**NEUROCOSMETICS: HOW TO TEST SKIN SENSES?**

Nerves endings have key function on the skin, impacting on sensory perception, skin homeostasis and aging. Neurocosmetics aim to work on the cutaneous nervous system restoring the mediator-receptor balance in the skin. But how can one test *in vivo* the effectiveness of these products? inovapotek has developed new tests to evaluate the efficacy of a cosmetic product/substance in increasing the Pain, Heat and/or Cold threshold. These tests are performed *in vivo* in volunteers with healthy or tape stripping damaged skin. The volunteer’s perception after submission to the stimulus at different intensities is evaluated on control skin areas and on skin areas pre-treated with the test product. For heat stimulus, water tubes with temperatures ranging from 25 °C to 50 °C are used and for cold stimulus water tubes with temperatures of 0 °C, 5°C and 10 °C are used. To evaluate the pain threshold a Pinprick test is conducted, with a mildly sharp sterile pin and a non-sharp object used randomly while volunteers rate the pain intensity in a 5-point scale to determine the pain threshold to each object.

**SILICONES – HAIR BEST FRIENDS OR ENEMIES?**

Silicones are widely used in hair care products to impart manageable, smoothness and shine and to seal the cuticle. The ability of different shampoos, conditioners or other hair care products to leave a silicone film in the hair surface is of utmost importance to achieve these effects. However, they can also have a build-up effect and make the hair heavy. So how much silicone deposition on hair do we want? inovapotek developed an *ex vivo* test to measure the silicone deposition on hair after treatment with test products. The relative amount of silicone (silicon atoms) deposited on hair tresses is analysed with X-Ray fluorescence (XRF) spectroscopy, measuring intensities across a two-theta scan range. Different types of hair can be used with this methodology allowing the efficacy proof of hair care products designed for different markets.

**CAN WE PROTECT HAIR MOISTURE AFTER PLANKING?**

Hair moisture is essential to maintain the hair in a good condition, with proper manageability, smoothness and shine. Thermal damage induced by planking and chemical damage induced by bleaching as many other professional hair treatments can impart negatively the hair moisture holding ability and the hair absorption ability. inovapotek developed new tests to assess the hair moisture holding ability and the hair absorption ability before and after treatment with repairing products. The methodology can be used with damaged hair tresses under controlled conditions or with virgin hair. Hair damage prevention can also be evaluated by applying the test products before inducing the damage. These methods can be combined with other measurements such as hair strength, electronic microscopy photography and water content and keratin content by DSC.
Anti-pollution is a new trend for cosmetic active ingredients born on the consumers concern about air and water pollution and its impact on allergies, skin irritations, premature ageing and other diseases. Therefore the evaluation of the efficacy of cosmetic products in preventing and/or repairing the negative impacts of pollution on skin and hair has gained huge importance. For haircare products an ex vivo test was developed by inovapotek, using bleached tresses impregnated with charcoal particles. Evaluations are done by electronic microscopy photography and image analysis to determine the % of hair surface coupled by particles. For skincare cleansing products an in vivo test was developed, including photos and skin colour measurements before and after exposure to a pollution mixture. inovapotek is presently working on new in vivo anti-pollution tests for leave-on skin care products and make-up products.

HOW TO MEASURE HAIR UV PROTECTION?

It is known that the sunlight affects several hair properties, and influences its appearance, being responsible, for example, for hair lightening, dryness, split ends, etc. Several hair care products aim to protect the hair from UV-damage. One of the most perceptible changes is on fibre colouration, as result of a photoreaction of the hair’s natural pigments, either eu- or pheomelanin, as well as a result of photodecomposition of artificial hair dyes. The goal of this method is to evaluate the efficacy of hair care products in the protection of the colour of hair tresses from fading by UV radiation exposure. In this study hair tresses are dyed with a semi-permanent hair dye and submitted to UV irradiation to induce hair colour fading. The UV irradiation emitted by the sun is simulated by a solar simulator and its effect on hair colour is evaluated through colorimetric measurements performed before and after UV irradiation.

IS YOUR LIPSTICK “KISS-PROOF”?

When considering make-up products, the comfort, easiness of application, appealing colours and long lastingness are crucial factors to contemplate. The transfer of a lipstick is the transition of the lipstick colour from the lips to a substrate in contact with it, as seen in everyday objects like napkins, teeth, glasses, cigarettes, food, clothes, and even in the skin and lips of a loved one. This colour transfer is visually noticeable and can make the consumer uncomfortable, and with the need to constantly reapply the lipstick. How does one prove this type of claim? A new method based on the kissing test was developed by inovapotek to assess the lipstick transfer, based on biometric measurements, ensuring reproducibility and allowing the statistical analysis of the data obtained. Precise instructions are given to the volunteers about the application of the test product on the lips. A tissue is placed on the surface of a calibrated weight, held at a fixed distance from the volunteer’s face, and pressed against the lips, using a customised apparatus. The use of this apparatus creates standard conditions throughout the study, leading to lower variability, higher reproducibility and reliability of the data obtained. The weight of the tissue is assessed and the colour of the tissue is measured with a Skin-Colorimeter.
SPF boosters are ingredients that can significantly increase the *in vivo* SPF but don’t alone contribute meaningfully to SPF. The search on SPF boosters has gain a huge importance as its use decreases the level of SPF filters needed on the sun protection formulas. Boosters might work by increasing UV absorption by maintaining the sunscreen film thickness, increasing UV scattering ability of sunscreens, increasing the UVA coverage by extending the critical wavelength, among other mechanisms.

inovapotek has developed an *in vitro* methodology to evaluate the efficiency of SPF boosters, comparing with the same formulation without booster.

**NAIL PRODUCTS IN VIVO TESTING – CURRENT CHALLENGE!**

Nails are important, not only aesthetically, but also structurally and functionally to the fingertips. Regular nail care is very important both for aesthetical appeal and to keep the nails healthy. Hence it is crucial to evaluate the properties of nail lacquers and nail plates, assuring the health and good functioning of the nails as well as the consumer acceptability of the products. Although there are a great variety of techniques available, the majority of them are performed *in vitro*, lacking *in vivo* data considering the actual product application on live nails. There is a need to develop new techniques that allow analysing numerous characteristics of nail plates and nail lacquers *in vivo* or mimicking the conditions verified *in vivo*. inovapotek is developing and validating several new techniques, helping to understand and analyse some of the key features of nail products, such as hardness, opacity, adhesion, among others. One of the innovations is the analysis of the roughness of the nail surface with PRIMOSlite, typically used to assess wrinkles, scars and other characteristics of the skin.

**NOVEL APPROACH FOR TESTING ANTI-OXIDANTS IN VIVO**

Exposure to UV light increases the Reactive Oxygen Species (ROS) and oxidative stress on the skin, responsible for DNA damage, malignant transformation and other signs of cell damage that ultimately lead to premature skin ageing and even to skin cancer and degenerative diseases. The natural antioxidant process of the skin minimizes, impairs and even reverses many of the damaging effects of ROS, oxidative stress and oxidizing agents however, the antioxidant action and immune response of our organism is sometimes exceeded, requiring help. This may come in three forms: reducing exposure to UV light, increasing the antioxidant defence levels of the skin, and boosting the skin repairing system. inovapotek developed an *in vivo* methodology to evaluate the ability of antioxidants to reduce the skin erythema caused by UV light. The method consists on the application of test products and controls on the skin of human volunteers that will be exposed to different Minimal Erythema Doses (MED) of UV light. The skin erythema is assessed visually by experts and objectively by colour measurements.