Cosmeceuticals: Drugs vs. Cosmetics

Edited by Peter Elsner, MD, and Howard I. Maibach, MD

© 2000, Marcel Dekker, Inc., New York, New York. 369 pages
Price: $175.00

A Review by Karen E. Burke, MD, PhD,
New York, New York

Dermatologists today enjoy the capability of not only treating skin diseases but also preventing damage to normal skin and even retarding the skin's natural aging process. We can actually reverse many of the unsightly signs of photodamage and rejuvenate the appearance of the skin by prescribing or recommending appropriate cosmeceuticals. Our specialty has been much enhanced by these new tools—patients not only consult us regarding their medical problems but also seek our advice on skin care and the treatment of wrinkles, large pores, mottled pigmentation, hair loss, and other signs of aging. As a by-product, we often diagnose serious problems, such as skin cancers and precancers, on individuals who have come to see us for the sole purpose of requesting prescriptions for retinoic acid or minoxidil.

As dermatologists, we are inundated with questions from patients "informed" by the internet and by advertising regarding various "rejuvenating" products, some of which are effective, some not. Thus the book, *Cosmeceuticals: Drugs vs. Cosmetics*, is particularly timely and helpful to the practicing dermatologist and medical researcher. The editors, Drs. Peter Elsner and Howard I. Maibach, have brought together 33 experts from around the world to contribute detailed reviews of all the most important cosmeceuticals, including hydroxy acids, topical retinoids, hair growth enhancers, moisturizers, depigmenting agents, antioxidants, protective agents, barrier creams, hyaluronic acids, and botanical extracts. The absorption, the mechanism of action, and the relative efficacy of each substance is highlighted. Also included are excellent explanations of the many new and sophisticated methods of measuring and testing the penetration and metabolism of each. One chapter describes quantitative methods for clinical assessment of adverse reactions. Recent research on the physiology of photoaging, sebum production, and intrinsic antioxidant mechanisms also is presented.

The word *cosmeceuticals* was coined by Albert M. Kligman, MD, PhD, more than 20 years ago to define cosmetic products that also have pharmaceutical properties or pharmaceutical products that primarily enhance the appearance of normal skin, rather than treat disease. Although the concept was both timely and relevant, the term has often provoked dispute or triggered the dissemination of confusing or incorrect information to the patient and consumer.

Appropriately, the book's first chapter was written by Dr. Kligman himself, who discusses the social, economic, and legal issues that arise because each of the 3 main global trading blocks—the United States, Europe, and Japan—cling to different criteria for cosmetics and drugs. He explains the controversy generated by the term *cosmeceuticals*, which he introduced to "reconcile archaic legal statutes with modern science." The debate has centered on the distinction between those products which, when applied to the surface of normal skin, change the appearance by actually altering the structure of the skin and those which act only transiently to color or camouflage. Dr. Kligman makes the point that *any* substance applied to the skin can indeed modify its structure, physiology, or microbiology in some way. With the precise testing methods available to us today, we now realize that exposure to even seemingly inert materials, such as water or petrolatum, can alter the molecular biology of the skin!

The lack of internationally accepted standards has detrimental consequences, particularly to Americans. For example, in Europe, sunscreens (as well as antiperspirants and antidandruff shampoos) are classified as cosmetics, while in the United States they are regulated as drugs. As a consequence, in Europe and elsewhere outside the United States, there are far more effective sunscreens available than in America. Dr. Kligman points out that paradoxes abound in the United States. Certain drugs such as minoxidil and theophylline (drugs with relatively narrow therapeutic indices when taken orally for hypertension and asthma, respectively) are available without prescription for topical application in the treatment of hair growth and cellulite, respectively. Topical retinoic acid, indicated for the treatment and prevention of photodamage, requires a prescription at low concentrations of 0.025%, while

topical retinol and retinyl palmitate at higher concentrations do not.

An entire chapter is dedicated to the history of these legal distinctions. It is interesting and amusing to learn about cases pertaining to antiaging products ranging from Line Away and Magic Secret in the 1960s to Dr. Christiaan Barnard's Glycel in the 1980s. It is suggested that these cases are precedent to the tobacco initiative of 1995.

Most skin care products fall somewhere between drugs and cosmetics. One chapter describes Japan's legal categorization of "quasidrugs," which includes products for the prevention and treatment of hair loss but not those for aging skin.

It is convincingly argued that the international standardization of the classification of substances as cosmeceuticals is essential. If the safety of an ingredient has been established beyond question (especially by a long history of use in oral medications), if testing shows no topical irritancy at concentrations to be formulated, and if topical efficacy is demonstrated, the very costly and stringent testing of new drugs can be superfluous and indeed counterproductive to progress. On the other hand, the potential efficacy of some cosmetics is frequently misrepresented by ambiguous wording and false promises in advertising or labeling. As we dermatologists pick our way carefully through these quandaries, this book can make a major contribution.

Particularly important are the chapters on commonly used products. The mechanisms of α- and β-hydroxy acids are precisely explained, clarifying their action as desmolytic (not keratolytic) at low concentrations and as chemical peeling agents at higher concentrations (depending upon the pH). This discussion would have been enhanced if the authors had included a diagram demonstrating the dramatic change in activity with minor changes in pH and a chart showing relative therapeutic indices of various hydroxy acids. The boosting of the normal physiology of the skin to correct skin atrophy and dyspigmentation is documented with a comprehensive bibliography. A description of the new lipophilic derivative of salicylic acid, β-lipohydroxyacid, is of interest.

The chapter on moisturizers, supported by an extensive bibliography of 202 citations, clarifies "lack of water may be too simple an explanation for all types of problems covered by the term *dry skin*." The role of emollients, humectants, lipids, and the precise manner in which water is bound at a molecular level is explained. The necessity of monitoring both transepidermal water loss and barrier function is emphasized.

The chapter on topical retinoids offers a classification of natural retinoids and of the first, second, and third generation of medical retinoids—showing their structure and describing their uses, as well as explaining their absorption, metabolism, mechanism of action, and toxicity. Included is a summary of the histology of photoaging, touching on the role of UV-responsive matrix metalloproteinases. This is an excellent review of the studies demonstrating clinical efficacy of topical retinoic acid in treating photoaging. It would have been of interest to clarify that topical tretinoin actually *protects* from UV damage by inhibition of UV-induced matrix metalloproteinases.

A discussion of depigmenting agents tabulates more than 20 causes of pigmentary disorders of the face and discusses melasma in detail, reviewing comprehensive hormonal measurements and cutaneous sensitivity in affected patients. Methods of evaluating depigmenting agents are described, including suppression of mushroom tyrosinase, inhibition of tyrosinase in cultured B-16 melanoma cells, in vitro inhibition of melanin synthesis in *Streptomyces fervens*, and depigmentation of black gold fish. The mechanisms of action and limitations of 6 depigmenting agents are described, with a detailed history of the research on kojic acid.

With 206 references, the chapter "Antioxidant Defense Systems in Skin" presents one of the clearest, most comprehensive reviews of this complex subject that I have encountered. The 10 most important antioxidants in the skin are described in detail, documenting their mechanisms of action, concentrations in different cutaneous layers, interactions of the many antioxidant vitamins and enzyme systems, and responses to environmental stress. Clear tables enumerate the research on each, rendering otherwise complex information readily accessible.

Another outstanding chapter, complete with 194 references, "Hyaluronan: The Natural Skin Moisturizer", discusses the complexity of the "natural moisturizer" hyaluronic acid (HA)—a polymer with an extraordinarily high number of functions stemming from its vast number of shapes and configurations (dependent on polymer size, pH, salt concentrations, and associated cations). We are now only beginning to isolate and elucidate the vast number of receptors, the synthetases and hyaluronidases specific to each tissue and the hyaladherins (proteins that bind HA). The distinctions among types of intercellular ground substance—glycosaminoglycans and proteoglycans (which accumulate intercellularly, particularly in malignancies) and mucins (which may or may not

CONTINUED ON PAGE 224

CONTINUED FROM PAGE 222

contain HA, a substance that protects against tumor metastases and parasite invasion) is clarified. The role of HA in embryonic development, intrinsic aging and photoaging of skin, wound healing, and inflammation is described. Now that biotechnology has made it possible to engineer bacteria with augmented HA production, these polymers will be used more frequently in moisturizers, skin substitutes, and other cosmetic products.

Two other chapters of particular interest to the dermatologist are "Botanical Extracts" and "Decorative Products." Both are good sources of reference on subjects about which most of us are not expert, although we are frequently questioned on them by inquisitive patients.

This excellent book affords ready and welcome access to detailed scientific information on the many cosmeceutical products containing active substances intended for cosmetic correction. As we and our patients live longer, adding not only "years to our life" but also "life to our years," we are increasingly aware of the health and appearance of our skin. As dermatologists, we are committed to prescribing and recommending only those formulations that are indeed effective and safe. In *Cosmeceuticals: Drugs vs. Cosmetics*, the editors and contributors offer a comprehensive, up-to-date compendium, which is well-organized and readable. I recommend this book. It is a fine resource for all practicing dermatologists and dermatologic researchers, and an important and useful addition to the libraries of medical, cosmetic, and drug company professionals.

To order this book, please telephone Marcel Dekker at 800-228-1160.