SKIN MICROBIOTA: 3D skin model combining RHE and microbiota compounds

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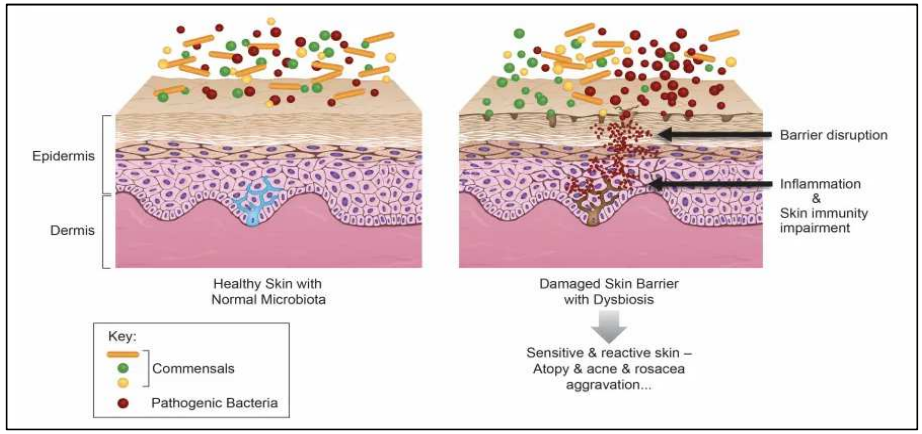
The microbial flora and its diversity, also called microbiota, is beneficial and even essential to maintaining our good health. StratiCELL is studying commensal and opportunistic pathogens strains of the skin including Staphylococcus epidermidis and S. aureus, Cutibacterium acnes, and probiotics such as Lactobacillus plantarum.



Model of relationship between skin barrier and skin microbiota.
Illustration from Baldwin et al., *J Drugs Dermatol.* 2017; 16 (1): 12-18.

We are able to co-cultivate our reconstructed human epidermis (RHE) with these microorganisms, to monitor the growth and viability of these strains over time by counting CFUs or quantitative PCR, and to study the biological response of the epidermis in presence or absence of test products. We are also operational in the evaluation of the epidermal benefits of certain probiotics applied topically to a reconstituted human epidermis (barrier efficacy, release of antimicrobial peptides, study of cell junctions, activation of the innate response of the epidermis and TLR receptors, etc.). Our spectrum of micro-organisms species is continuously extending, as well as their roles in specific skin conditions such dermatitis, acne or dandruff. In addition, a 3D skin model based on ex-vivo cutaneous microbiota transplantation will be developed to study effects of dermo-cosmetic products on biodiversity.

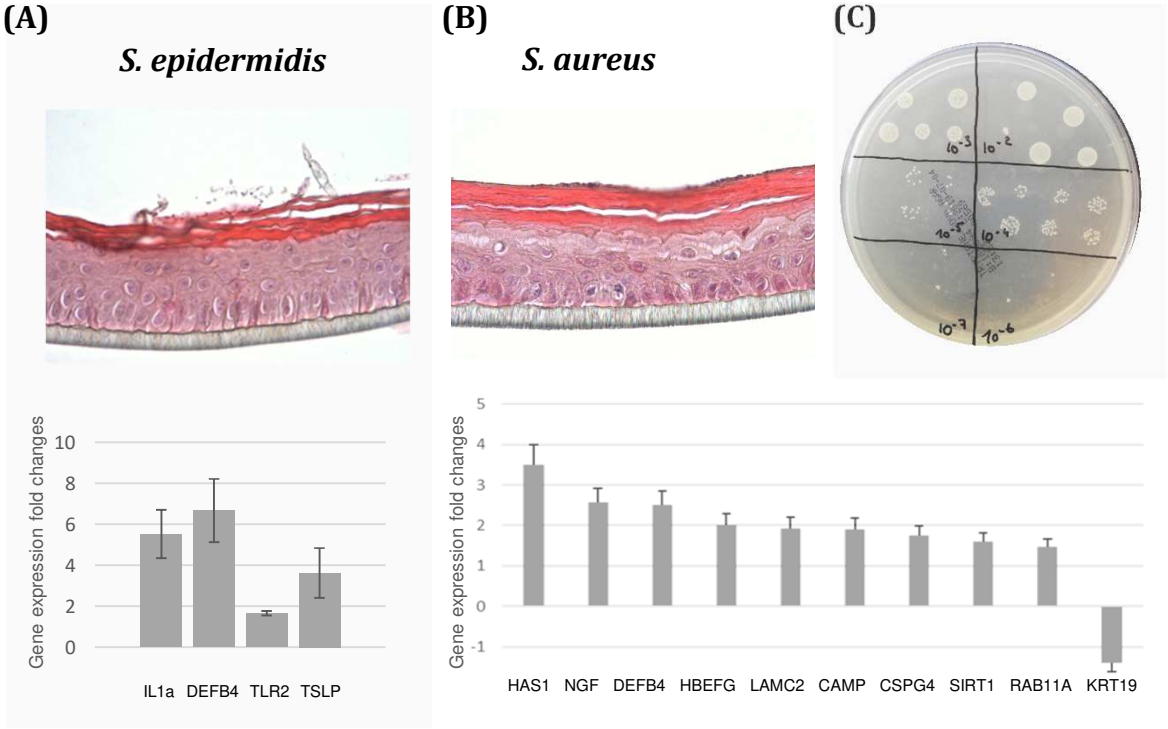
MODELS:

- ***Planktonic cultures of multiple strains of interest***
- ***Bacterial colonies on agar plates***
- ***Reconstructed human epidermis infected by S. epidermidis, S. aureus, L. plantarum, etc.***

TESTS:

- Neutrality of skin care products towards the microbiota (“microbiota friendly”)
- Beneficial or protective effect of your PROBIOTIC strain or POSTBIOTIC product
- Beneficial effect of your PREBIOTIC on a specific strain or on the balance & diversity of the flora
- Endpoints include: bacterial growth/inhibition and viability (CFUs counting, PCR targeting 16S or genomic DNA). Tissue morphology, Gram⁺ staining, qPCR on key epidermal genes, TaqMan Low Density Arrays, immunolabelling, etc.

RESULTS:



Effects of S. epidermidis (A) or S. aureus (B) on epidermal response (inflammation, barrier function and antibacterial defense) shown by tissue morphology after hemalum/eosin staining (up) and fold changes of gene expression levels compared to uninfected tissues (bottom). An illustration of the single plate serial dilution spotting procedure for CFUs counting is shown (C).