



The challenges of skin care

Vijai K.S. Shukla

Skin is really quite remarkable. It protects us from the sometimes harsh external environment, microbial invasion, and physical injuries; regulates our body temperature; provides sensory input; and eliminates waste.

An adult's skin constitutes between 15 and 20% of the total body weight. Each square centimeter of skin has 6 million cells, 5,000 sensory points, 100 sweat glands, and 15 sebaceous glands.

The top layer of the skin, the epidermis, has an outermost layer called the stratum corneum. The stratum corneum is where moisture content is controlled. Within the stratum corneum, two main components aid in this function—keratin and phospholipids. In healthy skin, these two components work in conjunction to “keep out” irritants and maintain moisture.

When skin loses its phospholipid bilayers, it becomes dry. The ultimate result is the entrance of potential irritants and the exit of moisture through the skin. Thus, moisturizers are applied preventively or to help restore the stratum corneum to its more normal function.

There are two means to moisturize the skin. Moisture can be added back into the skin, or transepidermal water loss (TEWL) can be blocked or inhibited. TEWL is the process by which moisture migrates from the dermal tissues to the epidermis into the stratum corneum and evaporates into the atmosphere.

Fats are the secondary ingredient (after water) in moisturizers that act as emollients and humectants. An emollient makes skin soft and supple, and a humectant promotes moisture retention.

Current trends in skin care

There are multiple current trends in skin care. The old definition of Galenus for personal-care and cosmetic products (to cleanse, to care, and to decorate) is considered obsolete these days. Newer developments emphasize *to maintain and to improve*.

On a daily basis, new ingredients are introduced with all kinds of claims, even for a hand soap or a toothpaste. Innumerable botanical extracts are being introduced, and frequently these are implemented in products only on the basis of *in vitro* experiments.

More and more products, particularly in the high-end market segment, make effective use of components that are also part of our diet. The unity and integrity of the whole body is considered, and the skin is also an organ of our body; thus, a combination of skin care and body health is highly practiced. The use of active ingredients (vitamins, flavonoids, alkaloids, etc.) becomes manifest, but proof needs to be generated regarding the functionality in and on the body. In the past it was said that “vitamins are good for you.” Now substantiation is required; proven functionality is one of the trends.

Another major trend is to eliminate petrochemical products. This started in the Nordic countries, has already gone over to Germany, and is slowly moving to the Benelux countries as well. So no more ethoxylates, no petrochemical compounds such as mineral hydrocarbons; petrochemistry is phasing out.

Last but not least in skin care trends is mildness and skin friendliness, i.e., mimicking what the skin really needs relative to its functionality as the largest organ of our body. Mildness can be proven these days not only *in vitro* but also *in vivo*. Mildness and skin friendliness are the important criteria for the future in skin care products.

People are looking for nature-derived products. In the terminology of the marketplace, natural cosmetics are defined as products that do not contain:

- Animal-derived ingredients
- Ingredients that have been tested on animals
- Artificial preservatives
- Artificial dyes and pigments
- Synthetic chemicals
- Petrochemical products
- Crop-control agents and pesticides
- Solvents

In addition, botanical products shall be produced under controlled and certified conditions. The ingredients used must be safe for humans, animals, and plants and cause no harm to the environment during production, application, and disposal. The native microflora of the skin, hair, and mucous membranes should be respected, maintained, and controlled. The personal-care and cosmetic natural products shall satisfy the boundary conditions of the required microbiological status, and pathogenic organisms should be absent. All ingredients used must be metabolized in the body and should not cause irritation, sensitization, or allergic reactions.

Consumer expectations

Consumers expect their personal-care and skin care products to be functional: A toothpaste will clean the teeth, a moisturizer will regulate the skin's moisture balance, a shampoo will cleanse the hair, and so forth. Sometimes the claims adhere to what the consumer wants (for example, to get rid of wrinkles) and is willing to pay for. In general people want to improve their quality of life: Personal-care products and cosmetics play an important role in that direction.

However, more and more consumers are becoming wiser. The number of consumer questions on particular INCI (The International Nomenclature Cosmetic Ingredients) names is ever increasing. Questions such as: Does this product contain silicone oils, Are the surfactants used biodegradable, Are any allergenic products present, Are petrochemical products present? are being asked more frequently. Customers want to be fully informed. Unfortunately, many companies adhere to a false approach and are misleading their customers. They state that their products are preservative free, but they do not hesitate to use 10–20% ethanol as the preserving substance. They even go further than that, making non-justifiable claims and totally misleading their customers by heavily using ingredients that are not in line with their marketing messages. However, these messages appeal to the customers.

Particular organizations such as Warentest und Öko-Test, Germany; Ecotox (Chemical Ecology and Ecotoxicology, University of Lund, Sweden), and BDIH/Germany (Bundesverband deutscher Industrie- und Handelsunternehmen) are having more and more influence on public opinion. Sometimes these organizations can even kill products. Whether or not it is justified, 10 minutes of television coverage and your product may be finished, or your product may be raised to stardom (even though it may have nothing to offer). If your formulation is in agreement with their boundary conditions, you may use these organizations' approval in your marketing approach.

People also want to be able to identify themselves with a particular ingredient they want in a product, even though it may not have any functionality at all, e.g., vitamin C, or pro-vitamin B₅, even though they have no idea of what it does. They want products with anti-free radical properties, even though they don't know what they're talking about. But they know the word and it sounds interesting and healthy — a product of a successful marketing department, whose task is to create awareness of particular ingredients.

What role do oils and fats play in cosmetic products?

We need to differentiate the commodity oils (corn, soybean, rice, rapeseed, palm, coconut, palm kernel oil, etc.) from specialty oils such as avocado, wheat germ, peach kernel, apricot kernel, argan, cherry kernel, evening primrose oil, etc., and the butters: shea, mango, illipe, allanblackia, shorea, pentadesma, cocoa, etc.

The commodity oils are too well known to require further discussion. They are there, and it goes without saying that they will be there

to stay. Personal-care products and cosmetics can't do without these oils.

The group of specialty oils and butter are often considered from the perspective of their triglyceride composition, and from the presence of common substances such as tocopherols and tocotrienols. Most of these oils are cosmetically valuable because of their unsaponifiable fraction: the terpenoids, the steroid fraction, and the pentacyclic triterpenoid fraction. These are the real workhorses, and they are indispensable for personal-care and cosmetic products. The sales approach for vegetable oils as the carriers for unsaponifiable products has never received as much attention as today.

The vast majority of skin care products use specialty oils and fats but usually not in a concentration that is beneficial for the skin. The reason is that high concentrations of vegetable oils and fats are considered to give a distinct oily/fatty skin feel. That is not necessary, but it requires quite a bit of formulation technology. Probably also a limiting factor is that the unsaponifiable fraction is physiologically active; therefore, the claims would be quite pharmaceutical. Finally, the current suppliers, usually traders with little product knowledge and even less cosmetic/dermatological know-how, do not really know the potential of these oils.

Products with natural vegetable oils and fats (provided they are formulated correctly) are highly beneficial for skin care, and the same is valid for botanical extracts and vitamins. No single oil or butter can provide all the available benefits; therefore, we promote recipe-engineered products with a multifunctional approach. Polyunsaturated lipids are extremely prone to oxidation. We have recently developed a procedure to enhance the shelf life of cosmetic products through a novel stabilization procedure. Future approaches using phytochemicals and balanced fatty acid molecules, combined with an internal stabilization procedure, will open avenues of new research in cosmetic applications.

Future perspectives

A clear agenda for skin care formulation with natural ingredients is strictly hindered due to an extensive lack of formulation technology. It is a real challenge for cosmetic chemists to learn about the diversity of complex lipids and their offerings to beautify the world of cosmetics.

Vijai K.S. Shukla is director of the International Cosmetic Science Centre in Lystrup, Denmark. Contact him at: ApS, P.O. Box 44, DK-8520 Lystrup, Denmark; phone: +45-86-22-99-86; fax: +45-86-22-99-96; e-mail: info@icsc.dk ■