STUDY OF SKIN MICROBIOTA IMPAIRED BY SKIN HYGIENE HABITS

S. Leoty Okombi, P. Moussou, V. Andre-Frei and S. Pain
BASF Beauty Care Solutions France, 32 rue Saint Jean de Dieu, Lyon, France

INTRODUCTION

Every day our skin is daily aggressed by environmental factors and by certain personal care products (cleansers, soaps, deodorants, etc). In the West, our obsession with cleanliness may do more harm than good for the balance of our skin's microbiota and skin health. Figure 1.

It has been observed that overcleanliness leads to an impairment of the skin barrier function and of skin microbiome balance leading to increased sensitivity, irritation and dryness with dysbiosis (1-2)

Although concerns have been expressed about the effect of hygiene products on the skin integrity and function, very few investigations have been conducted to show the effect of their component on the skin barrier function and skin microbiota composition.

Figure 1: Beyond the physical skin barrier, the microbiotic skin barrier.

HYPOTHESIS

Sodium Lauryl Sulfate (SLS) is a widely used surfactant in cleaning products and personal care products. SLS is an anionic surfactant that denature cell membrane proteins. It is also known to induce irritation under occlusive patch application (3-4).

We aimed to conduct a study which had two objectives:

- Firstly, to explore the effect of SLS on skin microbiota abundance and diversity in parallel to skin barrier function evolution;
- Secondly, to explore the protective effect of a formulation containing purified natural rapeseed phytosterols.

METHODS

CLINICAL PROTOCOL (Figure 2):

Study 1: 23 females, 20-64 yo, having fair skin (Phototype I to III), declaring a thin, dry and sensitive skin on the inner side of the forearms and showing a similar response to SLS on both forearms

- Occlusive patch containing 1% SLS for 24h on both inner sides of the forearms (from Day-2 to Day-1).

Study 2: 29 healthy females, 18-45 yo, (Phototype II & III) with body mass index between 18.5 to 29.9 kg/m² and declaring a reactive skin

- Occlusive patch containing 0.5% SLS for 24h on the upper back (from Day-2 to Day-1).
- Formulation containing 1% purified natural rapeseed phytosterols or the vehicle of phytosterols (Cetearyl Alcohol) applied to S0, 24h after patch removal, twice a day for 7 days.

Skin barrier evaluation:

- Trans Epidermal Water Loss (TEWL) by Tewameter
- Hydration by Corneometer

Microbiota evaluation:

- Skin microbiota sampling by swabbing
- 16S rDNA gene sequencing
- Determination of skin microbiota composition and abundance

Figure 2: Clinical protocol design.

RESULTS

Physical barrier damage and restoration

- At D7, SLS skin barrier damage is unrepaired
- Rapeseed Phytosterols significantly improved the recovery of the skin barrier function after impairment with SLS

Microbiota ecology after 0.5% SLS damage

- After SLS application, the number of bacterial species and the diversity increased

Microbiota damage and restoration

Skin microbiota before (D-2) and 24h after 0.5% SLS-occlusive patch removal (D0)

Following the application of SLS, there was significant shifts in microbiota at different taxonomic levels.

Skin microbiota after SLS impairment and Rapeseed Phytosterols treatment

- Compared to SLS induced changes, Rapeseed Phytosterols:
- Increased the relative abundance of *Micrococcus*, *Paracoccus* and *Corynebacterium* genus
- Reduced the relative abundance of *Pseudomonas* and *Pantoea* genus

CONCLUSIONS

Besides disrupting the physical barrier of the skin, SLS also alters the microbiotic barrier by disrupting the balance of the skin microbiota: some resident commensal microorganisms belonging to *Actinobacteria* (*Micrococcus*, *Corynebacterium*) and *Proteobacteria* (*Paracoccus*) decreased, while some opportunistic pathogenic and environmental microorganisms overgrew (*Pseudomonas* and *Pantoea*).

The Rapeseed Phytosterols treatment helps actively to recover a beneficial resident microflora (*Micrococcus*, *Corynebacterium* and *Paracoccus*) and to cutback the growth of pathogen microflora (*Pantoea* and *Pseudomonas*) for a restored microbiotic barrier.

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