

NATURAL SULFATED EXOPOLYSACCHARIDE FROM *COBETIA MARINA* – A POTENTIAL MIMETIC OF HEPARAN SULFATE AND ITS MODULATION OF THE *IN VITRO* EPIDERMAL BIOLOGICAL ACTIVITY

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Barrier function is a key element in skin homeostasis. We study the effect of a natural sulfated polysaccharide on the epidermal regeneration and the barrier function differentiation through different *in vitro* tests on isolated stratum corneum or human reconstructed epidermis. We show that this natural sulfated polysaccharide from *Cobetia marina* bacterium helps enhance the amount of Cornified Enveloppe maturation in stratum corneum. Moreover, we are able to show, thanks to Transmission Electronic Microscopy, that this sulfated polysaccharide has an impact down to the Dermal-Epidermal Junction (DEJ), with the creation of hemidesmosomes : it leads to a reinforcement of the DEJ. Some organized polysaccharides, which are not present in the controls, appear also in the extracellular spaces. This sulfated polysaccharide from *Cobetia marina* is therefore a good candidate to enhance the barrier function and epidermis integrity

INTRODUCTION

Heparan sulfate is the major sulfated glycosaminoglycan found in the epidermis and is typically found covalently linked to a protein core forming a complex known as heparan sulfate proteoglycans (HSPGs)¹.

The discovery of heparanase in the stratum corneum (SC) suggested that its substrate HS ought to be also present in the cornified layer of the epidermis².

Recent works from our group have brought new insights on the presence of Heparan sulfate on the corneocytes surface in the SC.³

The objective of this study was to determine the biophysical and biological activity of a natural sulfated exopolysaccharide extracted from bacteria *Cobetia marina* on the epidermis quality.

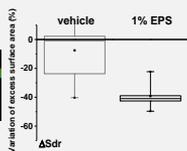
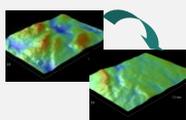
COBETIA MARINA POLYSACCHARIDE



Molecular Weight	> 1.4·10⁶ Da
Monomers	Rhamnose
	Glucose
	Galactose
Sulfate content	10-20%

EFFECTS AT THE STRATUM CORNEUM LEVEL

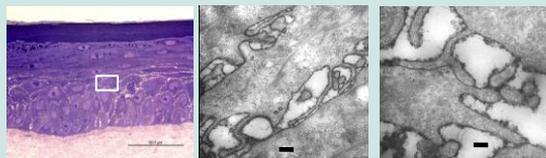
SMOOTHING OF THE SC SURFACE MICRORELIEF



Analysis of surface microtopography by optical profilometry reveals smoothing of the SC surface microrelief after treatment with *Cobetia marina* exopolysaccharide (EPS).

EFFECTS AT THE EPIDERMAL AND DEJ LEVEL

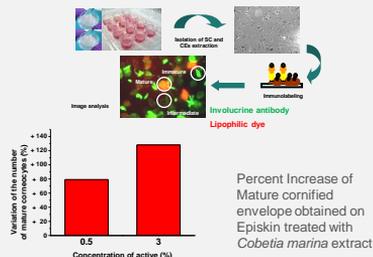
GAG AND PG EXPRESSION: SUPRA-BASAL KERATINOCYTES



Realskin treated with *Cobetia marina* polysaccharide (0.05% topically) trichloride hexamine ruthenium staining

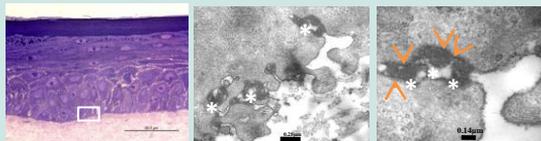
Optical microscopy (left) and TEM (centre and right) reveals extracellular GAG and PG expression stimulation with *Cobetia marina* polysaccharide (black line in the intercellular spaces).

MATURATION OF CORNIFIED ENVELOPE OF CORNEOCYTES



Percent Increase of Mature cornified envelope obtained on Episkin treated with *Cobetia marina* extract

HEMI-DESMOSOMES AND DEJ REINFORCEMENT



Realskin treated with *Cobetia marina* polysaccharide (0.05% topically) trichloride hexamine ruthenium staining
Hemi-desmosomes appear in Realskin™ treated with *Cobetia marina* polysaccharide.
Comparison with hemidesmosomes in ex-vivo human skin.

CONCLUSION

Our results suggest that topical application of this sulfated polysaccharide could improve the skin barrier in dry skin or more generally facial skin, but also the visual appearance of aged skin, through an immediate smoothing effect and a strengthening of the dermal – epidermal junction.

Even if this sulfated polysaccharide behaves like a macromolecule, with potentially a low penetration capacity in the stratum corneum, **strong benefits have been surprisingly observed in the epidermal layer and at the DEJ level.** These results suggest that topical application of this sulfated polysaccharide has positive effect on the epidermal regeneration and its adherence to the dermis, which could potentially improve the surface topography of dry or aged skin and increase the lasting effect of moisturizers

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3. Abdayer, R. *et al.* (2015) Ultrastructural localization and evolution of cell surface glycans in human stratum corneum, *poster WCD 2015*

The authors declare no conflict of interest