A powerful and sustainable natural plant extract visibly minimizing the appearance of stretchmarks on the body

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Abstract (Maximum of 250 words)

In this Covid-19 pandemic period, the level of sedentary lifestyle reached records. Eating habits changed. With documented tendencies to gain weight, the probability to get stretchmarks increased. The change in aesthetic may generate a decrease of self-esteem, and the need to have an efficient solution against stretchmarks is real, still challenging to achieve *in vivo*.

We investigated the ability of a natural plant extract, *Papaver rhoeas* extract (MAS-30) in a placebo-controlled, double blind *in vivo* study, for its ability to lessen the visibility of stretchmarks. Volunteers were *postpartum* women with recent pink stretchmarks on the stomach, the buttocks, or thighs. The anti-stretchmark efficacy was assessed by measuring the length and width of the marks, clinical grading, color measurement, and illustrative pictures.

Results show that both the test product containing MAS-30 and the placebo emulsion had significant effects on stretchmark appearance but there was a tendency in favor of the emulsion containing *Papaver rhoeas* extract (MAS-30) especially in the case of redness reduction, lightness increase, and illustrative pictures.

Keywords: stretchmarks; natural plant extract**,** *Papaver rhoeas*, *in vivo* study

Background

Stretch marks are apparently caused by stretching of the skin. Examples of cases where stretch marks are common, include weight gain (in the form of fat and/or muscle), pregnancy, and adolescent growth spurts... But other external factors like stress and diseases may also increase the likelihood of the appearance of stretch marks.

In this complicated Covid-19 pandemic period, the level of sedentary lifestyle has reached record high levels with lockdowns and strong recommendations to work in home-office. Eating habits and behavior have been modified [1]. Studies have already shown that male and female population tend to have gained weight. Therefore, the probability to get stretchmarks on the body has increased. The change in aesthetic aspect may generate a decrease of self-esteem, self- confidence, and the need to have an efficient solution is real. Nonetheless it is still a real challenge to achieve tangible results against stretchmark on an *in vivo* basis.

MAS-30 is extracted from the seeds of *Papaver rhoeas*, better known as corn poppy, corn rose, field poppy, red poppy or coquelicot, whose flowers are large and showy, with four vivid red petals, most commonly seen with a black spot at their base.

The red wild form is often grown as an ornamental plant, but this is not its only application: petal extracts are said to be able to soothe coughs and seeds can be used as a food ingredient or for oil production [2] [3].

Earlier scientific investigations showed that MAS-30 can be used for body and face applications. It increases skin micro flow blood, flattens the dermo-hypodermal junction, leading to a visual improvement of cellulite conditions [4]. For face applications it was shown that volume eye bags, color of dark circles under the eyes could be reduced, and skin elasticity and density were improved [5].

Based on these previous *in vivo* proven claims, we decided to explore MAS-30 for its ability to lessen the visibility of stretchmarks in a new *in vivo* study, whose results are presented in

this manuscript. The study was performed as a placebo controlled, randomized-double blind study.

Materials and Methods

Tested products

MAS-30 (INCI: Caprylic/Capric Triglyceride, *Papaver Rhoeas* Extract (for China: Papaver Rhoeas Flower Extract), Tocopherol)

Origin and extraction process of *Papaver rhoeas.* extract [5]

The flowers of *Papaver rhoeas* are cultivated in France according to sustainable principles. The seeds are ultimately used for the extraction process. The extract of *Papaver rhoeas* seeds was obtained via an Ethanol/CO_2 co-extraction (super-critical CO_2 extraction). The supercritical status of CO_2 represents a well-established green process and a preferred extraction medium in comparison to conventional solvents [6]. The ethanol is removed by vacuum evaporation. Afterwards the oil extract is clarified by filtration and conditioned under inert atmosphere. Under given process conditions a standardized extract of *Papaver rhoeas* is available to us. The lead component of the extract is linoleic acid in a concentration range between 69 – 85 %. Other components include oleic acid, palmitic acid and further saturated fatty acids bound or in free form.

In order to obtain a ready-to-use, easy-to-formulate cosmetic active ingredient, the poppy seed extract is then mixed with a suitable cosmetic oil (INCI: Caprylic/Capric Triglyceride). The final ingredient MAS-30 is a clear oil containing 10 % of *Papaver rhoeas* extract.

In vivo Study

A 56-days double-blind *in vivo* study was organized. 24 Caucasian female subjects, at least 18 years old having given their written consent were included in the study. All the subjects were *postpartum* subjects having at least 2 recent stretch marks on each side of the body (less than 6 months) pink and comparable on the stomach, the buttocks, and the thighs.

The volunteers applied an emulsion containing 1% MAS-30 (*Papaver rhoeas* extract) (see Table 1) and the placebo (same basis formulation without any skin care active ingredient) twice daily on the selected stretchmarks and surrounding during 56 days with a slight massage until complete absorption of the test products. The application zones of the study products were randomized.

Statistical analysis was done using Shapiro-Wilk test, then paired student T-test or Wilcoxon Signed rank test according to the results of the normality test.

Read out parameters and instrumental methods

The following read out parameters were explored: centimetric measurements, clinical grading by a dermatologist, colorimetric measurement using a MINOLTA CM700-d spectrophotometer®, and illustrative pictures (Nikon® D90 and SONY® A6600). There was also a subject self-evaluation using a questionnaire.

Results

A significant anti-stretchmark effect by clinical scoring could be observed after 56 days of use for both test products *Papaver rhoeas* extract (MAS-30) and the placebo: increase in the average grade of the firmness by +40%,+36%, decrease in the average grade of the stretchmark color by -46%, -46%, decrease in the average grade of the stretch mark relief; by -38%, and -33% for MAS-30 and placebo respectively for each parameter (see Figure 1).

Significant decreases in the average measurements of the stretchmark length and width after 56 days could also be observed for both test products: respectively -9% and -19% (in 70% of the subjects) for MAS-30, and respectively -10% and -16% (in 55% of the subjects) for the placebo after 56 days of use (Figure 2).

Spectrophotometer measurements showed significant increases of the lightness (L* value) for both *Papaver rhoeas* extract (MAS-30) and placebo by +5% ($p=<0.0001$) L* >3 A.U.) and +3% ($p=0.0076$); L* value < 3 A.U.).

The redness value (a*) significantly decreased by -20% ($p<0.0001$) for MAS-30 and by -12% ($p=0.0011$) for the placebo after 56 days of use.
The statistical comparisons between both products showed a tendency in favor of MAS-30 regarding the redness decrease ($p=0.0668$) after 56 days and regarding the lightness parameter ($p=0.1093$) (see Figure 3)
Illustrative pictures taken during this *in vivo* study (see representative example shown in Figure 4) furthermore fit well with these tendencies observed for 1% MAS-30. The overall appearance of the stretchmarks is minimized. Pictures of the stretchmark treated with the placebo in contrary do not show an effect on the same level of magnitude.

Finally, the subjective questionnaire indicated with multiple questions the preference of the volunteers for the emulsion containing 1% MAS-30 (see Figure 5)

Discussion

Getting visible and measurable effects as well as a statistically significant difference between active and placebo formulations in an anti-stretchmark *in vivo* study is a complex task.
The outcome of our *in vivo* study shows significant results for both the test product containing *Papaver rhoeas* extract (MAS-30) and the placebo product, with tendencies in favor of MAS-30 especially in the case of the redness reduction, the lightness increases and the stretchmark width. The number of volunteers included is this study was the minimum required to envision getting a statistically significance difference at the different time points and between the products. This was a first proof of concept and due to the organizational complexity of such a study (and more even in Covid times) we could only include 20 subjects; literature shows that higher number of volunteers are often recruited [7] and we might have reached significant differences between products with a higher number of included subjects. The positive effect of the placebo might be attributed to the fact that the volunteers were asked to massage the stretchmarks with both products until complete absorption of the products into the skin. Some studies reflect the benefits of massage alone [8] [9], [10], [11], [12].

Concerning the color of the stretchmarks, let's remind that red colored stretchmarks (*striae rubrae*) are fresh and correspond only to the beginning of the marks. Such scarring shows the blood vessels through, hence the red color pops. They typically occur when the skin stretches due to the rapid increase in size of underlying structures, like it may typically be the case of pregnant women, or those who are after child delivery in the *postpartum* phase (*postpartum* women were recruited in this *in vivo* study). Earlier studies undertaken with MAS-30 showed its ability to increase skin elasticity in volunteers having cellulite on their thighs and/or gluteus [4]. Therefore, it might explain and validate the stronger decrease of redness observed in this study in the case of treatment with MAS-30. These results also correlate well with other earlier investigations in which MAS-30 at 2% use level applied on the face increased the lightness/radiance of the skin [5].

Ingredients	**INCI**	**Verum [%]**	**Placebo [%]**
A			
MAS-30	CAPRYLIC/CAPRIC TRIGLYCERIDE, PAPAVER RHOEAS EXTRACT, TOCOPHEROL	1,00	0,00
Montanov 202	ARACHIDYL ALCOHOL, BEHENYL ALCOHOL, ARACHIDYLGLUCOSIDE	3,00	3,00
Lanol 99	ISONONYL ISONONANOATE	2,00	2,00
Myritol 318	CAPRYLIC/CAPRIC TRIGLYCERIDE	1,00	2,00
Cetiol CC	DICAPRYLYL CARBONATE	3,00	3,00
Cocoate BG	BUTYLENE GLYCOL COCOATE	2,00	2,00
B			
Water, demineralized	AQUA (WATER)	Ad 100	Ad 100
1.2-Propanediol	PROPYLENE GLYCOL	6,00	6,00
C			
Simulgel NS	HYDROXYETHYL ACRYLATE/SODIUM ACRYLOYLDIMETHYL-TAURATE COPOLYMER, SQUALANE, POLYSORBATE 60	2,00	2,00
D			
Preservative		q.s. 100,00	q.s. 100,00

Table 1. Composition of the placebo and verum containing 1% Papaver rhoeas extract (MAS-30)

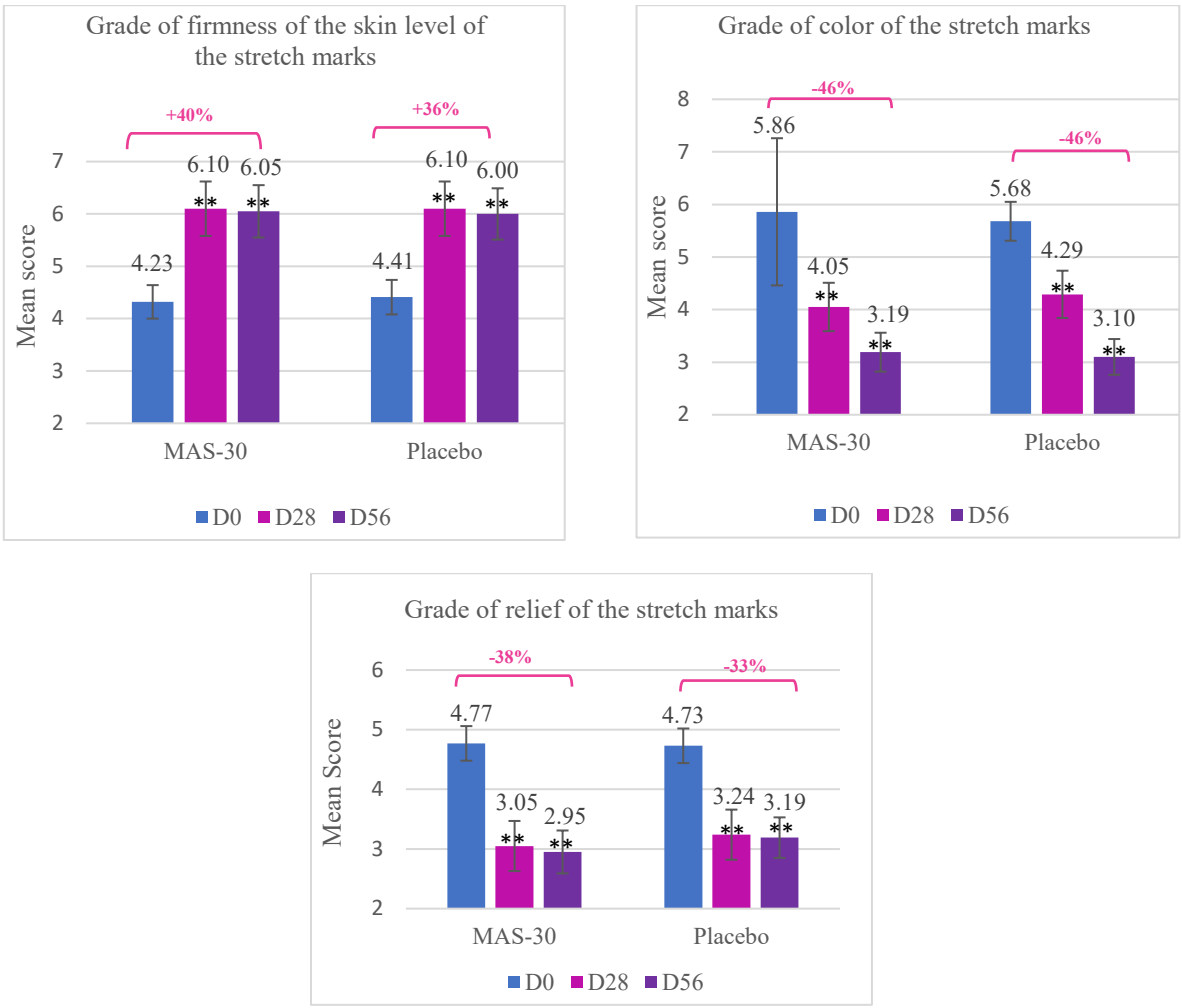

Figure 1: Grade of firmness, color and relief of the skin: for an emulsion containing 1% MAS-30 and for the placebo.

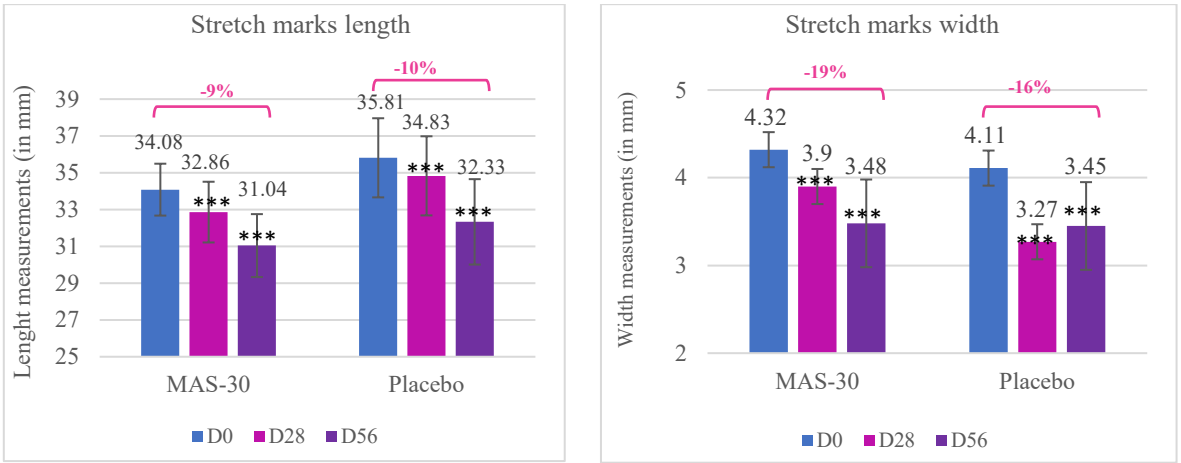

Figure 2: Centimetric measurements: Stretchmark length and width for an emulsion containing 1% MAS-30 and for the placebo.

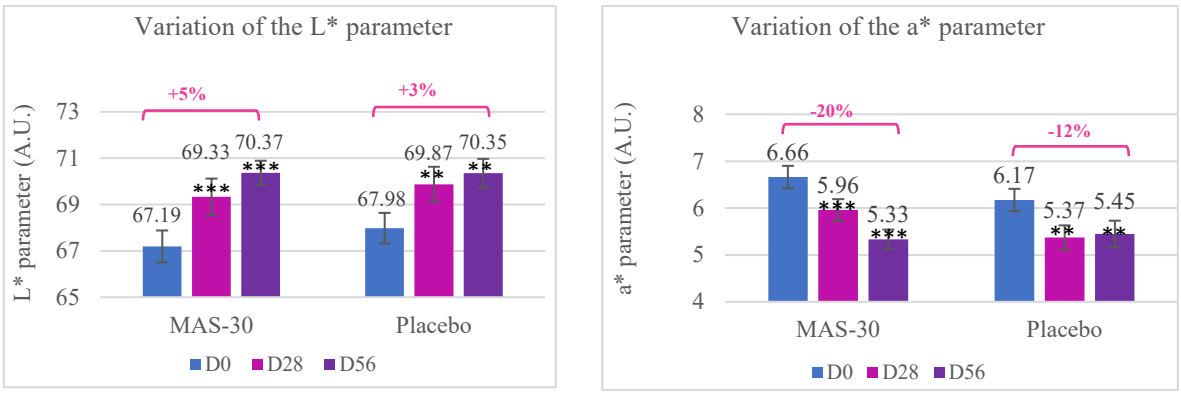

Figure 3: Spectrophotometirc measurements: Variation of the L and a*parameter for an emulsion containing 1% MAS-30 and for the placebo. - The statistical comparisons between both products showed a tendency in favor of MAS-30 regarding the redness (a*) decrease (p=0.0668) and regarding the lightness parameter (L*) (p=0.1093) after 56 days.*

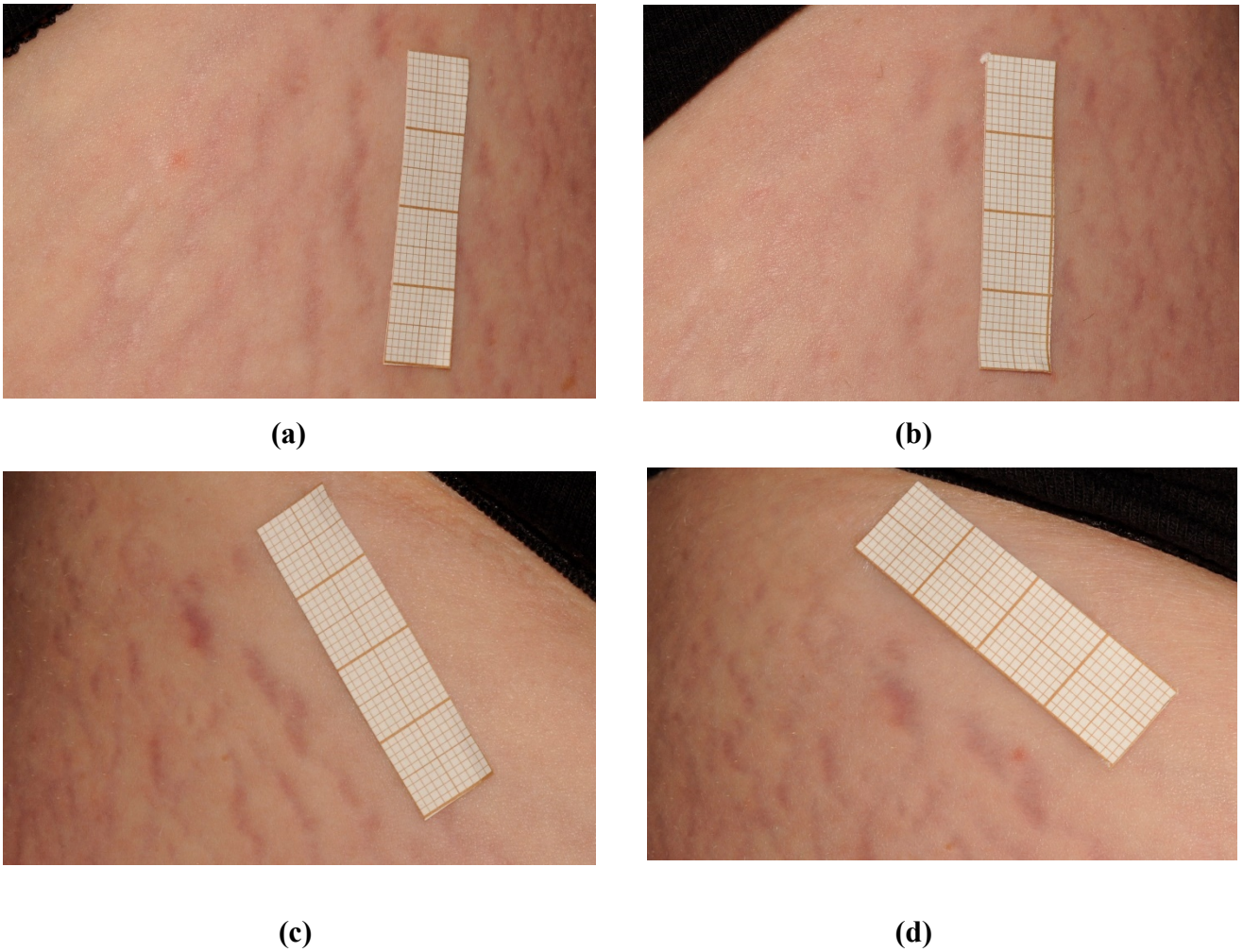

Figure 4: Illustrative pictures: Pictures showing evolution of stretchmarks for a selected volunteer. (a) at D0 without any treatment (b) at D56 after treatment with an emulsion containing 1% MAS-30 (c) without any treatment (d) after treatment with placebo emulsion

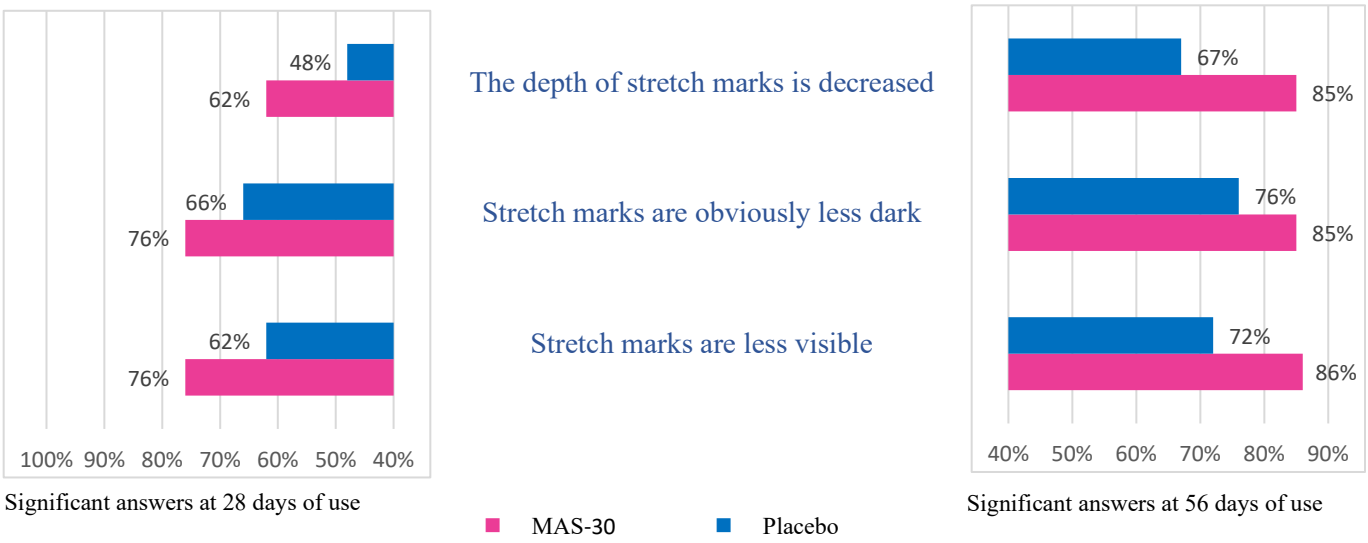

Figure 5: Subjective evaluation questionnaire for both test produicts 1% Papaver rhoeas extract in an emulsion (MAS-30) and the placebo

Conclusion

Stretchmarks do not only concern *postpartum* women, but also a wider range of individuals, of both sexes and different age categories. The appearance of stretchmarks may become a significant concern, affect self-confidence and self-esteem of individuals. Our study shows that both test products had significant effects on stretchmark appearance with a tendency in favor of the emulsion with 1% *Papaver rhoeas* extract (MAS-30) especially in the case of redness reduction, lightness increase and . They also well correlate with illustrative pictures as well as with previous *in vivo* results showing the ability of MAS-30 to notably increase skin elasticity and skin radiance.

Papaver rhoeas extract (MAS-30) may represent a natural and sustainable solution to help minimizing the appearance of stretchmarks and future investigations should be undertaken for further validation. Including more volunteers, longer duration of a study, selection of an alternative placebo basis formulation could be parameters to focus on when setting up a new study protocol.

Conflict of Interest Statement. NONE.

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