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Full Length Research Paper

Cosmeceutical value of herbal extracts as natural ingredients and novel technologies in anti-aging

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Last few decades have witnessed a great demand for herbal cosmeceutical products, because these herbal and natural cosmeceutical products are safe to use and do not have any side effects. With man relearning the benefits of natural products, cosmeceutical products are increasingly being used by leading herbal manufacturers right from body lotions to face packs, from skin cleansers to fairness creams. There has been a metamorphosis in the cosmeceutical industry with natural products being more in demand than their synthetic counterparts; this has been possible because of the shift in consumer preference from synthetic cosmetics to natural ones. This review gives an overview from cosmeceutical value of natural ingredients and novel technologies in anti-aging.

Key words: Cosmeceutical products, side effects, natural products, synthetic cosmetics.

INTRODUCTION

Cosmetics are commercially available products that are used to improve the appearance of the skin (Mary and Lupo, 2001). Even though the cosmetic field is closely related to the pharmaceutical or food industry, the expectations of cosmetic product consumers and their needs are completely different. They are more sophisticated and are looking for safe cosmetic products that actually do something beneficial to their skin. This is in contrast to the cosmetic legislation which says that only pharmaceutical products are allowed to really act on the body and skin on a systemic way. So the big challenge for the cosmetic industry is to combine these two contradictory needs and to fulfill both requirements. They have to provide functional and safe products (Kostarelos and Rheins, 2002). The skin is the largest organ; as our primary external barrier, it is on the forefront of the battle with external causes of damaging free radicals. Ultraviolet light and environmental pollutants are known initiators of free radicals. Free radicals are highly reactive molecules with an unpaired electron that result in damage to surrounding molecules and tissues. The most significant damage by free radicals is to biomembranes and to DNA. It is thought that additional, topical use of vitamins (A, B, C, E, K) and antioxidants in cosmetics can better protect and possibly correct the damage by neutralizing these free radicals. In addition, some vitamins may be beneficial to the skin because of other actions such as effects of suppression of pigmentation and bruising, stimulation of collagen production, refinement of keratinization, or anti-inflammatory effects. Plants and plant derived ingredients are common and of major importance in the fields of pharmacy, food and cosmetics. (Mary and Lupo, 2001).

Advances in medicine, better nutrition, and improved standards of living have been driving life expectancy and mean age increases for years. These increases are projected to continue at least for the next few years. The expectations of living longer and of having years of healthy, active living ahead have contributed to significant shifts in attitudes about health, beauty, and aging in the last decade. One group significantly influencing attitudes regarding health, beauty, and aging are the LOHAS consumers. LOHAS is an acronym for Lifestyle of Health and Sustainability (Kirillov, 2008).Some pharmaceutical companies have begun to develop cosmetic improvement lines. In this process, the once obvious division line between cosmetics and drugs has increasingly become unclear. More recently, a plethora of nutritional supplement and food manufacturers have joined the skin

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improvement bandwagon. Product descriptors trying to capture the myriad of hybrid possibilities like cosmeceuticals, nutricosmetics, and nutraceuticals have become part of the complex category lexicon and offering (Farage et al., 2010).

Cosmeceuticals is the best established in most markets, represented by success stories like StriVectin S-D1 wrinkle reducer (originally a pharmaceutical product to combat stretch marks) and the myriad of ‘‘Doctor’’ or ‘‘Professional’’ skin care brands – like Murad1, Perricone MD Cosmeceuticals1, and DDF1. According to a May 2008 online article from Cosmetics Design, citing Kline and Company research, professional skin care is a US$5.9 billion global business and its growth is outpacing the general market both in the US and Europe. The report describes the segment as an ‘‘explosive opportunity’’ with strong potential in both developed and developing markets (Montague-Jones, 2009). Nutraceuticals, like foods and drinks including omega-3s and probiotics (live bacteria that offer health benefits), long prevalent in Japan, are increasing in acceptance and popularity (Malik et al., 2008).

One significant development in anti-aging skin care is the emergence of advanced biological treatments beyond the growing use of youth-promoting nanotechnologies, growth factors, and hormone replacement therapies. While many of these advances – like the use of stem cells to regenerate damaged skin, DNA-customized formulas, mitochondria and enzyme boosting treatments, neural rejuvenation, and plasma therapies–are still in their infancy and are highly controversial, they are expected to eventually change the way the fight against aging is approached. With advances in longevity science and the use of genomics becoming mainstream among the big beauty companies, it is a matter of time before antiaging products begin to address aging at the most basic biological levels. Diagnostic tools are also becoming more sophisticated and portable, allowing researchers to customize products and treatments to an individual’s skin and even genotype. In response, consumer expectations are increasing, and they are beginning to look for effective, customized treatments and solutions with minimal or no trade-offs in timeliness, affordability, and ease of use. These advances are further accelerating the blurring between cosmetics and pharmaceuticals, and some of them challenge the conceptions of what is going ‘‘too far’’ in the quest for beauty and agelessness. Advances in ingredient technologies, new approaches, devices, and skin understanding are creating many opportunities for new products and segments that are more profitable. The breadth and depth of these advances can be intimidating. The key is to understand which are most promising and which can be best synergized with one’s existing capabilities to deliver better results and breakthrough news in this category where promises abound (Farage et al., 2010).

LITERATURE REVIEW

Plant extracts and the use of plant parts such as leaves, fruits, flowers, stems, barks, buds and roots are known in cosmetic and pharmaceutical applications since ancient times. They are wide spread and where used for purposes such as moisturizing, whitening, tanning, colour cosmetics, sunscreen, radical-scavenging, antioxidant, immunostimulant, washings, preservatives, thickeners etc.

Along with the growth in the use of advance scientific and pharmaceutical ingredients in skin care, there is an opposing trend that rejects synthetic chemicals in beauty products. This trend is reflected in the steady growth of natural/organic personal care products, which often avoid ingredients like parabens and other synthetic preservatives, phthalates (solvents often used in fragrances), silicones, petrochemical derivatives (like mineral oil), sulfates (like sodium laury/laureth sulfate), and chemical sunscreens (Goliath, 2009).

Many cosmetic products have claimed biological functions such as antiwrinkle, anti-aging, anti-acne, depigmentation, etc. To take real effect on the skin, the biologically active ingredients should be absorbed in to the skin. For that reason, topical delivery of active ingredients has gained considerable interest in cosmetic science (Zatz, 2000; Wiechers, 2000).

Skin care industry has evolved and innovated beyond the scope of most current regulatory systems. Hybrid products that challenge the boundaries between cosmetics, pharmaceuticals, and nutritional supplements and the growing number of claims for natural/ organic products demand further regulation. Globalization and the internet create the need for common standards across regions. Global brands can significantly benefit from cohesive standards that can enable product development and marketing, and the internet makes products available globally-crossing regulatory lines-almost instantly (Nagochi and Nikki, 2000).

Anti-aging is among the most dynamic of all cosmetics and toiletries categories when it comes to pace and breadth of innovation. Consumer demand for new and better ways to reverse, delay, and prevent signs of skin aging is high and increasing. This, coupled with significant scientific advances and relentless competitive pressures, ensures that there is never a lull in the category’s innovation pipeline. Not all innovation spaces are equal, though. Some meaningfully shift consumers’ expectations at large, while others result in specialized niches with fewer but highly committed followers (Montague-Jones, 2009). Stratum corneum of the skin forms an excellent barrier to external application and it is necessary to employ some penetration enhancers or appropriate vehicles to increase the skin permeation of the active ingredients. The use of phospholipids to increase skin permeation has been studied widely. Phospholipids are used in solubilized form as penetration

enhancers (Yokomizo and Sagitani, 1996; Raghavan, 2007). The major advantage of phospholipids is a lower level of the tendency toward the inducement of skin irritation, compared with that of typical penetration enhancers (Sasaki et al., 1990; Ghosh et al., 1997).

Today, the basic development of cosmecutical product is not just for cleanse, protect and moisturize, but to incorporate the antioxidants in skin care products. Consumers are increasingly looking to maintain youth and vitality. The concept of free radical damage has highlighted the importance of antioxidants and nutritional supplementation in maintaining health; cosmetics and topical creams are a vital component of this movement.

There are considerable data to suggest the benefits of such ingredients in cosmetics. Free radicals are highly reactive molecules or chemical species containing unpaired electrons that cause oxidative stress, which is defined as “an imbalance between oxidants and antioxidants in favor of the oxidants, potentially leading to damage” (Sies, 1997). Oxidative stress can damage lipids, proteins, enzymes, carbohydrates and DNA in cells and tissues, resulting in membrane damage, fragmentation or random cross linking of molecules like DNA, enzymes and structural proteins and even lead to cell death induced by DNA fragmentation and lipid peroxidation (Beckman and Ames, 1998). These consequences of oxidative stress construct the molecular basis in the development of cancer, neurodegenerative disorders, cardiovascular diseases, diabetes and autoimmune disorders.

Market survey

Skin care is truly a global business, with the biggest regions, according to Euromonitor data, being Asia Pacific (40%) and Western Europe (29%). North America is about 14% of the total market (Kirillov, 2008). While developed Asian markets are the largest for skin care as a whole (Japan and South Korea rank No.1 and No.3 in skin care sales globally), anti-aging significantly lags behind in importance as compared whitening products. In Japan, for example, antiaging only accounts for about 10% of sales, while it exceeds 30% in the US and the UK, according to Euromonitor International . Other large developed markets where anti-aging is of great importance are France, Australia, Italy, Germany and Spain (Kirillov, 2008).

METHODOLOGY

Most cosmetic products and their applications are defined by active ingredients. These active ingredients may derive from either synthetic sources or from plant sources. Beside this, no other origin like human or animal are accepted or allowed in cosmetics nor are genetically modified plant sources. The whole cosmetic research and development society is therefore desperately seeking for new innovative plant ingredients for cosmetic application (Sisti et al., 2008). Pharmaceutical products and active substances are often produced by biotechnological processes starting with the cultivation of bacteria, yeast, plant or mammalian cells in large scale bioreactors with a capacity of up to 75,000 (examlpe, Taxol produced by Phyton Biotech, USA) and going on with the isolation, clarification and concentration of the active substances in a very complex down-streaming procedure.

Although, it is very widespread in the pharmaceutical industry, biotechnology as well as plant cell culture technology is not yet common in cosmetic field. Most established are ingredients synthesized by or extracted from microorganisms like bacteria, yeast or algae. Such substances include polysaccharides, pigments, amino acids, peptides or proteins. Only a few *in vitro* processes, based on plant cell cultures, are already established in the cosmetic industry. Examples for such commercially available products are Shikonine as cosmetic pigment (Fujita and Tabata, 1986; Payne et al., 1991) (produced from Lithospermum erythrorhizon by Mitsui Petrochemical Industries, Japan), Arbutin as whitening ingredient (Misawa, 1994; Yokoyama and Yanaigi, 1991) (produced from Catharanthus roseus by Mitsui Petrochemical Industries, Japan) or Carthamin as cosmetic pigment (Yamamoto et al., 2002; Haghbeen, 2006; Ekiert, 2004; Oda, 2005) (produced from Carthamus tinctorius by Kibun, Japan).

Nevertheless, the use of plant cell culture or their metabolite derived cosmetic active ingredients is very rare and in its infant stage. Beside the production of active ingredients, biotechnology becomes more and more important in other cosmetic research areas too, like tissue engineering and molecular approaches for product safety and claim testing (Kostarelos and Rheins, 2002). The bridge between biotechnology and cosmetic has already been built and brings new possibilities into cosmetic research including the possibility of genetically individualized cosmetic products based on the science of human genome (Kostarelos and Rheins, 2002).

The use of and search for drugs and dietary supplements derived from plants have accelerated in recent years. Ethnopharmacologists, botanists, microbiologists, and natural-products chemists are combing the Earth for phytochemicals and “leads” which could be developed for treatment of infectious diseases. While 25 to 50% of current pharmaceuticals are derived from plants, none are used as antimicrobials. Traditional healers have long used plants to prevent or cure infectious conditions; Western medicine is trying to duplicate their successes. Plants are rich in a wide variety of secondary metabolites, such as tannins, terpenoids, alkaloids, and flavonoids, which have been found *in vitro* to have antimicrobial properties. Since many of these compounds are currently available as unregulated botanical preparations and their use by the public is increasing rapidly, clinicians need to consider the consequences of patients self-medicating with these preparations (Stockwell, 2007).

RESULTS AND DISCUSSION

Many cosmetics contain synthetic chemicals that react adversely to skin. The demand for natural and organic products are increasing. For this reason we can find lots of natural and organic products in the markets. Synthetic ingredients in cosmetics effected skin even faster. Some synthetic ingredients are so commonly used, that consumer would not think twice about using them; whether they are harzadous or not.

There are some common dangerous chemicals that are usually found in cosmetics, such as bentonite, parabens, propylene and ethylene glycol. Some anti-wrinkle and hydrating products contain bentonite and kaolin are types of clay that attract water, therefore absorb water to swell

the skin cell on the surface layer. It also controls body temperature through water retention and sweating.

Parabens is the most common ingredients that can find in any kind of cosmetic; it is used as cosmetic preservative. Using parabens not only harm our skin, but our environment as well. Many consumers prefer products with parabens-free, because parabens are highly toxic and can cause allergic reactions and skin rashes to sensitive skin.

Therefore, manufacturers are striving to develop natural products containing all natural ingredients. Plant materials may prove a viable alternative to synthetic preservatives, as they are a significant source of active constituents with a high level of antimicrobial activity. Consumers consider these materials less toxic and more beneficial to the body than synthetics, and their use is consistent with the all-natural concept fueling the personal care and cosmeceutical industries. New plant derived ingredients are limited because several plants of cosmetic interest are not to be used due to following facts: the plants contain toxic metabolites, the plants grow too slow and a seasonal harvesting is not possible, the concentration of plant constituents differ from harvest to harvest or the plant is endangered and not allowed to harvest.

Conclusion

Most innovations in anti-aging skin care are new ingredients, often touted as the next "fountain of youth". While no one has discovered how to stop or reverse aging yet, there are some ingredients that have truly transformed what is possible in anti-aging skin care. Some of the most effective ingredients (like retinoids, peptides, and antioxidants) have become leading skin aging fighters in the industry. Hydroxy acids, vitamins (like B, C, and E), hyaluronic acid, coenzyme Q10, alpha-lipoic acid, and green tea are also among the industry's staples. However, in this ever-changing landscape, there are always new additions. Some recent ones include growth factors, sirtuins, resveratrol, hydroquinone, argireline, and dimethylaminoethanol (DMAE).

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