

OZONE PEAKS AS A MAJOR EMERGING STRESSOR AND POLLUTANT CAUSING DETRIMENTAL SKIN CONDITIONS; A SKINCARE SERUM OFFERS PROTECTION AND CORRECTION.

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INTRODUCTION

Major air pollutants which affect the skin are UV rays, visible light, particulate matter (PM), heavy metals and, more recently highlighted but among the most toxic, ozone (O₃). Tropospheric ozone is an atmospheric pollutant created by chemical reactions between NO_x gases (oxides of nitrogen produced by combustion) and volatile organic compounds. The combination of these chemicals in the presence of sunlight form ozone. Tropospheric ozone is the only pollutant increasing in most industrialized countries in recent decades and is a key factor in skin damage inducing oxidative stress and inflammation. [1, 2 & 3]

In the present work, we evaluated whether photo-pollution including O₃ acts in inducing skin damage, and whether this effect could be prevented through native *Crithmum maritimum* cells extract or a topical application of a specific skincare SERUM containing it.

MATERIALS & METHODS

1. In-vitro study

- To demonstrate the “**protective efficacy of native *Crithmum maritimum* cells against O₃**” on the skin by systemic application for 3 days.
=> “Normal” & “stressed (O₃)” reconstructed human full-thickness skin models, untreated (T & S) & treated (CM & CMS) by the native *Crithmum maritimum* cells (0.04%).
- Immunostaining & image analysis

2. Ex-vivo studies

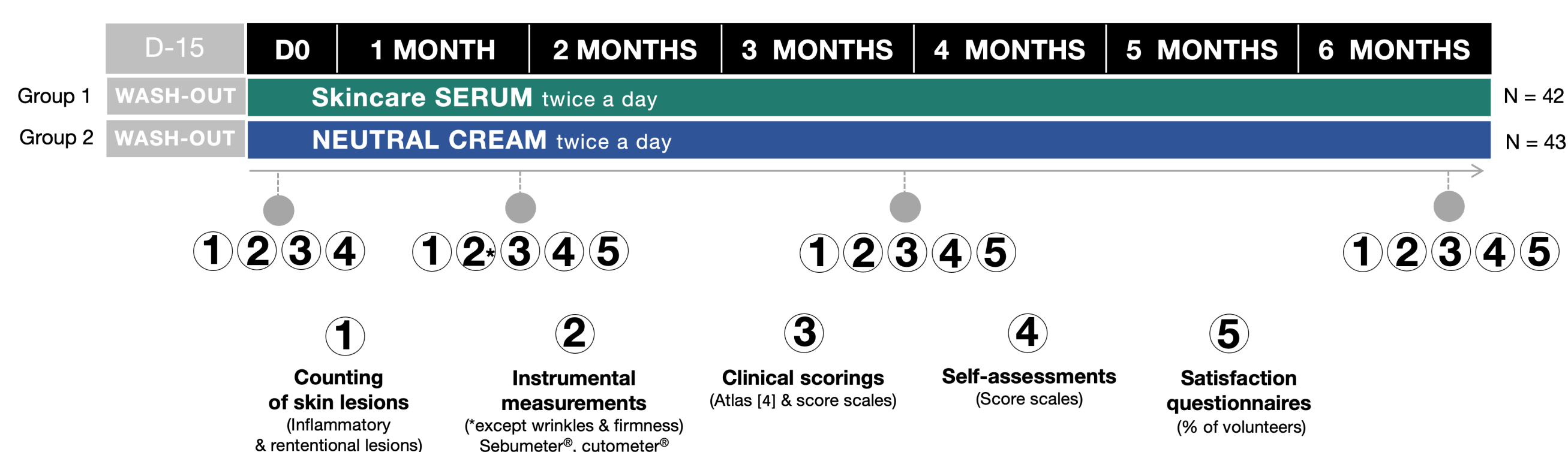
- To highlight the “**additive effect of O₃ to photo-pollution**” in increasing levels of oxi-inflammatory markers and the “**SERUM biological preventive efficacy**”.

		D0	D1	D2	D3	D4
T01	Tissue control “old” donor	▼				▼
T1	Untreated control “old” donor					▼
P	SERUM	▲	▲	▲	▲	▼
S1	STRESS 1 exposure: POLLUBOX® + UVA + BLUE LIGHT + OZONE				■	▼
PS1	SERUM + STRESS 1 exposure	▲	▲	▲	▲	▼
S2	STRESS 2 exposure: POLLUBOX® + UVA + BLUE LIGHT				■	▼
T02	Tissue control “young” donor	▼				▼
T2	Untreated control “young” donor					▼

- Immunostaining & image analysis

3. Clinical study

- To prove the efficacy of the cosmetic SERUM on “**skin imperfections & aging signs**”
=> 2 groups of 42 & 43 Asian women, 25-45 y.o, with inflammatory lesions (≥ 3), sensitive skin & aging signs, for 6 months, in harsh urban pollution including ozone pics during hot conditions in Shijiazhuang, China.



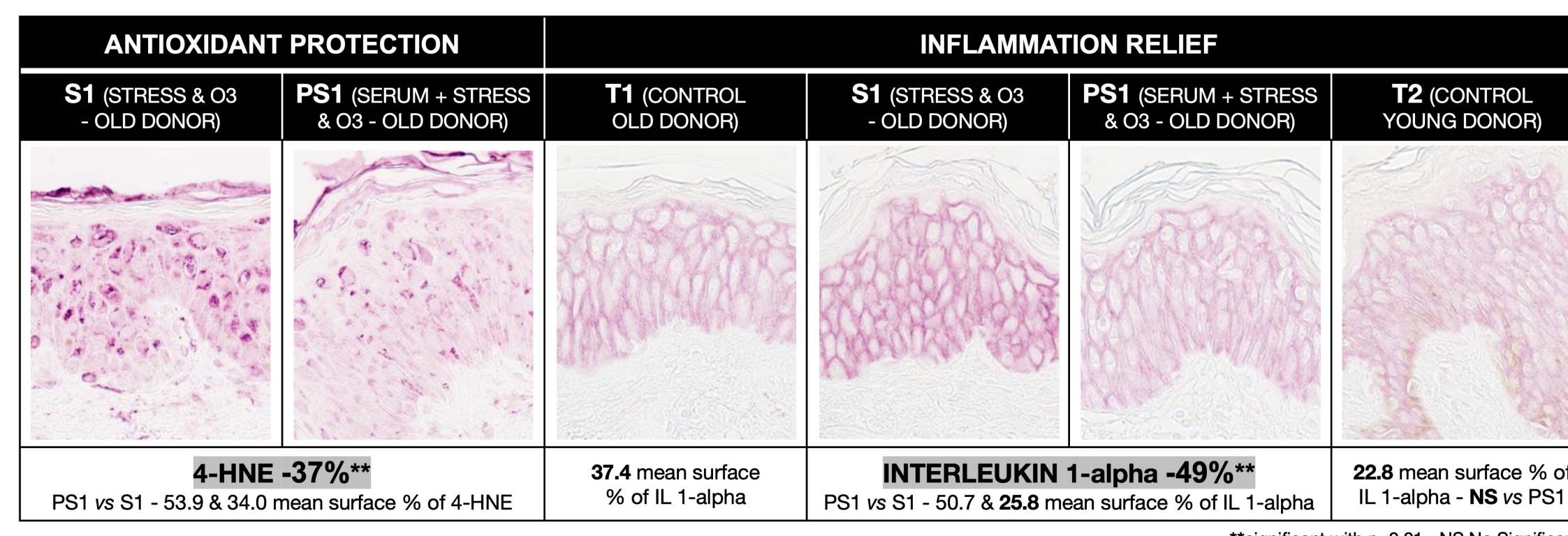
RESULTS

1. In-vitro study

- “**Protective efficacy of native *Crithmum maritimum* cells against O₃**”
Native *Crithmum maritimum* cells induce a significant decrease of **oxidative markers 8-ISOPROSTANE** of **-18%** (CMS vs S).

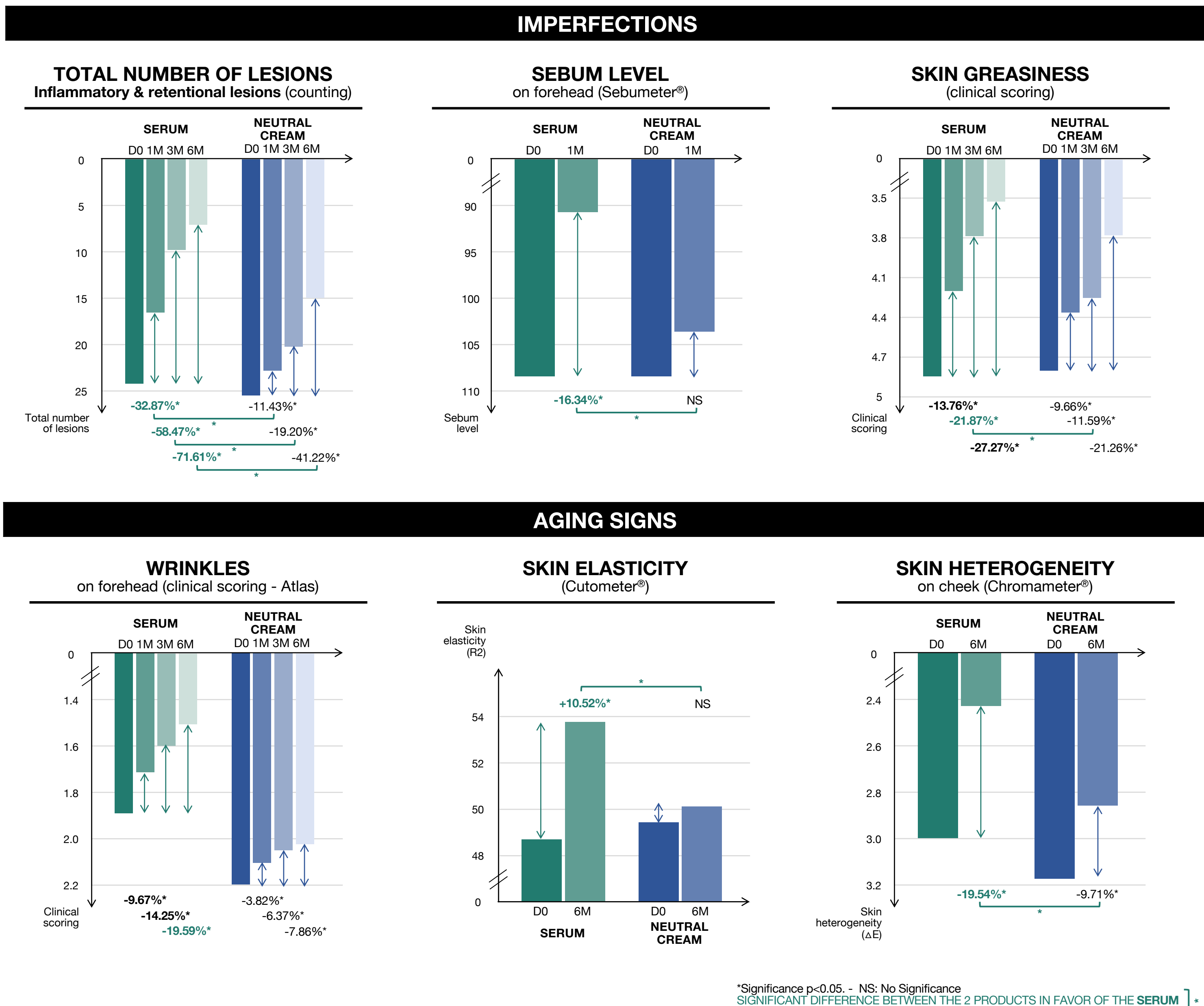
2. Ex-vivo studies

- “**Additive effect of O₃ to photo-pollution**”
O₃ multiplies by **X1.6** the **oxidative marker 4-HNE** and by **X2.5** the **inflammatory marker IL1-alpha** (S1 vs S2).
- “**SERUM biological preventive efficacy against photo-pollution including O₃**”



The concentration of the **inflammatory marker IL-1 alpha** was even **lower** than the **unstressed “older” skin control** (PS1 vs T1) and **back to the level of “young” skin** (no significant difference between PS1 & T2).

3. Clinical study



CONCLUSION

Faced with increasing environmental photo-pollution, it is essential **to develop cosmetic skincare designed to counter oxidative stress and the inflammatory phenomena induced, to limit skin imperfections and reduce aging signs.**

These studies investigated the combined effects on human skin of the most harmful outdoor stressors, **including O₃** among the most toxic, and the only pollutant increasing in most industrialized countries in recent decades. They suggested that **native *Crithmum maritimum* cell prevents deleterious effect of O₃** and that topical application of a **skincare SERUM containing native *Crithmum maritimum* cells prevents inflammation and oxidation leading to decrease skin imperfections and aging signs.**

[1] Donzelli, G et al. Tropospheric Ozone: A Critical Review of the Literature on Emissions, Exposure, and Health Effects. Atmosphere 2024, 15, 779. <https://doi.org/10.3390/atmos15070779>
[2] Y. Yang et al. Meteorological characteristics of extreme ozone pollution events in China and their future predictions. Atmospheric Chemistry and Physics, 2024, 24, 1177-1191
[3] P. Puri, et al. Effects of air pollution on the skin: A review. Indian J Dermatol Venereol Leprol 2017; 83:415-423
[4] R. Bazin, F. Flament. Skin aging Atlas. Volume 2 Asian type. Ed Med Com. 2010.

