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Research Article

A REVIEW OF CURRENT AND NOVEL TRENDS FOR ANTI-AGEING FORMULATION

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ABSTRACT

Recently, many developing countries have had changes in the composition of population and have become aging societies. Therefore, anti-aging medicine which is believed to have beneficial effect on the risk factors of geriatric associated diseases has been paid much attention. Anti-ageing continues to be a major trend in the personal care industry. Some of the reasons this trend continues to exist are due to the maturing baby-boomer generation and general negative feelings surrounding ageing. Over the past few years the market has been inundated with a variety of products delivering instant effects. This innovative reference highlights the uses of delivery systems in cosmetics, analyzing new approaches for obtaining sophisticated cosmetic products and examining the most common methods for enhancing the skin's penetration properties. More and more developments in delivery systems are being integrated to optimize the efficacy and cost effectiveness of the therapy. This review article is written to provide a coverage commentary of novel drug delivery system for Anti-aging. Novel drug delivery systems have been developed to improve. The present review article explores the overall study of different formulation which leads to Anti-aging.

Keywords: Anti-aging, liposomes, niosomes, micro-emulsion.

INTRODUCTION

Skin appearance is a primary indicator of age. With the advent of retirement age, there has been an increased interest in anti-aging preparation, or cosmeceuticls, and their purported ability to enhance a person's more youthful appearance (Sharma and Sharma, 2012). Anti-Aging Medicine belongs to a category of preventive medicine that aims to improve the quality of life (QOL) among older persons (Yonei, 2011). During the last decade, substantial progress has been made toward understanding underlying mechanisms of human skin aging. This understanding provides the basis for current use and new development of Anti-aging treatments (Joshi et al., 2013). The ideal anti-aging intervention should be applicable for both cosmetic maintenance of an age appropriate healthful appearance, stemming the development of degenerative diseases, optimizing the function of the aging brain and other tissues, and acting on biologic systems known to prolong lifespan. Although there is continuing debate about defining anti-aging, and whether there is indeed any true anti-aging intervention, there is more of a consensus about what factors contribute to biologic aging (Draelos, 2007; De Gray, 2003).

In aged skin, collapsed fibroblasts produce low levels of collagen and high levels of collagen-degrading enzymes. This imbalance advances the aging process in a self-perpetuating, never-ending deleterious cycle (Joshi et al., 2013).

Skin is a feature that may make all the difference in how old an individual looks. If skin is leathery or wrinkly, it can make you look a decade older than you really are. By the same token, smooth and supple skin can take years off your appearance right away. It is for this reason that it's important to look after your skin. For some, it'd be too late to take preventative measures, but anti-ageing skincare can work wonders in reversing the years (Sharma and Sharma, 2012).

SKIN

Skin is the outermost tissue of the body and the largest organ in terms of both weight and surface area. It has an area of approximately 16,

000 cm^2 for an adult and represents about 8% of the body weight. As seen in Fig 1.1, skin has a very complex structure that consists of many components. Cells, fibers and other components make up several different layers that give skin a multilayered structure. Veins, capillaries and nerves form vast networks inside this structure. In addition, hairs stick out from the inside of skin. Numerous fine hair furrows are scattered over the surface of skin. Skin performs a wide variety of functions resulting from chemical and physical reactions inside these components. The major function of skin is to act as a barrier to the exterior environment (Mithal and Saha, 2006).
Skin forms a remarkable protective barrier against the external environment (Costin and Hearing, 2007), helping to regulate the temperature and fluid balance, keeping out harmful microbes and chemicals and offering some protection against sunlight (Svobodova et al., 2006; Palm and O'Donoghue, 2007; Hussein, 2005). Due to external and internal causes, the collagen fibers and elastic fibers present in dermal tissue of the skin is modified or damaged which leads to wrinkles formation and sagging on the skin because the elasticity of the skin is reduced, it is one of the measure causes for the skin aging (Kuno and Matsumoto).
The human skin is composed of mainly three distinct layers are: a) Epidermis, b) Dermis, and c) Hypodermis.

Classification of the Skin:
The skin is classified into generally four types are

1. Normal skin
2. Dry skin
3. Oily skin, and
4. Mixed skin.

1. Normal skin
It is worth noting that there is no definition of normal skin, the latter being qualified in comparison with the other skin types: a normal skin is not a dry skin, not an oily skin, not a mixed skin, and no more a pathological skin Therefore, considering its structure and its functions, a normal skin should be a smooth skin, pleasant to touch, because of the cohesion of the cells of its more superficial layers; a firm and supple skin because of the existence of a dense supportive tissue and of the presence of numerous elastic fibers of good quality.

2. Dry skin
The term "dry skin" conceals several complementary or opposite points of view it remains completely different from the way it is approached. Therefore, for them it is first of all a feeling of drying along with loss of skin suppleness and elasticity, characterized by a rough appearance. This dysfunction actually depends on a qualitative and quantitative change of enzymes and or on an inadequate change of the pH of the skin (Wells et al., 1964).

3. Oily skin
Whereas dry skin reflects a functional change of different skin components, the oily skin results from an over activity of the sebaceous glands, leading to an overproduction of sebum overflowing on the skin, giving it a characteristic oily and shiny appearance (Waugh and Grant, 2004).

4. Mixed skin
It corresponds to a complex skin where the different types previously described coexist on different areas of body or face. The characteristic example is the face, where solid and oily skin with well-dilated pores on the medico-facial area can coexist with a fragile skin with fine grains on cheeks (Zoe et al., 2006).

COSMETICS
The cosmetics are defined as the articles intended to be rubbed, poured, sprinkled or sprayed on, introduced into, or otherwise applied to the human body or any parts thereof for cleansing, beautifying, promoting attractiveness or altering the appearance (Harry, 1962).

Anti-aging cosmetics
Anti-aging cosmetics is a branch of cosmetics which deal with the removal of aging and wrinkle effect on the human skin.
Anti-aging is emerging class of cosmetics which anti aging ingredients also helps to reduce the fine lines and increasing the moisture level of the skin. Main function of anti aging preparation is reduces wrinkles and puffiness.

Aging and types of aging
Skin aging is a complex biological process influenced by combination of endogenous or intrinsic (genetics, cellular metabolism, hormone and metabolic processes) and exogenous or extrinsic (chronic light exposure, pollution, ionizing radiation, chemicals, toxins) factors (Cevenini et al., 2008). These factors lead together to cumulative structural and physiological alterations and progressive changes in each skin layer as well as changes in skin appearance, especially, on the sun-exposed skin areas. In contrast to thin and atrophic, finely wrinkled and dry intrinsically aged skin, premature photo aged skin typically shows a

thickened epidermis, mottled discoloration, deep wrinkles, laxity, dullness and roughness. Gradual loss of skin elasticity leads to the phenomenon of sagging (Ruta et al., 2012) (Table 1 & table 2).

Types of Aging

1. Intrinsic (internal) aging
2. Extrinsic (external) aging (figure 1)

NOVEL TRENDS FOR ANTI-AGING

Several approaches have been developed to weaken this skin barrier. One of the approaches to achieve increased skin penetration of drugs and other cosmetic chemicals is through the use of vesicular systems, such as liposomes and niosomes. These carriers can act as drug reservoirs showing several advantages over conventional dosage forms. The major disadvantage of transdermal and dermal drug delivery is the poor penetration of most compounds across human skin. The main barrier of the skin is located within its uppermost layer, the stratum corneum (Carlotta et al., 2011).

Cosmetic pharmaceuticals, or cosmeceuticals, are cosmetic products that contain biologically active ingredients and claim to have medicinal or drug-like benefits. Like cosmetics, cosmeceuticals are topically applied, but they contain ingredients that influence the biological function of the skin (Singhal et al., 2011).

This innovative reference highlights the uses of delivery systems in cosmetics, analyzing new approaches for obtaining sophisticated cosmetic products and examining the most common methods for enhancing the skin's penetration properties. More and more developments in delivery systems are being integrated to optimize the efficacy and cost effectiveness of the therapy. In cosmetics, the main concern is to reach cutaneous cell while limiting the passage into the blood circulation.

Depending on the composition, a vehicle is used to exert mainly five types of effects on the skin cleansing, decoration, care, hydration and protection. Carrier technology offers an intelligent approach for drug delivery by coupling the drug to a carrier particle such as nanoparticles, microspheres, liposomes, etc. which modulate the release and absorption characteristics of the drug. Almost all the major cosmetic manufacturers use novel delivery systems in their products.

The application of novel delivery systems in cosmetic products has been the subject of continuous discussion in the media, scientific circles and among policy makers for the past few years. There are a number of classes of novel delivery technologies used, or proposed for use, in cosmetic applications. Further, the products launched by various cosmetic giants will be discussed at length (Nageen et al., 2012).

Advances in Cosmetic Formulation Technology

There are number of innovative cosmetic delivery systems used in cosmetic products. A cosmetic delivery system is a composition or a process that can enhance perceptual or measured performance of cosmetic product (Mufti et al., 2002). A pointed discussion of a select group of delivery systems (Table 3) of current interest shall be presented in this article.

LIPOSOMES

Liposomes are the most widely known cosmetic delivery systems. These are artificial spherical submicroscopic vesicles with diameter between 25 and 5000 nm. Vesicles are composed inevitably of amphiphilic molecules. Liposomes that have vesicles in the range of nanometres are also called nanoliposomes (Redziniak and Perrier, 1996; Nacht, 1995).

Liposomes are used in a variety of skin care rejuvenation products because of their ability to encapsulate active anti-ageing ingredients and deliver them deep into the cells. Liposome acts as an efficient delivery system. When a gel or cream with liposomes is applied to the skin it is quickly absorbed and penetrates into the deep layers of the skin merging with the cell membranes and deposits the active ingredients into the cell membranes (Sharma and Sharma, 2012).

The effects of liposomes benefit the skin in several ways, one of which is delaying the beginning signs of ageing. In addition to delaying the appearance of wrinkles and skin ageing, liposomes provide other unique qualities and benefits to the skin. A special characteristic of liposomes is the ability to adapt to water soluble and non-water soluble ingredients within a product such as a cosmetic cream or gel without the use of a surfactant or an emulsifier.

The first liposomal cosmetic product to appear on the market was the anti-ageing cream 'Capture' launched by Dior in 1986. One of the reasons for the widespread use of liposomes in the cosmetic industry is their ease of preparation and the ability to improve the absorption of active ingredients by skin. Liposomes are generally utilised in aqueous systems. Recently, water-sensitive 20 to 30 micron-size microspheres of polymer structure have been developed for the delivery of fragrances, botanicals, and vitamins from

anhydrous formulations, such as lipsticks, deodorants, antiperspirants and body sprays. Liposomes are unstable due to their susceptibility to oxidation and the breakdown of liposomal structure; it is overcome by optimising the storage conditions and adding chelators and anti-oxidants (Lasic, 1998).

Dior launched the first liposome containing antiageing cream "Capture" which combats cell ageing and helps reducing the signs of ageing. Marinosomes® are liposomes based on a natural marine lipid extract containing a high polyunsaturated fatty acid ratio. The characterisation studies showed Marinosomes® as promising candidates for topical application in view of the prevention and treatment of skin diseases (Moussaoui et al., 2002).

NIOSOMES

Due to some drawbacks like high cost, variable purity of natural phospholipids and unstable nature, surfactant based vesicles 'niosomes' were proposed (Muller, 2002). Niosomes are non-ionic surfactant vesicles having a bilayer structure formed by selfassembly of hydrated surfactant monomers (Vyas and Khar, 2011). Niosomes are formed by non-ionic surfactants that in aqueous media assume closed bilayer structures (Uchegbu and Vyas, 1998). In comparison to phospholipid vesicles (liposomes), niosomes offer higher chemical stability, lower costs, and great availability of surfactants with different structures (Santucci et al., 1996; Di Marzio et al., 2011; Masotti et al., 2010).

These vesicular delivery systems attracted considerable attention in topical/transdermal drug delivery for many reasons: niosomes can act as enhancers for the penetration through the skin of guest molecules, are biodegradable, effective in the modulation of drug release properties, and in most cases non-toxic. Their effectiveness is strongly dependent on their physicochemical properties, such as composition, size, charge and lamellarity (Maibach and Choi, 2005). Niosomes, as liposomes, can carry hydrophilic and/or hydrophobic drugs. In 1975 the first cosmetic product containing non-ionic surfactant vesicles, called 'Niosomes', was brought into the market (L'Oréal, 1975; L'Oréal, 1989). Later the product had also a successor, the 'Niosome Plus' antiageing cream, which reached the market in the early nineties. Usually, vesicles are applied to the skin in solution or in gels, since stable niosomal creams are difficult to formulate and gel formulations do not seem to prevent efficient transport of niosomes into the skin (Carafa et al., 2004).

The advantages of using niosomes in cosmetic and skin care applications include their ability to increase the stability of entrapped drugs, improved bioavailability of poorly absorbed ingredients and enhanced skin penetration (Van Hal et al., 1996). Example of antiageing cream containing niosome is Niosome Day time skin treatment by Lancôme (Buckton and Harwood, 1995).

MICROEMULSION

A microemulsion is a system of water, oil and amphiphilic compounds (surfactant and cosurfactant) which is a transparent, single optically isotropic and thermodynamically stable liquid. The droplets in a microemulsion are in the range of 0.1-1.0μm (Lawrence and Rees, 2000). Microemulsion is homogenous, thermodynamically stable dispersion of water and oil stabilized by relatively large amounts of surfactant(s) frequently in combination with cosurfactant(s) (Shrma et al., 2012).

A micro-emulsion formula is a complex and clinically proven time lapse system that penetrates skin quickly and thoroughly. The best wrinkle treatments utilize technologically advanced ingredients that deliver an array of powerful, anti-ageing and skin-repairing agents to the cells of the skin. Even hours after you have applied them, the best wrinkle creams are still working hard at keeping your skin hydrated, wrinkle-free and void of scaly patches and other signs of ageing. And unlike the costly and only mildly effective wrinkle treatments of the past, the best wrinkle creams of today work wonders on your skin, typically showing signs of noticeable improvement in just the first few weeks of daily usage.

Skinlastin™ is a micro-emulsion formula with a time lapse system so it penetrates skin quickly and thoroughly. Its technologically advanced ingredients deliver a host of powerful anti-ageing repairing agents to the cells of the skin to help you look more youthful and radiant.

NANOEMULSION

Nanoemulsions consist of very fine oil-in-water dispersions, having droplet diameter smaller than 100 nm. Compared with microemulsions, they are in a metastable state and are very fragile systems by nature. The nanoemulsions are easily valued in skin care because of their good sensorial properties (rapid penetration, merging textures) and their biophysical properties (especially, hydrating power). In general, the o/w nanosized emulsion should be formulated with compatible vehicles and additives (Barnett and Scher, 1992).

Procter and Gamble's Olay™ brand was designed with nanoemulsion technology in 2005 (Sonneville-Aubrun et al., 2004). Marie Louise Vital Nanoemulsion α-VC & Crème α-VC-use nanotechnology to deliver a powerful proprietary blend of anti-ageing & skin brightening ingredients to address your anti-ageing concerns.

MICROPARTICULATE SYSTEMS

Nanoparticulate systems include nanospheres and nanocapsules and can be defined as submicron colloidal systems having a mean particle diameter of 0.003-1μm. Such nanosized particles which have a shell and an interior space that can be used to load drugs are called nanocapsules (Guterres, 2007). Nanocapsules differ from nanospheres in that the former is a reservoir type of system, whereas the latter is a matrix system. The active ingredient in nanocapsules and nanospheres can be incorporated in different patterns; dissolved in the nanosphere matrix, adsorbed at the nanosphere surface, dissolved in the liquid-phase nanocapsules, adsorbed at the nanocapsules surface (Nageen et al., 20012). In general, microparticles are used in cosmetics to avoid incompatibility of substance, reduce odour of actives and for protection of substances prone to oxidation or action by atmospheric moisture (Parison, 1996).

Cosmetics companies that market skin care products containing nanospheres claim that their products are more effective because they penetrate the outer layer of skin to deliver their beneficial effects to affected skin areas more efficiently and precisely than products that do not contain nanospheres, according to the Beauty Brains website. Nanospheres could provide more effective delivery of salicylic acid and benzoyl peroxide, both common ingredients in acne treatments (Nageen et al., 2012).

Example of antiageing formulation containing microparticles is Pond's Gold Radiance Night Cream. Pond's Gold Radiance with real gold microparticles is a powerfully concentrated formula that blends into the skin to instantly restore a youthful radiance and fade visible signs of ageing.

MICROSPHERES

Microspheres, typically defined as spherical microparticles between 1 micron and 1000 microns (1 mm) in diameter, have been widely used in personal care and the cosmetics industry over the past decade. In skin care lotions and creams, microspheres can help deliver a soft and smooth feel, excellent lubricity and soft focus effects that reduce the appearance of fine lines and wrinkles. Microspheres have numerous advantages in the personal care and cosmetics industry. Due to their unique geometry and the smallest surface area to volume ratio of any shape, microspheres offer beneficial properties such as ball bearing effect for superior texture, light scattering or "optical blurring" for minimising lines and wrinkles, gentle but effective exfoliation, as well as the ability to house colorants and active ingredients. The use of microspheres in the personal care and cosmetics industry is growing as microspheres are getting incorporated into an increasing number of anti ageing creams (Sharma and Sharma, 2012).

CR1 Moisturiser is an example of microsphere containing anti-ageing formulation. It is a deeply hydrating cream with anti-ageing collagen tripeptide microspheres which adheres to the skin upon application stimulating collagen synthesis thus reducing signs of wrinkles.

CONCLUSION

Today's in our society every person wants to enhance their health and beauty. This report we have studied the Anti-aging preparation which enhance persons appearance. Thus anti-ageing formulations are becoming increasingly popular. There are a number of companies utilizing the novel approaches for the preparation of anti-ageing products in the market which due to their unique property of beneficial delivery to the skin renders extended efficacy. Thus, now days the novel approaches for drug delivery system has been given a great opportunity with a main focus on anti-aging cosmetics.

Table 1: Factors and Effects of Aging (Joshi et al., 2013)

S.N.	Causes	Non-Visible Effects	Visible Effect
1.	**Internal:** Genetics Breakdown of cellular structures and processes Reduced bone Density Hormonal changes Other	Reduction of collagen Reduction of elastin Reduction of hyaluronic acid Fat loss and redistribution Dermal thinning Bone resorption	Wrinkles & folds Fine lines Drooping eyelids Hollowed cheeks Jowls Dry skin
2.	**External:** Photoaging Smoking Facial expression Sleep position Gravity	Epidermal thickening Dermal thinning	Wrinkles & folds Rough skin Blemishes and pigmentation Freckles

Table 2: Effect of aging on increasing age (Joshi et al., 2013)

S.N.	Age	Aging Problem	Visible Effects
1.	25 – 40	Some sun damage Some collagen loss Some fat loss Some Water loss/suppleness Stress	Frown lines begin to appear in upper face Fine lines, wrinkles, and folds begin to appear in mid face
2.	40 – 55	More sun damage More collagen loss More fat loss More water loss/suppleness Stress	More defined frown lines in upper face More defined fine lines, wrinkles, and folds in mid face Some lip thinning Hollowing of eyes and cheeks Jowls
3.	55 +	Extensive sun damage Extensive collagen loss Extensive fat loss/suppleness Stress	Deep frown lines in upper face Extensive fine lines, wrinkles, and folds in mid face More prominent lip thinning

Table 3: Novel cosmetic Delivery systems (Nageen et al., 2012)

S.No.	Systems	Novel Approaches
1.	Vesicular Delivery systems	Liposomes, Niosomes, Silicone vesicles and matrices, Multi-walled Delivery systems
2.	Particulate Systems	Microparticulates, Porous polymeric systems, Nanoparticulates
3.	Emulsion Delivery Systems	Microemulsions, Liquid crystals, Multiple emulsions, Nanoemulsions, Pickering emulsions
4.	Other Delivery systems	Cyclodextrin complexes, Carbosomes, Dendrimers and hyperbranched polymers, Nano Crystals
5.	Delivery Devices	Iontophoresis, Cosmetic patches

Table 4: Novel Market Preparations for Anti-aging Cosmetic

S.N.	Novel Trends Cosmetic	Active ingredients	Available Market preparation	Application	Ref.
1.	Liposome	Ascorbyl palmitate, Tocopherol, retinol. Coenzyme Q10, Niacinamide	Rovisome ACE Plus Ageless Facelift cream	Anti-ageing, wrinkle reduction Anti-ageing, anti-oxidative, wrinkle reductio	(Sharma and Sharma, 2012)
2.	Niosome	methotrexate	methotrexate gel	Treatment of Psoriasis NSAIDS, ↑ anti-inflammatory action	Lakshmi and Devi (2007)
3.	Micro-emulsion	VitaminC (5%)	Ultimate Anti-Ageing Cream	Anti-ageing, wrinkle reduction	(Sharma and Sharma, 2012)
4.	Nano-emulsion	CoenzymeQ10, Vitamin E acetate. Vitamins A,E,C	Nano-Lipobelle H-EQ10 cream Nano-Lipobelle H-AECL	Anti-ageing, anti – inflammatory. Anti-wrinkle, antiageing.	(Sharma and Sharma, 2012)

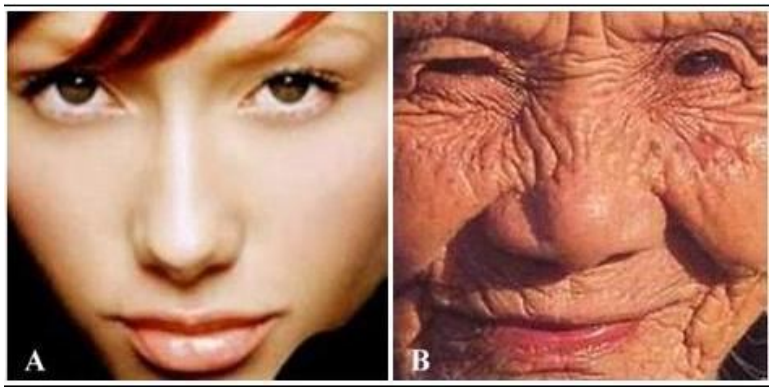

Fig. 1: (A) Normal skin, (B) Aging effect on skin

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