VISIOPHARM®

Animal-free skin research model – accurately quantified

Research question

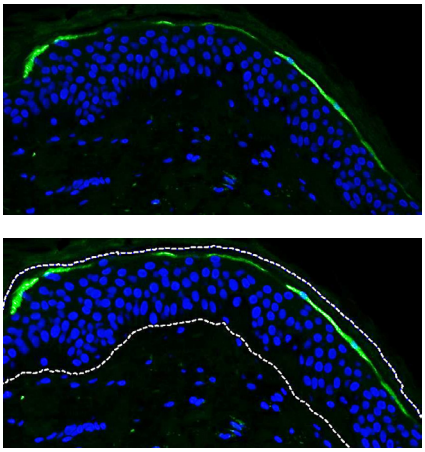
There is a critical need for robust and reproducible models in cosmetic research as alternatives to animal models. The research team at Chanel evaluated the effectiveness of an innovative ex vivo method for maintaining human skin tissue in culture for up to 16 days, providing flexibility for studying different biological mechanisms, from short-term effects (e.g., exfoliation) to longer-term impacts (e.g., anti-aging). In a second step, they used this model to investigate the exfoliating effect of a specific lotion ("The Lotion") using Visiopharm deep-learning analysis.

Why Visiopharm's Discovery software helps

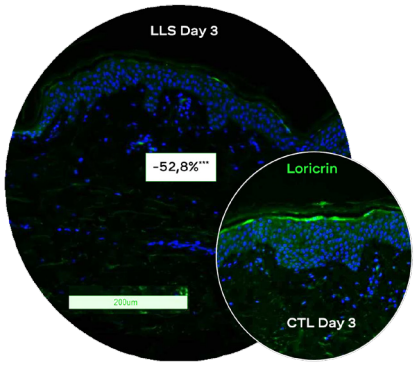
The Discovery software was selected for its ability to deliver custom image analysis applications that precisely detect specific targets within the epidermis. Its deep-learning capabilities enable the software to be trained on multiple images, ensuring consistent performance. The two-step analysis process—first outlining the epidermis as the region of interest, then detecting and quantifying the biomarker within that region - provides analytical precision and reproducibility that was essential for this study.

Key insights

- The innovative ex vivo skin model offers Chanel a robust way to assess the efficacy and safety of their products – animal free.
- Artificial intelligence allows them to quantify the efficacy of products.
- Using deep learning image analysis ensured high reproducibility and reliability of the results.
- The model demonstrated flexibility for various cosmetic evaluations, from exfoliation (short-term) to anti-aging (longer-term).



Measuring the amount of respective biomarkers (right side: detection overlay) in the skin epidermis (white dotted line) of the ex vivo tissue



Testlotion (LLS) reducing Loricrin 52.8% compared to the Control (CTL) at day 3

Read the poster here →

CHANEL
FRAGRANCE & BEAUTY
INNOVATION, RESEARCH & DEVELOPMENT
VISIOPHARM®

15th International Conference on SKIN AGEING & CHALLENGES, MALTA, November 5-6th 2024

Skin CHALLENGES

LONG-TERM SKIN TISSUE MAINTENANCE FOR THE BENEFIT OF PRODUCT EFFICIENCY

Fanny RICHARD, Anissa SAHEBDEEN, Luca PONCELET, Helena NYGAARD REGEV, Emmanuelle ROUISSOU CADIOT, Nada ANDRE, Youcef BEN KHALIFA
IRD Chanel Fragrance & Beauty, Pantin, France. Visiopharm Hørsholm, Denmark

INTRODUCTION

Skin acts as a protective barrier against external aggressions that our bodies are submitted to on a daily basis, although it can also be challenged by endogenous stresses. 3D reconstructed skin models are often used in the cosmetic industry as an alternative to in vivo animal models, but although very reproducible, they do not cover the entire complexity of the morphological and physiological characteristics of human skin. Ex vivo can be a more complex and complementary research model helping to understand skin responsiveness to internal & external factors (UV..) and to evaluate the effect of active ingredients and cosmetic products on biological mechanisms. Here we present an innovative ex vivo method consisting in a dynamic maintenance of human skin samples in culture for up to 19 days, that allows us to study skin response to environmental stresses or cosmetic products over a long period of time. This long-term culture makes it possible to adapt the culture time to the biological theme studied and allows to ensure perfect tissue viability on the window of use of our model for common studies. For example, up to 3 days to evaluate the exfoliating nature of a product, up to 10 days to evaluate the anti-aging effectiveness.

So, the development of this model up to 19 days is a proof of quality and allows us to be confident about the results delivered on the window of use of our explants for common studies. Through this presentation, we highlight the use of our ex vivo model to prove the exfoliating effect of a topically applied product, The Lotion. Finally, the quantification of the observed effect was done using specific "soft ware" tools where AI & deep learning were implied.

1/ DYNAMIC MAINTENANCE OF HUMAN SKIN EXPLANTS FOR UP TO 19 DAYS

METHOD: An abdominoplasty from a 61-year-old woman was treated to remove the hypoderm. Punches of 12mm were taken out of the skin sample and placed on porous cell culture inserts, which were disposed over the wells culture plate containing an internally developed culture medium for up to 19 days, at 37°C +/-2°C in a humid atmosphere at 5% CO2. The medium was removed and changed every two days. At every day of assessment, skin samples were put into histological cassettes and immersed overnight into a 10% Formalin solution at 4°C. The next morning, skin tissues were dehydrated through several baths of increased concentrations of ethanol and xylene, followed by liquid paraffin baths using the Histocore PEARL (Leica). This step was followed by paraffin embedding of the samples. Paraffin-embedded samples were then cut with a semi-automatic microtome (Leica) set at 4µm. Sections were put into a 42°C waterbath until they unfold and were then placed on a Superfrost plus histological glass slides (Epredia), then dried in an oven at 37°C overnight. Sections were then deparaffinized and stained with Hematoxylin Eosin staining using an automatic Stainer (Leica), mounted in Eukitt mounting media and covered with coverslips. Slides were scanned in brightfield at 20X with an Aperio Versa (Leica) scanner.