

THE EFFECTS OF NEW GENERATION COSMETICS ON EPIDERMAL BARRIER PERMEABILITY.

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Synopsis

Synopsis skin with a surface area of 1.8 square meters and an average weight of approximately 4 kilograms is the largest and heaviest organ of human body. The outermost intergumentary tissue, the epidermis, maintains a reserve of germinal cell layers whose proliferation, stratification and differentiation result in production of stratum. Organized into a two compartment system, the stratum corneum consists of protein enriched corneocytes embedded in a lipid-enriched, intercellular lamellae.

The two compartment arrangement explains both the ability of cells in the other stratum corneum to take up water as well as the differences in rate of percutaneous absorption of topically applied lipophilic versus hydrophilic cosmetic agents.

Age and the environment bring about a reduction in the metabolic activity of the skin and a consequent reduction in the speed of extracellular renewal. Ultraviolet and infrared rays accelerate the process of skin aging by developing free radicals which interact at the cellular level with proteins lipids and DNA.

Appropriate cosmetic products can intervene at different level to slow down, limit and reverse damage deriving from photoaging.

They if correctly used, may be very helpful to the dermatologist by resolving medical-aesthetic problems without their patients taking oral drug too much.

Riassunto

La pelle umana con il suo peso di 8 kg e con la sua superficie di circa 1,8 metri quadrati rappresenta l'organo più esteso e pesante di tutto il corpo umano.

Il rivestimento esterno della pelle, l'epidermide, mantiene una riserva di cellule attive la cui proliferazione, stratificazione e differenziazione si estrinseca con la produzione dello strato corneo.

Lo strato corneo organizzato in un sistema a due compartimenti è formato da corneociti proteici immersi in lamelle intercellulari ricche di lipidi.

L'organizzazione in due compartimenti spiega l'abilità esercitata dalle cellule dello strato corneo di assorbire o di respingere sia i composti idro che liposolubili.

L'età e l'ambiente provocano un rallentamento dell'attività metabolica della pelle e quindi del suo continuo rinnovarsi. I raggi ultravioletti ed infrarossi accelerano il processo dell'invecchiamento cutaneo mediante la formazione dei radicali liberi che interreagiscono con le proteine ed i lipidi del DNA danneggiandoli. L'uso corretto dei cosmetici può spesso ridurre o evitare questi danni aiutando il dermatologo a risolvere molti problemi estetici dei suoi pazienti, evitando l'uso dei farmaci.

The stratum corneum: a two compartment system.

Organized into a two compartment system, the stratum corneum consists of protein enriched corneocytes embedded in a lipid-enriched intercellular medium. Some enzyme activity also takes place in this layer. The two compartment arrangement explains both the ability of cells in the outer stratum corneum to take up water as well as the differences in rate of percutaneous absorption of topically applied lipophilic versus hydrophilic cosmetic agents.

Blank's observations provided the basis for most products now generally known as moisturizers, the principal ingredient of which is water. Other ingredients include substances which attract, retain or bind water within the stratum corneum. Another category of cosmetic compounds known to influence the qualitative character of the stratum corneum are the alpha-hydroxy acids. A number of these occur naturally in food.

The alpha-hydroxy acids

Whereas moisturizers affect the stratum corneum already formed, alpha-hydroxy acids determine the quality of the stratum corneum at its formation, promoting normal cohesion among the newly formed cells.

For absorption of most compounds, the stratum corneum acts as the rate-controlling membrane. For lipophilic, water-insoluble compounds, diffusion through the epidermis constitutes the limiting step. For cosmetic purposes, total percutaneous absorption is typically undesirable, with a sustained local effect at or near the surface of the skin being preferable. Many products require minimal absorption. Absorption followed by long-term accumulation is also undesirable for frequently used products.

Biopolymers and liposomes

Common cosmetic ingredients have always in-

cluded biopolymers extracted from plant and animal materials for emollient and protective treatments.

However, these macromolecules work only to protect skin on the surface and are too large to be absorbed through the skin. New delivery systems are enhancing uptake of these molecules and thereby significantly contributing to the overall effectiveness of cosmetic products. In addition, the quality of today's natural materials is much improved due to more sophisticated harvesting, purification, processing, and quality control methods.

Most recently, true cosmeceutical ingredients have been developed. They include: liposomes and niosomes (non -ionic vesicles) that can deliver antioxidants; free radical scavengers, and other active ingredients to the dermis; cell extracts and cell energizing complexes that purportedly speed up the rate of epidermal cell renewal; and cell recovery nutrients that enhance the rate of DNA repair following sun exposure.

Photoaging and free radicals

Significant differences exist between photoaging and the natural aging process. Photoburning enhances and accelerates these effects and promotes DNA damage.

Photoaging results from an uncontrolled level of lipid peroxidation caused by the generation of free radicals when UV photons hit the molecular components of skin. These highly reactive free radicals induce degeneration of the skin's key components. To counteract their destructive effects, skin cells possess enzymatic and non-enzymatic free radical scavengers that control the activity and level of free radicals.

Free radical damage worsens with age, due to increases in free radical production and declines in the ability of the antioxidant system to reduce levels of peroxidation. Appropriate cosmetic products can intervene at different levels to slow down, limit, and reverse damage deri-

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