



Hydration

Studies always highlight that the hydration is the most sensitive claim for the consumers. Since the superficial layers of the epidermis, investigators gradually go through the different skin layers analysing the overall skin hydration. Skin hydration, as a **gold claim**, is often evaluated for a large range of product functionalities such as **aging, soothing, mechanical properties, pollution, radiance, and complexion...**

The hydration of the skin is the more important thing to consider maintaining the good conditions of the skin. The hydration of the skin comes from the **inner tissues** and the moisture state of the skin is influenced by the **physiological conditions of the barrier function** that regulates the perspiration. **The hydrolipidic film of the stratum corneum**, and the physico-chemical structure of the epidermis, work as a barrier to regulate the water loss protecting the body from climatic **external stress, and from internal stress** such as inflammation, hormonal changes, aging, diet...



In vivo evaluation

There are a wide range of devices enabling the in vivo demonstration of the skin moisture considering the skin surface, its structure, its trans-epidermal water loss, or its capacitance. The measures are generally implemented under temperature and humidity-controlled conditions, before and after treatment using a standardised quantity of products, on the volar surface of the arm on treated,

placebo and untreated zones. The **consumer testing** under normal conditions contribute also to this assessment.

The best-known measurement principle uses **the skin electrical properties** to assess the moisturizing effect of the Stratum Corneum, the epidermis and the dermis. The probe indirectly measures either the capacitance, the impedance, or the permittivity with specific characteristics to study the water content of the several layers of the skin.

The measure is **easy, fast, reproducible**, and **well established** and can be carried out in contrasting climate and various ethnicities. Their values are expressed in arbitrary units. The moisturizing effect can be quantified for short (30 minutes, 1hour), day (6h, 12h, 24h) or long term (7-28 days). For skincare containing high levels of electrolytes like salts, small proteins or organic acids that increase conductivity, the hydration values can be overestimated. A contrario, skincare's containing an important ratio of lipophilic or apolar components the values of the hydration can be overestimated.

- **Stratum Corneum:** Corneometer® (C+K), Dermalab, Epsilon (Biox), MoistureMeter SC, Skicon-200, DPM 9003,
- **Epidermis:** MoistureMeterEpiD,
- **Dermis:** MoistureMeterD
- **Quantitative and qualitative alternatives measures** have emerged with different levels of technology:

The second renown methods to study the hydration rate of the skin is the indirect method of the trans-Epidermal Water Loss, called TEWL. Useful for oily formulations that are not easy to evaluate using impedencemetry principle it is also an interesting device to globally evaluate the skin barrier function.

The TEWL methods, based on the diffusion principle measure trough a cylinder with sensors the humidity in an open or closed chamber, detecting the water that evaporates from the skin by measuring the **gradient of humidity** between the skin and the upper side of the cylinder. The conditions of the measure must respect an acclimation period of the subjects in a humidity and temperature-controlled room. For Trans Epidermal Water Loss, indirect method: Tewameter® TM 300 and Nano (C+K), Aquaflux® (Biox), Dermalab®, Evaporimeter®, Vapometer®...

Other methods for the quantification of the hydration of the skin

- Micro-topography analyse: MoistureMap® (C+K), Epsilon (Biox),
- Infra-red Spectroscopy: Dermo,
- The cutaneous surface visualisation: Visioscan (C+K), Dermalab, Hirox, and all other camera systems.
- Lipids and proteins composition analyse by genomic and proteomic analyse from non-invasive swabbing or stripping.
- The scoring by technician experts and dermatologists represents a valuable approach giving, with specific scales, many information through visual and tactile objectivation.

Hydration can be objectivated using **very high-tech and non-invasive** methods through various ways:

- **The skin structure visualization:** MPT Flex Optical Multiphoton Tomography, Scanner, Vivascope and Vivosight and Laser Confocal microscopy,
- **The skin molecular water content** with Confocal microscopy LBRAM 800 and Raman spectroscopy gen2-SCA.
- **The latest technology developed** is LC-OCT 3D microscopy enables both quantitative and visual results.

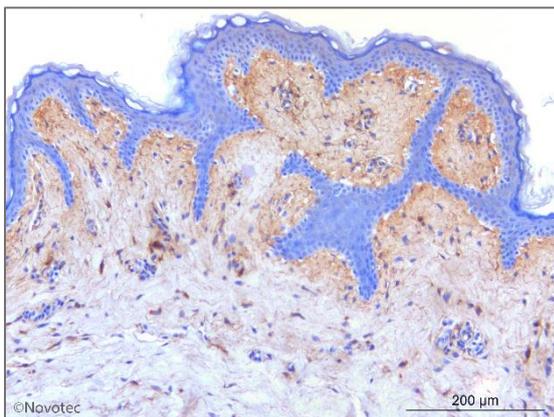
Among the biometrological evaluation, sensory analysis by trained panels or naïve subjects giving scientific objectivation can be combined with face emotional analysis. The study of **emotional processes** represents an infinite source of innovation for the beauty industry by following the expectations of consumers in search of an ever-renewed sensory experience. To objectify emotions scientifically, there is not a single simple and direct method but a multitude of methods. To increase the reliability of these analyses resulting from an unconscious and implicit process, it is necessary to consider in the design of the protocols, the claim sought, the type of product studied, the typology of consumers and to integrate the combination of the **3 components of the emotion:**

- *Expressive or behavioural:* what modifies facial and postural expressions
- *Physiological:* what changes body parameters
- *Subjective or cognitive:* what can be verbalized.

For the hair studies different methods have been developed to substantiate this claim through combing, friction, traction, structure or gravimetry analysis.

In vitro and ex-vivo evaluation

Copyright Novotec



Assays of the hydration properties of skin care and actives can be implemented on several supports:

- 2D cells line, well characterised cells or primary coming from surgery operation, Keratinocytes, Sebocytes derived from human iPSC and 2D co-cultures, often chosen for actives with hydrophilic property.

- 3D spheroids scaffold-free
- 3D skin models, epidermis, or full

thickness, 3D printed or not, often choose for lipophilic formulations.

Here are some of the most classical biomarkers targeting the various biological mechanisms of hydration associated with **aging, the barrier function, inflammation, mechanical integrity, or the regeneration** of the skin. Dehydration can be simulated in vitro by adding increasing percentages of salts (NaCl) to the cells or by removing culture medium.

These biomarkers can be quantified or and visualized by various methods: gene expression, histology (morphology ad imaging) protein and metabolic dosage (Elisa, Western Blot...) or other specific technologies.

- **Hyaluronic acid** corresponds to the main skin extracellular matrix glycosaminoglycan and has unique capacity in retaining water.
- **Natural Moisturizing Factor [NMF]** is mainly composed of amino acids and is involved in the maintenance of skin hydration, on which the barrier function, the skin suppleness and plasticity, the desquamation process and skin homeostasis depend.
- **Aquaporins:** they correspond to channels facilitating the transfer of water and small molecules across cell membranes.
- **Glycosaminoglycans (GAGs)** are polysaccharides (hyaluronic acid...) synthesised by fibroblasts in the extracellular matrix and help to keep water.
- **CD44:** The cluster of differentiation 44 is involved in skin hydration as a key cell receptor for hyaluronic acid.
- **Caspase 14:** Mainly expressed in suprabasal layers and activated during keratinocyte cornification, this protease induces filaggrin proteolysis. This allows the accumulation of free amino acids such as urocanic acid and pyrrolidone carboxylic acid which constitute the NMF
- **Filaggrin:** is a known marker of terminal differentiation of keratinocytes and a major constituent of stratum corneum. Under the action of proteases including caspase 14, filaggrin produces a **mix of amino acids constituting** NMF (Natural Moisturizing Factor).
- **Ceramides and Phospholipids:** in conjunction with the other stratum corneum lipids, they form ordered structures.
- **Matrix metalloproteinases (MMP)** are various proteases located in dermal extracellular matrix and involved in extracellular matrix remodelling.

Moisturizing performance enhances the **density of the dermal extra-cellular matrix** [ECM]. This "renowned" matrix plays one of the essential roles of the water retention properties of the dermis with this intricate **network of extracellular macromolecules** providing **cells structural, bioactive molecules and biochemical support**.

It is crucial to take time with the CRO's to design each protocol and define precisely, the all parameters of the in-vitro or in vivo study... You never waste time briefing these essential elements. Moisturizing performance of skin care is one of the fundamental claims of personal care. Even it seems obvious to validate this property, there are many options of protocols, and the choice of methods is wide and should be well documented.

Easily find the methods and testing labs to substantiate Hydration

- For the in-vitro efficacy tests: ["Preclinical Testing Platform"](#)
- For the clinical tests: ["Clinical Testing Platform"](#)

Warning Connection: You need to subscribe twice for both platforms

Our partners have the floor

We are glad to introduce the several topics presented by our partners

- Multimodal Hydration by [IEC](#)
- Water measurements on the skin – C+K's Core Expertise by [C+K](#)
- [Ellead](#) presents a total solution for skin moisturizing evaluation through in vitro and clinical test
- Assessment of Product Hydration Efficacy in Clinical Trials by [PCR](#)
- Skin Hydration measurement by [Proderm](#)
- [Eurofins](#) assesses skincare hydration for different ethnic skin groups
- Winter is coming! This means that it is the perfect time to test hydrating products or moisturizers on the skin by [Evalulab](#)
- The cornerstone of facial care by [Zurko Research](#)
- Hydration measurement by Pixience by [Pixience](#)
- [Newtone](#) solution for nomadic or in-lab follow-up of moisturization performance using skin digital imaging & 3D surface micro-relief pattern analysis
- D-Squame with "PAC and iST" techniques for skin proteomics, to characterize skin barrier function and superficial inflammation by [Phylogene](#)
- Capture water with Natural Moisturizing Factor by Rachida Nachat-Kappes
- [CIDP](#) has developed ex vivo and in vivo methodologies to determine the efficacy of moisturizing products



Multimodal Hydration by IEC

Jean-Robert CAMPOS | Scientific Director

Test your moisturizing products with multiple devices, in multiethnic panel under various climatic conditions

The skin, the largest organ of the human body, can exchange with its environment while protecting itself from external aggressions.

On the surface of the skin, the hydrolipidic film contributes to maintaining a protective barrier, in particular its level of hydration by **regulating water exchanges** and **maintaining a supple, soft, and comfortable skin.**

To keep the skin hydrated and prevent skin ageing by maintaining a certain elasticity and a radiant complexion, it is not only essential to drink but also to moisturize the skin with cosmetic products whose effectiveness has been proven by clinical tests during a controlled Kinetics and/or in use tests.

To address the issue of hydration, IEC suggests **various subjective tests** (scoring, self-assessment) associated with **instrumental measurements.** These measurements of the skin's hydration state can be carried out directly by quantifying **electrical or electromagnetic properties** of the skin or indirectly by assessing skin surface, texture and entropy.

Corneometer™ CM 825 [Courage + Khazaka]

This "classic" equipment measures the electrical capacity (a.u.) and is commonly used to obtain basic information on the hydration of the superficial layers of the skin (stratum corneum) of different parts of the body (face, lips, forearms, legs, etc.), during in use tests or controlled Kinetics over 8, 10 or 24 hours.

A model of the hydration of the different areas of the face can be obtained by carrying out 30 measurements on each hemi-face (i.e. 60 measurements in total) allowing **a establish cartography** [Mapping by Newton Technologie] and thus to visualize the most hydrated areas over time.

Moisture Map® MM100 [Courage + Khazaka]

It measures the penetration of the electromagnetic field and complement to the classic hydration measurement mentioned above, which allows a mapping of surface hydration. The images and measurements of the micro-depression network (RMD) also give perspectives in the evaluation of skin texture (roughness, etc.).

VisioScan® VC 20 plus [Courage + Khazaka]

Several parameters relating to skin hydration can be assessed with this device:

- **Skin surface parameters** such as smoothness, roughness, desquamation.
- **Texture parameters** such as entropy, homogeneity
- **Anisotropy index** which decreases for a more hydrated skin.

C-Cube® [Pixience]

The C-Cube is based on an Ultra-HD camera, LED lighting and a colorimetric, geometric and 3D calibration that provides information on the degree of hydration of the micro-relief (roughness/Smoothness; symmetry/sharpness). It is also possible to obtain other data such as the **isotropy and dryness** of the micro-relief or even the quantity of scales.

Skin Cam®- [Newtone Technologies]

This compact and nomad device, which can be used both in the laboratory and **by the subjects at home**, provides among other data on the texture and roughness of the micro-relief through a 3D analysis.

Squames Analysis Station [Monaderm]

The purpose of the Quanti-Squames® software is to analyze and quantify the amount of scaling (occupied surface area and the scaling index) on the surface of skin collected using D-Squames™.

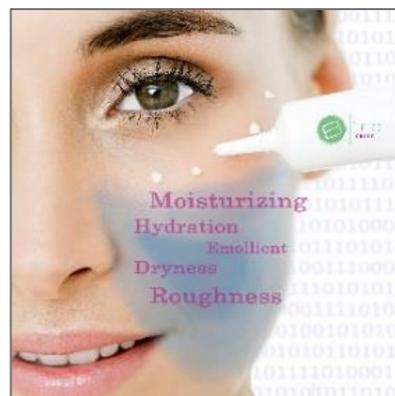
Silicone Skin Replica Analysis Station [Monaderm] or Fringes Projection [EOTECH]

Using Quantilines®[Monaderm] and AEVA [EOTECH] softwares, an indirect analysis of the micro-relief is carried out on cheek silicone replica, which gives the **roughness and smoothness** parameters of the skin.

ColorFace® [Newtone Technologies]

Based on multimodal acquisitions of the full face, the Colorface can be used for **texture** (contrast, entropy) and **roughness analysis** under cross polarization modality.

IEC offers protocols combining in **Use Tests with various techniques** mentioned above under standard environmental conditions, but also under specific climates in **multiethnic panels** due to the geographical distribution of its testing centers [Europe, Asia, Africa], : continental with harsh winters [Sofia, Bulgaria], equatorial with heat and humidity [Singapore], Mediterranean with dry summers and winters with drying sea winds [Cape Town, South-Africa], and also in France, Japan, China and Korea for a global appraisal of moisturizing performances for cosmetic products.



Contact: jr.campos@iecfrance.com

Discover IEC Group profile and instrumentation on the Preclinical and Clinical Platforms: [IEC Group](#)



Water Measurements on the Skin

Courage + Khazaka's Core Expertise

Diana Khazaka | General Manager Courage + Khazaka

The moisture in the stratum corneum and the quality of the skin barrier function are the most important basic parameters and relevant for all products and other materials that are applied to or meet the skin.

That is why **Corneometer**[®], the gold standard for measuring the water content of the stratum corneum (SCH), and **Tewameter**[®], the gold standard for measuring transepidermal water loss (TEWL), are indispensable in the worldwide R&D of cosmetics, pharmaceuticals and household products. They are used daily as robust, accurate "workhorses" in the respective work and studies.

The measurements around the water content of the skin belong to the area in which C+K has an absolute core expertise. So, we are pleased to present two devices that illuminate this important parameter from other angles and are therefore a perfect complement to the "gold standard".

State-of-the-art capacitance imaging with new hard- and software – MoistureMap MM 200

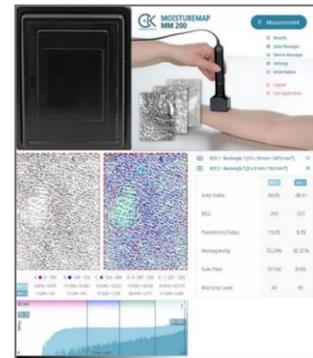
Capacitance imaging is based on the renowned L'Oréal SkinChip^{®*}. The

sensor gives graphical information on the near surface hydration distribution and the micro-topography of skin and other tissues

(textiles, plants, etc.).
The **new MoistureMap MM 200**

(successor of the MM 100) features new hard- and software. The very flat sensor surface without any metal rim and a capture-button on the probe facilitate the taking of high-quality images. The convenient, modern software offers new functions and parameters.

MoistureMapping: analyse the distribution/homogeneity of hydration on the skin surface (results known from the various L'Oréal publications, a permittivity result, and more) presented in an easy to understand graphical and numerical way. Compare even different ROI in one image. With optional accessories, the MoistureMap is well-suited for **in vitro measurements**.



Micro-topographic results: As the sensor has no contact to the skin where lines and wrinkles are, they are perfectly visible in the image (background - no signal). In addition to looking at hydration, topographic measurements (polygon size, corner density, anisotropy index) give interesting aging parameters.

Impressive "3 D"-style images to add to your documents and publications.

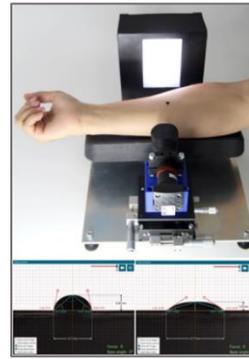
Take a video (.avi) to show kinetic effects of moisture distribution: select the number of frames you want to analyze to show a development over time, especially useful for in vitro applications, occlusion studies, etc.

*MoistureMap is licensed worldwide under the L'Oréal patent for the Skin Chip® (EP 1 438 922 B1). A variety of articles on the measurement principle have been published.

Unique new instrument to assess skin's wettability by drop shape analysis – Drop Angle Meter DM 300

Analyzing the shape of a drop of water on a surface and determining its contact angle is a well-known method to characterize wettability, skin's free surface energy, its tension, and its hydrophilic/ hydrophobic properties.

When a defined droplet is applied to the skin, the drop forms a certain shape. The point at which the skin, **liquid and air** meet determines the contact angle. Water forms droplets with contact angles 90 degrees and



higher on a hydrophobic (low energy) surface and less than 90 degrees on a surface. The larger the contact angle the lower the wettability and vice versa. Higher

wettability indicates more moisture at the skin surface (hydrophilic – higher surface energy). The compact Drop Angle Meter DM 300 features a very uniform diffuse LED light source, a flexible arm rest and a high-resolution camera, that takes the macro image of the drop on the skin from the side, which is then analyzed in the modern, convenient software.

The Drop Angle Meter is a perfect addition for:

- Effect of products on the skin (degreasing, washing, moisturizing)
- Testing spreadability
- Testing water repellence of products, for example lip gloss or nail polish
- Tissue engineering, e.g., skin grafts for scars (improved adhesion of cells with increased wettability)

Both, MoistureMap MM 200 and Drop Angle Meter DM 300, feature connections for Corneometer® and Tewameter®, thus allowing you to create a sophisticated "water measurement center".

Contact: info@courage-khazaka.de

Discover Courage & Khazaka profile and instrumentation on the Clinical Platform: [C+K](#)



Ellead presents a total solution for skin moisturizing evaluation through in vitro and clinical tests

Sunhwa Lee

There are many evaluation methods to check the moisturizing effect of the skin, and Ellead evaluates not only the skin moisture but also trans-epidermal water loss through various equipment. **Raman Spectroscopy** is the most powerful tool to directly evaluate skin moisture, noninvasively. Ellead evaluates the change of the water contents and **natural moisturizing factor (NMF)** through Raman-based hydration status analysis (Fig.1).



Fig 1. Raman-based hydration status analysis

Raman Spectroscopy is a non-destructive technique based on the scattering of light by molecules. In a Raman scattering event, part of the energy of the incoming light is transferred to a molecule, thereby excites one of the molecule's

vibrational modes. Since every molecule contributes to the overall Raman spectrum, it is a direct representation of the overall molecular composition. As such the Raman spectra can be used as highly specific spectroscopic fingerprints, that enable the **identification or classification of cells and tissues**. By using these principles, the main role is to measure the skin penetration of topical formulations. But also, the water content and NMF changes in the skin tissues and cells.

There is also a moisturizing evaluation method based on the principle of electrical conductivity on the skin surface and sub-surface using **Corneometer[®], Epsilon[®] and MoistureMeterD[®]**. The results by using these methods can be expressed numerically and the effect of moisturizing can be expressed through a color scale (Fig.2).

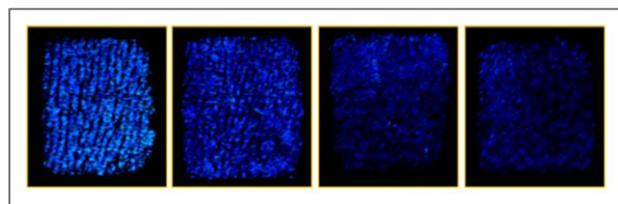


Fig 2. The Visual evaluation of skin hydration

Ellead can design various moisturizing evaluations. The skin moisture effect can be evaluated the skin moisture effect according to the environment of season in the temperature and humidity control room. It is possible for us to evaluate the skin persistence for **up to 24 hours or 48 hours**. If you are curious about the skin hydration status after a workout or a sauna, you can check it out at Ellead.

Ellead can evaluate not only the clinical evaluation of cosmetics, but also the moisturizing of raw materials **through in vitro test**. The major factors related to skin moisturizing are **Aquaporin3(AQP3) and Hyaluronan Synthase 2(HAS2)**. Skin moisture balance is regulated by hyaluronic acid (HA) and natural moisturizing factors (NMFs). HA promotes skin hydration and plastic properties of the skin and is synthesized by hyaluronic acid syntheses. Moreover, HA stimulates the cell proliferation and differentiation of keratinocytes. Hyaluronan Synthase 2(HAS2) induces HA synthesis in skin keratinocytes. Another important gene in skin hydration is aquaporin 3 (AQP3). AQP3, water channels are involved in various physiological functions, such as cellular metabolism, water balance, and wound healing through transporting

glycerol and water. In particular, AQP3 found in the epidermal basal cell layer plays an important role in skin barrier function and facilitates differentiation in keratinocytes. Ellead provides skin moisture factor AQP3 and HAS2 mRNA expression analysis services in keratinocyte by using RT-qPCR assay, it can detect the enhanced moisture potential of cosmetic ingredients (Fig. 3).

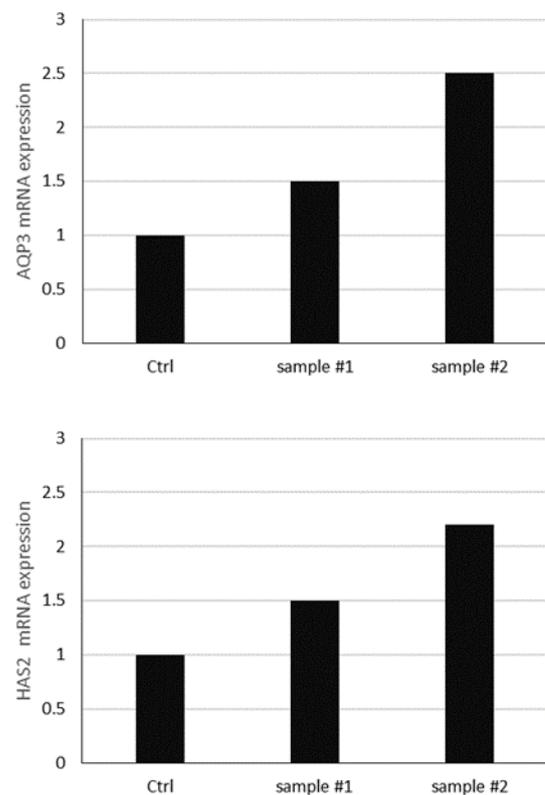


Fig 3. Skin moisture factors

Contact: ellead@ellead.com

Discover Ellead profile and instrumentation on the Preclinical and Clinical Platforms: [Ellead](#)



Assessment of Product Hydration Efficacy in Clinical Trials by Princeton Consumer Research

Dr. Nalini Kaul | Ph.D. Vice President Technical

Hydration or moisture of the skin means the moisture content of the stratum corneum (SC). The hydration level of our skin helps determine whether our skin is beautiful, bright, healthy, or dry, parched, tight and rough. The epidermis is composed of different layers. At the bottom layer, known as the stratum basal, the cells divide and push already formed cells into the higher layers. As the cells move into the higher layers, they flatten and eventually die. The top layer of the epidermis, known as **the stratum corneum, is made up of dead, keratinized cells** that shed about every two weeks. While the amount of water in **the inner layers of the skin is relatively constant**, the moisture in the SC depends on different factors:

- the rate at which the water in the dermis reaches the SC
- the rate at which the water is eliminated by evaporation (Trans Epidermal Water Loss-TEWL)
- and the ability of the SC to retain water.

Our skin barrier helps prevent excessive water loss through evaporation and helps guard it from

external stressors. Scrubbing, friction, or abrasion may partially or completely remove the SC and thus disrupt the skin barrier by exposing the viable and water-rich epidermis to the environment. Presence of natural moisturizing factor increases the ability of the SC to retain water. The water content of the SC is thus a delicate balance between the deeper layers of the skin and the environment. With aging, our skin is less capable of retaining moisture and as a result gets dryer. When skin gets dehydrated, the skin barrier is compromised.

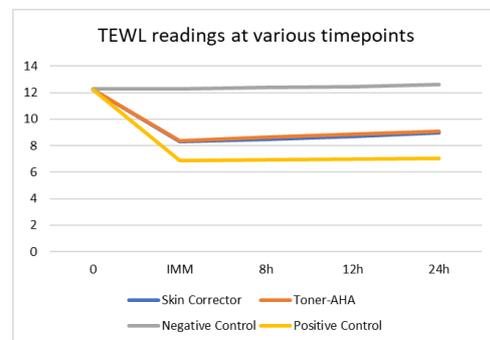
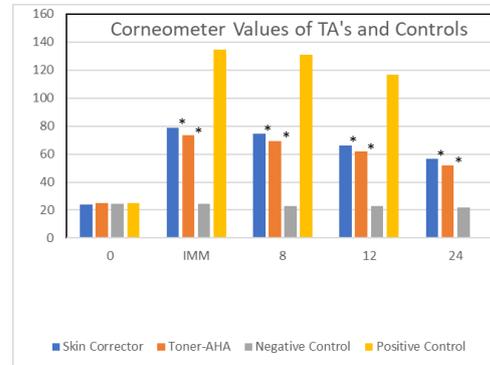
A primary objective in skin care is for the skin to be optimally hydrated. In fact, hydration claims top the list when it comes to cosmetic products. The market is full of products that promise immediate, locks in moisture/ long lasting and /or sustained hydration which need appropriate testing designs to evaluate these claims. Moisturizers work either **by attracting moisture from the atmosphere** into skin (humectant) or they **create a barrier** and restrict water loss from the skin (emollient) and they also **reduce skin friction and** increase hydration.

It is important to design and test the product with the claims in mind. Methods to evaluate skin hydration include measuring the electrical capacitance with the help of the **Corneometer® CM825 (C+K)**, **Visual assessments** and **Self Perception Questionnaires**. An altered skin barrier function it is normally marked by an elevated TEWL (e.g., in atopic dermatitis and psoriasis or in studies using solvents and detergents). Elevated TEWL values in disturbed skin barrier are frequently correlated with low hydration within the SC.

There should be an inclusion in the study design of an untreated site along with a positive control like glycerol or petroleum jelly depending on whether the moisturizer is a humectant or occlusive in nature. Investigational moisturizers are usually tested on volar arms or lower lateral legs. Change from baseline in visual evaluations along with Corneometer values at baseline, immediately after supervised product application, and as designed at 4, 8 and 12 hours and sometimes up to 24/48 and/or 96 hours depending upon the claims to be made are determined. For TEWL determination a Tewameter® TM300 (C+K) is used.

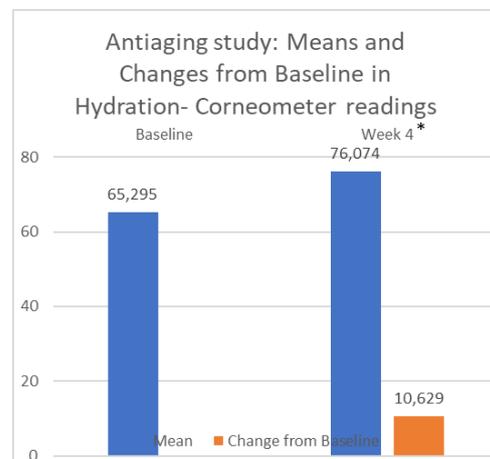
In anti-ageing, products ingredients like hyaluronic acid/retinol and its derivatives/alpha hydroxy acids like glycolic acid are routinely added for hydration. Usually, study design of 4 weeks or more is selected to allow for complete turnover of corneocytes. Skin surface hydration is evaluated visually by a trained grader at baseline and then at 2 weeks and 4 weeks along with Corneometer® and Tewameter® recordings.

Study 1: N=30 healthy M/F were used to evaluate moisturization efficacy up to 24 hours in a randomized blinded study design after a single application of TA to sites on lower lateral side of legs.



*Significant changes from baseline at all time points up to 24 hours

Study 2: Antiaging study: 31 Healthy M/F (35-75y) in a single blind monadic design for a 4-week study period.



*Significant change from baseline

Antiaging Study-Skin attributes and VISIA Analyses

Attribute	Treatment	Timepoint	Treatment Mean	Mean Difference from Baseline	Within Treatment t test p-value	Percent change Mean	Number Improved	Percent improved
Total Skin Area with Lines and Wrinkles	A	Baseline	111.726					
		Week 4	100.19	-11.535	0.0026*	-10.3%	-13.00%	84.60
Roughness	A	Baseline	8.73					
		Week 4	8.131	-0.598	0.0003*	-6.90%	-6.50%	84.60

SPQ-4WK	Percent	p-value
Q My skin looks smoother	79.31	0.0016*
Q I have fewer wrinkles	48.28	>0.5000
Q My skin feels softer	82.76	0.0004*

In conclusion employing proper study designs is important for moisturizing product efficacy determinations and substantiation of related claims on dry skin. In the studies presented above topical applications of the products led to increased skin hydration and decreased TEWL, thereby substantiating the “restores hydration” claim for the products studied.

Contact

Canada: elsiekohoot@princetonconsumer.com

U.K: kirstiemaquire@princetonconsumer.com

USA: lialong@princetonconsumer.com

Discover Princeton Consumer Research profile and instrumentation on the Clinical Platform: [Princeton Consumer Research](#)



skinobs
Skin, Hair, Nail Testing Platforms

Discover the Methods
Choose the Tests
Contact the Testing Labs

NEW
PRECLINICAL
TESTING

+ 800 tests for 60 claims
+ 200 cros in 40 countries
+ 4 700 users from 72 countries

CLINICAL TESTING

CONNECT FOR FREE SKINOBS.COM

OPTIMISEZ VOS PROJETS D'ÉVALUATION

Les plateformes Preclinical et Clinical Testing de SKINOBS aident les cosméticiens à évaluer :

La sécurité
La tolérance
L'efficacité

des actifs et produits finis et trouver, dans le monde entier, **les prestataires de tests reconnus et les méthodes les plus pertinentes.**

Suivant un principe de recherche par menu, filtres et mots clés, SKINOBS offre aux responsables d'évaluation, une **consultation gratuite, rapide et approfondie :**

Des méthodes
Des laboratoires de tests

Et la possibilité d'une **demande directe** d'information aux prestataires.

« À l'écoute des tendances et de l'évolution des technologies de l'étude des **ongles, des cheveux et de la peau**, nous travaillons à l'amélioration continue de notre base de données. Les attentes des cosméticiens et des prestataires de tests sont au cœur de notre réflexion et **de notre approche indépendante et exhaustive.** »

Anne Charpentier - CEO

OPTIMIZE YOUR EVALUATION PROJECTS

SKINOBS Preclinical & Clinical testing Platforms help cosmeticians, worldwide, to **evaluate:**

the safety
the tolerance
the efficacy

of actives and personal care products and help to find recognized tests providers and relevant methods.

Following a menu, filters, and keywords search, SKINOBS offers evaluation managers free, rapid, and in-depth consultation of:

methods
testing laboratories

the possibility of a **direct contact** to obtain information from test providers.

"We pay constant attention to trends and developments of technologies in **nail, hair and skin assessment.** We aim to improve our database, continuously. The expectations of cosmeticians and testers are at the heart of our thinking, and our **independent and comprehensive approach.**"

Anne Charpentier - Founder



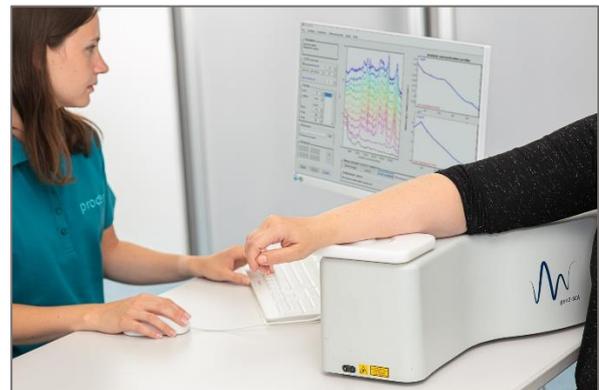
Skin Hydration Measurement by proderm

Stephan Bielfeldt | Director Research

Measuring skin hydration in humans can be a complex process due to the nature of instruments (despite ease of use), what is being measured, and how relevant this is to the consumer. Classic methods used for measuring skin hydration rely on measuring water capacitance and/or transepidermal water loss (TEWL) using e.g., a Corneometer® or an open or closed chamber TEWL-probe. More advanced methods can provide **moisture imaging or even molecular information** on not only the water content in different layers of the stratum corneum, but also the state of its **molecular mobility**. This article aims to present two of such advanced methods.

Moisture Imaging Systems such as the Epsilon® measure the skin hydration by assessing the electrical permittivity (epsilon = di-electrical constant) or the capacitance. Moisture imaging systems have ~20 micron sensing depths that confine the measurement predominantly to the stratum corneum. The system has 76800 sensors on an area of 12.8 x 15 mm, whereas standard devices have only one. Its signal processing technology converts the non-linear sensor output into a linear and calibrated response, which then

correlates highly to other di-electrical devices such as the Corneometer® values. This technique can visualize **dynamic parameters** of hydration e.g., in a Moisture Accumulation Test (MAT). A video is taken and shows the accumulation of water under occlusive conditions by the sensor. The Area Under the Curve (AUC) is defined as the area over the time points of measuring Epsilon® on the occluded area during the live video. The bigger the AUC the higher is the mean moisture accumulation per time.



Using **Raman spectroscopy**, we can determine certain molecules in the skin without damaging it. Raman is by far the **most advanced method** for studying skin "hydration" in vivo and measures the vibrational properties of molecules via the inelastic light scattering. This

provides information on the **molecular composition and structure** of the skin. It is a laser-based, **non-invasive method** that enables the measurement of various parameters. Raman confocal spectra in the high wavenumber region highlighting the bands of CH stretching and OH stretching can be used for the calculation of water content and of the water molecules in different states based on their mobility. Up to three states:

- "bound,"
- "intermediately mobile" and
- "most mobile"

water can be discriminated.

Raman spectroscopy is a non-destructive, non-invasive technique which can be used to monitor skin **hydration depth profiles**, water gradients in tissue, drug delivery profiles and NMF (natural moisturizing factors) composition.

Detailed information regarding the molecular composition of the skin can be read from the positions, relative intensities, and shapes of the bands in the acquired Raman spectra.

To conclude, with the **rapid advances in skin care innovations** and the increasing desires of consumers for solid performance products, expectations for "moisturizers" to deliver are very high. Valid instrumental developments to provide claim support are not only keeping pace with product technologies and consumer needs, but also contributing to the continued advancements in **skin barrier function knowledge** and hydration processes. Combining such instrumental methods with **consumer self-assessed and expert witness** adds gravitas to the weight of evidence generated for hydration studies.

Contact: AJourdren@proderm.de

Discover proderm profile and instrumentation on the Preclinical and Clinical Platforms: [proderm](http://proderm.com)

Eurofins assesses skincare hydration for different ethnic skin groups

Sarah Bachir-Levy | Global Marketing Leader

As lack of hydration can affect all skin types, it's one of the **most common concerns of consumers around the world**. Several studies have been conducted to find adequate solutions, but the need for moisturizing products that are tailored to different skin groups is still a challenge.

Several past and recent overviews have demonstrated significant variabilities of quantifiable parameters between different ethnicities, such as

- skin hydration,
- TEWL,
- skin surface
- pH,
- sebum,
- water content,
- ceramide levels, and
- skin reactivity gradients,

suggesting anatomical or physiological property differences across skin groups.

As skin hydration is increasingly becoming a topic in different communities, cosmetics and personal care companies are looking to address a more diversified audience

with targeted solutions and patient-specific regimens to treat lack of skin hydration. This strategy requires a different approach, whereby companies must consider different parameters in clinical trials, such as: structural and functional specifics,

- skin biochemistry and physiology,
- inter-ethnic and intra-ethnic skin,
- beauty ritual inspirations,
- moisturizer application,
- environmental factors,

and more.

With a worldwide network of **18 clinical laboratories across five continents**, Eurofins has access to a wide panel of 100,000 subjects of diverse ethnicities with specific criteria, including, but not limited to, degree of dry skin, age, and specific pathologies. This allows us to undertake **multi-centric trials** with a dedicated recruitment process that considers different skin and environmental factors to perfectly fit hydration criteria.

Our international clinicians and dermatologists are very knowledgeable on skin types across different ethnic groups, to develop **customized tests** to assess the hydration benefits of skin care products.



We aim to address the complexity of facial skin moisturization needs in greater depth, as well as the need for different products for differently hydrated skin types, by offering multi-technical approaches:

- **Clinical assessment:** Clinical scorage, self-assessment, photo/dermatoscope, etc.
- **Biometry assessment:** Corneometer, moisture map, mapping analysis of facial skin hydration, TEWL, isotropy, D-squames, quantisquam, MoistureMeterD®, surface sampling to analyze NMF and lipids, etc.

Multi-site access and diverse panelists open up substantial innovation opportunities for more efficient, multiethnic moisturizing care.

Contact: cosmetics@eurofins.com

Discover Eurofins Cosmetics & Personal Care profile and instrumentation on the Clinical Platform: [Eurofins](#)



Winter is coming!

This means that it is the perfect time to test hydrating products or moisturizers on the skin

Elisabeth Fiquet | President

Brands require that their products be tested **under the conditions closest to instructions of use**, hence the need for representative subjects in terms of:

- ethnic groups,
- skin types (normal, dry, oily, or sensitive) and
- environmental conditions (extremely cold or hot).

Evalulab has conducted over a **thousand clinical studies** for over 20 years on the efficacy and safety of topical products in the **coldest conditions of North America**.

Winter is coming! This means that it is the perfect time to test hydrating products or moisturizers on the skin.

How do you demonstrate that a topical product hydrates?

Epidermal moisture of the stratum corneum can be assessed by non-invasive in vivo instrumental testing method based on the capacitance, an electrical property of the skin, expressed in arbitrary units via the Corneometer®.

To clinically evaluate the hydration levels, measurements are taken before the application of the product to be tested at time $t=0$ and then at various times after application of the test product.

The skin has a barrier role against the external aggressions for the body. In healthy and intact skin, the barrier function is effective and water loss rates are very low.

If the barrier is compromised due to pathological, physical, or chemical damage, the rate of trans-epidermal

water loss increases, indicating a degree of damage. Thus, the Tewameter® is used to measure the rate of water loss through the skin and to determine the state of health of the skin.

Evalulab guarantees the validity and authenticity of the study results by adhering to the strict measures put in place by the test protocol, **good clinical practices (GCP)** and by requesting approval of study protocols by an ethics committee.

Also, Evalulab has developed standard protocols to evaluate the short- and long-term changes of one

or more topical products, to verify the level of hydration or their capacity to repair the skin barrier in cold, normal and/or extreme weather.



Contact: efiquet@evalulab.com

Discover Evalulab profile and instrumentation on the Preclinical and Clinical Platforms: [Evalulab](#)



The Cornerstone of Facial Care

Sabina Giovanni | Chief Executive Officer

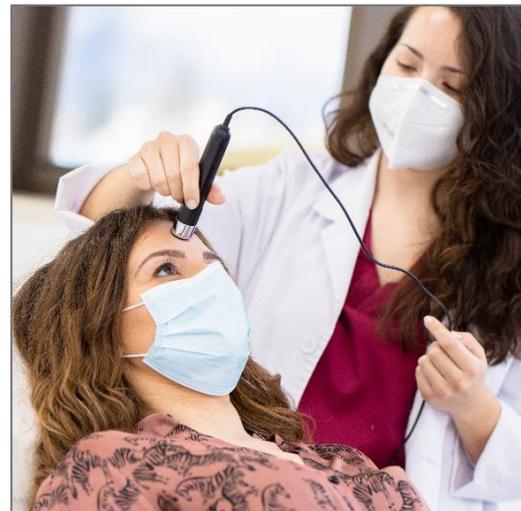
The skin, as the largest organ in the body, is daily exposed to external agents that can alter its characteristics; **water is essential for its proper functioning.**

At present, we see more and more new and increasingly advanced claims. But the importance of guaranteeing basic aspects in our skin care routine, such as maintaining optimal hydration, should not be neglected, this optimal hydration will provide **both aesthetic and functional benefits.**

The stratum corneum of the skin is the outermost layer of the epidermis, and the one on which cosmetic products can have the greatest effect. As for cosmetic products, we could highlight in their composition different substances designed to improve skin hydration.

We can differentiate between moisturizing substances, which are those preparations that **release water to the stratum corneum**, usually solutions or emulsions of external aqueous phase. We can also find formulations aimed at forming an

occlusive film to reduce transepidermal water loss, and thus prevent dehydration.



Finally, the moisturizing substances would be those hygroscopic substances that have the property of absorbing water from the environment, thus increasing the hydration of the skin.

Regarding the formulations, we could make two large groups, leave on and rinse off products.

In rinse off products, what we will generally look for is that the use of the products does not alter the skin by dehydrating it. On the other hand, for

leave-on products we will seek an increase in skin hydration.

The ideal execution for these types of tests is to try to test them on a type of dry skin, more prone to changes in terms of hydration values. And of course, count, whenever possible, with an experimental control zone without product application.

In addition to performing instrumental measurements, we can also evaluate certain parameters related to **xerosis of the skin using several widely recognized clinical scales**. These scales can involve **subjective opinion parameters such as itching** to be evaluated by:

- the panelists,
- visual evaluations of parameters such as flaking, redness and cracks
- tactile evaluations, for example of roughness or smoothness by one or more specialists.

In conclusion, hydration of the skin is essential to maintain its good health and avoid skin alterations with repercussions on all skin types and especially on those skins with a tendency to xerosis.

It is convenient to use cosmetic active ingredients on a daily basis that, in one way or another, allow the skin to be properly hydrated.

The ideal protection against dehydration is based on applying preparations with hydrating active ingredients daily, and not waiting for the skin to show symptoms of dryness.

Depending on the type of skin and age, it is important to select the type of substance or a combination of these to use the best treatment in each case.

Contact: info@zurkoresearch.com

Discover Zurko Research profile and instrumentation on the Preclinical and Clinical Platforms: [Zurko Research](#)



Hydration Measurement by Pixience

Sebastien Mangeruca | CEO

French leader in digital dermoscopy, Pixience works closely with dermatologists and researchers to develop high quality products for skin and hair imaging and analysis.

We strive to bring you **innovative instruments** that are accurate, reliable and consistent. This is the reason why 50+ dermo-cosmetic laboratories, CROs, and universities around the world have chosen our products for their product efficacy studies.

More than a mere dermoscope, C-Cube® Clinical Research – Or C-Cube CR - is the **most versatile instrument for color and surface analysis**, specifically designed to be used in dermatology and cosmetic clinical trials.

Its patented glossless lighting and exclusive color calibration turn each of its 10 million pixels into an actual color measurement. It also works as a handheld 3D scanner with **micrometric resolution**, allowing quantitative analysis of the smallest changes in microrelief. With these exclusive features, C-Cube® Clinical research can be used to evaluate a variety of product effects: anti-aging,

sun protection, moisturizing, pores and seborrhea, blemish, and pigmentation, and of course, haircare.

One of the many uses of the C-Cube® CR is **hydration measurement**. Hydration, a fundamental characteristic of the skin, is more complex than a simple water content. Poor hydration has consequences on **flaking, micro-relief, roughness and potentially inflammation**.



C-Cube® Clinical Research makes it possible to observe, illustrate and quantify these consequences of dehydration.

From the calibrated color photographs of the C-Cube, and thanks to its **wide field of view**, you can evaluate the flaking, directly

on the skin, or on scales sampling strips.

Thanks to the **3D reconstruction module**, observe the micro-relief and analyze the isotropy of the furrows, or measure the local roughness, disturbed by poor hydration.

- Amount of scales (in-vivo or on Sebutape)
- Roughness (Sdr, Sa, Sq)
- Isotropy of micro-relief

We invented C-Cube® Clinical Research to bring you unique observations and convincing illustrations, and to offer an innovative alternative to the many single-application probes and instruments you are used to work with. Soon you may include the C-Cube® in most of your studies.

Equip yourself with a hydration analysis device that will allow you to clearly **visualize and illustrate** the action of moisturizing active ingredients.

Contact: sales@pixience.com

Discover Pixience profile and instrumentation on the Clinical Platform: [Pixience](#)



NEWTONE

IMAGING HEALTH AND BEAUTY

Newtonone solution for nomadic or in-lab follow-up of moisturization performance using skin digital imaging & 3D surface micro-relief pattern analysis

Elodie Prestat-Marquis | C.O.O

The Newtonone family of solutions specializes in creating and developing increasingly powerful customized interpretation algorithms and acquisition systems, to help Cosmetic Industry to Innovate, Explore and Develop new products for all countries.

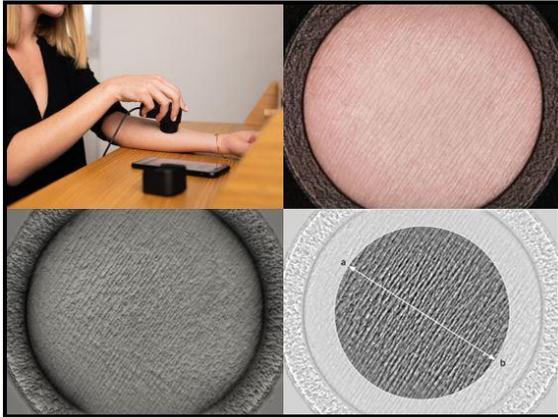
One challenge addressed by Newtonone is to develop solutions enabling to measure “ground truth”: what the consumers **actually see in their mirror**. To help investigate moisturizing product performance, Newtonone developed **a specific optical solution and algorithms**, for a combined approach using local visible light and 3D imaging with powerful algorithm for the analysis of skin micro-relief pattern.

Newtonone portable high-resolution camera allows rapid at-contact acquisition and analysis of versatile skin features: colour and complexion, lentigos, acne, etc., but also **topographic features** such as wrinkles, fine lines, or roughness. Its capabilities have now been evaluated

for several years, either under nomadic conditions (by the consumer, at home, under real conditions of life), or under controlled conditions, by a technician, at the clinical lab.

It proved its efficiency to follow-up skin changes overtime to various face, scalp, or body locations (hands, forearms, legs, feet etc.).

One research was presented to the ESDR congress in September 2020, showing how this approach enables to measure and compare moisturizers efficacy overtime, under a nomadic context, versus untreated skin by **analysing skin microrelief** and monitoring its changes upon moisturizers application, to the forearm (poster available upon request).



Indeed, the skin **surface roughness** is an indicator of major interest for dermatology and cosmetology. Increased in xerotic skin or irritation, it is one of the most common frequent dermatological disorders. In addition to the discomfort triggered by dry skin, the associated roughness and unevenness degrade the appearance of the skin. Yet even a young and healthy skin presents a pattern of fine and isotropic microrelief that contributes to its resistance and to the skin's soft and velvety aspect due to the light scattering it induces.

It consists of polygonal plateaus, mainly triangles or quadrangles, delineated by furrows.^{5 7} These furrows are classified according to their length and depth. The only ones visible with naked eye are the primary lines, the widest and the deepest (30-100 μ m deep relative to the skin surface), while secondary lines are shallower (5-40 μ m) and narrower. Many intrinsic and extrinsic factors influence the skin microrelief, including skin dryness.

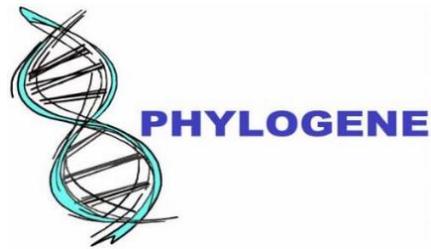
Objective and quantitative evaluation of the skin microrelief is an essential aspect of dermo-cosmetic, especially when it comes to claims substantiation. Newtone camera, connected in real-time to data storage and analysis servers, combined with software suites, proved its potential in analyzing the skin microrelief various parameters under moisturizing effects, sometimes showing a longer efficacy lasting than when measured with classical method (corneometry).



NEWTONE. Poster
Microrelief & Hydrat

Contact: eprestat@newtone.fr

Discovery Newtone profile and instrumentation on the Clinical Platform: [Newtone](#)



D-Squame with “PAC and iST” techniques for skin proteomics, to characterize skin barrier function and superficial inflammation

Gilbert Skorski - CEO | Romuald Arnaud - Business Development Manager

The skin is a barrier membrane that separates environments with profoundly different water contents. Barrier properties are assured by the outer layer of the skin, the stratum corneum (SC), which controls the transepidermal water loss (TEWL). The glandular nature of the skin and its bacteria / fungi composition is

making it prone to lipids metabolism and salts secretions as well, affecting TEWL.

Even though the microbiome role in inflammation / infection is currently subject to intensive research, its implication **in lipids metabolism and thus TEWL** is also to consider. Metaproteomic analysis are well suited for taxa's ecosystem characterization and elucidate functional interactions between skin and its microbiota.

Several sample types are available for dermo-cosmetic studies (reconstructed skin, skin explants,

strips, swabbs), but non-invasive techniques on patient cohorts remain the ones of choice since they allow replicas, more flexible studies design and overall, a direct work on the stratum corneum.

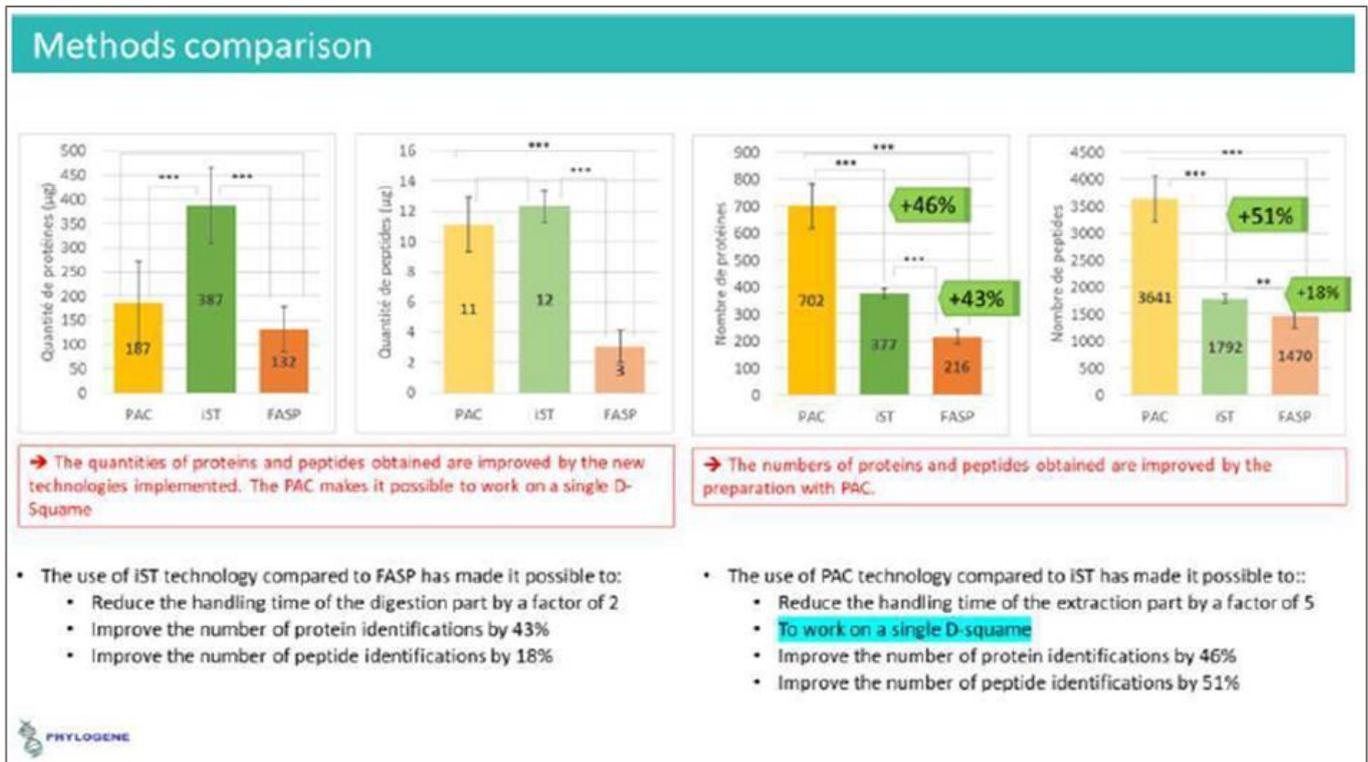


Stripping remains the more efficient and easy way of sampling although these sample types present significant technical challenges during proteomic analysis. From samples preparation to extraction, several critical steps are to be taken care of with caution to avoid samples loss of integrity. Moreover, glue, plastic polymers are major contaminants that must be removed before digestion and mass spectrometry analysis.

To overcome these technical issues and for continuous improvement in dermo-cosmetics, Phylogene developed new **“PAC and iST” techniques** for skin proteomics described hereunder.

When 6 D-Squame were previously necessary, only **1 D-Squame is now**

enough for an improved recovery yield of proteins! Just few D-Squame are now sufficient to obtain proteins identification and function, making the hydration substantiation easier with the associated bioinformatics analysis.



D-Squame with “PAC and iST” techniques for skin proteomics, to characterize skin barrier function and superficial inflammation.

High-resolution nano LC-MS/MS quantitative proteomics and CORAVALID™ data processing, the efficient tools for discovery.

Contact: g.skorski@phylogene.com

Discover Phylogene profile and instrumentation on the Preclinical Platform: [Phylogene](#)



Capture Water with Natural Moisturizing Factor

Rachida Nachat-Kappes, PhD, Cell and Skin Biologist, Scientific Consultancy, Education

Imagine suddenly being teleported from a humid tropical zone to a desert where drought reigns! Well, that's what happens to our epidermis. While the deep "living" layers contain around 65% water, this rate drops to only 15 to 20% in the most superficial part of the horny layer, the stratum disjunctum, made up of the accumulation of dead anucleated cells, the corneocytes, resulting from the keratinocyte terminal differentiation programme. As the boundary with our environment, the stratum corneum (SC) was for a long time considered as a simple inert interface, lifeless and therefore of little use.

The continuous evolution in the understanding of the physiopathology of cutaneous disorders has highlighted the vital barrier functions that it provides. The barrier properties of the SC involve the formation of a rigid protein shell, the cornified envelope; inter-corneocyte lipids and their lamellar structural organization; but also, a

mixture of small molecules called Natural Moisturizing Factor (NMF).

Composition of the NMF

The compaction of intermediate keratin filaments is ensured by the presence of a protein associated with intermediate filaments: filaggrin. But this protein also participates in skin hydration thanks to its proteolysis into hygroscopic amino acids, which are constituents of the NMF, in the most superficial part of the SC (Figure). More than 50% of the NMF is made up of free amino acids and water-soluble derivatives, such as pyrrolidone carboxylic acid (PCA) and urocanic acid (UCA), which are, respectively, a derivative of glutamine, which is highly hygroscopic, and a derivative of histidine, the deamination of which is catalyzed by a histidase. The NMF also contains lactic acid, sugars and other molecules with a very high-water uptake capacity.

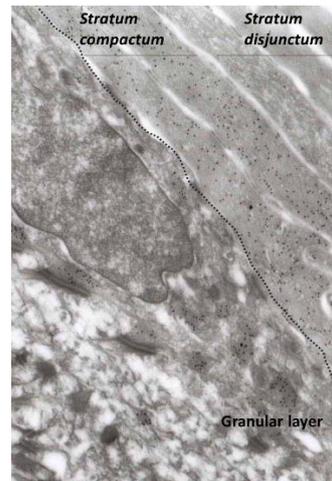
Function of the NMF

NMF is present in the corneocytes and can represent up to 30% of the dry mass. Thanks to its strong humectant properties, it can capture a large quantity of water from the ambient humidity (up to 3 times the dry weight of the SC). The hydration provided by the NMF is essential for the activity of the numerous corneocyte enzymes, such as proteases involved in desquamation process (SCCE, SCTE, cathepsin D...), phospholipases, responsible for the acidification of the SC (~pH 5.2). This acidic pH regulates the skin microbiota, and activates lipid hydrolases necessary for ceramides synthesis and the integrity of the lipid barrier. Neutral and/or basic amino acids of NMF interact with keratins via ionic bonds and contribute to the elastic properties of the SC to maintain its relative flexibility. UCA acts as a natural UV filter, it has an immunomodulatory role and is involved in the acidification of the SC.

In humans, numerous abnormalities in filaggrin expression or maturation have been identified. Particularly in 2006, when two loss-of-function mutations of filaggrin were

discovered which affect 9% of the European population and which are both a predisposing factor for atopic dermatitis and a cause of ichthyosis vulgaris, characterized by intense skin dryness.

Figure legend:



Immunoelectron microscopy observation of filaggrin with immunogold staining method (Dark spots). In the stratum disjunctum, the filaggrin is deiminated by PAD1 and 3 and is proteolyzed to produce the free amino acids of the NMF (demonstrated by the disappearance of the gold particles).

Contact: rachida@innovskin.com

Access free online MasterClass in French « Comprendre la peau et ses besoins » : <https://formation.innovskin.com/registration>



CIDP has developed ex vivo and in vivo methodologies to determine the efficacy of moisturizing products

Florence FOURNIER | Client Relationship

Skin hydration plays an essential role for the barrier function of the skin and helps to shield from exposome such as pollution, ultraviolet radiation and prevent microbial contamination on the inside of the body.

A hydrated skin physically limits water loss and prevents evaporation of essential ions and amino acids.

Moisturizing skin care occupies a major segment of the cosmetics and Skin care market. CIDP, leader in dermatological testing, has developed several *ex vivo* and *in vivo* methodologies to determine the efficacy of moisturising products.

Ex vivo, human skin explants can be used where biological markers implicated in cellular cohesion and cell-cell junctions can be monitored. This includes biomarkers such as Claudin-I, Occluding-I, Integrin and Collagen. Lipid synthesis as well as

the epidermal differentiation and extracellular matrix synthesis can also be evaluated to determine the hydrating effect of a cosmetic product.



In healthy volunteers, the skin hydration can be evaluated based on the electrical properties of the skin such as conductance and capacitance that change with the water content of the skin. For this purpose, equipment such as the Corneometer® CM820, Tewameter® TM 300, VapoMeter can be deployed.

Contact: f.fournier@cidp-cro.com

Discover CIDP profile and instrumentation on the Preclinical and Clinical Platforms: [CIDP](#)

cosmetotest

Cosmetic Testing Symposium



Symposium on Preclinical and Clinical Testing in Dermocosmetics

24th & 25th May 2022
ENS - Lyon

Tuesday May 24th

Preclinical Evaluation in-tubo, in-vitro, or ex-vivo

1st Session: Pollution - Inflammation - Allergies

2nd Session: Sun - Pigmentation - Aging

3rd Session: Content-Container Interaction - CosmeBooste Project

Wednesday May 25th

Clinical Objectivation - Skin and Hair

1st Session: Gloss of the Skin and Hair Brightness

2nd Session: Barrier Function

3rd Session: Sensitive Skin

For more informations, [click here](#)

Cosmet'In Lyon: Marie Christine Di Murro cosmetinlyon@cosmetinlyon

Skinobs: Ophélie Rebillard orebillard@skinobs.com