

Intense moisturising power restores skin balance

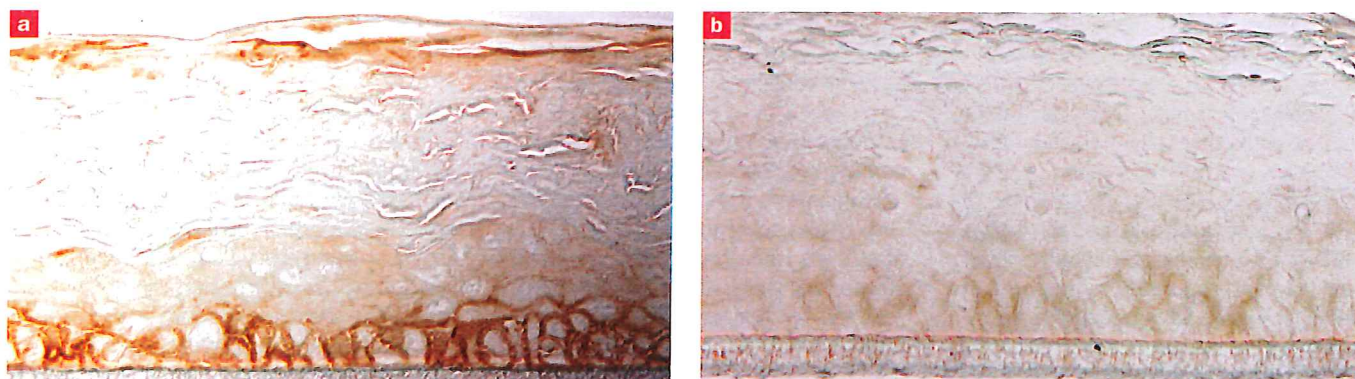


Figure 1: Immuno-localisation of AQP-3 in the basal and suprabasal levels in RHE in **a)** normal conditions and **b)** under stress.

The transport of water and solutes in a highly organised structure such as the skin plays an essential role in maintaining its homeostasis and a healthy appearance. Skin moisturisation involves the entire skin structure through active and passive mechanisms. The horny layer acts as a defensive barrier, limiting an excessive evaporation of water (TEWL), while the presence of specific channels and the natural moisturising factor (NMF) retains the water and transports it through the multi-layered skin structure.

Hydroveg® is a synergetic blend of moisturising humectants and swelling ingredients specifically aimed to correct skin dryness, particularly recommended whenever an intense and immediate restoring action is needed.^{1,2} It was developed by taking into account the normal constituents of a healthy skin, in order to propose a cosmetic raw material that has characteristics very similar to the NMF. Corneometric tests and innovative

in vitro studies conducted on biological models of reconstructed skin prove the effectiveness of Hydroveg in restoring stressed skin³⁻⁹ to the condition of physiological balance with a mechanism that is active at the molecular level.

Composition

In order to develop a reconstructed moisturising factor, it is important to take into account the diversified composition of NMF, including ingredients that could give enhanced and immediate moisturising effects and stimulate the cellular renewal processes within the skin.⁸⁻¹⁴ To meet these specific needs, Variati has developed two versions of Hydroveg (see Table 1). Hydroveg VV consists of hydrolysed wheat protein whereas Hydroveg R consists of hydrolysed rice proteins. This is because rice is one of the few plant sources of proteins that can actually be claimed to be gluten free.

In addition, rice proteins are known for

their characteristics of mildness, and this is why they are often included in formulations for sensitive individuals. The whole composition of both products is very similar to the skin NMF. All ingredients constituting Hydroveg have a long history of use and on the basis of the available data, they are all considered safe for normal use in cosmetic products.¹⁵

Efficacy

In vitro skin dryness model: moisturising effect active on molecular level

In vitro skin dryness model uses samples of reconstructed human epidermis (RHE) to recreate *in vitro* the molecular and physical modifications occurring in dry skin. The test evaluates the ability of a substance to counteract these changes or to replace the tissue homeostasis, lost in the dryness model, monitoring the genic expression of relevant biomarkers, aquaporins, also by morphological analysis and by immuno-localisation.

Table 1. Composition of Hydroveg VV and R and their use.

Trade name	INCI name	Origin	Applications	Suggested dose
Hydroveg VV	Aqua, Sodium PCA, Diglycerin, Urea, Hydrolysed Wheat Protein, Sorbitol, Lysine, PCA, Allantoin, Lactic Acid	Moisturising complex, designed according to NMF composition	Specifically recommended for soothing and moisturising body care cosmetics, hand care and massage creams	1%-5%
Hydroveg R	Aqua, Sodium PCA, Diglycerin, Urea, Hydrolysed Rice Protein, Sorbitol, Lysine, PCA, Allantoin, Lactic Acid	Moisturising complex, designed according to NMF composition. Gluten free	Specifically recommended for soothing and moisturising body care cosmetics in allergy-prone individuals	1%-5%

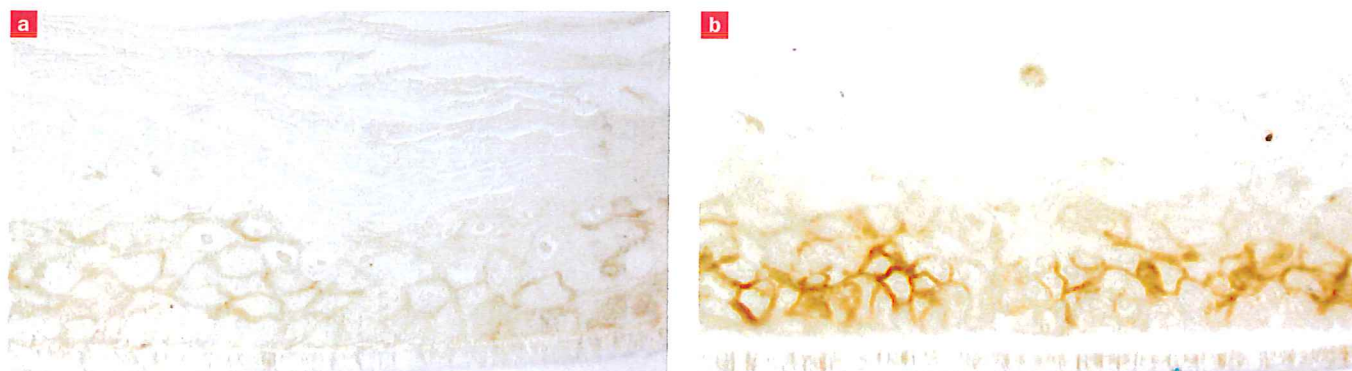


Figure 2: Immuno-localisation of AQP-3 RHE after treatment with a) 5% glycerin and b) 2.5% Hydroveg R.

The experimental protocol, based on the assessment of the moisturising capacities in induced skin dryness conditions, made it possible to investigate the activity of rice-based moisturising complex at the molecular level. The aquaglyceroporine-3 (AQP3) expression has been examined. AQP3 is a protein associated with the membrane, whose role is to transport and distribute water and glycerin while also regulating the cellular skin differentiation. The reconstructed skin (RHE) was stressed for 24 hours by modifying the external environmental conditions with increased temperature and decreased humidity. Rice-based moisturising complex was then applied on dried RHE for 16 hours. The quantification of the moisturising efficiency of rice-based moisturising complex was evaluated against glycerin by simultaneously monitoring the localisation and expression levels of AQP3. In normal conditions, the expression of AQP-3 is preferentially localised in the basal and suprabasal skin layer (Fig. 1a). Following the induced skin dryness stress, a dramatic decrease of AQP3 occurs (Fig. 1b).

The immuno-histochemical analysis confirmed the over-expression of the protein following treatment with 2.5% rice-based moisturising complex (Fig. 2b), compared both to the 'dry skin' control (Fig. 1b) and treatment with 5% glycerin (Fig. 2a). Additionally, the localisation of AQP3 is manifested with a high basal level intensity, as observed in physiological conditions, which suggests a 'conservative' mechanism able to bring the skin back to physiological homeostasis conditions (Figs. 1a & 2b). The test results showed that the treatment with glycerin does not significantly overexpress the AQP3 gene ($RQ < 2$), while rice-based moisturising complex significantly increases its expression ($RQ > 2$), which suggests a moisturisation mechanism active at the molecular level. The test results lead to conclude that rice-based moisturising complex supports and reinforces the physiological activity of the NMF and gives an immediate response in order to restore the efficiency of the

channels that transport water, when it fails as in dry conditions.

In vivo corneometric test: Immediate and high moisturising power

A corneometric test on 20 subjects, male and female, between 18 and 70 years of age was carried out to determine the moisturising power of the moisturising complex. The test was conducted using wheat-based moisturising complex in a carbomer gel with concentrations of 2.5% and 5%. They were evaluated compared to the control sample not containing wheat-based moisturising complex.

The samples were applied in three specific areas of the forearm with a similar moisturisation index. The moisturising difference was assessed by analysing values taken using the corneometer before and after application. The readings were taken at

T0 (baseline), 15 minutes (T1), two hours (T2) and four hours (T3) after applying the product. The statistical analyses show a significant increase ($p < 0.05$) in the moisturising indices following the application of the tested products compared to the initial value (Fig. 3). The data confirm that both samples have significant efficacy, suggesting use of the active ingredient in situations where an intense and immediate moisturising action is needed.

Applications

The moisturising complex gives cosmetic products a strong and immediate skin moisturising action and is therefore indicated for making various types of formulation, such as hand and body creams, protective day creams, firming and massage creams, treatment creams for dry and hyperkeratotic skins, facial cleansers and nourishing/ moisturising hair conditioners. It is also easy to use in production since it is a liquid. Recommended dosage for Hydroveg products is 1%-5%. Two examples of formulations are shown.

Formulation 1: Body Care Lotion.

Phase	Ingredients	%
A	Aqua (Water)	qs 100.0
	Butylene Glycol	3.0
	Carbomer	0.3
B	Steareth-21	3.0
	Steareth-2	2.0
	Glyceryl Stearate	2.0
	Cetyl Alcohol	2.0
	Caprylic/Capric Triglyceride	5.0
	Isononyl Isononanoate	3.0
	Isostearyl Palmitate	4.0
	IS Avocadoato	3.0
C	Dimethicone	1.0
	Hydroveg® VV	3.0
D	Triethanolamine	0.3
	Preservatives	as needed
	Parfum	as needed

Procedure

Combine phase A and heat to 70°C-75°C. Combine ingredients of phase B and heat to 70°C-75°C. Add phase B to phase A under stirring. At 30°C, add phase C, preservatives and parfum. Adjust pH between 5.5-6.0 with phase D.

Formulation 2: Mild Shower Gel.

Phase	Ingredients	%
A	Aqua (Water)	qs 100.0
	Betaine	2.0
	Disodium EDTA	0.1
	Polyquaternium 7	6.0
B	Sodium Laureth Sulfate	18.0
	Decyl Glucoside	7.0
	Sodium Cocoamphoacetate	5.0
	Cocamidopropyl Betaine	6.0
C	Hydroveg® R	2.5
D	PEG-40 Hydrogenated Castor Oil, PPG-26 Buteth-26	1.0
	Parfum	0.3
	Preservative	as needed
E	Lactic Acid	as needed

Procedure

Combine phase A until limpid product. Add phases B, C and D. Adjust pH with phase E.

Conclusion

Hydroveg products perfectly meet today's expectation of moisturisers being highly effective and safe but also having high cosmetic acceptance. *In vitro* tests on cellular cultures and RHE have shown the ability of Hydroveg to stimulate cellular vitality and renewal, suggesting an overall improvement of appearance, softness and elasticity of skin tissue. Clinical tests have shown the performance to moisturise the skin significantly and to achieve a smooth skin feel. The clinical evaluations have also confirmed the absence of irritating action to the skin and eyes and the absence of allergenic potential. Hydroveg can be stated to be hypoallergenic (up to 5%) under normal conditions of use (non-irritating and non-allergenic).

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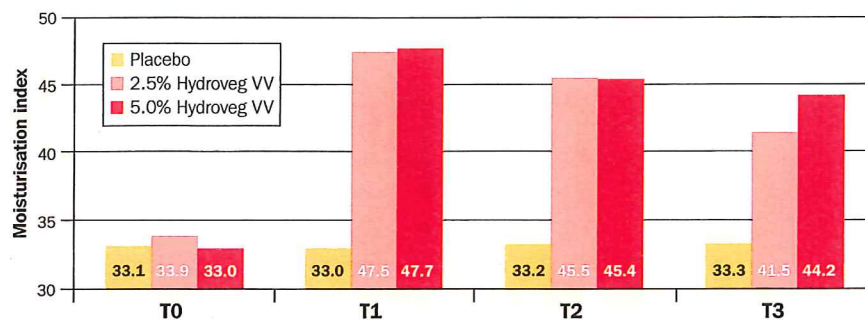


Figure 3: Moisturising efficacy of 2.5% and 5.0% Hydroveg VV.

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