ATOPIC ECZEMA/DERMATITIS

TARGETING S. AUREUS ADHESION, COMPETITION WITH S. EPIDERMIDIS AND BIOFILM FORMATION: APPLICATION TO ASSESS EFFICACY OF DERMATOLOGICAL FORMULATIONS FOR AD

Marisa Meloni [1] - Stéphanie Bredif [2] - Silvia Balzaretti [3] - Gaelle Bellemere [2] - Caroline Baudouin [2]

Vitroscreen, Vitroscreen, Milano, Italy [1] - Laboratoires Expanscience, Innovation R&d Direction, Epernon, France [2] - Vitroscreen, Vitroscreen, Milano, Italy [3]

Introduction: Staphylococcus aureus has an important role in atopic dermatitis (AD) pathogenesis, by influencing secretion of cytokines, disrupting barrier function and interfering with the homeostatic equilibrium of the skin microbiota. Formation of biofilm is a successful strategy of protection for S. aureus, thus hampering the efficacy of topical treatments.

Objective: In vitro human reconstructed epidermis (RHE) we used to develop colonized and immunocompetent models to study the interactions between bacteria and host in defined experimental conditions.

Materials & Methods: S. aureus adhesion: the surface of RHE was gently scraped before colonization with S. aureus MRSA for 6h and 24h.
Competition model: after 6h colonization with S. epidermidis, S. aureus was applied for 24h.
AD immunocompetent model: RHE were infected with MRSA for 4h, before 16h co-culture with THP-1 monocytes.
Bacterial phenotype at the surface was assessed by scanning electron microscopy (SEM) and gene expressions were studied by qRT-PCR.

Results: S. aureus behavior was evaluated on intact skin and in presence of barrier impairment: biofilm was observed at the epidermal surface with signs of tissue toxicity at morphological level.
The co-colonized tissue based on the interaction between S. epidermidis and S. aureus, representing a balanced community, allowed to create a more complex and realistic model: a homeostatic response and balanced microbiome was established in terms of regulation of innate immunity (TLR-2 and HBD2) and skin tolerance.
In the immunocompetent AD model, increased TSLP and decreased TLR2 expression,

suggested the activation of Th2 response, mimicking the initial phases of AD acute flare.

Conclusions: Colonized RHE, in co-culture or not with immunocompetent cells, represent useful and biologically relevant models to study the interaction microbiota-host and to understand the mechanisms by which dermatological formulations act in vivo on AD. The efficacy of balms specifically formulated to reduce AD acute flare in infants was demonstrated.