

## Abstracts

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#### Bioavailability of Cosmetic Actives – What it Means?

J. Arct

In harmony with classical pharmacology and toxicology, the activity of each biologically active compound depends on two factors: the ability to reach a receptive system and evoke physiological effect in the result of interactions on the molecular level. It concerns also drugs and toxic substances applied on the skin or mucous membranes. In this case, an active has to permeate through the horny layer and viable epidermis and reach the compartments, in which capillaries are, that is dermis and subdermal tissue. After penetration into blood circulation it may reach other compartments and evoke local or systemic physiological effects depending on its properties. It happens sometimes that the maximum activity is observed in the areas localized close to an application site, i.e. for anti-inflammatory non-steroid drugs and local anesthetics. Dermatological drugs and substances eliciting contact dermatitis such as i.e. topically applied retinoids, contact allergens and irritants belong to the separate group. In this case, the activity is localized in the skin and the condition of their activity is their ability to permeate through the horny layer and reaching the receptors of the viable tissue layer localized directly under the stratum corneum. The amount of a substance capable to elicit immune response is – for contact allergens – so small that the toxicokinetic factor of bioavailability can be often neglected.

#### Liposomal Drug Delivery – Outdated or Seminal Concept?

D. Teichmüller, G. Blume

There are countless numbers of topical cosmetical or pharmaceutical products on the market with as many active ingredients. Liposomes are commonly used in dermal applications as protective system for active ingredients and for their moisturising properties. They are spherical vesicles composed of phospholipids with an aqueous core and can either encapsulate lipophilic or hydrophilic active ingredients. Depending on their composition, they can also have the property of penetrating into the skin, carrying actives to the target site, where these molecules will be released. The efficacy of many products has been improved by liposomes due to an enhanced penetration into the skin. Since their first introduction in cosmetics (Dior, Capture, 1986) and today's controverse discussion about nano-technology in cosmetics, it is of importance to evaluate future benefits of this delivery technology.

#### The Fatal Effect of Self-Tanning Agents during UV Irradiation

K. Jung, M. Seifert, T. Herrling

Using the recently developed RSF (Radical Skin Protection Factor) method, the radical induction capacity of self tanning agents as dihydroxyacetone (DHA) was investigated. The reaction of the reducing

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sugars used in self tanning products with amino acids in the skin (Maillard reaction) leads to the formation of Amadori-products that generate free radicals during UV irradiation. Three different self tanning agents were analysed and it was found that particularly DHA increased the amount of generated free radicals up to 180% during sun exposure. For this reason the exposure duration in the sun is decreased by using self tanning agents. Photo aging processes in the skin are accelerated at the same time.

#### A New Accelerator and Long-Lasting Tanning Patented Peptide

M. Mateu, M. Mangues, J. Cebrián, C. Carreño, N. Almiñana

A new patented tanning peptide has proved to act as a tanning accelerator and long-lasting key active ingredient for tanning formulations by stimulating the skin natural tanning mechanisms. Melatime™ showed to induce cAMP production and stimulate melanogenesis in melanocytes, increasing melanin content in a dose-response manner in human melanocytes in absence of UV radiation, proving its efficacy *in vitro* as self-tanning agent and ensuring a skin natural tan which fits the skin constitutive colour. Under UV-induced conditions, Melatime™ decreased skin luminosity and darkened the skin colour *in vivo*, demonstrating to stimulate pigmentation intensity. In addition, the peptide also showed to be effective in prolonging the suntan two weeks after discontinuing the UV-exposure. In conclusion, Melatime™ can be regarded as an effective tanning active ingredient for tanning accelerating and longlasting cosmetic formulations, allowing to get a perfect long-lasting sun-kissed skin and shorten UV-exposure times.

#### Dihydroxyacetone - Properties and Application in Self-Tanning Cosmetics

A. Ratz, S. Blazejak, J. Arct

In the contemporary world, sun-tanned skin has been considered a sign of good health and fashionable lifestyle. As a result, a substantial number of people sunbathe and expose their skin to UV radiation generated by solar lamps to make their skin look darker. UV radiation activates tyrosinase and increases melanocyte proliferation, which stimulates melanogenesis and the production of pigmented biopolymers, the so-called melanins. Melanins concentrate in keratinocytes in the area of nucleus and absorb UV radiation, which protects the skin against

damage resulting from exposure to natural and artificial light, and neutralize active oxygen. However, severe UV exposure, in particular, shortwave radiation, may reduce the skin's protection barrier and induce skin irritations. Recurrent exposure accelerates photo-ageing manifested by increased stratum corneum thickness, chronic inflammations, dysfunctions of sebaceous glands, telangiectasias, hyperpigmentation, and wrinkle formation. Moreover, this is the basic risk factor of the development of skin neoplasms, wherein the carcinogenicity applies to both, shortwave and long-wave radiation (UVB and UVA). Suntanned skin still remains fashionable; however, people are more and more aware of the negative aspects of long-term exposure to sun. Consequently, the demand is growing for self-tanning preparations providing similar effects to natural suntan without the above-mentioned side effects, and in particular, without the risk of accelerated photoageing and the development of neoplasms. As an alternative to sun- and solar tanning, special cosmetic preparations may be used, which produce brown skin color similar to natural tan in reactions between active browning agents and epidermal proteins from stratum corneum. In particular, alpha-hydroxy ketones react with amino acids from the peptide structures of keratinocytes (Maillard reaction) to produce water-insoluble pigments – melanoidins, and to temporarily produce a brown color to the superficial layers of stratum corneum. Skin tanning preparations contain, in particular, dihydroxyacetone (1,3-dihydroxy-2-propanone) and L-erythrulose ((S)-1,3,4-trihydroxy-2-butanone), as well as quinone derivatives: lawsone (2-hydroxy-1,4-naphthoquinone) and juglone (5-hydroxy-1,4-naphthoquinone). These compounds quickly react with proteins to produce melanoidins of suitable color. Dihydroxyacetone is primarily used as an ingredient in sunless tanning products.

#### Alternative methods and safety assessment of cosmetic products and cosmetic ingredients

K. Bazela

The European Commission imposed transition periods on the cosmetic industry. After their expiration, a complete ban of animal testing of cosmetic products and their ingredients will be in force for the member states of the European Union. On 11th March of this year a new ban went into force – a ban on animal testing of cosmetic ingredients. The prohibition of animal testing remains one of the most controversial topics for the cosmetic industry. The legal regulations regarding animal testing and the safety assessment of cosmetic products and chemical substances are

ambiguous and difficult to interpret. Despite many research programmes conducted in the European Union's laboratories, alternative methods for most toxicological parameters have not yet been approved. The article quoted below presents alternative methods which are useful in the safety assessment of cosmetic ingredients and finished cosmetic products.

Will Detergents Disappear ? An Evaluation of  
Alternative Wash Technologies

F. Schambil, W. Buchmeier, B. Glusen, J. Bohnen,  
H.G. Hloch, A. Ophuls

The last major innovation in wash technologies took place in the middle of the last century, in the 1950s. Fully automatic drum washers, which could wash, rinse and spin-dry, conquered the European market. Although numerous technical improvements have been introduced since then, especially with regard to water and electricity consumption, the wash technology as such has in principle remained unchanged. In 2001, Sanyo launched an ultrasonic washer in Japan. According to the manufacturer, the use of ultrasonic waves in special wash cycles can make laundry detergents totally redundant (zero-detergent cycle). Comprehensive studies of primary and secondary detergency carried out by, among others, the Japanese

Soap & Detergent Association, the Japanese Consumer Affairs Centre and all wellknown appliance and washing machine manufacturers, all point to the conclusion that the performance of the washer is not acceptable in the absence of detergent. In response to the launch of the Sanyo ultrasonic washer, all major Japanese manufacturers rapidly developed washing machines with programs that require less detergent (detergent half cycles). Consumers showed little interest, however, and after 2005 the claims were dropped. In recent years, other washing machines based on new principles have come out of Asia. Terms such as ultrasonic pretreatment, ozone and steam cleaning, and silver-based technologies for hygiene attracted interest. In the commercial sector, a widely varied range of cleaning methods are employed, some of which totally or partially dispense with the use of water. New technologies, such as lasers and plasma, are used to clean hard surfaces, and increasing numbers of textiles are claimed to have soil-repellent, and in some cases even self-cleaning, properties. These developments raise the question of whether detergents will be unnecessary in the future. This study looks at alternative wash methods, and whether they can realistically be expected to establish themselves in the household sector. The influence that new types of textiles may have on the laundry detergents market is also examined.

