Tea oil concentrate from *Camellia oleifera,* obtained by molecular distillation, to improve skin comfort and well-being

M. Le Roux[1], G. Boyer[1], S. Leclère-Bienfait[1], G. Bellemère[1], C. Baudouin[1]

1 - Laboratoires Expanscience, Innovation R&D Direction, rue des Quatre Filles, 28233 Épernon, France

· Introduction ·

Psychological stress has multiple physiological and clinical impacts on skin. The two main processes of skin response to stress involve the Sympathetic Nervous System and the Hypothalamic-Pituitary-Adrenal axis, which induce the release of stress neuromodulators and hormones such as substance P and cortisol. In skin, these mediators have been shown to increase skin inflammation, itching, impair skin barrier function, provoking skin discomfort that can amplify psychological stress, thus creating a real vicious circle[1-2].

We have developed a new active ingredient from *Camellia oleifera* seeds, tea oil concentrate (TOC), enriched in unsaponifiable fraction. This active ingredient was evaluated in *in vitro* models mimicking the effects of stress in the skin and in two clinical studies on comfort and well-being of skin and mind.

· Materials & Methods ·

In vitro evaluation

- **Effect on cortisol release:**
  Skin explants were pre-treated by TOC for 24 hours before stimulation by adrenocorticotropic hormone (ACTH). Then, skin explants were incubated at 42°C for 24 hours to induce dehydration stress. Cortisol release was evaluated by ELISA.
- **Effect on skin barrier function:**
  During five days, skin explants altered by tape stripping were stressed by daily application of cortisol and TOC. *Stratum corneum (SC)* thickness was analyzed by Hematoxylin/Eosin staining and skin barrier integrity by Lucifer Yellow permeability (measure of fluorescence intensity on 250 µm from *stratum corneum* surface).
- **Effect on substance P release:**
  Reinnervated epidermises were pre-treated by TOC for 24 hours and stressed by lactic acid for 15 minutes. Substance P release was measured by ELISA.

Clinical studies

Two clinical studies were performed. Both designs were double-blind, parallel groups, TOC formulated at 1% versus Placebo, 28 days of application twice a day, assessment on face:

- 1st clinical study with 2 groups of 22 women with sensitive and dry skin and expressing psychological discomfort/stress/bad mood due to their skin condition. Assessment of Global self-esteem with questionnaire[3], sensitive skin aspect[4] and physiological measurement of stress (vocal stress, heart rate variability, verbatim) by Mirror Tests™ approach (Spincontrol, Tours, France).
- 2nd clinical study with 2 groups of 22 women with sensitive and dry skin. Assessment of sensitive and dry skin clinical signs (redness, roughness, scaling, dryness), Quality of Life by questionnaire, barrier function by TEWL measure and quantification of biomarkers related to stress and inflammation (IL1-α and cortisol).

· Results ·

In vitro results

TOC significantly decreased the release of cortisol stimulated by ACTH and temperature (Fig.1).

In a skin explant model mimicking the effect of cortisol on skin barrier, TOC increased SC thickness and decreased the lucifer yellow penetration indicating a better barrier integrity (Fig.2) (significant vs Placebo). TOC promoted skin repair and protected skin from the consequences of psychological stress.

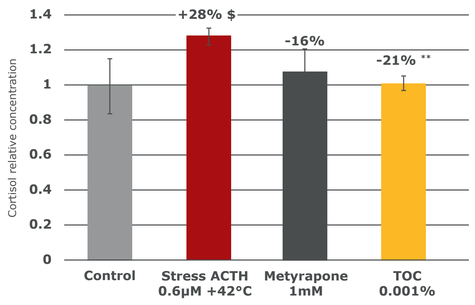

Figure 1: Cortisol quantification
*Student t test, $ p<0.5 vs Control; ** p<0.01 vs Stress*

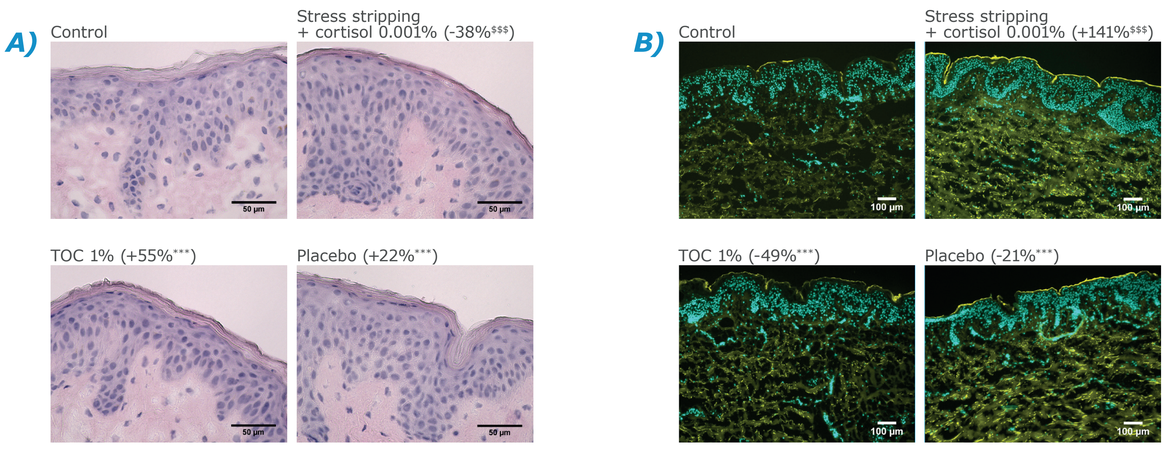

Figure 2: A) Stratum corneum thickness quantification (Hematoxylin/Eosin staining) B) Skin barrier integrity quantification (Lucifer Yellow fluorescent dye penetration)
*One-way ANOVA followed by Tukey test, $$$ p<0.001 vs Control; *** p<0.001 vs Stress; TOC vs Placebo (p<0.001)*

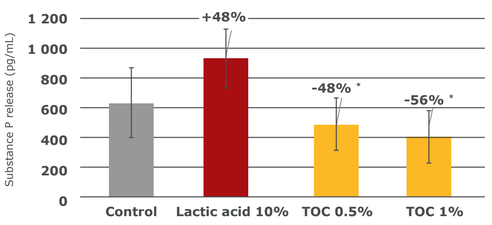

Figure 3: Substance P quantification
*Student t test, * p<0.05 vs Lactic acid*

TOC significantly decreased the release of substance P induced by lactic acid (Fig.3).

TOC significantly inhibited IL1-α production induced by PMA in reconstructed human epidermis model (data not shown).

Clinical results

Results of the 1st clinical study demonstrated that TOC improved:

- Global self-esteem, significant versus Placebo *(p<0,05).*
- Sensitive skin symptoms, limit significant versus Placebo *(p<0,1).*
- Stress related to sensitive/dry skin condition (illustrated Fig.3):
  - increase of Heart rate variability,
  - decrease of Vocal stress.

  } Significant versus Placebo *(p<0,05)*

Moreover, the specific verbatim produced by the group testing TOC was related to the reduction of skin discomfort relative to skin condition at T0 whereas specific verbatim produced by the group testing the Placebo refers to more general statements (i.e. hydration, smoothness).

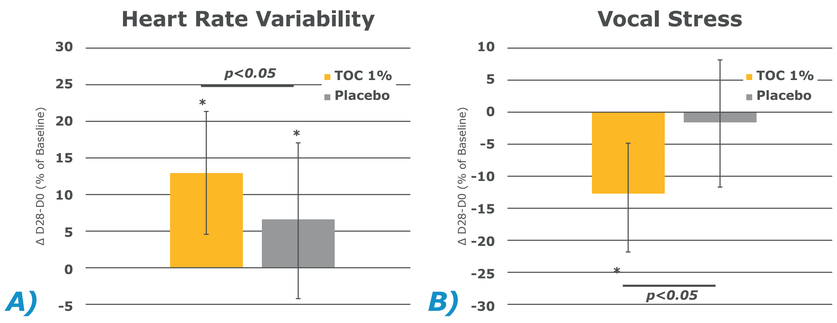

Figure 3: A) Heart rate variability and B) Vocal stress evolution during Mirror Test™ after 28 days of TOC 1% and Placebo application. *indicates p<0.05 for D28 vs D0 comparison. Bar indicates p<0.05 significance for TOC 1% vs Placebo comparison.

Results of the 2nd clinical study demonstrated that TOC improved:

- Sensitive and dry skin clinical signs (redness, roughness, scaling, dryness)
- Barrier function assessed by TEWL, significant versus Placebo *(p<0.05)*
- Quality of Life assessed by questionnaire.
- Skin inflammation assessed by IL1-α, significant versus Placebo *(p<0,05).*
- Skin stress assessed by cortisol.

· Conclusion ·

Psychological stress has multiple negative impacts on skin that can alter well-being and amplify the perception of stress. This leads to a real vicious circle that amplify the effects of stress on skin (inflammation, skin barrier dysfunction, itching…), characteristic of dry and/or sensitive skin. By counteracting the vicious circle of stress, TOC promotes skin comfort and improves well-being of dry and sensitive skin.

· References ·

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