# A NOVEL APPROCH TOWARD FUNCTION COSMETIC

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## ABSTRACT

Whereas "Phyto" suggests a plant, "Some" denotes a cell. It is sometimes referred to as herbosomes,a novel, patented technique in which phospholipids and standardized plant extracts or water- soluble phytoconstituents combine to form lipid-compatible molecular complexes that significantly improve absorption and bioavailability. The latest the research and development ofseveral investigators have been extensively examined to determine the transdermal pathway as apossible means of supplying phytoconstituents. Plant-derived goods and extracts are becoming more and more popular. consideration as dietary supplements for the homeostatic control of toxicities, cancer, inflammation, and weight loss further acute or chronic degenerative illnesses. However, these products often have issues with bioavailability and stability.

Following their separation, plant products become unstable and may not be suitable for crossingBy increasing the hydrophilicity of highly lipophilic drugs, the phytosome or herbosometechnology makes them acceptable for drug administration and sufficiently raises the lipophilicity of hydrophilic phytoconstituents to pass biological membranes. It has already been demonstrated that phytosomes can be used topically for aesthetic purposes. Along with a comparison of liposomes and phytosomes, this paper covers recent developments in phytosome technology with a focus on transdermal medication administration. Phytosomes are self-assembled delivery vehicles based on phospholipids that can be used to augment the restricted oral bioavailability of polyphenolic compounds.

# INTRODUCTION

The majority of plant elements that are physiologically active are polar or water soluble;nevertheless, limited absorption leads to restricted usage of these chemicals, eventuallylowering their bioavailability. Herbal preparations need to have appropriate equilibrium between hydrophilic (forabsorption) and to penetrate the lipid bio membrane balance) and lipophilic (to enter the gastrointestinal tractfluid). Plant preparations are extensively utilized in both conventional and contemporary medical systems. Throughout conventional era, several pharmacological investigations have been conducted to examine the therapeutic use of several plant extracts and their components. Above the Significant progress has been made in the last year to develop novel drug delivery systems (NDDS) for a range of plant extracts and the components that make them active. Novel drug delivery Since ancienttimes, phytomedicine preparations have been utilized to maintain health. Since ancient times, phytomedicine preparations have been utilized to maintain health. Thereare several therapeutic applications for phytomedicines. Herbal extracts and their derivatives have been shown to have components, biological activities, and health-promoting propertiesduring the course of the last century by phytochemical and phytopharmacological studies. It has been noted that the majority of phytoconstituents that are physiologically active, such terpenoids and flavonoids, are highly polar or water -soluble compounds. It has been noted that the Due to their poor lipid solubility, these highly water soluble elements are difficult to absorb and provide a barrier to crossing the biological membrane, which ultimately leads to poor Bioavailability. Numerous strategies, including the addition of solubility and bioavailability enhancers, structural alteration, and entrapment with lipophilic carriers, have been devised toincrease the bioavailability.The technology of phytosomes is one such strategy. Indena has created a revolutionary technique called phytosome technology to address theproblem of low bioavailability. "Some" refers to anything like to a cell, and "phyto" indicates plant .This new preparation creates lipid-compatible molecular complexes with improved absorption and bioavailability by mixing a standardized plant extract with phospholipids. The phytosome mechanism creates a tiny cell that shields the priceless plant extracts from being broken down by gut microbes and digesting enzymes. Complex chemicals called phospholipidsare in charge of creating cell membranes. Phospholipids are lipid molecules in which a phosphate group occupies the leftover space after glycerol is linked to two fatty acids. Phosphatidylcholine, which is mostly used, is sourced from soybeans (Glycine max).Phosphatidylcholine reacts with plant extracts in an aprotic solvent to produce phytosomes.

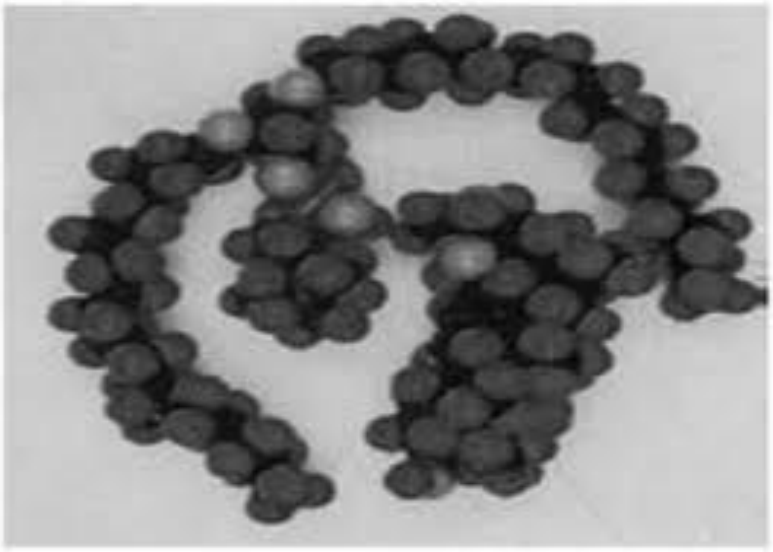
The cosmetics business is entering a new age of innovation, with a rising emphasis on natural, organic, and sustainable goods, driven by the quest of beauty and wellbeing. Customers are looking for skincare products that not only work well but also reflect their beliefs of health consciousness and environmenta responsibility. Plant-based botanicals, which include a wide range of bioactive substances that may be beneficial to skin health, have long been a mainstay of conventional medicine and skincare regimens. Nevertheless, there are a lot of formulation issues with using botanicals in cosmetics. These natural substances' potential as therapeutic agents is typically compromised by factors such as poor solubility, instability, and restricted skin penetration that limit their efficacy. In order to overcome these obstacles, scientists have created cutting-edge delivery methods that improve the effectiveness and bioavailability of botanicals. Phytosomes are one of these cutting edge technologies that has attracted a lot of interest. Plant extracts are encapsulated in phytosomes, which are nanoscale lipid-based vesicles that protect them from deterioration and aid in their skin absorption. The usage of botanicals in cosmetics has been completely transformed by this unique delivery technology, which also gives formulators the ability to make sustainable, all-natural skincare product. Flavonoids and glycosides, which make up the majority of phytomedicines' bioactive components, are soluble in water. The most prevalent kind of bioactive component is flavonoids, which have a variety of therapeutic uses. Several plant flavonoids, such as silymarin and glycyrrhizic acid, have beneficial cosmetic benefits when administered topically in addition to their medicinal uses. Numerous conditions, including as inflammation, edema, discomfort, and various bacterial and fungal infections, are affected locally by plant flavonoids. However, their use for topical administration is restricted because of their poor skin absorption Phytosomes are probably the technology that can enhance the skin's absorption of phytoconstituents, allowing for the regulation of the physiology of skin compositions. The enhancement of skin function indicates the usefulness of phytosomes as a cosmetic agent. The components linked to phospholipids transit as a result of their contact with the cutaneous structure, which controls the release of phytoconstituents. Without harming the epidermis, the complex's absorption rate is significantly increased, indicating that the phytoconstituent-phospholipid complex may find use in both systemic usage through the skin and as functional cosmetics. The term "cosmetics" is used in many different fields and has varied definitions under different laws. According to accumulated research, cosmetics—aside from soap—were historically substances used to the human body for purposes of washing, beautifying, smelling, or altering appearance, and they had to be safe for human health. However, the most recent trend combines proprietary delivery technologies, clinically established chemicals, and the beauty of high-end cosmetics. Products that lie in between pharmaceuticals that cure and treat and cosmetics that just clean and enhance are known as cosmetics.

The advantages of nutracosmetical components are combined with the style, texture, and delivery methods of cosmetics in the new category of health and beauty assistance products known as nutracosmetics. Since herbs offer several health benefits, including

anti-aging, moisturizing, antioxidant, anti-cellulite, and antibacterial activities, they have been utilized to preserve and improve human attractiveness.

# PHYTOSOME TECHNOLOGY

The Italian company Indena s.p.A. created the phytosome technology, which significantly increases the bioavailability of specific phytomedicines by adding phospholipids to standardized plant extract. This process enhances the phytomedicines' absorption and usage. Both in lipids and water, polyphenols are not very soluble. Spectrophotometry can be used to demonstrate the unique arrangement that is formed when the polar functions of the lipophilic guest engage with the charged phosphate head of phospholipids through hydrogen bonding and polar contact.



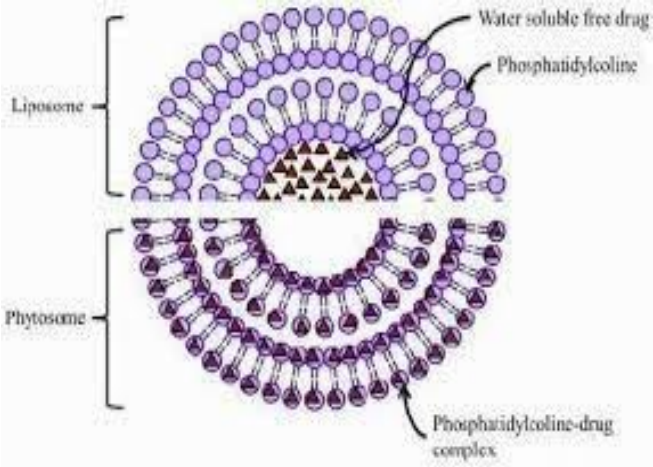
The molecule is bound by the hydrophilic choline group head and the hydrophobic phosphatidyl group .whereas the limited area is enveloped by the phosphatidyl portion. In order to meet contemporary food criteria, the first generation of phytosomes was created by mixing phospholipids and particular polyphenolic extract in a non-polar solvent. More recently, however, the generations of phytosomes have been created utilizing a hydro-ethanolic solvent. The components of phytosome have been authorized for use in pharmaceuticals, and their composition is safe. Increased bioavailability and absorption of water-soluble phytoconstituents is observed.This results in improved therapeutic advantages. Comparatively speaking, phytosomes are more stable than liposomes. This is due to the fact that chemical bonds are present in the former but not in the latter.The plant extract's nutritional value is increased by phospholipids.

# PROPERTIES OF PHYTOSOMES

Physico-chemical properties

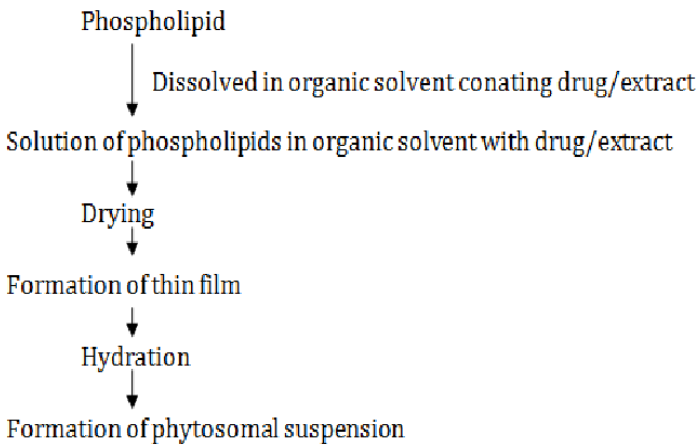
As was previously mentioned, a standardized plant extract is used as the substrate in a reaction with a stoichiometric amount of phospholipid to create phytosomes. According to the spectroscopic data, the phospholipid-substratum contact results from the polar head (phosphate and ammonium group) and the polar head forming a hydrogen bond. functions of the substrate. A phytosome can range in size from 50 nm to a few hundred µm. After being exposed to water, phytosomes take on a micellar form that resembles a liposome and photon correlation. These liposomal structures that Phytosomes have gained are shown by PCS spectroscopy.
A natural substance and natural phospholipids, such as soy phospholipids, combine to form phytosomes. Stoichiometric concentrations of phospholipid react with the chosen polyphenol (such as simple flavonoids) in a nonpolar solvent to form this complex [17]. The primary phospholipid-substrate interaction has been demonstrated to be caused by the creation of hydrogen bonds between the polar functional groups of the substrate and the polar head of phospholipids, or phosphate and ammonium groups, based on their physicochemical and spectroscopic data. They have a clear melting point, are lipophilic, freely soluble in nonpolar solvents (but not in the hydrophilic moiety), and are only moderately soluble in lipids.
Phytosomes take on a micellar shape and form structures resembling liposomes when exposed to water. In phytosomes, the active principle is attached to the polar head of phospholipids and forms an essential component of the membrane, but in liposomes, it dissolves in an internal pocket or floats in the layer membrane [18, 19–20]. Certain spectroscopic techniques can show that molecules are linked to the polar head of the phospholipids by chemical bonds [21–22].

# BIOLOGICAL PROPERTIES



According to pharmacokinetic studies and pharmacodynamic tests conducted on experimental animals and human subjects, phytosomes are novel complexes that are better absorbed and utilizedthan conventional herbal extracts or non-complexed extracts, producing more bioavailability and better results. Phytosomes express their behavior in physical or biological systems due to their physical size, membrane permeability, percentage entrapment, chemical composition, quantity, and purity of the materials used. Pharmacokinetic studies and pharmacodynamic testing in both human subjects and experimentalanimals have shown that phytosomes are novel complexes that are better absorbed and utilized than conventional herbal extracts or non-complexed extracts, producing more bioavailability andbetter results. Because of their physical size, membrane permeability, percentage of entrapment, chemical makeup, quantity, and purity of the materials employed, phytosomes can express their behavior in physical or biological systems.The biological behavior of phytosomes has been demonstrated by pharmacokinetic and pharmacodynamic research conducted on both human and experimental animal subjects [23]. Based on these research, it has been determined that phytosomes have a higher bioavailability than non-complexed botanical derivatives [18].

# PREPAERATION OF PHYTOSOMES




Typically, to create phytosomes, a precise quantity of phospholipid—soya lecithin—is added to plant extracts in an aprotic solvent. Phosphatidylcholine, the main ingredient in soy lecithin, has two functions. The phosphoryl portion has a lipophilic character, whereas the choline portion has a hydrophilic one. While the phosphatidyl component is a lipid soluble substance associated to the choline bound complex, the choline part is attached to the hydrophilic main active ingredients.It causes a lipid complex to create something more bioavailable and stable.

One method for making phytosomes is the reflux approach. A 100 mL round-

bottom flask containing phospholipid and polyphenolic extract was refluxed in DCM for an hour at a temperature not to exceed 40°C. The clear solution was evaporated, and then 15 milliliters of n-hexane were added until a precipitate was produced.
After being removed, the precipitate was put in a desiccator. [7]

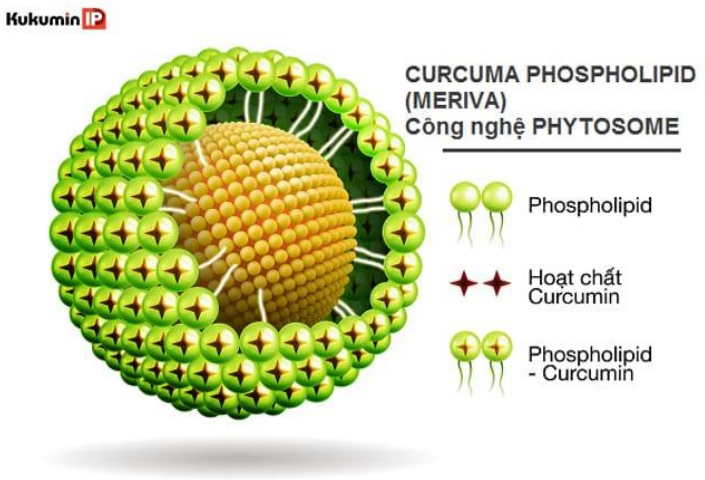
# Novel approaches

Cosmetics that are often used have limited percutaneous absorption and a low affinity for the skin. As cosmeceuticals, traditional cosmetics are not very effective. Nutraceuticals and bioactive chemicals can be delivered more effectively and efficiently thanks to new technologies. Nanotechnology has recently shown promise as a cosmetic for labile, poorly absorbed, and poorly soluble herbal extracts and phytochemicals. A cosmetic product's effectiveness and appearance can both be enhanced by an inventive approach. The use of innovative techniques can also increase the effectiveness of herbs' ongoing effects on the human body.
There are a lot of products on the market now that have increased efficacy. This article discusses the more recent methods that have been developed in this regard. The preparation goal (i.e., topical or systemic effect), the intrinsic qualities of the drug or herb extract (e.g., hydrophilic or hydrophobic), the surface characteristics of a system (e.g., permeability and charges), the degree of biodegradability, biocompatibility, and toxicity, the release profile, the size of the product required, and the antigenicity of the finished product[32] will all influence the formulation and choice of approach to be used for herbal cosmetics. It will be useful while choosing a strategy for herbal cosmetics. Phytosomes are pure fractions or standardized extracts that have been complexed with phospholipids to improve their activity and bioavailability. Because of their lipophilic nature, they enhance the topical absorption of complex compounds, resulting in better specific activity in skin processes including hydration, collagen structure, enzyme balance, etc. Biologically active phytoconstituents can be applied locally at the place of need by topical absorption. Through improved absorption, increased bioavailability, and improved tissue distribution, the phytosome process enhances herbal substances.

# PHYTOSOME WITH AN ANTIOXIDANT FOR THE SKIN

## PHYTOSOME DRUG DELIVERY SYSTEM

The phytosome of curcumin




The rhizome of Curcuma longa yields curcumin, an antioxidant polyphenol molecule.

According to numerous studies' findings, curcumin possesses a wide range of pharmacological properties, including antioxidant, antiviral, anti-inflammatory, and cancer-prevention properties.

One of the tetrahydro curcumin derivatives that has been suggested for use in cosmetics as a skin antioxidant is curcumin, which has also been demonstrated to be beneficial in the treatment of skin conditions.

The possible ameliorative effects of curcumin phytosome (Meriva®) on AlCl3-induced hepatotoxicity have been explored in the past year.

The findings indicated that there is a considerable chance that the curcumin phytosome will lessen the hepatotoxic effects of AlCl3. [10]

The Polydispersity Index (PDI) of Phytosome curcumin is 0.191, its zeta potential is -44.5 mV, and its particle size is approximately 23.21 ± 6.72 μm, with a loading efficiency of 2.67 ± 0.23% . [11] . [12]

The performance of curcumin compound has been successfully increased by phytosome formulation; curcumin phytosome could provide a slower release profile and achieve a higher absorption level and longer half-life (3.16 h);[11] taking an oral curcumin supplement twice a day, prior to and following median nerve surgery, was completely safe and effective[13] because it reduced glutathione, matrix metalloproteinase-2 activity, and collagen deposition while also increasing the levels of growth factor-b1, muscle actin smoothness, and heat shock protein-47 gene

expressions[14].
Additionally, it boosted nuclear factor kappa-B expression, activated macrophages, dramatically reduced tumor necrosis factor-a and interleukin pancreatic cancer,[15] raised the level of antioxidant enzymes, and improved mouse responses.[16]

### Cacao husk phytosome

The polyphenol chemicals found in cacao fruit (Theobroma cacao L.) have the ability to block the tyrosinase enzyme. Priani et al. developed a face serum phytosome formulation with cacao husk in 2019 to boost the potency of the tyrosinase inhibitor action. By employing the thin-layer hydration technique, phytosomes were created. Phosphatidylcholine was the carrier utilized in this instance to enhance the phytosome's bioactive flavonoids. The end product was a phytosome with a 90.5% entrapment efficiency and a particle size of 672 nm. The tyrosinase inhibitor activity of the cacao husk phytosome is impressive, at 199.98 ppm.[33]

## Herbal extracts with actions

| Applications | Herbal ingredients | Action | References |
|---|---|---|---|
| Antioxidant and photoprotective effect | Vitamin C and E, tea polyphenols, curcumin, silymarin, resveratrol, ginkgo, genistein, pomegranate fruit extract | • Counteracts the harmful effects of reactive oxygen species and other free radicals<br>• Reduces erythema, sunburn cells, and immunosuppression caused by sunlight and DNA adduct formation | 24-25 |
| Antiaging | Pycnogenol, centella, boswelia, oleanolic extract, tetrahydrocurcuminoids | • Stimulates normal skin growth and cellular growth and repair<br>• Repairs the loss in tone and elasticity of the skin<br>• Reverses the | 26-27 |

| Applications | Herbal ingredients | Action | References |
|---|---|---|---|
| | | chemical changes that occur in collagen with aging and normalizes the immune system | |
| Moisturizer | Retinoids, alpha hydroxy acids, fruit acids, soy extract, black kohosh, aloe vera, calendula | • Causes excretion of cytokinins, which induces edema, vasodilation, and frank inflammation<br>• Makes stratum corneum softer<br>• Fills spaces between the layers and reduces fine lines | 28,29 |
| Astringent | Arnica, cucumber | • Cools, refreshes, and tightens the pores of skin<br>• Controls oily skin and lowers the pH of the face after cleansing | 30 |
| Anti-irritant and anti-inflammatory | Corriander seed oil, bisabolol | • Inhibits the release of histamine and relieves irritation | 31 |

# APPLICATION

Phytochemical and phytopharmacological studies have been able to determine the chemical compositions, biological activities, and health-promoting properties of many plant productsthroughout the past century.

Molecules that are polar or water soluble make up the majority of the physiologically active components of plants. Nevertheless, water-soluble phytoconstituents (such as tannins, terpenoids, flavonoids, etc.) are poorly absorbed because of their large molecular size, which prevents passive diffusion from working, or because of their poor lipid solubility, which severelyrestricts their ability to cross biological membranes that are rich in lipids. This leads to poor bioavailability. The natural component synergy is lost during the separation and

purification of an extract's constituents, which has frequently been found to result in a partial or complete loss of the purified constituent's unique bioactivity. The bioavailability of the active components appears to be highly dependent on the chemical complexity of the crude or partially purified extract. Certain components of extracts may be degraded in the stomach environment when consumed orally. Poor bioavailability frequently restricts the therapeutic value of established standardizedextracts for the reasons mentioned above [8] [9]. Because of its many interrelated qualities, including photoprotection, antiaging, moisturizing, antioxidant, astringent, anti-irritant, and antibacterial action, botanical extracts are multifunctional in nature. Reactive oxygen species are produced when skin is exposed to sunlight and other atmospheric conditions. These species can react with proteins, fatty acids, and DNA to induce oxidative damage and degrade the antioxidant system. These wounds harm the skin's regulatory systems, which promotes photoaging and the development of skin cancer.

## CONCLUSION

Phytosome drug delivery methods have demonstrated remarkable outcomes in enhancing the pharmacological and bioactive characteristics of natural plant-based products, including their antioxidant and brightening potential. By improving the solubility and penetration of active chemicals through biological membranes, the phytosome drug delivery method maximizes bioavailability. Furthermore, it is the primary choice for increasing the effectiveness and is a promising technology for cosmeceutical products because to its ability to mediate controlled release systems, targeted delivery systems, and the ability to increase the stability of active compounds.A PHYTOSOME® is a compound that exhibits distinct physicochemical and spectroscopic characteristics and is formed by polar polyphenolics and dietary phospholipids. Although PHYTOSOME® complexes were initially studied for cosmetic purposes, over the past 20 years, there has been growing evidence of their potential for drug delivery, with positive activity in the fields of anticancer, hepatoprotective, anti-inflammatory, and cardiovascular uses.

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