

# Long-term instrumental evaluation of skin compatibility of a shaving treatment for sensitive skin

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## SUMMARY

### Long-term instrumental evaluation of skin compatibility of a shaving treatment for sensitive skin

*In order to evaluate the long-term skin compatibility of the treatment Vichy Homme Sensi-Baume Ca and Mousse à Raser Anti-Irritations, 30 volunteers, having sensitive skin, used it for the daily shave for 3 weeks. Instrumental evaluations of transepidermal water loss (TEWL), skin redness and blood micro-flow were performed on the cheeks, before and 30 minutes after the shaving, at the beginning and at the end of the period of use. TEWL: the highly significant increase in the transepidermal water loss values detected after the shaving with the habitual treatment indicated a worsening in skin barrier health. After the shaving with the new treatment, a non significant decrease in the same parameter was detected. Furthermore, the comparison between the habitual and the new treatment was highly significant. These results indicate that the shaving with the new treatment preserved the barrier health and the integrity of the skin.*

*The comparison between the TEWL values recorded before the shaving, at the basal control and at the end of the study, showed a statistically significant decrease in the values. This indicated that the new treatment is also effective in protecting and strengthening the skin after a long-term use. Cutaneous colorimetry and blood micro-flow: a statistically significant increase in the skin redness and in blood micro-flow values was detected after the shaving with the habitual treatment. No significant variation in the same parameters was instead detected after the shaving with the new treatment. The comparison between the habitual and the new treatment was statistically significant. These results showed that the new treatment is effective in preventing the onset of skin irritations after the shaving.*

KEY WORDS: Shaving treatment, TEWL, Cutaneous colorimetry, Blood micro-flow

## Aim of the study

The aim of the study is to evaluate the skin compatibility of a shaving treatment for sensitive skin, as for its soothing effect against shaving rash and bumps, through measurements of transepidermal water loss, skin redness and blood micro-flow.

years) were included in this study according to the following criteria.

### **b. Inclusion criteria**

- Race: Caucasian;
- Age and sex: men aged from 25 to 60;
- Health state: no pathological events both for the period immediately before and during the test;
- Subjects with Fitzpatrick skin type I-IV;
- Subjects who shave themselves on a daily basis;
- Subjects with sensitive and/or reactive face skin;
- Subjects must have discontinued the use of

## Materials and Methods

### **Selection of the volunteers**

#### **a. Criteria for recruitment and admission**

At the beginning of the study each volunteer signed the informed consent drawn up by the technicians. 30 men (mean age 47

systemic dietary supplementations for 1 month prior to study entry;

- Subjects must have discontinued the use of topical facial medication for 15 days prior to study entry;
- Subjects must accept not to apply any topical products to the face for at least 7 days prior to study evaluations, nor any cosmetics on the days of study evaluations.

#### c. Exclusion criteria

- Subjects who are undergoing concurrent therapy or who are suffering from systemic diseases or skin disorders which may interfere with the evaluation of the test articles or increase the risks for the volunteers;
- Subjects involved in another clinical investigation within a period of 30 days prior to admission in this study;
- Subjects must be willing and able to follow all study directions and to commit to all follow up visits for the duration of the study;
- Subjects must have completed the informed consent process;
- Subjects must be willing to avoid direct daily sun exposure on the face and the use of tanning beds;
- Subjects with a history of unusual skin reactions to skin care toiletry products, cosmetics, or sensitivity to any of the test article components.

#### d. Drop-out

The following reasons were considered sufficient cause for interrupting the subject's participation in the study:

- free choice of the subject;
- medical reasons not correlated with the treatment (ex. onset of disease, surgical operation);
- reasons correlated with the treatment (ex. irritant or allergic reactions).

Details of any cases of drop-out are anyway included.

## INSTRUMENTS

#### a. Fotofinder Dermoscope Ver. 2.0

Fotofinder Dermoscope is a system that allows to carry out, memorize and process static and/or dynamic recorded images of any skin surface. It consists in a high-definition colour videocamera which is able to magnify any surface on which it is placed by means of a series of magnifying lenses. The digital images are shown on the screen in their real colours. This

allows the observer to view the smallest details.

#### b. Tewameter TM 210, Courage & Khazaka

The apparatus measures the water vapour released by the skin surface, on the base of Fick's diffusion formula. This formula is only valid on the inside of a homogeneous diffusion zone, obtainable by means of a cylinder open at both ends. The evaporimeter is supplied with a probe with a cylindrical part (inside diameter: 10 mm; height: 20 mm), open at both ends, which contain a pair of sensors. The humidity which evaporates from the skin surface passes through the cylindrical part of the probe. The saturation gradient that is formed is indirectly measured by the pair of sensors (temperature and relative humidity) and then transformed into numeric values through a microprocessor.

The instrument is supplied with a digital indicator, on which appear:

- a curve of the evaporation amount with the time;
- the single measurement value;
- the average value of the measurements carried out at set times;
- the standard deviation of the measured values.

TEWL values are expressed in  $g/h\ m^2$ .

#### c. Chromameter CR-300, Minolta

This is a portable dual channel, reflecting colorimeter with incorporated microcomputer, liquid crystals display and Xenon light source in the measuring head. The measuring head surface is 8 mm in diameter. The colour rating system used to read is  $L^* a^* b^*$ :

- $L^*$  parameter refers to skin luminosity.  $L^*$  values range from 0 to 100, where 0 corresponds to black colour and 100 to white.
- $a^*$  and  $b^*$  refer to two-colours axis:  $a^*$  represents the red - green colour while  $b^*$  the yellow - blue colour.

In the present study, only the values relating to the skin redness ( $a^*$  parameter) were taken into consideration.

#### d. Flowmeter Periflux PF4001, Perimed

The blood micro-flow is measured by means of a computerized laser Doppler device named Periflux PF4001.

A laser light, carried by an optic fibres probe, is partially reflected and partially absorbed by the examined tissue. The light, hitting the moving haematic cells, is subjected to wavelength varia-

tion (Doppler effect) while the light hitting static bodies does not change its wavelength. The power and frequency distribution of the wavelength variations is correlated to the number and the speed of the haematic cells, but not to their direction. The relative information are picked up by a return optic fibre, turned into an electronic signal and analyzed. The perfusion is expressed in Perfusion Units (P.U.), that are arbitrary units of the laser Doppler-device.

**METHOD**

**a. Method of evaluation**

The study was carried out in a bioclimatic room (24 ± 2 °C; 50 ± 10% rh) and all the instrumental evaluations were performed after a 30-minute acclimation period. Subjects were asked not to apply any product on the face the day of the basal visit. At the basal control the volunteers were asked to shave themselves in the laboratory with their *habitual shaving treatment* (razor, shaving foam and aftershave). The instrumental evaluations of transepidermal water loss, skin redness (a\* parameter) and blood micro-flow were performed on the cheeks, before (T<sub>0</sub>) and 30 minutes after the shaving (T<sub>30min</sub>). After the shaving digital images of the shaved area were also taken. After the basal measurements, the *Vichy Homme* (shaving foam and aftershave, *new treatment*) was given to the volunteers who used it for the daily shave, for 3 weeks. During this period they shaved themselves with their habitual razor. At the end of the period of application, the volunteers returned to the laboratory and shaved themselves with the *new treatment* and their habitual razor. The final instrumental measurements were taken before (T<sub>0</sub>) and 30 minutes (T<sub>30min</sub>) after the shaving. Digital images of the shaved area were also taken 30 minutes after the shaving.

**b. Mathematical elaboration**

Mean values and standard deviations

are calculated for the instrumental values related to the habitual and to the tested shaving treatment, recorded before and 30 minutes after the shaving. Furthermore, it is calculated:

$$T_{30min} - T_0 = \text{Variation of the parameter}$$

where:

$$T_{30min} = \text{mean value 30 minutes after the shaving}$$

$$T_0 = \text{mean value before the shaving}$$

This difference is reported as percentage of variation too.

The obtained values and the variations are compared by means of paired samples t-test.

The differences between the groups of values are considered significant when the probability p is < 0.05. The statistical comparison is performed between the following groups of values:

- the values recorded before and 30 minutes after the shaving, in order to evaluate if the shaving modifies the skin parameters (T<sub>0</sub> vs T<sub>30min</sub>);
- the basal values recorded before each shave made in laboratory, at the basal control and at the end of the study (T<sub>0</sub> Hab vs T<sub>0</sub> New treatment), in order to evaluate if the new treatment improves the skin conditions after the 3 weeks of use;
- the variations occurred after the shaving with the habitual and with the new treatment (T<sub>30min</sub> Hab - T<sub>0</sub> Hab vs T<sub>30min</sub> New treatment - T<sub>0</sub> New treatment) in order to compare the two treatments.

**Results**

**a. Transepidermal water loss**

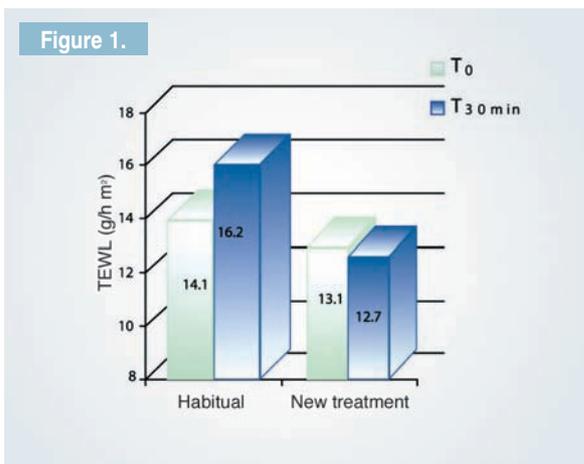
(Table 1, Figure 1)

**Habitual:** a highly significant increase in the mean basal values of transepidermal water loss was detected after the shaving.

Table 1.	T <sub>0</sub>	T <sub>30min</sub>	Variation T <sub>30min</sub> -T <sub>0</sub>	% variation	t-test T <sub>0</sub> vs T <sub>30min</sub>
<b>Habitual</b>	mean 14.1 std. dev. 3.2	mean 16.2 std. dev. 4.0	2.1	14.9%	p<0.001
<b>New treatment</b>	mean 13.1 std dev. 2.9	mean 12.7 std. dev. 3.3	-0.4	-3.0%	p>0.05

T<sub>0</sub> Habitual vs T<sub>0</sub> New treatment: p < 0.05  
 T<sub>30min</sub> - T<sub>0</sub> Habitual vs T<sub>30min</sub> - T<sub>0</sub> New treatment: p < 0.001

**New treatment:** a non significant decrease in TEWL values was recorded. The comparison between the variations obtained after the shaving with the habitual treatment and with the new treatment showed a highly significant difference. The comparison between the values recorded before the shaving, at the basal control and at the end of the treatment, showed a statistically significant decrease in the considered parameter.



**b. Cutaneous colorimetry**  
**[a\* parameter: skin redness index]**

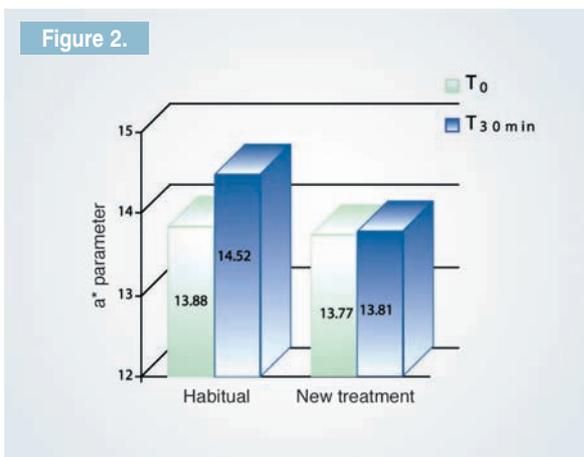
(Table 2, Figure 2)

**Habitual:** a statistically significant increase in the mean basal values of skin redness was detected after the shaving.

Table 2.	T <sub>0</sub>	T <sub>30min</sub>	Variation T <sub>30min</sub> -T <sub>0</sub>	% variation	t-test T <sub>0</sub> vs T <sub>30min</sub>
<b>Habitual</b>	<b>mean 13.88</b> <i>std. dev. 3.2</i>	<b>mean 14.52</b> <i>std. dev. 4.0</i>	<b>0.64</b>	<b>4.6%</b>	<b>p&lt;0.05</b>
<b>New treatment</b>	<b>mean 13.77</b> <i>std. dev. 2.9</i>	<b>mean 13.81</b> <i>std. dev. 3.3</i>	<b>0.04</b>	<b>0.3%</b>	<b>p&gt;0.05</b>

T<sub>0</sub> Habitual vs T<sub>0</sub> New treatment: p > 0.05  
 T<sub>30min</sub> - T<sub>0</sub> Habitual vs T<sub>30min</sub> - T<sub>0</sub> New treatment: p < 0.05

**New treatment:** a non significant increase in the same parameter was recorded. The comparison between the variations obtained after the shaving with the habitual treatment and with the new treatment showed a statistically significant difference. The comparison between the values recorded before the shaving, at the basal control and at the end of the treatment, resulted non significant.



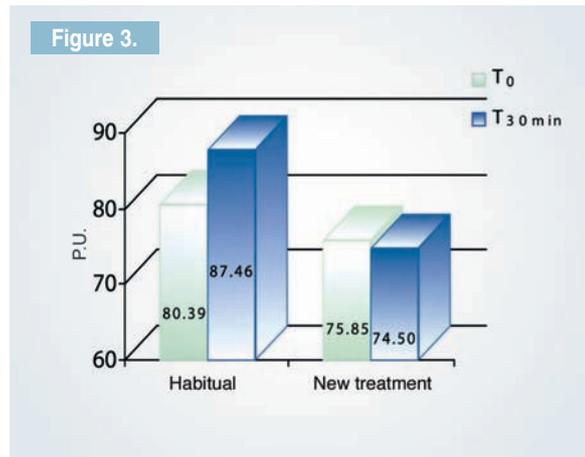
**c. Cutaneous blood micro-flow**

(Table 3, Figure 3)

**Habitual:** a statistically sig-

Table 3.	T <sub>0</sub>	T <sub>30min</sub>	Variation T <sub>30min</sub> -T <sub>0</sub>	% variation	t-test T <sub>0</sub> vs T <sub>30min</sub>
<b>Habitual</b>	<b>mean 80.39</b> <i>std. dev. 3.2</i>	<b>mean 87.46</b> <i>std. dev. 4.0</i>	<b>7.07</b>	<b>8.8%</b>	<b>p&lt;0.05</b>
<b>New treatment</b>	<b>mean 75.85</b> <i>std. dev. 2.9</i>	<b>mean 74.50</b> <i>std. dev. 3.3</i>	<b>-1.35</b>	<b>-1.8%</b>	<b>p&gt;0.05</b>

T<sub>0</sub> Habitual vs T<sub>0</sub> New treatment: p > 0.05  
 T<sub>30min</sub> - T<sub>0</sub> Habitual vs T<sub>30min</sub> - T<sub>0</sub> New treatment: p = 0.05



nificant increase in the mean basal values of cutaneous blood micro-flow was detected after the shaving.

**New treatment:** a non significant decrease in the same parameter was recorded. The comparison between the variations obtained after the shaving with the habitual treatment and with the new treatment showed a statistically significant difference. The comparison between the values recorded before the shaving, at the basal control and at the end of the treatment, resulted non significant.

## Conclusion

In order to evaluate the long-term skin compatibility of the treatment *Vichy Homme Sensi-Baume Ca* and *Mousse à Raser Anti-Irritations*, 30 volunteers, having sensitive skin, used it for the daily shave for 3 weeks. Instrumental evaluations of transepidermal water loss, skin redness and blood micro-flow were performed on the cheeks, before and 30 minutes after the shaving, at the beginning and at the end of the period of use. Those evaluations showed the following results: TEWL: the highly significant increase in the transepidermal water loss values detected after the shaving with the habitual treatment indicated a

worsening in skin barrier health. After the shaving with the new treatment, a non significant decrease in the same parameter was detected. Furthermore, the comparison between the habitual and the new treatment was highly significant. These results indicate that the shaving with the new treatment preserved the barrier health and the integrity of the skin.

The comparison between the TEWL values recorded before the shaving, at the basal control and at the end of the study, showed a statistically significant decrease in the values. This

indicated that the new treatment is also effective in protecting and strengthening the skin after a long-term use.

Cutaneous colorimetry and blood micro-flow: a statistically significant increase in the skin redness and in blood micro-flow values was detected after the shaving with the habitual treatment. No significant variation in the same parameters was instead detected after the shaving with the new treatment.

The comparison between the habitual and the new treatment was statistically significant. These results showed that the new treatment is effective in preventing the onset of skin irritations after the shaving (Figure 4).

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