

A new discovery model of active molecules based on biomimicry

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Queiroz Aina¹, Le Tirant Agathe², Gavory Cécile²

¹ Innovation & Scientific Communication, SEQENS Cosmetics (ID bio), Porcheville, France,

aina.queiroz@seqens.com

² Research & Development, SEQENS Cosmetics (ID bio), Porcheville, France

Introduction

Daniel Janzen was the first scientist to publish and explain that certain vertebrates might just have acquired knowledge that enabled them to avoid certain toxic herbs and improve their own health through the plants they used¹. The repeated observation of curative behaviors in animals has consequently given rise to a new field: **zoopharmacognosy**². As this scientific topic has not found its way into skin applications, Seqens Cosmetics has chosen to put it at the center of its innovation discovery platform known as Etho-Phytology™. The first anti-inflammatory ingredient developed in this way focuses on the consumption of grains of paradise by the gorilla.

Indeed, some cases of zoopharmacognosy in primates involve the consumption of seeds. For instance, the **western lowland gorilla** (*Gorilla gorilla gorilla*) is believed to eat the seeds of the **grains of paradise plant** (*Aframomum melegueta*) to protect its myocardium³. Monitoring the health and behaviors of gorillas living in the Mamfé region of Cameroon has helped to highlight the importance of *Aframomum melegueta* seeds in fighting certain inflammatory conditions responsible for cardiomyopathy. Furthermore, the lack of availability of this plant to gorillas held in captivity has been found to have a detrimental effect on the animals' health³. These seeds contain molecules belonging to the gingerol family, such as 6-gingerol, that could explain the preventive effects it has on the gorilla's myocardium through the cyclooxygenase-2 (COX-2) pathway⁴. This study seeks to demonstrate that the development of an extract bio-inspired by gorilla behavior can provide new solutions for chronic inflammation at skin level, improving skin barrier function and reducing skin redness.

Results

Clinical results: TEWL and skin redness are reduced

Improving skin barrier function

After only 1 day of use, *A. melegueta* extract treatment at 3% significantly inhibited TEWL by 15% ($p < 0.05$ vs D0) compared to D0 (Figure 1). The placebo has non-significant effect. A significant difference of TEWL was also observed with treatment versus placebo after 1 day of use ($p < 0,05$ vs placebo).

Reducing skin redness

After 5 days of use, *A. melegueta* extract treatment at 3% significantly reduced skin vascularization by 50% ($p < 0.05$ vs D0) and thus, skin redness, compared to D0 (Figure 2). A significant difference of vascularization was also with treatment versus placebo after 5 days of use ($p < 0.05$ vs placebo). This is supported by the self-assessment questionnaire done on women with sensitive skin in which the volunteers thought that the product was making their skin less reactive, more protected, more uniform and with less apparent blood vessels.

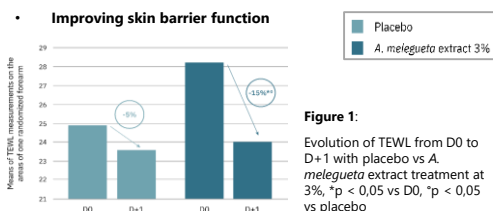


Figure 1:

Evolution of TEWL from D0 to D+1 with placebo vs *A. melegueta* extract treatment at 3%, * $p < 0,05$ vs D0, * $p < 0,05$ vs placebo

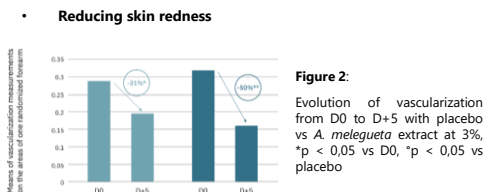


Figure 2:

Evolution of vascularization from D0 to D+5 with placebo vs *A. melegueta* extract at 3%, * $p < 0,05$ vs D0, * $p < 0,05$ vs placebo

Materials & Methods

1. Preparation of *Aframomum melegueta* seed extract

The *A. melegueta* seed extract tested in this study was obtained by solid-liquid extraction involving glycerin. This extraction was followed by clarifying and sterilizing filtrations until the 0.2 μ m cut-off.

2. Clinical study

A double-blinded clinical study was carried with *A. melegueta* extract at 3% versus placebo on healthy skin. For this clinical study, a panel of 21 subjects, male and female reporting sensitive skin (self-report), aged from 21 to 70 years old, was selected for vascularization study. A panel of 19 subjects was considered for TEWL parameters. As the aim of the study was to evaluate the improvement of the cutaneous barrier function, the skin needed to be irritated with an irritant agent. SDS (Sodium Dodecyl Sulfate) patches at 1% were used for this study and were applied for 24h and then removed before the beginning of the applications. Measurements were recorded on the volunteers at D-2, at D0, at D+1 and at D+5, at the end of the study :

- Skin transepidermal water loss (TEWL) analysis by evaporation meter SWL-5®. This step implies a normalization in the measurement: room at 21°C +/-1.5, a determined zone, with a measurement once evaporation stabilized.
- Skin vascularization analysis with high resolution photographs carried out with a high-resolution digital camera and dedicated software to identify the blood map (hemoglobin image). The blood map is an extraction of the red component of the RGB space, correlated to the hemoglobin intensity, from these high-resolution pictures obtained under reproducible conditions of the studied area.

Conclusion

This bio-inspired approach allowed us to identify three plants to help the inflamed skin. Grains of paradise (*A. melegueta*) seeds, used by gorillas to heal themselves, inspired the development of a new cutaneous solution to limit chronic skin inflammation. This active reduces TEWL and vascularization, thus improving skin barrier function and reducing skin redness.

In a world increasingly aware that other species are affected by human behavior, there is an urgent need to realize that our progress also depends on them. Biomimicry thus encourages conservation for ecosystems and their inhabitants, because they hold the knowledge we need to thrive. In its very definition, besides being a high-potential source of innovation, biomimicry invites us to understand nature rather than just take from it.

References:

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