Evolution of Cosmetics: Increased Need for Experimental Clinical Medicine

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Cosmetics, once regarded as a luxury, have evolved into socially beneficial products that satisfy the physical and emotional needs of modern men and women. Their roles have expanded to include protection from UV exposure, weather and disease, and to obscure signs of senescence; they also provide emotional comfort and satisfaction. As a result, the number of drugs or drug-like active ingredients is increasing rapidly, generating an emphatic need for advanced clinical testing methods, safety, and efficacy substantiation. This will ensure compliance with government regulations. Therefore, we require a heightened strategy that ensures evidence-based approaches as for other practices with clinical implications.

1. History: From Antiquity to the 20th Century

1.1. Antiquity

The desire to appear beautiful is universal among humans, although the means to achieve this can vary from culture to culture. The Egyptians supposedly invented eye make-up, using coloring from minerals and plants before the days of Cleopatra.

Although some lead compounds used were toxic, according to ancient Egyptian manuscripts, they were remedies for treating eye illnesses and skin ailments. Cold cream, an emulsion of beeswax, vegetable oil and water still used in many skin care products today, was invented by Galen, a Greek physician in the 2nd century. Historically, cosmetics and drugs have always had some connection, but this relationship is becoming much stronger as we move into the 21st century, due to increasing demand for drug-like cosmetics and assurance of their safety and efficacy.

1.2. The 20th and 21st centuries

In the United States, the industry’s largest trade association, founded in 1894, was originally known as the Manufacturing Perfumers’ Association because its main products at that time were perfumes and colognes. In 1922, its name was changed to American Manufacturers of Toilet Articles, which later became Toilet Goods Association in the 1930s. In 1970, the organization became known as The Cosmetic, Toiletry and Fragrance Association (CTFA) to better reflect the current focus, which was to manufacture an increasingly diverse range of make-up, skin care, hair care, deodorant and aerosols. Most recently, in 2007, CTFA underwent another change, and is now officially known as the Personal Care Products Council (PCPC).
Why so many name changes? This is a clear indication that cosmetics are a dynamic, innovative industry in which new products are constantly being created and introduced to an expanding market, in response to new consumer needs. The cosmetic industry, which began primarily by manufacturing fragrances in Europe in the 19th century, has spread and grown internationally in the 20th century, exceeding sales of US$250 billion. As traditional cosmetic products evolved, overlapping with drugs or drug-like products, government agencies also began to promulgate new regulations to protect consumers. In the United States, the Food and Drug Administration (FDA) became more active in regulating products in the 1960s and began classifying certain cosmetics as drugs.

For example, suntan lotions or sunscreens, containing UV absorbers, had been marketed as a cosmetic for many years until the FDA began regulating them as an over-the-counter (OTC) drug in 1978. Since then, all sunscreens containing UV absorbers for protecting humans must be manufactured in compliance with FDA regulations. Use of increasing numbers of new raw materials and synthetic chemicals has created a substantial need for reliable safety testing and risk assessment methods, as, for example, some dyes used in coloring cosmetics have been found to cause cancer in animals. Concern for product safety also inspired the FDA to become more involved in regulating all products. In addition to sunscreens, many others (e.g., antibacterial lotions, acne lotions, skin protectants) also became OTC drugs, subject to FDA regulation. Moreover, for efficacy substantiation, new test methods for measuring sun protection factor (SPF) were developed. Thus, the relationship between cosmetics and drugs is becoming ever closer.

2. Culture, Zeitgeist: Overt and Covert Influences

Cosmetics evolve with society and as governments or cultures change, so too will their content, focus and marketing emphases. In recent years, the pace of such changes (e.g., products, formulations, use of ingredients, packaging, manufacturing, and marketing themes) has increased rapidly. Certain changes have undoubtedly been caused by competition, globalization and government regulations, but changes in culture or zeitgeist of the society also play an important role in affecting the “evolution” of cosmetics. It is important to note that these changes occur in economically advanced and in many developing nations.

Understanding the history and the current evolution of cosmetics is important for professionals in science and medicine. Why is this essential? Changes now taking place will exert a significant impact on the need for increased knowledge and more advanced technologies in experimental and clinical medicine. For example, in the 1960s, when consumerism became an important social force in the United States, as illustrated by Ralph Nader’s Unsafe At Any Speed, the demand for increased protection against unsafe consumer products also rendered cosmetics a target. Books that were critical of their products (like Toni Stabile’s Cosmetics: Trick or Treat?) prompted manufacturers to conduct more clinical tests to ensure that their products were not only safe, but also useful.

As a result, many new testing methods were developed to validate that cosmetics could be safe and effective. For example, dry skin is an ailment caused by excessive loss of moisture from the stratum corneum, thus causing the skin to appear rough and perhaps unattractive. Cosmetic companies required a mechanism to substantiate that products were effective in “moisturizing” and preventing excess water loss from the stratum corneum. The very useful method of measuring transepidermal water loss was developed for this purpose. The appearance of a significant counterculture in the 1970s not only resulted in promoting a new type of hair spray for long hair, but also a culture of respect for nature and a love for animals! This change also affected development in American companies, leading to greater emphasis on safety testing of personal care products.

3. A Question of Ethics as in All Medical Practice

As in all aspects of medical practice, ethical principles are paramount. These include, at the core, patient care, treatment and post-treatment analyses. Sometimes, the expertise of legal authorities is essential. In Japan, manufacturers traditionally settled disputes with consumers without court intervention. In the 1970s, influence of the consumer movement in the United States and cosmetic safety also became an important topic. In 1976, there was an incident that involved an adverse reaction to make-up products, initially causing an inflammation of facial skin, and later, uneven darkening called “female facial melanosis.” In Japanese, it became known as kokuhisho, which means “black skin disease”. The following year, a group of women filed a class action suit against five major cosmetic manufacturers for marketing unsafe products.

3.1. Stronger linkages with clinicians

Insistence on safer products was a stimulus for Japanese manufacturers to augment their surveillance and to establish more stringent regulations to ensure that safe health measures were implemented. As a result, the Japan Cosmetic Science Society (JCSS) was established in 1976. Actually, Japan had already founded the Society
of Cosmetic Chemists of Japan (SCCJ) in 1947 to promote chemistry and science, but the JCSS was formed to invite medical doctors and biomedical researchers to become more involved in safety. In Japanese, the word “cosmetics” can be translated as either keshohin or koshojin. Since the older SCCJ was already using the former to identify their society, the newer JCSS used the latter, keshohin, to differentiate the name of the societies and to avoid confusion. Extensive investigation by the industry and dermatologists eventually led to the discovery that kokuhisho was most likely caused by the impurity, 1-phenylazo-2-naphtol, often present in the dye Red No. 219. This incident also resulted in many Japanese cosmetic manufacturers to conduct more basic research on skin and the effects of cosmetic products.

3.2. Intervention by governmental organizations

As the FDA became more demanding with respect to safety, manufacturers in the United States began implementing more safety tests. A well-known eye irritation test developed by Draize of the FDA in 1940 was once the standard for assessing irritation caused by products like shampoo and mascara. In the 1980s, activists protested against the use of the Draize test since it was deemed to be cruel to rabbits. Under threat of boycott, most firms promised to eliminate this test. The zeitgeist was against mistreating animals, and as “cruelty-free” cosmetics gained popularity, the industry began to support research to develop in vitro testing with the ultimate goal of abolishing testing on animals. Today, a popular in vitro assay for testing is the Ocular Irritation® Test, which utilizes protein denaturation and disaggregation that mimics eye irritation. Since that time, there has been growing emphasis on in vitro assays, which are also less expensive for biomedical researchers and not controversial since live animals are not involved.

4. Cosmeceuticals and Senescence

Dr. Albert Kligman, professor of dermatology at the University of Pennsylvania, who developed many useful methods for testing the safety and performance of cosmetics, is credited with coining the term “cosmeceutical” around 1980 to describe a class of hybrid cosmetics having drug-like effectiveness. Cosmeceuticals have become popular in recent years, and many drug-like anti-aging cosmetics are available globally. In addition to the numerous firms that offer these products, drug companies, medical doctors and those specializing in dermatology have begun to market their own brands of anti-aging cosmeceuticals. Although the FDA does not recognize or regulate cosmeceuticals as a special class of cosmetics, safety tests and efficacy substantiation are nevertheless important requirements.

The desire for youth and beauty is probably as strong as being healthy and content. Thanks to advances in modern science and medicine in the last 100 years, human life expectancy is increasing. Not surprisingly, anti-aging skin care products have become the fastest growing category of cosmeceutical products in the United States and many other countries. Many advertisements for plastic surgery or anti-aging products suggest that wrinkled skin should not be considered an inevitable result of senescence, but is a condition to be reckoned with. A great deal of biomedical research has documented the social benefits of cosmetic products, including those that are psychological.

In 1989, the major trade organization for the cosmetics industry in America, CTFA (now known as PCPC), began a public service program for cancer patients called, “Look Good...Feel Better”. What was the idea? By helping patients to look better by using cosmetics and wigs, they could find hope, courage and confidence to better cope with their illness. It has since grown into a successful global program available in 19 countries.

5. Perspectives on Evidenced-based Approaches

Cosmetics, once regarded as a luxury or frivolity, for ornamental purposes only, have evolved to become socially beneficial, serving the needs of modern men and women. To demonstrate their benefits and effectiveness to a skeptical public, manufacturers have increasingly come to rely on evidence-based approaches for design and promotion. Manufacturers have noted that the public are becoming better educated and more demanding, and they have therefore become more dependent on various reliable testing methods to measure and demonstrate the usefulness of their products.

Intuitively, we suspect that an “attractive person” has more social advantages. Research conducted by Waters using different photographs in job applications has revealed that physically attractive applicants are more highly valued and have a better chance of being offered a higher salary. Increasingly, manufacturers are conducting basic research, investigating physical and biological effects, as well as the emotional, psychological and even immunological benefits of cosmetics.

In the United States, cosmeceuticals and “natural cosmetics” are the fastest growing categories of personal care products. As a drug-like cosmetic, an anti-aging product requires evidence to demonstrate its safety and efficacy. Increasingly, organic cosmetics manufacturers are relying on certifications as evidence of sources of raw materials. In contrast, manufacturers of chemicals for cosmetics also require proof that their chemicals are safe, effective and do not contribute to pollution or cause environmental harm. Even in the manufacturing process of cosmetics, one must now consider effective
use of energy to help reduce greenhouse gas emission. For example, Boots, a leading health and beauty retailer in the United Kingdom, has worked with Carbon Trust to reduce their carbon footprint. This is partly accomplished by labeling carbon contents (e.g., in shampoo).25

In my recently published book on manufacturing of cosmetic emulsions, I have included a significant component that deals with techniques to reduce energy consumption without affecting product stability and quality.26 Interest in these connections strongly suggests that increased knowledge and research in experimental and clinical medicine are essential.

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