

# EXPLORING THE MICROCIRCULATION OF THE HUMAN LIPS BY A NEW LASER TECHNOLOGY (LASCA)

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## AIM

Among various features of feminine beauty, the natural color of the lips and change afforded by lipstick are of a high aesthetic desire. The natural color of the lips is at first driven by the intensity of underlying microcirculation that probably declines with age, leading to a darker tone. The present study aimed at i) exploring the microcirculation of human lips through a non-invasive new laser technology and ii) assessing the effect of cosmetic ingredients upon microcirculation, compared to that of their vehicle alone.

## MATERIALS AND METHODS

A Laser Doppler Imager (Figure 1) based upon the Laser Speckle Contrast Analysis (LASCA) technology was used to measure superficial blood perfusion (the microcirculation) instantaneously. It is rather difficult to draw results in absolute values (for example ml / min / 100 grams of matter) using a laser doppler. The measures are then expressed in an arbitrary and relative unit: the Perfusion Unit (PU), defined by the number of moving red cells multiplied by their velocity in the blood. We therefore mostly studied variations of relative values following stimulations of the microcirculation: the higher the perfusion unit the higher the microcirculation.

Volunteers had to rest, lying on the back in an air-conditioned room, for 15 minutes under calm and silent conditions, having avoided ingestion of any meal or beverage (coffee, tea) 2 hours prior to measurements (Figure 2).

Measurements followed the two step objectives:

**Step 1:** To evaluate the impact of age upon the microcirculation of bare lips  
 This was carried out on two age groups of Caucasian females with thick or medium lips:

- Group of 19 young women [28-35y] 25 +/- 4 y.o.
- Group of 19 aged women [above 50y] 58 +/- 7 y.o.

**Step 2:** To assess possible changes in microcirculation of the lips induced by a cosmetic product containing a mixture of 2 cosmetic ingredients (collagen peptides and hyaluronic acid) compared to those induced by their vehicle. Considering the results from step 1, 16 women aged 50-65y with thick or medium lips, free from sensitive skin were selected for such aim.

Each woman tested the 2 products (product with actives and vehicle) on 2 different days (with a wash out of 48 hours in between) following a prior randomization. The measurements were performed on bare lips, immediately, 2 and 10 minutes following product application.

**Analysis:** The preliminary results showed that the lower lip led to much more reproducible results than upper lip, likely related to its thinner structure.(Figure 3)

**Statistics :** Statistical analysis was carried out using Statistic software (IBM SPSS Statistics 20). The influence of age was evaluated by Levene's Test. The product effect was evaluated by Anova test (time, product) for the evolution during the time and by T Test to compare the 2 products at each time.

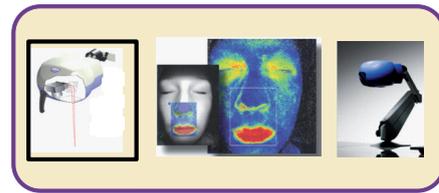


Figure 1: The Speckle is a blood perfusion imager based on the Laser Speckle Contrast Analysis (LASCA) technology. It is a method that measures superficial blood perfusion (the microcirculation) instantaneously.

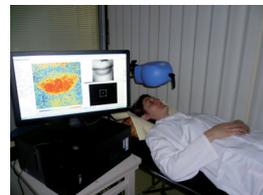


Figure 2: Acquisition of measurements and area of analyse

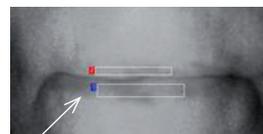


Figure 3: Area of measurement: RO1 lower lip

## RESULT

### Step 1 = Influence of age

statistical analysis (Levene's Test) showed a significant difference between the two groups (s = 0.006). the perfusion values appearing higher in the younger group than in the older one.(Figure 4)

Descriptive Statistics						Levene's test
Groups	N	Mean	Std. Deviation	Minimum	Maximum	Significativity
A = 18 to 35 years old	19	382.34	113.42	225.37	612.06	S 0.006
B = sup to 50 years old	19	277.13	107.37	143.28	539.94	

Perfusion unit = Number of red blood corpuscule on the move X their speed

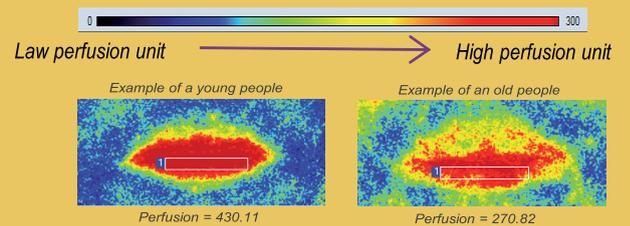


Figure 4: Illustrative photos

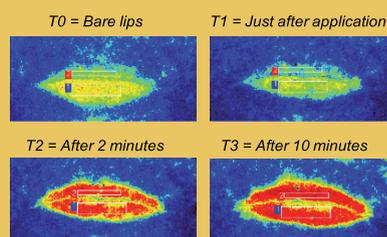
### Step 2 = Effect of product and vehicle

Statistical analysis (Anova (time, product)) led to the following conclusions:

✓ **Product with actives:** Microcirculation only significantly increased 2 and 10 minutes following product application. (Table1)

Temps	N	Subset	
		1	2
T0	16	389.14	
T1	16	406.27	
T2	16	505.48	
T3	16	528.12	
Sig.		.935	.863

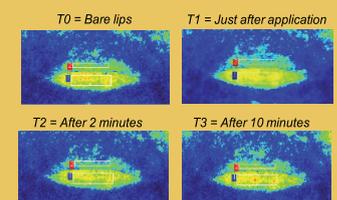
Table 1: Statistical analysis Anova by time



✓ **Vehicle:** Microcirculation remained unaltered immediately, 2 and 10 minutes following application. (Table2)

Temps	N	Subset	
		1	2
T0	16	396.07	
T2	16	397.86	
T3	16	405.95	
T1	16	428.35	
Sig.		.118	

Table 2: Statistical analysis Anova by time

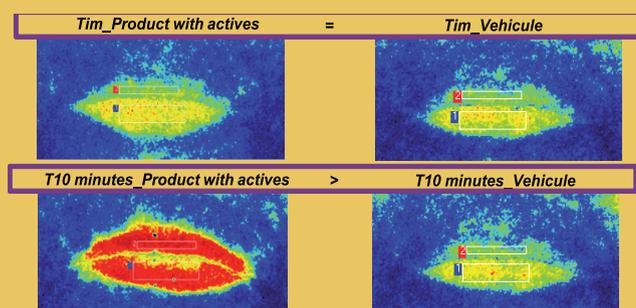


✓ **Product with actives vs Vehicle:** At 2 and 10 minutes, the effect of the "active" product is found significantly different (s= 0.001 at T2min and s= 0.009 at T10min) from that of vehicle. (Table3)

Temps	Moyenne	Ecart type	Significativité
Tim-T0_A	17.13	61.097	0.39
Tim-T0_B	32.28	46.319	NS
T2min-T0_A	116.34	114.859	0.001
T2min-T0_B	1.79	46.967	S
T10min-T0_A	138.98	137.300	0.009
T10min-T0_B	9.88	77.873	S

A = Product with actives; B = vehicule

Table 3: Statistical analysis T Test



## CONCLUSION

The new technique referred as Laser Doppler Speckle (LASCA) appears a valuable tool for characterizing the microcirculation of the lips, with a good reproducibility, mostly on the lower lip. It helped to confirm that ageing slows down the microcirculation of the lip and showed that some actives may bring improvements, suggesting the development of products (lipsticks, glosses) better designed towards older feminine consumers.

Since lips color intensity decreases with aging, the improvement in lip microcirculation allows them to regain an intense natural color