunoglobulins, OLEOVA makes an effective anti-acne active ingredient.

Recommended dosage ≈ 10%

### **Burn, Wound & Sores care:**

OLEOVA speeds up the process of cell growth and stimulates re-epithelization due to the presence of Omega-3 fats & biotin.

Recommended dosage ≈ 15%



## CARDIO-PROTECTANT

Phosphatidylcholine (PC) is involved in reverse cholesterol transport by effecting Lecithin cholesterol acyltransferase.

Lecithin cholesterol acyltransferase (LCAT) is an enzyme made in the liver which catalyzes the uptake of free cholesterol from the plasma into the lipoprotein particle.

LCAT converts immature disc-shaped HDLs to mature, large round HDL.

HDL particles get bigger as cholesterol is brought into its core. In fact, measurement of HDL sizes is an indirect way of assessing the degree of reverse cholesterol transport.

PC allows the ALCAT enzyme to put more cholesterol into the HDL particles. Doing this clears more non-HDL cholesterol from the circulation. Purified forms of PC and lecithin have been shown to work both orally and intravenously to improve cholesterol numbers. Intravenous injections of PC is found to be equally effective reducing symptoms of angina pectoris.



## MESOTHERAPY

It is the latest range of lipo-sculpting away fat accumulations i.e to reduce or eliminate unwanted localized accumulated fats.

It is non-surgical, relatively painless injection technique.

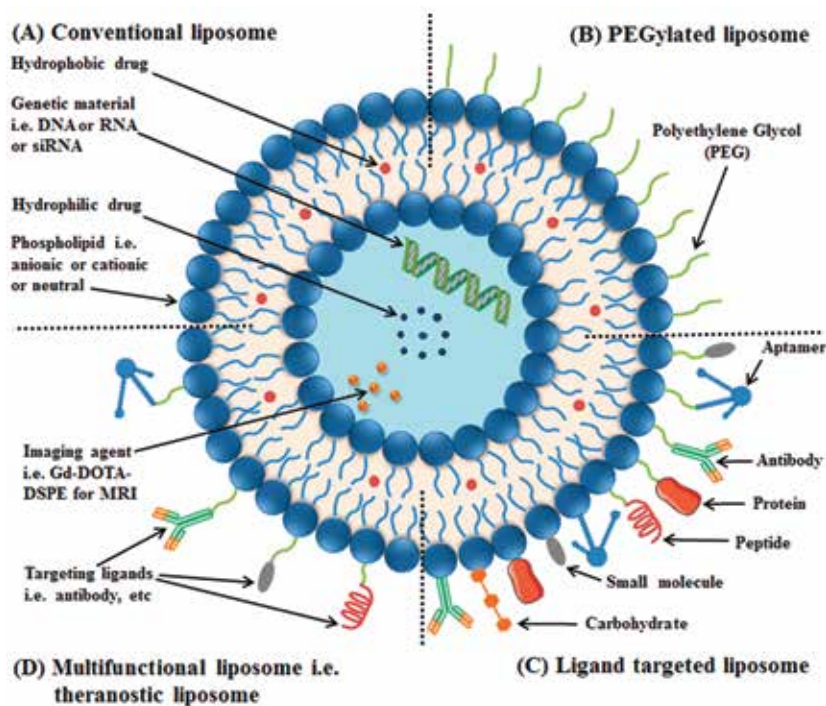
- ✔ Mesotherapy will replenish the PC in adipose cell membrane.
- ✔ PC penetrates the adipocytes and is then, due to the impact of phospholipase D, hydrolyzed to phosphoric acid and choline.
- ✔ Cholines act as emulsifiers and phosphoric acid triggers the activation of protein kinase C (PKC).
- ✔ The latter has the effect that lipolytic lipases - assisted by hormone sensitive lipases hydrolyze triglycerides to become fatty acids and glycerine, transported to liver and eliminated as bile acid.





## TARGETED DRUG DELIVERY

- ✔ Smart drug delivery system.
- ✔ Increases accumulation of liposomal formulations in the desired cells and tissues, by using the targeted liposomes including surface-attached ligands such as; antibodies, folates, peptides and transferrin that are capable of recognizing and binding to the desired diseased cells, leaving healthy cells intact.
- ✔ Beneficial for stabilizing therapeutic compounds, overcoming obstacles to cellular and tissue uptake and improving biodistribution of compounds to target sites in vivo.

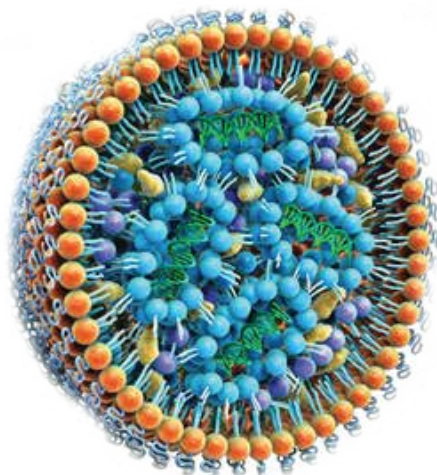


## VACCINE DELIVERY

Lipids are used to nano-encapsulate the genetic strands to significantly enhance the immunogenic response of vaccines against antigens and has led to a medical breakthrough in vaccine-based delivery systems, enabling the development of Covid-19 vaccines at a blistering pace. They help to develop adaptive immune responses against a wide variety of pathogens, besides Coronaviruses

### LIPID NANOPARTICLE (LNPs) BASED VACCINES UTILISE PHOSPHOLIPIDS :

- ✔ To aid potent sustained effects and represent natural & biodegradable delivery systems.
- ✔ Can be rationally customized in terms of particle size, charge, surface modulation, site specific targeting to optimally deliver an antigen/active/mRNAs etc.



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