**In-Vitro evaluation of cutaneous penetration of sprayable sunscreen emulsions with high concentration of UV-filters**

**INTRODUCTION**

The interest in sunscreen products is growing because the incidence of skin cancer has surged over recent years mainly because of the increased exposure to the sun. So it is important to develop sunscreen products with high concentrations of organic and inorganic filters. These high concentrations of UV-filters can be a problem in terms of accumulation in the skin, or in term of skin penetration. Moreover, it seems to be evident that sunscreen products have to stay on the epidermis surface to keep their UV-protecting effect. So it is important to evaluate and to control the possible cutaneous penetration in order to guarantee the efficacy and the safety of sunscreens products. The aim of this study was to evaluate the possible penetration through human skin of organic and inorganic filters contained in sunscreen emulsions conditioned in aerosol cans using an in vitro method. These experiments were investigated on two different types of emulsion: Water in Silicone (W/Si) and Water in oil (W/O).

**MATERIAL AND METHOD**

**Analytic methods**

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<th>Organic UV-filters</th>
<th>Inorganic UV-filters</th>
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**Organic UV-filters**

- **Analysis methods**: HPLC method for the determination of five compounds: Escalol® 507, Escalol® 557, Tinosorb® M, Tinosorb® S and Uvinul® A.
- **Operating conditions**: 
  - Absorption was measured at 310 nm and 360 nm for UVB and UVA filters, respectively. The mobile phase was a gradient of solvent: from MeOH:THF:ACN:H2O with 0.5% of acetic acid (35:10:15:40) to MeOH:THF:ACN:H2O with 0.5% of acetic acid (70:10:15:5) in 15 min.

**Inorganic UV-filters**

- **Analysis methods**: ICP-OES (Inductive Coupled Plasma-Optical Emission Spectrometry).
- **Operating conditions**: The ICP was operated at 1.20 kW, with a plasma flow rate of 15 L/min, an auxiliary organ flow rate of 0.8 L/min and a nebulizing pressure of 200 kPa. Sample signals were monitored 15 min above the local cell. Ti and Zn were measured at 334.94 nm and 213.85 nm, respectively. Before analyzing, samples were digested (furnace at 500°C during 1-2h) and mineralized (fuson with K2SO4) and dissolution in hot concentrated solution of H2SO4.

**RESULTS AND DISCUSSION**

**Organic UV-filters**

- **Repartition of organic UV-filters**
- **Level of skin penetration**

**Inorganic UV-filters**

- **Repartition of inorganic UV-filters**

**CONCLUSION**

A HPLC method for the determination of two common organic sunscreen were developed, in parallel with an ICP-OES method for inorganic sunscreen agents. Sprayable sunscreen products with high concentration of UV-filter, with a low rate of cutaneous penetration were developed. The use of validated analytical methods is necessary to evaluate the safety and efficacy of all new sunscreen products.