

# Hydro-Gain™

## Innovative Moisturizing System

### Introduction

Hydro-Gain™ is a 100% natural, preservative-free (self-preserving) moisturizer based on extracts from plants naturally exposed to extreme climatic conditions. The unique combination of actives from birch bark extract, barbary fig seed oil and canola oil in an innovative matrix comprised of glycerol (a substance being part of the Natural Moisturizing Factor)<sup>[1]</sup> and natural lipids (hydrogenated lecithin) provides powerful hydration to the skin.

- **Birch** (*Betula alba*), domestic in both moderate and very cold regions (Siberia, Scandinavia, Canada, Alaska). The bark contains a variety of compounds, protecting the tree against cold and dryness. Birch bark extract contains amongst others the biologically active triterpene *Betulin*, which has been found to improve moisturization<sup>[2]</sup>, skin regeneration and wound healing<sup>[3]</sup>.
- **Barbary fig** (*Opuntia ficus-indica*), a species of cactus, domestic in very hot and dry regions (Mexico, South America, Australia). Barbary fig seed oil (cold-pressed from the small black seeds) is exceptionally rich in Vitamin E and contains a variety of biologically active ingredients (phytosterols, omega-3 and omega-6 essential fatty acids) with anti-oxidative and anti-inflammatory properties.
- **Hydrogenated Lecithin**, derived from Non-GMO soybean lecithin. Hydrogenated lecithin contains skin-identical lipids that mimic lamellar structures of the skin membrane. These lipids can regenerate the skin lipid barrier and restore its natural moisture balance and protective function.



### Properties

The proven moisturizing effect of Hydro-Gain™ results from its unique combination of lipophilic, amphiphilic and hydrophilic active ingredients. This innovative approach allows Hydro-Gain™ to provide both protection and hydration to the skin via three synergistic pathways:

- Lipophilic protective layer (A)
- Regeneration of the skin lipid barrier (B)
- Moisturizing depth effect of the hydrophilic ingredients (C)

The excellent hydrating properties of Hydro-Gain™ have successfully been demonstrated in two *in-vivo* studies, proving a superior moisturizing efficacy in direct comparison to related benchmark systems based on glycerol or sodium hyaluronate.

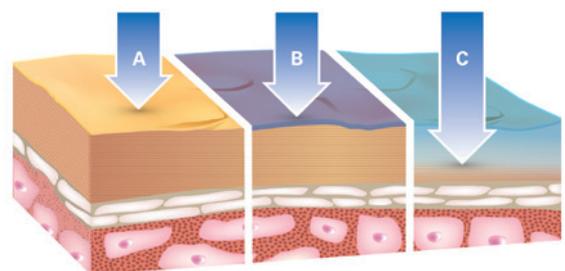


Figure 1. Hydro-Gain™: Mechanism of Action.

### In-Vitro Studies

The effect of Hydro-Gain™ on selected key genes involved in epidermal biology was studied. Hydro-Gain™ was applied to a fully differentiated reconstituted human epidermis at a concentration of 1% in the culture medium. After 24 hours of contact, RNA was extracted and qRT-PCR was performed using a TaqMan array. It was successfully shown that Hydro-Gain™ enhances the expression of several genes that favour a better moisturization of the skin tissue:

|        |                                                                                                                                                                                                                                                                    |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SPRR1A | Encodes <i>Small proline-rich protein 1A</i> , which serves as a radical scavenger and is involved in the formation of the physical barrier protecting the skin against water loss and extrinsic hazards <sup>[4, 5]</sup> .                                       |
| LOR    | Encodes <i>Loricrin</i> , a protein which is involved in the formation of the physical barrier protecting the skin against water loss and extrinsic hazards <sup>[5]</sup> .                                                                                       |
| KLK7   | Encodes the enzyme <i>Kallikrein-related peptidase 7</i> , which is involved in skin renewal. It also enhances the expression of CASP14 and therefore the formation of natural moisturizing factors (NMF) <sup>[6]</sup> .                                         |
| CASP14 | Encodes the enzyme <i>Caspase-14</i> , which is involved in the formation of natural moisturizing factors (NMF) <sup>[7]</sup> .                                                                                                                                   |
| HBEGF  | Encodes the <i>Heparin-binding EGF-like growth factor</i> , which promotes keratinocyte migration while preserving cell proliferative capability and is an actor of the epidermal homeostasis after stressing situations like cutaneous wounds <sup>[8, 9]</sup> . |

### In-Vivo Studies

To prove the efficacy of Hydro-Gain™, two independent *in-vivo* studies were carried out:

- Pre-study with 10 Caucasian female volunteers with dry skin (20 to 65 years old). Test period: June 2013
- Main-study with 23 Caucasian female volunteers with dry skin (20 to 65 years old). Test period: Dec. 2013

The volunteers were preconditioned over 5 days by washing their volar forearms with a conventional shower gel every evening. After the pre-conditioning phase, test subjects applied a placebo formulation as well as three cream formulations containing: 5% Hydro-Gain™, 4% Glycerol (corresponds to the Glycerol content in Hydro-Gain™) and 0.1% sodium-hyaluronate to the volar forearms, twice daily over a period of seven respectively fourteen consecutive days. 24 hours after the last application the long-term effect was measured by corneometry (skin moisture) and transepidermal water loss (TEWL). The change in the stratum corneum thickness was measured by Confocal Raman Spectroscopy.

### Pre-Study

#### Corneometry and Transepidermal Water Loss (TEWL)

A treatment of dry skin with a cream containing 5% of Hydro-Gain™ over seven consecutive days (twice a day) resulted 24h after the last application in a strong moisturizing effect. The corneometry value (skin moisture) increased by 25.2% and the transepidermal water loss (TEWL) decreased by 29.0%. In comparison to both benchmark systems (creams containing 4% of glycerol or 0.1% of sodium hyaluronate, respectively) a stronger moisturizing effect was achieved.

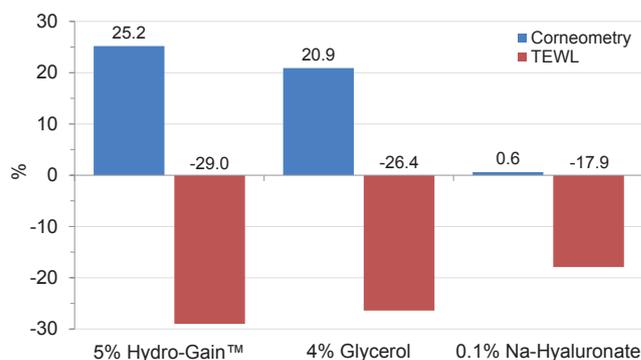


Figure 2. Corneometry: Change of Skin Moisture;  
TEWL: Change of Transepidermal Water Loss.

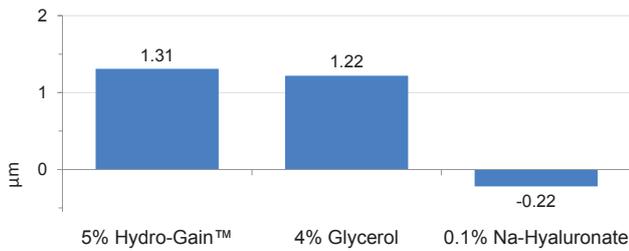


Figure 3. Confocal Raman Spectroscopy: Change of Stratum Corneum Thickness.

### Confocal Raman Spectroscopy

The moisturizing effect of a cream containing 5% Hydro-Gain™ was also determined by confocal raman spectroscopy. In correlation to the results from corneometry and TEWL, an increase of the thickness of the stratum corneum was found, indicating a significant improvement of skin moisture<sup>[10]</sup>.

## Main-Study

### Corneometry and Transepidermal Water Loss (TEWL)

Already after one week of application very good results were achieved. The corneometry value (skin moisture) increased by 29.2% respectively 29.8% (Figure 4) and the transepidermal water loss (TEWL) decreased by 11.5% respectively 18.4% after two weeks (Figure 5). In both cases, a stronger moisturizing effect in comparison to both benchmark systems (cream containing 4% of glycerol respectively 0.1% of sodium-hyaluronate) was achieved.

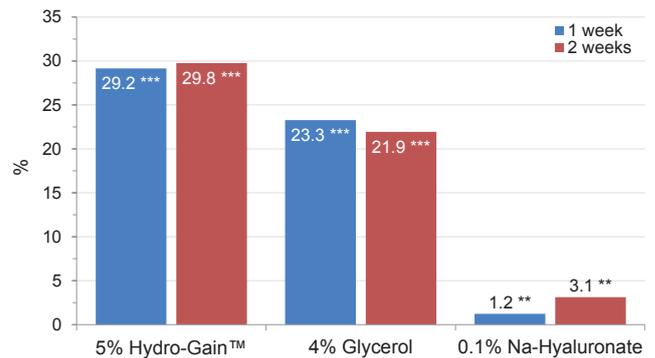


Figure 4. Corneometry: Change of Skin Moisture.

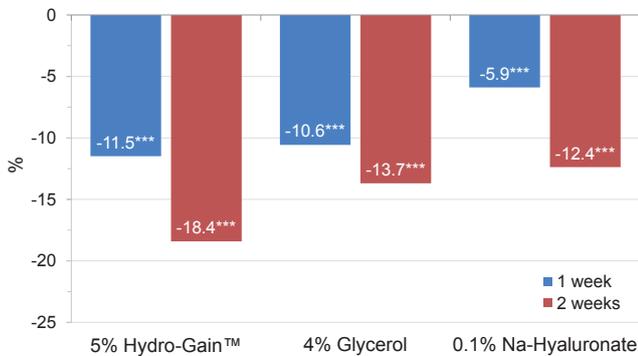


Figure 5. TEWL: Change of Transepidermal Water Loss.

A longer application of Hydro-Gain™ resulted in an additional decrease of the transepidermal water loss (TEWL): After two weeks, the TEWL decreased from 11.5% (7 days + 24h) to 18.4% (14 days + 24h). This is a reduction by factor 1.6, indicating that the skin barrier successfully has been improved.

### Comparison of Hydro-Gain™ versus Glycerol

A cream containing 5% Hydro-Gain™ showed a clearly stronger moisturizing effect than a cream based on 4% glycerol (corresponds to the glycerol content in Hydro-Gain™). This effect became even stronger by longer application: After 2 weeks of application the efficacy of Hydro-Gain™ was 35.6% (corneometry) resp. 34.5% (TEWL) stronger than glycerol.

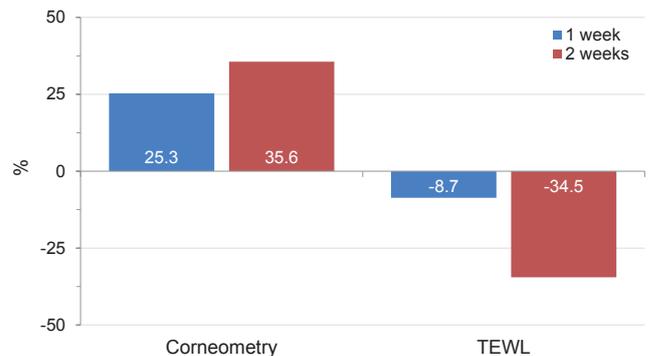


Figure 6. Comparison with Glycerol.

## Description

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- Novel moisturizing system with birch bark extract and barbary fig seed oil
- Superior moisturizing efficacy compared to glycerol (after 14d of application): Corneometry: 35.6%; TEWL: -34.5%
- Exceptional stability (minimum 12 months if stored refrigerated)
- ECOCERT and COSMOS approved raw material
- 100% natural, plant derived, GMO-free
- Appearance: translucent, yellowish, slightly viscous liquid
- Preservative-free (self-preserving)

## INCI

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EU: Glycerin, Aqua, Canola Oil, Hydrogenated Lecithin, Opuntia Ficus-Indica Seed Oil, Betula Alba Bark Extract, Citric Acid

US: Glycerin, Water, Canola Oil, Hydrogenated Lecithin, Opuntia Ficus-Indica Seed Oil, Betula Alba Bark Extract, Citric Acid

## Recommended Applications & Use Levels

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- Applications: For use in skin care products, especially those to prevent or treat dry skin.
- Recommended use level: 5% (according to *in-vivo* studies)

## Safety & Regulatory

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### Toxicology

- No allergens (as per current EU Cosmetic Regulation)
- Not phototoxic (OECD 432)
- Not irritant to skin (SPT) or eyes (HET-CAM, OECD 438)
- Not mutagenic (Ames-Test, OECD 471)

### REACH

- Compliant with the REACH regulation (EC) N° 1907/2006 and its amendments.

### ECOCERT & COSMOS

- Hydro-Gain™ is a raw material approved by ECOCERT GREENLIFE, conform to the COSMOS Standard, ECOCERT Natural and Organic Cosmetics Standard.



## References

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