Tulsi extract induces a global defense and protection against endogenous and exogenous stresses contributing to skin aging

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Introduction:

Tulsi (*Ocimum sanctum*), or « sacred basil », has been traditionally used in ayurvedic medicine, in which this adaptogen plant is considered as an elixir of life. We developed a new active ingredient rich in polyphenols extracted from the leaves *of O. sanctum*.

The biological efficacy of the extract was demonstrated thanks to *in vitro* models showing its ability to protect from oxidative stress, to preserve mitochondrial function and finally to fight against inflammaging. Those results, in favor of an anti-aging efficacy, were confirmed in a clinical study showing that the extract was able to reduce wrinkles appearance and to improve skin biomechanical properties as wells as complexion homogeneity.

Materials & Methods:

In vitro studies:

Normal human epidermal keratinocytes (NHEK) were treated with Cortisol in presence of OS leaf extract or ascorbic acid (AA), reference molecule. Nitric Oxide (NO) release was measured by amperometry.

Normal human dermal Fibroblasts (NHDF) were treated with a standardized mix of urban pollutants in presence of OS leaf extract. Cell bioenergetics was analysed using Bioenergetic Balance Screen Plus (BBS+) technology. Autophagy/mitophagy processes were evaluated by fluorescent immunostaining.

The formulated OS extract was evaluated in a model reproducing inflammaging process: conditionned medium of Reconstructed Human Epidermis (RHE), stimulated by PMA in presence of the extract, have been applied on NHDF. Gene expression was followed by qPCR.

Representative scheme of the inflammaging model :
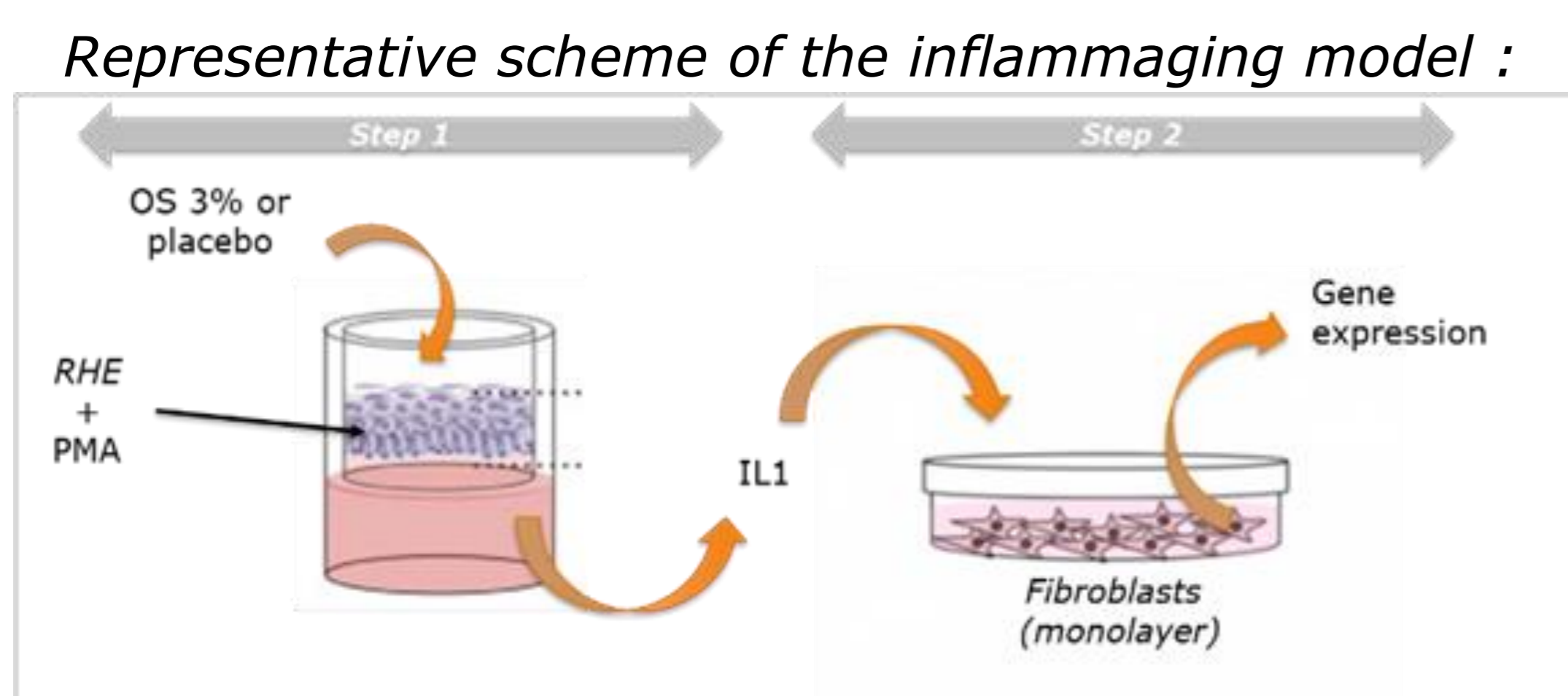
Clinical study:

A double-blind placebo-controlled clinical study has been performed on 40 to 60 years old Caucasian women (23 subjects in both O. sanctum leaf extract and placebo groups). O. sanctum leaf extract and placebo have been applied twice a day during 56 days on the face.

Anti-ageing effects on the face were evaluated on wrinkles using analysis of topography acquired with Dermatop® (Eotech), on skin biomechanical properties using Cutometer (Courage & Khazaka) and on skin complexion homogeneity by image analysis acquired with Colorface® (Newtone Technologies).

Conclusions:

Overall, these results suggest that the newly developed Ocimum sanctum leaf extract contributes to the skin global defense and helps it fight against exogenous and endogenous stress, well described as the cutaneous exposome. The extract is able to preserve skin homeostasis in response to the exposome stresses, and thus offers an anti-aging efficacy, demonstrated clinically.

Aknowledgments:

References:

1-Cordier-Dirikoc *et al.* (2019) Fibroblasts are potentially the key sensors of epidermis lesion through keratinocyte IL-1 signalling. *Journal of Investigative Dermatology.* 139(9S, supp.2):S278.

Results & Discussion:

Tulsi extract protects from oxidative stress and from cortisol damage related to psychological stress.

Figure 1: NO release in NHEK stimulated by cortisol
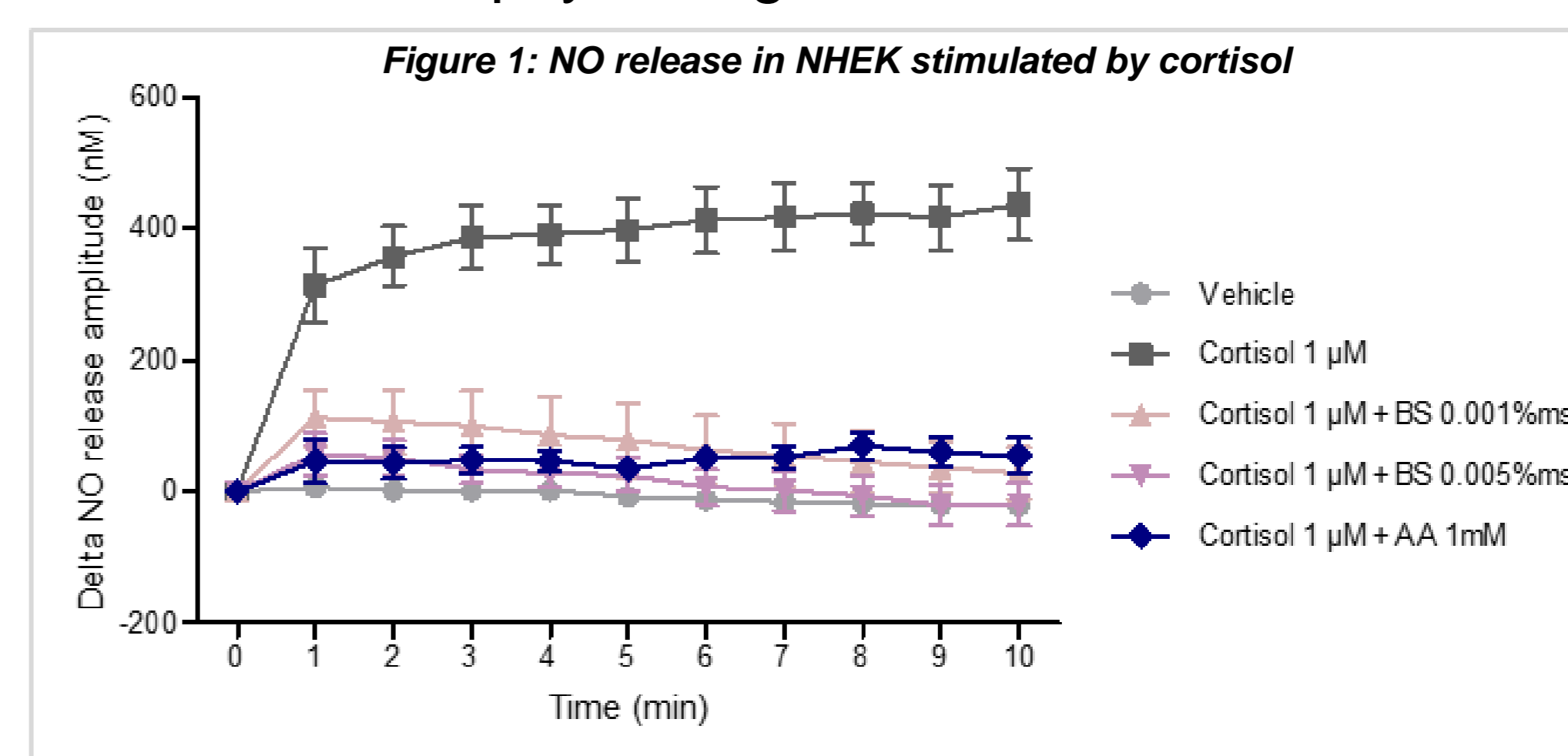
Tulsi extract normalizes cell bioenergetics and restores mitochondrial function altered by urban pollutants.

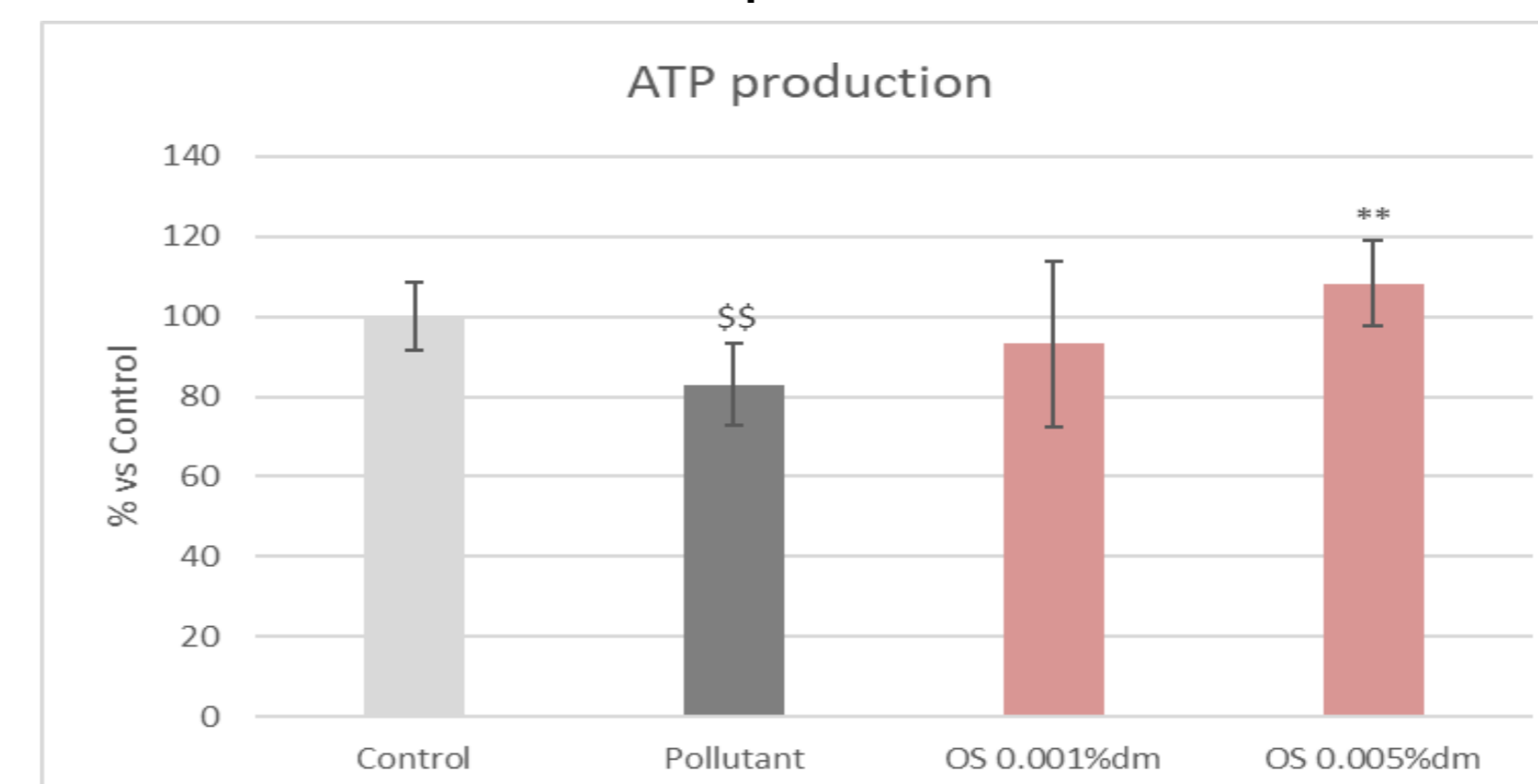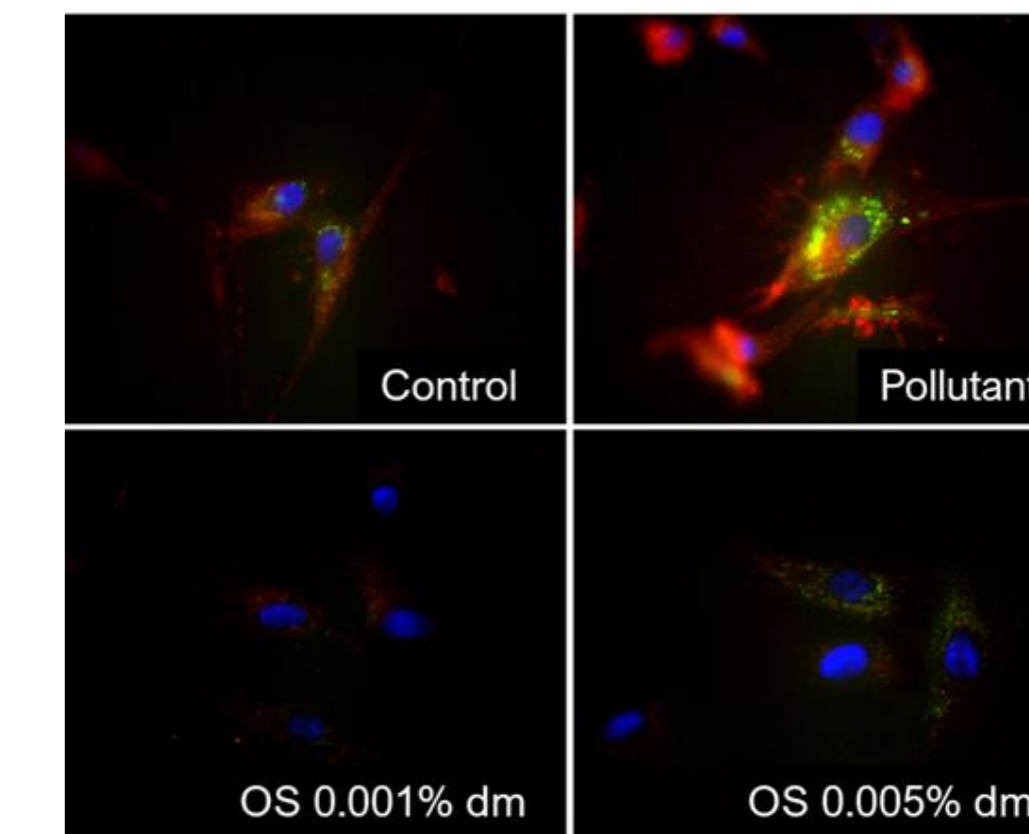Figure 2: Study of cell bioenergetics in NHDF subjected to pollutant stress

Figure 3: Immunostaining of damaged mitochondria (Red) and lysosomes (Green) in NHDF subjected to pollutant stress

Tulsi extract helps fight against Inflammaging.

Table I: Gene expression of biomarkers in fibroblasts exposed to "inflammaging-stress"
Results are expressed as relative quantity of gene expression; and % modulation compared to PMA.

	Control	PMA	Dexa. 1µM	Placebo	OS 3%
CXCL1	100	401	403	230 (-57%)	144 (-85%)
IL8	100	2133	503	1066 (-52%)	532 (-79%)
IL6	100	1109	92	537 (-57%)	330 (-77%)
CCL2	100	307	193	198 (-53%)	123 (-89%)
MMP1	100	1060	52	306 (-76%)	169 (-93%)
MMP3	100	533	112	386 (-34%)	250 (-65%)

Clinical study:
Tulsi extract showed significant anti-aging effects compared to placebo.

Figure 4: Analysis of topography

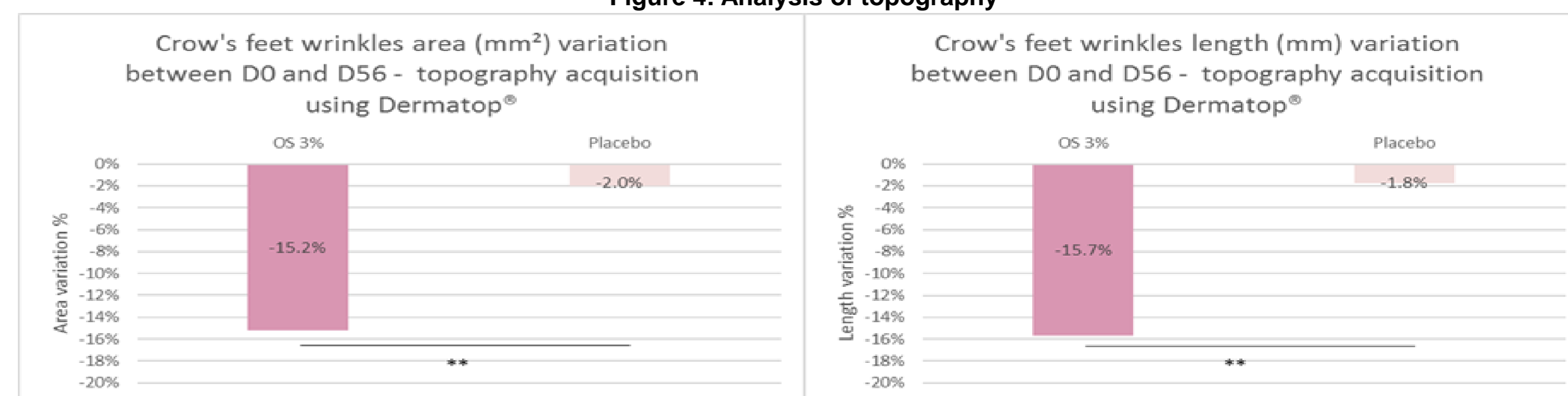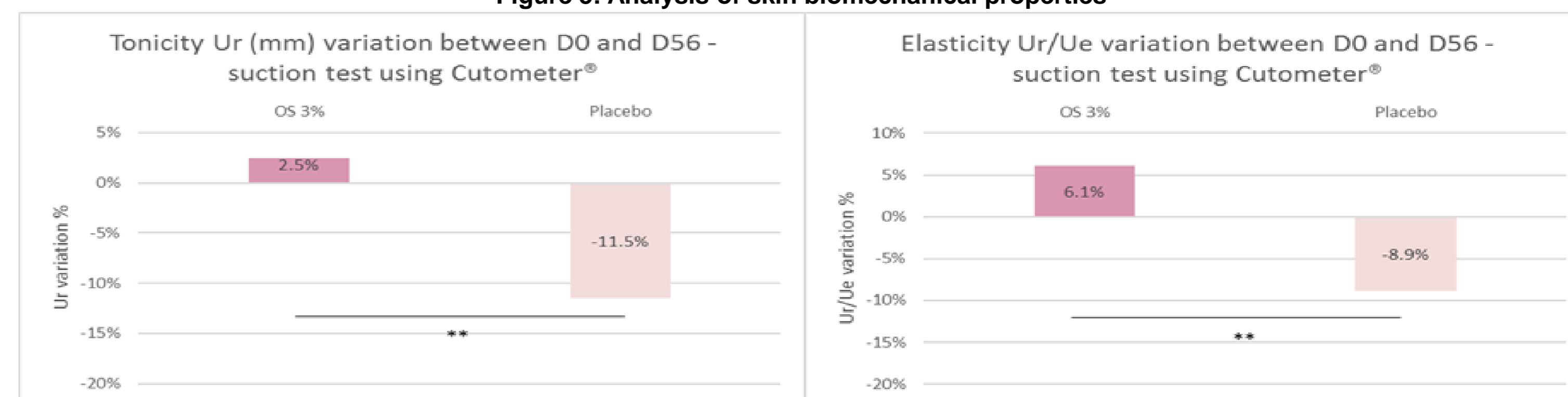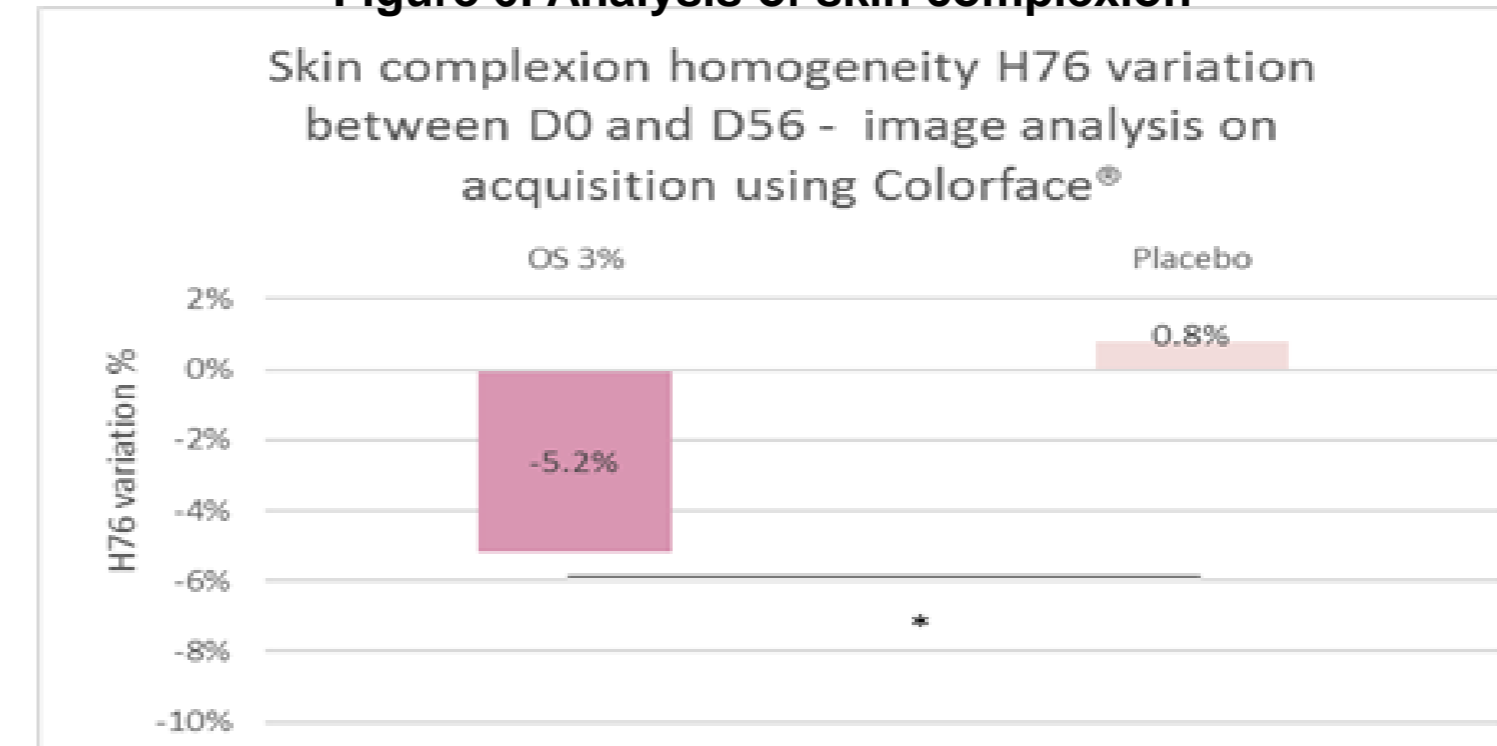Figure 5: Analysis of skin biomechanical properties

Figure 6: Analysis of skin complexion

Difference between O. sanctum leaf extract and placebo has been assessed by statistical analysis. Normality of the data was tested using a Shapiro-Wilk test, and a Mann-Whitney U or a non-paired Student's t-test was used to assess the statistical significance of differences between O. sanctum leaf extract and placebo groups. p-value <0.05 was considered to indicate a statistically significant difference (noted ** on graphs) and p-value <0.1 was considered to indicate a statistically limit significant difference (noted * on graphs).