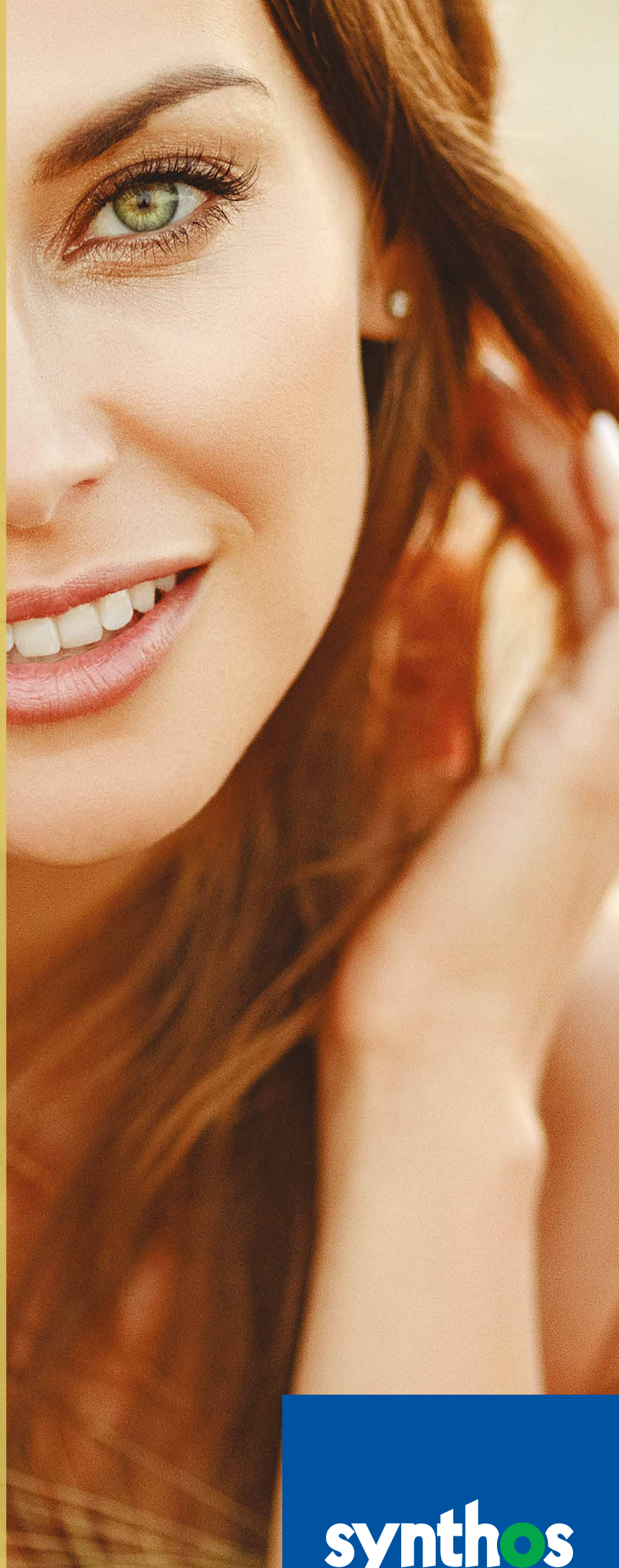


**IMPROVEMENT  
HEALING  
MOISTURISING  
SOFTENING  
SOOTHING  
TEWL  
REGENERATION  
ERYTHEMA  
ANTIPHLOGISTIC  
REDUCTION  
CARE  
EFFECTIVENESS**



**VECTICELL Sensitive**

**synthos  
CARE**

**Urea** is one of the most effective hydrating substances used in cosmetics. It occurs naturally in the skin as a component of NMF (Natural Moisturizing Factor), and its amount decreases with age and as a result of certain dermatoses, such as atopic dermatitis. This results in excessive dryness, roughness and skin irritation. The hydrating effect of urea results from modifying the chemical structure of proteins, protecting the water binding area, thanks to which it increases its content in the stratum corneum.

**D-panthenol** is a precursor to vitamin B5, which occurs naturally in the skin, hair and nails as a substance necessary for their proper functioning. For decades it has been used in the treatment of wounds and in skin care. It has strong anti-inflammatory, soothing, and moisturising properties, and it accelerates wound healing and eliminates pruritus, which has been confirmed by numerous scientific studies.

It has been proven<sup>1,2</sup> that both D-panthenol and urea encapsulated in carriers show much stronger soothing<sup>3</sup>, anti-inflammatory, and TEWL (Transepidermal Water Loss) reducing properties. D-panthenol administered in a carrier, in contrast to the substance in a free form, significantly reduced inflammation and erythema induced by UV radiation. The urea carrier reduced TEWL and increased the density of intercellular cement to a greater extent than the free form of the substance.

### VECTICELL Sensitive

is a combination of two substances - urea and D-panthenol with strong hydrating, soothing, anti-inflammatory and TEWL-reducing properties, documented by numerous scientific reports and our own studies. It was created for dry, rough, irritated skin, with microdamage and erythema

caused by UV radiation or inflammatory processes caused by dermatoses (AZS, diaper dermatitis, eczema). It is also perfect for skin care and softening the skin.

Additional protection for irritated and dry skin is provided by the lipid carrier coating, compatible with the ingredients of the skin's lipid coat. The carrier transports active substances to the deeper layers of the skin, where they activate fibroblast proliferation, thus contributing to faster wound healing and also reducing TEWL. The encapsulation of urea in a delivery system has also significantly improved its stability, which translates into its easier incorporation into cosmetic recipes and reduction of the irritation potential resulting from the formation of decomposition products of free urea.



## THE ADVANTAGES OF USING VECTICELL Sensitive

- Increased transepidermal penetration and absorption through the skin
- Prolonged release of urea over time - long-lasting effect on the skin and no risk of irritation
- Fast relief of UV-induced erythema
- Intense and long-lasting skin hydration

**Bibliography:**  
 1. Baschong W., Huglin D., Roding I.: D- panthenol loaded Nanotopes™ providing enhanced anti-inflammatory efficacy - a study on human volunteers, SOWF Journal 125, 4/99.  
 2. Tabandeh H, Ghazemi Z, Preparation of urea-containing stable plurilamellar liposomes and studying the effect of cholesterol on their encapsulation efficiency and release rate, DARU JOURNAL OF PHARMACEUTICAL SCIENCE 2001, Volume 9, Number 1-2, Page(s) 28 To 32.  
 3. Lodén M., Urea-containing moisturizers influence barrier properties of normal skin, Arch Dermatol Res (1996) 288 :103–107

### In vitro studies

VECTICELL Sensitive research has proven its stability, bioavailability, ability to overcome the epidermal barrier, as well as an appropriate release profile, which determines the high effectiveness of the active substance on the skin.

### Urea release

Solutions of VECTICELL Sensitive and pure urea with the same active substance concentrations were dialyzed into a PBS buffer with a pH level of 7.4, observing the change in the release rate over time. The measurement was monitored for 5.5 hours, each time determining the concentration of the released active substance.

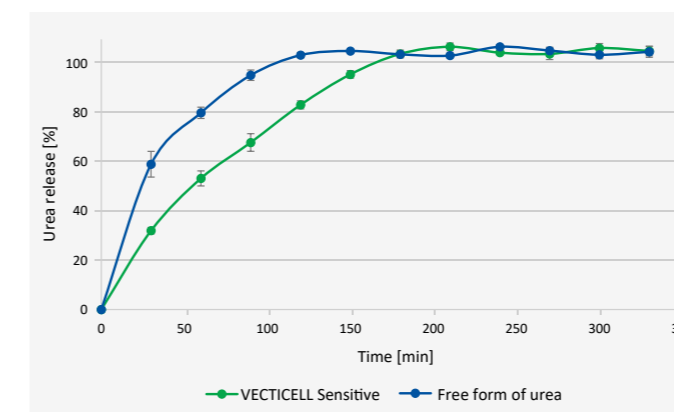


Figure 1: Dependence of the amount of urea released over time

### Results:

There was a visible difference in the release of urea encapsulated in VECTICELL Sensitive in relation to the pure form of this substance. Thanks to the encapsulation of urea in VECTICELL Sensitive, a much slower release of urea was recorded compared to the solution of the free substance. The prolongation of time release of urea encapsulated in VECTICELL strengthens its effects after penetration deep into the skin, thus minimising the risk of irritation.

### Urea penetration and absorption

Using Franz cell chambers, it was proven that the penetration through the skin and absorption into the

skin of urea encapsulated in the VECTICELL Sensitive carrier is increased compared to the free form of urea. To reflect the in vivo conditions, the study was performed using a skin fragment to which solutions of VECTICELL Sensitive and the free substance in the same concentrations were applied.

The penetration of urea was monitored for 24 hours.

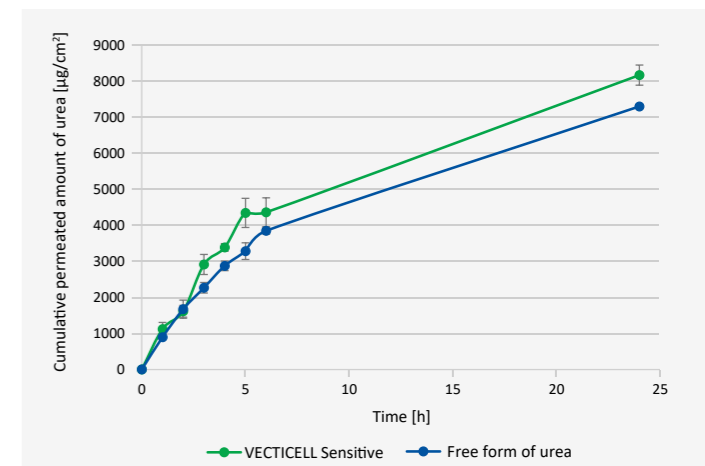
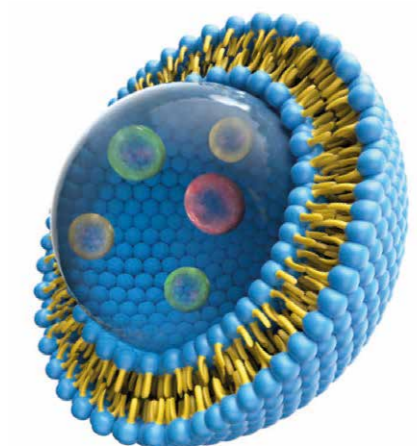


Figure 2: Penetration of VECTICELL Sensitive vs free form of urea

### Results:

After 24 hours, an **11% increase in the penetration** of urea encapsulated in VECTICELL Sensitive was noted in relation to the substance in a free form. A significant difference in the penetration of urea administered in the form of VECTICELL Sensitive was already observed after 3 hours of application. Thanks to the elastic lipid membrane, VECTICELL carriers are able to penetrate the deeper layers of the skin through the epidermis.



After 24 hours, a study of accumulation into the skin of urea enclosed in VECTICELL Sensitive was carried out.

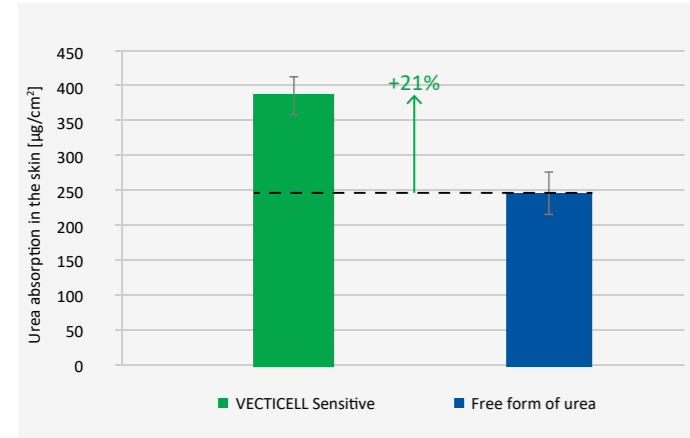


Figure 3: Increased absorption in the skin of urea in VECTICELL Sensitive vs free form urea

Results:

The study confirmed a **21% increase in the accumulation** of urea encapsulated in VECTICELL in relation to the solution of the free form substance. This indicates a significant increase in the bioavailability of urea provided with the VECTICELL delivery system.



The stability of urea in VECTICELL Sensitive

Urea is a substance sensitive to the effects of increased temperature, and its decomposition products have an irritating effect on the skin. The purpose of the study was to prove an increase in the stability of urea after encapsulating it in the VECTICELL carrier.

Solutions of VECTICELL Sensitive and a free form of urea, with an active substance concentration of 5%, were placed at +40°C, and the decrease in urea concentration over time was monitored. The measurements were carried out using the colorimetric method during a period of 4 weeks.

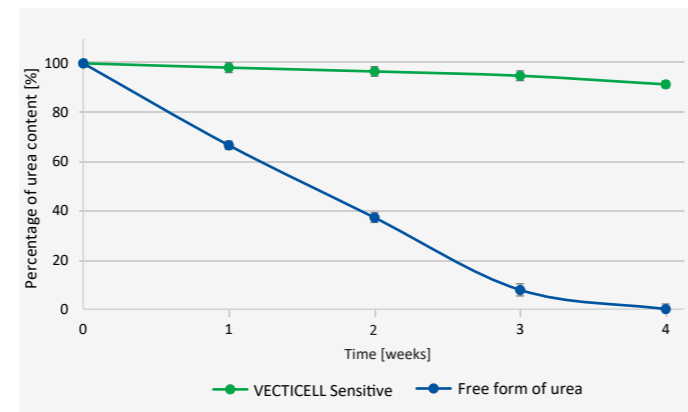


Figure 4: Graph of urea concentration over time

Results:

The study clearly showed an increase in the stability of urea after encapsulating it in VECTICELL Sensitive. After 4 weeks of storage of the solution at 40°C, total decomposition of urea in the free form was observed, whereas in VECTICELL Sensitive **it was practically undecomposed**. The VECTICELL lipid bilayer effectively protects the active substance contained in it against degradation. Increased stability allows for a longer effect of urea and an enhancement of its effectiveness, while eliminating the risk of skin irritation caused by its degradation products.

VECTICELL Sensitive stability in the cream

To prove the presence of VECTICELL Sensitive carriers in the cream, cryo-SEM imaging was applied. Using scanning electron microscopy, images of the cross-section of the cream's liquid nitrogen frozen surface were made.

Results:

Cryo-SEM imaging of the cream revealed the existence of wide strips, rich in various sizes of VECTICELL carriers, cutting through the homogeneous mass. The obtained results confirm the stability of VECTICELL Sensitive in the finished cosmetic product, which proves the resistance of the raw material to technological processes related to the formation of emulsions, such as: temperature, mixing, and homogenisation.

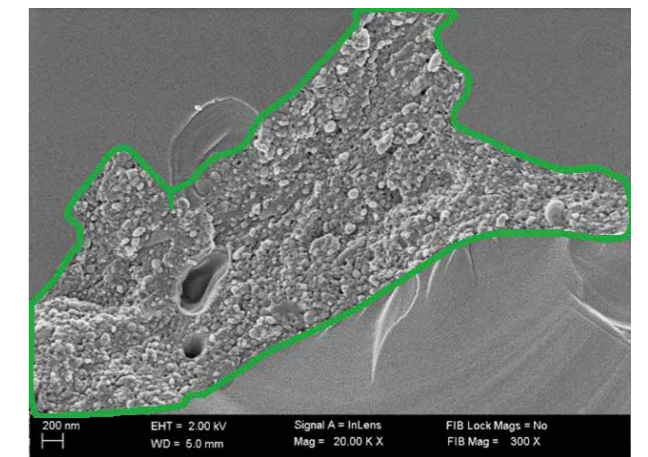
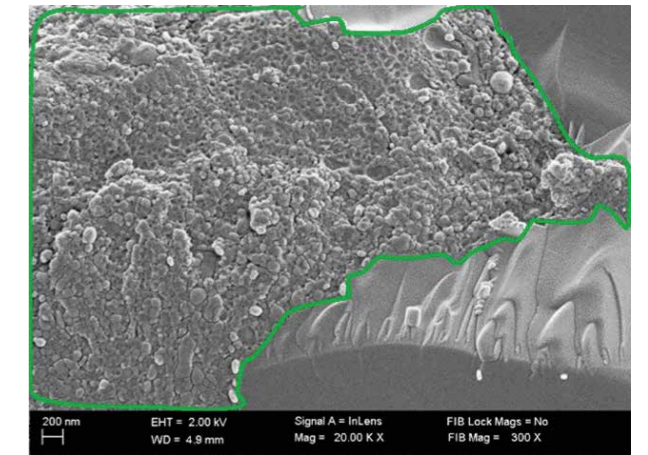


Figure 5: Topography of the cross-section of the cream's surface containing VECTICELL Sensitive

— VECTICELL Sensitive carriers embedded in the cream compound



In vivo studies

In vivo tests are a comprehensive assessment of the effect of active substances, giving the possibility of excluding any irritation or allergic reactions.

The actual effect of VECTICELL Sensitive on the skin has been confirmed in numerous in vivo studies, which included both apparatus measurements and subjective assessment of the probands after applying the cream with VECTICELL Sensitive.

Hydration and TEWL after use of VECTICELL Sensitive

A comparative study was carried out of the effects of VECTICELL Sensitive and a solution containing urea and D-panthenol in the same concentrations as in VECTICELL Sensitive. Five probands took part in the study. Hydration and TEWL measurements were taken before and after 30 minutes from the application of the preparations.

The increase in the level of skin hydration after using VECTICELL Sensitive.

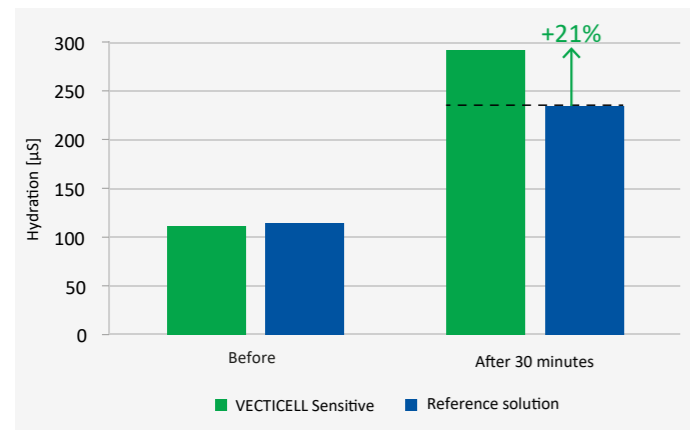


Figure 6: Hydration level of the skin: VECTICELL Sensitive vs. comparative solution

Results:

30 minutes after the application of VECTICELL Sensitive, a 21% increase in skin hydration relative to

the reference solution was observed, which proves that VECTICELL Sensitive is more effective. The obtained result confirms the penetration of VECTICELL Sensitive through the epidermis, the gradual release of urea from the carrier and its effect on restoring an optimal and long-lasting level of skin hydration.

Reduction of transepidermal water loss for VECTICELL Sensitive.

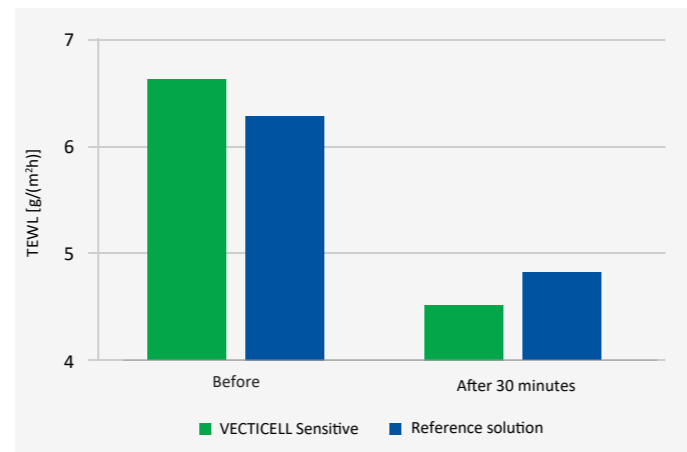


Figure 7: TEWL: VECTICELL Sensitive vs. comparative solution

Results:

The study confirmed a much greater reduction of TEWL after the use of VECTICELL Sensitive compared to the reference solution. TEWL measurements have shown that VECTICELL Sensitive improves and maintains a stable, deep level of skin hydration by slowing down the evaporation of water from the epidermis.

The significant increase in the intensity of hydration and the persistence of this effect over time indicates very good bioavailability and absorption through the skin of VECTICELL Sensitive. Thanks to this, it not only effectively prevents drying, but also provides a long-lasting moisturising effect and regenerates skin that is sensitive and prone to atopic dermatitis, soothes irritations, and eliminates roughness. The skin becomes elastic, smooth, and soft to the touch.

Reduction of erythema after the application of VECTICELL Sensitive

In vivo studies for VECTICELL Sensitive in pure form were carried out on a group of 30 volunteers with dry skin to determine the colour (erythema) of the skin. The cream was applied twice a day, in the morning and in the evening, on cleansed facial skin and on the neck for 4 weeks.

Results:

The above skin pictures of two probands before the application of VECTICELL Sensitive during and after 4 weeks of use clearly confirm a significant reduction of erythema and reduced visibility of the dilated blood vessels of the skin. In the conducted apparatus study, skin erythema was reduced by an average of 11%. The obtained results confirm the effectiveness of VECTICELL Sensitive in eliminating skin inflammation associated with capillary disorders.

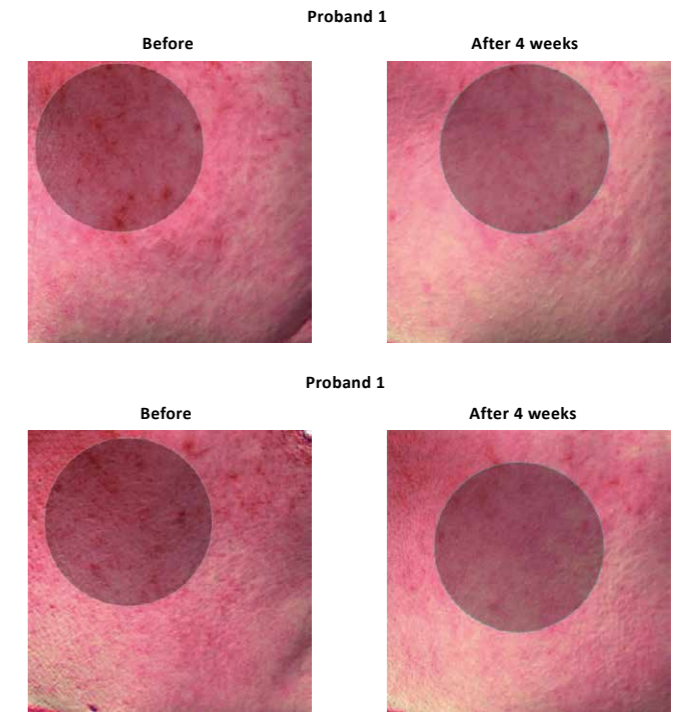


Figure 8: Reduction of erythema after the use of VECTICELL Sensitive



Cream with 5% VECTICELL Sensitive

The cream\* was applied twice a day, in the morning and in the evening, on cleansed facial skin and on the neck for 4 weeks. In this time, the subjects restrained from using any other products with the same or equivalent intended use during the test.

\*INCI Cream with 5% Vecticell Sensitive: Aqua/Water, Glycerin, Phosphatidylcholine, Black Currant Seed Oil/Olive Oil/Aminopropanediol Esters, Caprylic/Capric Triglyceride, Glyceryl Stearate, Hydrogenated Phosphatidylcholine, Butyrospermum Parkii Butter Unsaponifiables, Urea, Panthenol, Disodium EDTA, Disodium Phosphate, Citric Acid, Potassium Phosphate, Acrylamide/Sodium Acrylate Copolymer, Paraffinum Liquidum, Trideceth-6, Dehydroacetic Acid, Benzyl Alcohol

Improved hydration and TEWL reduction

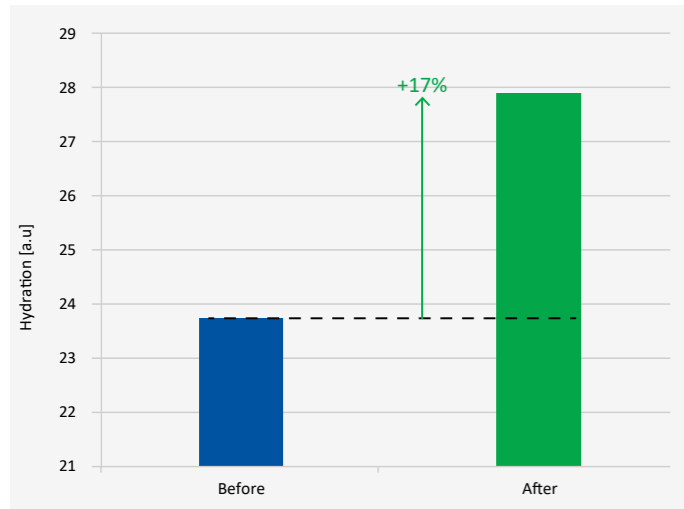


FIGURE 9: Hydration of the skin after applying the cream with 5% VECTICELL Sensitive

Results:

In the apparatus measurement of hydration carried out after one month of applying a cream with 5% VECTICELL Sensitive, a **significant improvement in skin hydration** was observed, by **17%** on average. This indicates a very good synergistic effect of urea and D-panthenol in restoring the skin's proper level of hydration. In addition, the gradual release of urea from the VECTICELL carrier ensures a long-term maintenance of this effect in the skin.

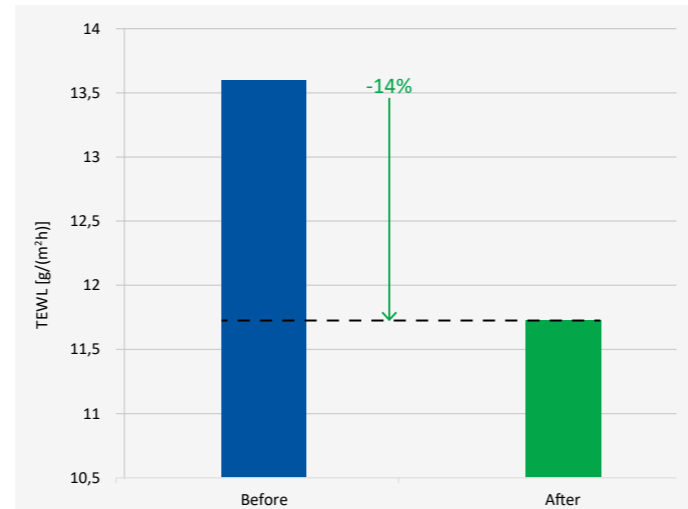


FIGURE 10: The effect of the cream with 5% VECTICELL Sensitive on limiting TEWL

Results:

After 4 weeks of application of the cream, there was a **clear reduction in transepidermal water loss (TEWL)**, which decreased by an average of **14%**. This effect is related to the strong hygroscopic properties of urea.

Assessment of the cream with 5% VECTICELL Sensitive by the probands

After a month of using the cream containing 5% VECTICELL Sensitive, the application properties of the cream were evaluated and the effectiveness of VECTICELL Sensitive on the skin was confirmed. All subjects confirmed the excellent softening effect of the skin. Over 90% of them noticed a significant increase in hydration and skin smoothing, which lasted for a long time. This was associated with

a clear feeling of comfort. In addition, over 80% of subjects noticed that the cream regenerated damaged epidermis, soothed irritations and prevented drying of the skin. 100% of subjects confirmed a lack of irritations after using the cream containing 5% VECTICELL Sensitive and no skin pulling sensation.

Summary

In numerous studies, we have proved the effectiveness of VECTICELL Sensitive in intensive and long-lasting skin hydration, a significant reduction of transepidermal water loss, the elimination of erythema associated with inflammation of the skin, as well as softening and smoothing of the epidermis. Products containing VECTICELL Sensitive can be recommended for daily care of sensitive, atopic and dry skin, regardless of age.



## Product description

A viscous, opalescent solution.

## Appearance

An opalescent milky to yellow-milky coloured solution.

## INCI

Aqua/Water, Glycerin, Phosphatidylcholine, Urea, Panthenol, Disodium Phosphate, Disodium EDTA, Citric Acid, Potassium Phosphate, Dehydroacetic Acid, Benzyl Alcohol.

## Storage conditions

The product should be stored in its original packaging. It is necessary to store the product indoors, protected from direct sunlight, at a temperature not exceeding  $5 \pm 3^{\circ}\text{C}$ .

## Shelf life

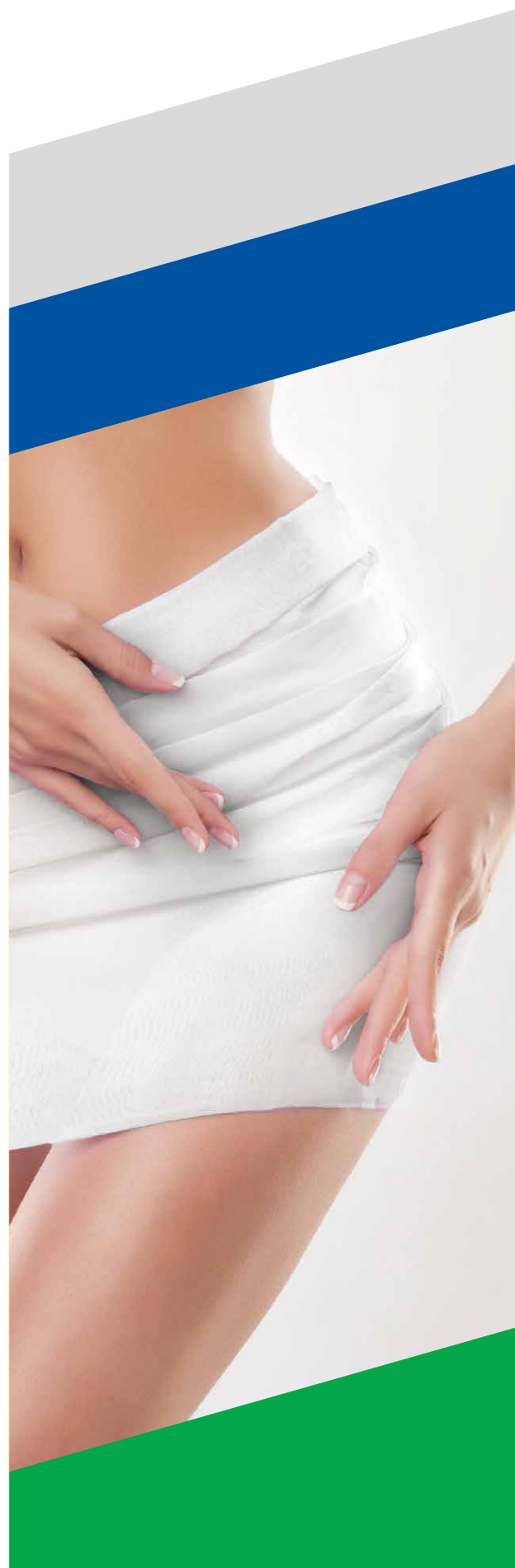
12 months from the production date.

## Recommended formulation conditions

**Shake the product every time before applying.** It is recommended to add the raw material to the final product at the final stage of production, at a temperature not exceeding  $35^{\circ}\text{C}$ . Optimal pH of the formulation during the addition of the raw material: 5.0 - 7.0. An alkaline pH is inadvisable.

**Soluble** in water.

Recommended **concentration** 3% - 5%



Life Science Park, Cracow

# VECTICELL

*delivery system*



Synthos CARE  
Synthos Dwory 2  
Spółka z ograniczoną  
odpowiedzialnością  
Spółka komandytowa

ul. Chemików 1, 32-600  
Oświęcim, POLAND

Customer Support Centre  
Tel. +48 33 847 42 47  
Fax. +48 33 847 42 47

Sales Department  
+48 885 800 398

[care@synthosgroup.com](mailto:care@synthosgroup.com)  
[www.synthoscare.com](http://www.synthoscare.com)

---

The Seller declares the completeness of the statements, applications and information contained in this folder and their reliability, but to the fullest extent permitted by applicable law, excludes his liability under the warranty, guarantee and suitability for a particular purpose.

Statements, conclusions, and information contained in the folder are accurate and intended only for product presentation.

The information contained in the folder is intended for a group of competent and conscious recipients.

The risk and responsibility associated with the use of the information or product lies with the user.

The test results contained in this folder are the sole property of the Seller and may only be used with prior written, explicit consent.

The use of information contained in this folder by the user may not constitute an incentive or be aimed at infringing the intellectual property rights of third parties.