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Phytosome: A Novel Approach Towards Functional Cosmetics

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Abstract: Phytosomes are newly introduced structure, which contains the bioactive phytoconstituents of herb surrounds and bound by a lipid. Most of the bioactive constituents of phytomedicines are water-soluble compounds e.g., flavonoids, glycosides etc. Flavonoids are a major class of bioactive compounds possesses broad therapeutic activities. Most of the plant flavonoids i.e., glycyrrhizic acid, silymarin also having cosmetic value apart from their medicinal value, when applied topically. Plant flavonoids have local action on some diseases like inflammation, oedema, pain, fungal infections etc. But their use in topical application is restricted due to poor absorption through skin. Phytosomes are probably a system which can improve absorption of phytoconstituents through skin, to regulate the physiology of skin compositions. The improvement in the functioning of skin suggests the functional cosmetic value of the phytosomes. Generally the passage of the compounds anchored to phospholipids takes place through interaction with cutaneous structure, which influences the release of the phytoconstituents. The rate of absorption from the complex is dramatically enhanced with out damaging the epidermis, which suggesting potential use of phytoconstituent- phospholipids complex for cosmetic value in skin as well as for systemic function via skin.

Key words: Phytosomes, flavonoids, cosmetics

INTRODUCTION

The skin is the largest organ of the body and provides a protective barrier against harmful microbes, chemicals and ultraviolet radiation. Natural plant products have been formulated to heal and prevent dry skin, treat skin conditions such as eczema and acne and retard the aging process (Early *et al.*, 2004).

As we grow older, the process of cell replication and many other complex cellular pathways breaks down and the body begins to make mistakes. In the same way that our reactions slow down as we age, so too our cells make errors and function more slowly. Young vibrant elastic collagen becomes progressively sluggish and inelastic, skin becomes more lined and wrinkled, colour and freshness are slowly replaced with dull, lifeless skin often speckled with discoloured patches where the deposition of melanin has become uneven and erratic. These discoloured areas are commonly referred to as age spots or liver spots technically it is known as chloasma or melasma (Dweck, 2000).

There are many causes of skin redness, some of them deliberately induced to bring muscle-pain relief by the use of rubefacients, which produce increased blood flow to the site of application. Other causes of skin redness are unwanted skin irritations induced by adverse cellular reactions. (Nowak *et al.*, 1985).

Functional cosmetics are used since ancient time to alter the appearance by recovering the bodies structure and functions and the materials which are used for this purpose are plant extracts, animal derived extracts, marine materials etc. These materials functions at structural and physiological level of the skin, that's why considered under functional cosmetics as similar as the word Quasi drugs are coined in Japan.

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The phytosomes have (Fig. 1) a marked lipophilic character and improve topical absorption of complex molecules which show improved specific activity in the skin functions such as hydration, collagen structure, enzyme balance etc. Topical absorption of biologically active phytoconstituents provides local application at the site of requirement. The phytosome process intensifies herbal compounds by improving absorption, increasing bioavailability and enhancing delivery to the tissues (Bombardelli *et al.*, 1994). By combining the emulsifying action of the phospholipid, with the standardized botanical extracts, the phytosome form provides dramatically enhanced bioavailability and delivers faster and improved absorption through the skin (Bombardelli *et al.*, 1989). Therefore application of natural molecules in form of phytosome improves its absorption, nourishes the skin and act as functional cosmetics. Functional cosmetics are topical cosmetic-pharmaceutical hybrids intended to enhance the beauty through ingredients that provide additional health- related function or benefits (Bombardelli and Spelta, 1991).

The dual application of phytosome as topical pharmaceutical agent and cosmetics with improved efficacy and safety results in proper utilization of herbals and cost effective functional cosmetic product (Citernes and Sciacchitano, 1995).

Skin Structure and Skin Alterations Due to Aging

Structure of skin is shown in Fig. 2 (Bissett, 1987). The aging of human skin is primarily caused by exposure to the ultraviolet radiation of the sun. There are two main process of skin aging: intrinsic

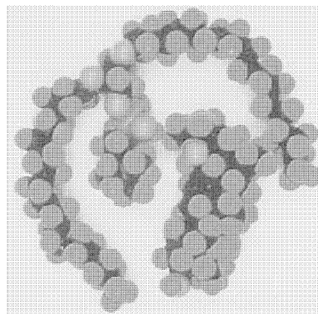


Fig. 1: Organization of the phytosome molecular complex. A flavonoid molecule (lower right) is enveloped by a phospholipid molecule. The two are held together by a chemical bond (Curri *et al.*, 1989)

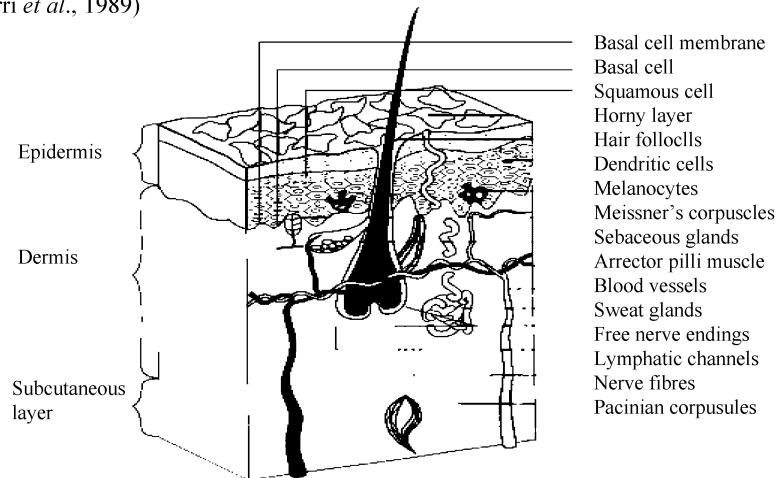


Fig. 2: Structure of skin (Bissett, 1987)

and extrinsic. Intrinsic aging reflects the genetic background of an individual and results from the passes of time (Scher, 1991). It is inevitable; thus, it is beyond voluntary control. Extrinsic aging is caused by external factors such as smoking, excessive use of alcohol, poor nutrition and sun exposure. This process then is not inevitable and referred as pre mature skin aging. Such types of aging are successfully protected by use of functional cosmetics (Harry, 1963).

Signs of Intrinsic Aging (Laurence *et al.*, 1998)

- Fine wrinkles.
- Thin and transparent skin.
- Loss of underlying fat, leading to hollowed cheeks and eye sockets as well as noticeable loss of firmness on the hands and neck.
- Bones shrink away from the skin due to bone loss, which causes sagging skin.
- Dry skin that may itch.
- Inability to sweat sufficiently to cool the skin.
- Graying hair that eventually turns white.
- Hair loss.
- Unwanted hair.
- Nail plate thins, the half moons disappear and ridges develops.

Signs of Extrinsic aging (Larrabee, 1986)

- Wrinkles
- Toxicity.
- Uneven pigmentation.
- Brown spots and leathery appearance.
- Chronologically aged skin.

Other Skin Complications

- Eczema, also known as atopic dermatitis, is a skin disorder characterized by redness, swelling, itching and scaling (Foster and James, 1990).
- Acne is an inflammatory disease of the sebaceous glands and hair follicles of the skin that causes pimples or pustules, especially on the face (Hans, 1988).
- Freckles are a reversible melasma induced by the photoreaction of the skin to sunlight (Chiej, 1988).

Some Examples of Functional Cosmetic Plants

Plants are used since ancient times for their pharmaceutical and cosmetic values around the world. There is increasing demand of naturals or herbals in medicines as well as in cosmetics. Some examples of herbals given in Table 1 are potentially used as cosmetics and therapeutically when applied topically. But poor absorption of these phytopharmaceuticals through skin diminishes its value. The approaches can alter by means of some chemical interactions or derivatisations, to increase bioavailability of these molecules for utilization of herbals in cosmetics as well as in therapeutics.

Phytosome systems can be effectively used for herbal constituents as functional cosmetics

Table 1: Plants having functional cosmetic properties

Name of plant	Active constituents	Pharmaceutical use	Cosmetic use	Reference
<i>Areca catechu</i>	Catechin	Anti cancer	Antioxidant	Evans (2001)
<i>Crocus sativus</i>	Crocetin	Antiinflammatory	Protective	Eiji <i>et al.</i> (2006)
<i>Curcuma longa</i>	Curcumin	Hepatoprotective	Antibacterial	Chandra and Gupta (1972)
<i>Glycyrrhiza glabra</i>	Glycyrrhizin	Antiinflammatory	Skin whitener	Blanchi <i>et al.</i> (1989)
<i>Green tea</i>	Chammomile	Antiinflammatory	Photoprotective	Franco and Bombardelli (1988)
<i>Crataevea nurula</i>	Lupeol	Antiinflammatory	Antiaging	Geetha and Mahalaxmi (1999)
<i>Rosemarinus officinalis</i>	Rosemary	Antiinflammatory	Antiaging	Geetha and Mahalaxmi (1999)
Buckwheat seeds	Rutin	Antiinflammatory	Antiwrinkle	Bunney (1984)
<i>Embellica officinale</i>	Ascorbic acid, Tannins	Free radical scavenger	Protective	Buchman (1987)
<i>Ginkgo biloba</i>	Ginkgo	Antioxidant	Skin tonic	Loggia <i>et al.</i> (1996)
<i>Centella asiatica</i>	Centella	Antioxidant	Skin firming/conditioning	Dweck (1996)
<i>Psorolia corlifolia</i>	Psorolin	Leprosy and vitiligo	Skin staining and pigmenting agent	Ashawat <i>et al.</i> (2007a)
<i>Citrus lemonus</i>	Hesperitin	Antibacterial	Fungal infection of skin	Hutchens (1973)
<i>Aloe vera</i>	Aloin	In burn treatment and protective	Antidermatitis	Ashawat <i>et al.</i> (2007b)
<i>Aricaria recutita</i>	Chamomile	Anti-inflammatory	Antiphlogistic	Safayhi (1994)
<i>Thea viridis</i>	Gallic acid, catechin, rutin	Astringent	Anti-oxidant	Safayhi (1994)
<i>Vitis vinifera</i>	Carotene	Intestinal haemorrhage,	Eczema	Schauenberg and Paris (1990)
<i>Daucus carota</i>	β -Carotene	Cheratoplastic	UV protection	Merck (1991)
<i>Lycopersicon esculentum</i>	Tamotine and tamotidine	Potent bacteriostatic	Potent bacteriostatic	Merck (1991)
<i>Allium sativum</i>	Alliin and allicin	Anticancer and in Cardiac diseases	Antioxidant	Dewick (1999)
<i>Hamamelis virginiana</i>	Gallic acid	Haemostatic	Cooling agent	Swoboda and Meurer (1992)

Benefits of Phytosomes as Functional Cosmetics (Bombardelli *et al.*, 1994)

- Phytosome enhances the absorption of herbal constituent and hence increase the bioavailability, because the drug is in complex form with phospholipids.
- Dose requirement is reduced due to improved absorption of chief constituent.
- Entrapment efficiency is high and more ever predetermined because drug itself in conjugation with lipid is forming vesicle.
- No problem of drug entrapment.
- Shows better stability profile because chemical bonds are formed between phosphatidylcholine molecules and phytoconstituent.
- Phosphatidylcholine, used in the phytosome process, besides acting as a carrier also nourish the skin, because it is a essential part of cell membrane (Franco and Bombardelli, 1988).

Commercial Phytosome as Functional Cosmetics

- Ginkgo Biloba Terpenes Phytosome was shown to be effective on soothing individual contact reactions to other substances contained in topical formulations (Loggia *et al.*, 1996).
- The well known soothing activity of Silymarin has been shown to be increased by more than 6 times in Silymarin Phytosome in experimental models. The improvement in the activity of the Phytosome form, compared to the free active principles, is due to a higher affinity of the complex for skin phospholipids (Yanyu *et al.*, 2006).

- The hydration of the superficial corneous layer is related to the liposomal-like properties of the phospholipids of the complex. Ginsellect Phytosome possesses a transdermic action which can be ascribed to the ginseng saponins present in the phospholipidic complex (Kidd, 2007).

CONCLUSION

Phytosomal formulations can be used as functional cosmetics to protect the skin against exogenous or endogenous hazards in normal as well as stressed environmental conditions. Many new plant extracts with commercial significance will likely be identified in the future, to assess its functional cosmetic values.

The technology enables cost effective delivery of phytoconstituents and synergistic benefits as functional cosmetics.

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