



## ALGICA

Skin capacitance, conductance and transepidermal water loss after single application of creams –  
A comparison between Algica and hyaluronic acid



### STUDY COMPARING THE MOISTURIZING PROPERTIES OF ALGICA AND HYALURONIC ACID<sup>1</sup>

Cream formulations containing Algica and hyaluronic acid (HA) were prepared and the moisturizing properties of the two formulations were compared. The study was controlled, double-blind and randomized.

Ingredients (INCI)	Algica	Hyaluronic acid
PEG-20 Methyl Glucose Sesquistearate	3	3
Methyl Glucose Sesquistearate	3	3
Cetostearyl alcohol	4	4
Caprylic / Capric Triglyceride	2	2
Shea Butter Ethyl Esters	4	4
Butyrospermum Parkii Butter	4	4
Algica	0,3	-
Hyaluronic acid	-	0,3
Citric acid / Sodium citrate	0,5	0,5
Aqua	Ad 100	Ad 100

The study was performed in two tests. The first test measured the change in skin hydration (skin capacitance and conductance) and TEWL (Trans Epidermal Water Loss) after a single application of the creams, two hours and four hours after application. Six healthy test persons participated in the test.

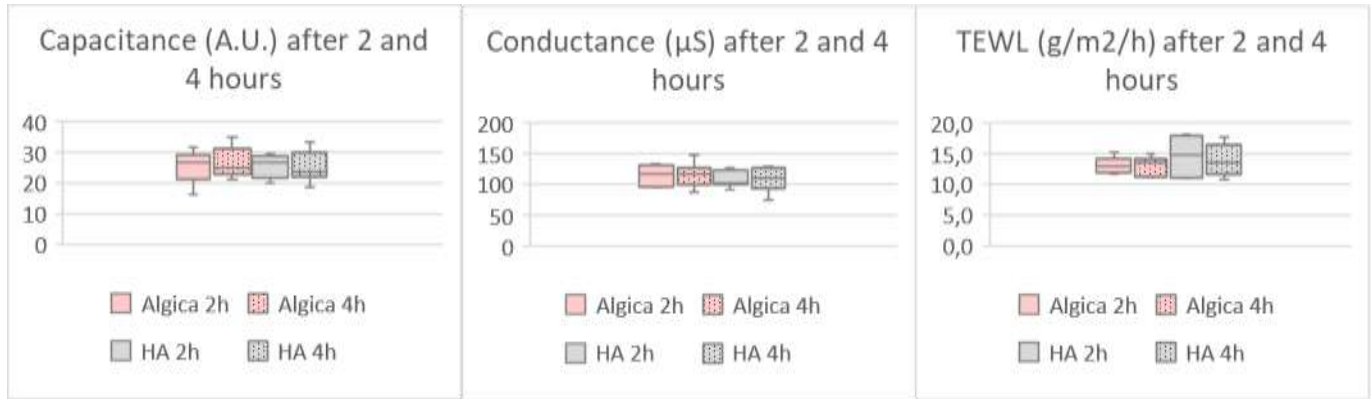
The second test was a cosmetic evaluation with nine participants (the six from the first test plus three more) that were asked to rate attributes of the creams on a Visual Analogue Scale (VAS) from “very difficult/worse” to “very easy/best” after application of the cream to the skin. The questions were:

- How easy is it to apply the cream?
- How easily is the cream absorbed by the skin?
- Which of the creams feels best?

<sup>1</sup> Eviderm Institute

## RESULTS

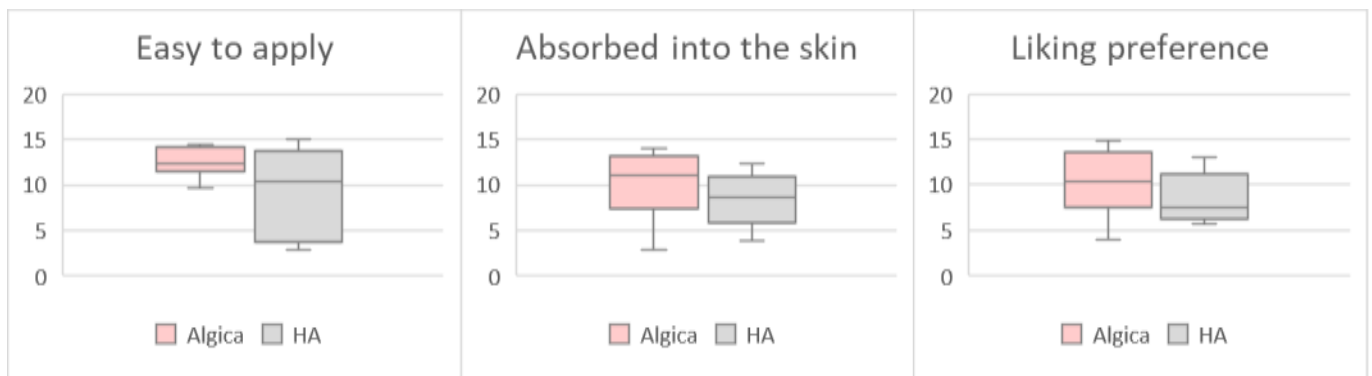
### Skin hydration and TEWL



The bottom line of the box is the first quartile (Q1), and the top is at the third quartile (Q3) value. A line is drawn across the box at the median. The whiskers are the lines that extend from the top and bottom of the box to the lowest and highest observation.

Though differences between the creams are small, **the test shows that Algica has at least as good moisturizing properties as hyaluronic acid.** The hydrating properties (conductance) is slightly higher on average for Algica compared to HA. The TEWL is lower for Algica compared to HA. A lower TEWL indicates that the cream forms a water barrier on the skin preventing water loss through evaporation.

### Cosmetic evaluation



The bottom line of the box is the first quartile (Q1), and the top is at the third quartile (Q3) value. A line is drawn across the box at the median. The whiskers are the lines that extend from the top and bottom of the box to the lowest and highest observation.

The two creams were graded from 1 to 16 by the participants where 1 represented “*very difficult/worse*” and 16 “*very easy/best*”. The cosmetic evaluation showed **a preference for Algica over hyaluronic acid.** A cream formulation containing Algica is perceived easier to apply and more easily absorbed by the skin.

## CONCLUSION

The overall conclusion from the two tests is that Algica is a good alternative to hyaluronic acid as a moisturizing ingredient in personal care products. The ability to bind a large amount of water makes Algica an excellent humectant that creates a water barrier on the skin.

In addition, the excellent rheological properties and smooth texture of Algica adds a luxury feeling to the cream and is easy to apply.

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## APPENDIX: ADDITIONAL INFORMATION

### Introduction

Application of creams to the skin make the skin feel moisturized and soft. Creams may contain high and low molecular weight humectants along with various types of fats, such as e.g. hydrophobic petrolatum or more hydrophilic fats from vegetable oils, such as e.g. esters and triglycerides. Upon application of a moisturizing cream to the skin, the formed layer of humectants and fats may change the water balance in the outermost skin layer; the stratum corneum. Measurement of skin hydration and transepidermal water loss (TEWL) can be used to assess the impact of cream-treatments on the skin.

The aim of the present pilot study was to measure the changes in skin hydration and TEWL after single application of creams with high molecular weight humectants to the skin in healthy volunteers, two and four hours after application of the creams. The measurement of hydration was made indirectly using two electrical measurements of skin surface, and the skin barrier function was measured by direct measurement TEWL. In addition, the cosmetic properties of the creams were judged.

### Material and methods

#### Design and test subjects

The study was conducted in accordance with the guiding principles for testing of cosmetics (EU no 655/2013, Colipa Guideline 2008) and Eviderm policy for data protection and integrity. The study was controlled, double-blind, randomized and was performed in June 2019 in Solna, Sweden. Informed consent was obtained from the included 6 volunteers, 3 women and 3 men, mean/median age 48/59 year. They were given written and verbal information of the study, they considered themselves healthy and showed no signs of skin diseases on the forearms. All included participants fulfilled the study.

The cosmetic evaluation of the creams was performed by 3 additional volunteers, i.e. in total 9 individuals; 6 women and 3 men (mean/median age 48/57 year).

#### Test products

Ingredients (INCI)	Algica (136B)	Hyaluronic acid (136C)
PEG-20 Methyl Glucose Sesquistearate	3	3
Methyl Glucose Sesquistearate	3	3
Cetostearyl alcohol	4	4
Caprylic / Capric Triglyceride	2	2
Shea Butter Ethyl Esters	4	4
Butyrospermum Parkii Butter	4	4
Algica <sup>1</sup>	0,3	-
Hyaluronic acid <sup>2</sup>	-	0,3
Citric acid / Sodium citrate	0,5	0,5
Aqua	Ad 100	Ad 100

<sup>1</sup>Provided by Swedish Algae Factory, <sup>2</sup>Making Cosmetics MW 800-1200kDa

#### Treatment

The volar part of the left forearm was used for the testing. 2 areas (each 2,5 x 2 cm=5 cm<sup>2</sup>) were marked on the arm. To prevent spreading of the cream to the nearby area, a thin layer of glue was applied between the areas. The products, 30 µl, were pipetted to the areas with a Gilson replacement pipette. After dispensing the product to the skin surface the cream was gently spread on the area during some seconds using the fingertip providing an approximate dosage 2 µl /cm<sup>2</sup> (allowing 5 µl to be lost on the fingertip). This dose - 2 µl /cm<sup>2</sup> corresponds to approximately 2 mg / cm<sup>2</sup> - and is the dose commonly used in experimental skin studies, such as in sun protection studies for measurement of Sun Protection Factor. Table 1 gives an overview of the study layout.

**Table 1. Overview of treatments and evaluations.**

Activity	Day -2	Time 0 h	Time 2 h	Time 4 h
Preparation of creams	X			
Randomisation	X			
Informed consent	X			
Marking of skin areas		X		
Application			X	
Measurements				
• Capacitance		X	X	X
• Conductance		X	X	X
• TEWL		X	X	X

### Evaluations

The evaluations of the creams were made without knowledge of identity and previous readings. The times for the readings were allowed to vary  $\pm 10\%$  without further notice. Room temperature was between 22-24 °C and relative room humidity between 51-53%.

Skin hydration was analysed by measurement of skin capacitance with a Corneometer® CM 825 (Courage+Khazaka) and of skin conductance (alternating voltage) with a DermaLab® Combo (Cortex Technology, Hadsund, Denmark). The Corneometer measures the change in the dielectric constant due to skin surface hydration changing the capacitance of the precision capacitor (arbitrary values). Skin conductance is measured with a spring loaded probe which triggers and stops the measurements electric current through the material. The probe has eight pins to minimize moisture accumulation under the probe. The value is expressed as  $\mu\text{Siemens}$  ( $\mu\text{S}$ ).

The measurement of TEWL was performed with an AquaFlux (Biox Systems Ltd, London, UK). The instrument uses a condenser-chamber technology with a hollow cylinder whose lower end acts as a measurement orifice that is placed into contact with the test surface. Its upper end is closed with an aluminum condenser that is maintained below the freezing temperature of water by means of an electronic Peltier cooler. After application of the probe onto the skin, the TEWL value was recorded into the computer until the SD of the values was  $0.075 \text{ g}/(\text{m}^2 \text{ h})$  where after the measurements stops (typically within 70 s). This value is used for further calculations.

The cosmetic properties of the creams were measured by asking 9 individuals to rate 3 attributes of the creams on a Visual Analogue Scale (VAS) after application of the cream to the skin. The VAS was 16 cm and the left end represented “*very difficult/worse*” and the right end “*very easy/best*”. The three questions were:

- Hur lätt är det att applicera krämen? (How easy is it to apply the cream?)
- Hur lätt går krämen in i huden? (How easily is the cream absorbed by the skin?)
- Vilken av krämerna känns bäst? Rangordna kosmetiken längs skalan. (Which of the creams feels best? Rank the cosmetics liking along the scale.)