Reflections on cosmetics, cosmeceuticals, and nutraceuticals

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Introduction

There is a time when people feel the need to take a new path in life, try new activities, exploit growth opportunities, and face new challenges to ameliorate their way of living. Personal appearance is becoming more and more individualized, and people desire living and staying young longer. The result is an increasing number of women and men wanting to stay attractive and fit, both mentally and physically. This trend applies not only to the younger generation but also to all age groups.

Younger people do not want to age, and older people want to appear younger; however, the older generation plays an increasingly important role in all of the industrialized countries, especially in Japan and Italy, where the average age of the population has increased (Table 1).

Lookin’ good

Nobody wants to look old. Facial appearance is one of the most powerful factors influencing social interactions in many situations. Those who are young and attractive gain advantages, and those who are unattractive may have to work harder to gain the same advantages. What is beautiful is good.

Thus, everybody assumes that attractive people have better personalities and favorable attributes, so they receive better treatment. The unattractive invite negative feedback reactions that sustain them in their negative outlooks and actions. Intelligent cosmetics (cosmeceuticals) have to decrease the appearance of aging, ameliorating and decreasing the number and depth of wrinkles. Functional foods (nutraceuticals) are to be formulated with ingredients capable of increasing the human expectancy of well-being and giving eternal youth. Skin is, in fact, the mirror of our mental state of mind.

The growing health and beauty consciousness constitutes a challenge for both dermatologists and manufacturers of cosmetic products, dietary supplements, functional food, and medical devices (dermal fillers). Therefore, changes in consumer demographics and advances in technology are the main stimulus for cosmeceutical and nutraceutical development.

New concepts

Cosmeceuticals and nutraceuticals are a constant area of interest and controversy. They are the magic dream every consumer hopes to realize, and they are the continuing intellectual challenge for dermatologists and cosmetic chemists.

To achieve this purpose, there are many lines of research to obtain the eternal life and many new active compounds studied to provide cosmetics and diet supplements as anti-aging agents. Dermatologists and biologists increase their knowledge of the skin’s role, and cosmetic chemists try to use new active compounds and delivery systems capable of penetrating into the deeper skin layers.
The efficacy of a cosmetic product depends not only on the active ingredients but also on the delivery system to improve its efficacy. We have to remember that skin is more than an assembly of several layers of cells as corneocytes, keratinocytes, fibroblasts, and so forth, and that mental well-being and physical relaxation go hand in hand, complementing each other. Many emotions are first seen or felt at the skin level. Even surprise, consternation, or anger translates into interactions that affect the skin by expression wrinkles. To counteract these wrinkles, there are muscle-relaxing agents, such as botulinum neurotoxin (Botox; Allergan Pharmaceuticals Ireland, Irvine, Calif) or acetyl hexapeptide (ArgiNew; Pharama Cosm Polli, Milano, Italy) that have shown the interesting activity that alpha-lipoic acid seems to have for repairing the condition of aging skin. Freeze-dried elastin concentrate seems to provide relief from stretch marks. A special cocktail of vitamin C, beta-glucan, and hyaluronic acid seems to be active when topically applied on wrinkles and stretch marks (HCG 1000; Mavi Sud, Rome, Italy).

In addition to the anatomic links (embryology), there are other functional links between brain and skin. Vasodilatation, sebaceous excretion, sweating, and piloerection are regulated by different cerebral neuromediators. Among these mediators, peptides seem to play a particularly important role, such as the substances enkephalin and endorphin. During the last few years, several research groups have confirmed the presence of a fully functional beta-endorphin/mu- opioid receptor system in different cutaneous cell types. This system has been shown to modulate the migration of keratinocytes and to be involved in wound healing. It can also regulate the melanogenesis, dendrivity, and proliferation of melanocytes. Within the endorphin sequence, the 5-amino acid peptide enkephalin was found and shown to be a powerful, endogenous, analgesic peptide in the brain, blocking pain signals. The close relationship between brain and skin outlined the identification of enkephalins’ insole proximity to cutaneous nerve cells.

**Investigative studies**

The fact that keratinocytes are capable of synthesizing met-enkephalin precursors, such as pro-opiomelanocortin, led scientists to investigate the topical use of a Tyr-Arg peptide and its chemical derivative N-acetyl-Tyr-Arg-hexadecylester, which ensures sufficient skin penetration and bioavailability. Thus when topically applied in a hexadecylester, which ensures sufficient skin penetration peptide and its chemical derivative N-acetyl-Tyr-Arg-led scientists to investigate the topical use of a Tyr-Arg met-enkephalin precursors, such as pro-opiomelanocortin, outlined the identification of enkephalins endogenous, analgesic peptide in the brain, blocking pain within the endorphin sequence, the 5-amino acid peptide seems to be active when topically applied on wrinkles and stretch marks (HCG 1000; Mavi Sud, Rome, Italy).

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Antimicrobial peptides are other interesting small molecules with broad-spectrum activity against bacteria, virus, and fungi. Cathelicidins and defensins are major groups of these epidermal peptides that have been shown to be important in such diverse functions as angiogenesis, wound healing, and chemotaxis. As an important part of the innate immune system, they influence both the immediate defense response and the slower adaptive and repair processes.

Moreover, antimicrobial peptides have a proven ability to avoid antimicrobial resistance. Recent advanced studies in antimicrobial peptide research also point to the role these peptides play in host responses, such as tissue repair and inflammation. Thus, drugs, cosmeceuticals/nutraceuticals, and medical devices incorporating these principles could provide a novel and safe approach to common skin disorders, such as atopic dermatitis, rosacea, acne, and psoriasis.

Another category of interesting natural compounds is carbohydrates. Carbohydrates play an important role in biological recognition phenomena because the tetrasaccharide sialyl compound interacts with selectins and some adhesion molecules. Because monosaccharides (eg, glucose or mannose) have these particular properties, they have been used in the formulation of peptidomimetic drugs. In the cosmetic field, the amazing properties of the saccharide sugar can make it an ideal ingredient in modern personal care products.

Sugars are multifunctional ingredients capable of helping formulators to create effective (humectant and healing), natural (renewal and biodegradable), and preservative-free formulas. Moreover, sugar-structured surfactant technology has led the way to use this natural material in cosmetic and personal care.

The real efficacy of a new or old active compounds is not sufficient to obtain a truly effective cosmetic product. A product depends not only on the active principles used but also on the penetrability throughout the stratum corneum, which strictly depends on the vehicle used. Thus, micro-dispersed or nanodispersed systems represent a milder way to enhance penetration and increase the performance of the cosmetic products. Liposomes, cubosomes, ethosomes, and lipid nanoparticles are surely the most innovative structures facilitating delivery of the incorporated active agents into the skin lipid bilayers. We cannot forget the increased and sometimes synergized activity checked on by the same active compound applied topically and taken orally.
Additional research

We are living in the era of cosmeceuticals and nutraceuticals!

According to recent studies, the OH-carotenoid lutein seems to provide an antioxidant property for both the skin and the macula lutea of the eye. Moreover, lutein applied on the skin as a cosmetic and taken orally as a diet supplement has moisturizing activity and sensibly reduces the free radical damage caused by ultraviolet rays. Topically applied and orally ingested lutein may provide a new approach to reduce premature aging of the skin and mucous membranes.

The goal of dermatologists and cosmetic chemists is to create new technologies and intelligent products. Discovering innovative cosmetics and diet supplements is the key to sustainable growth in the area of well-being. Innovation has the potential to contribute to new products and services capable of improving the quality of life.

Thus, for the constantly evolving nature of its innovative products, Mavi Sud was selected last year as the most innovative Italian Small Medium Enterprise in Europe, obtaining the Best Innovator award for its patented production and use of chitin nanofibrils.

Conclusions

Cosmeceuticals and nutraceuticals were made possible by the increased understanding of skin physiology and food necessities. The more we understand the structure and function of the skin and body, the more we can devise cosmetics and diet supplements, to modify key pathways. Aging skin cells can be reprogrammed in their function to obtain, for example, greater collagen production to reverse wrinkles, to normalize pigment transfer to slow down the appearance of black spots, and to ameliorate the inter-cell communication to maintain timely keratinocyte exfoliation.

The keystone for the connection between nutraceuticals and cosmeceuticals is the link among all skin care professionals, physiologists, biologists, dermatologists, plastic surgeons, cosmetic chemists, beauticians, dieticians, and innovative enterprises worldwide.

Bibliography

7. Morganti P. Dry skin and moisturization. SOFW J 2004;130:29-34.