

STUDIES ON THE EFFECT OF *PROPIONIBACTERIUM ACNES* ON THE BARRIER PROPERTIES OF HUMAN *IN VITRO* CULTURED KERATINOCYTES

Beáta Szilvia Bolla ¹,

Gábor Tax ¹, Lilla Erdei¹, Edit Urbán², Lajos Kemény ^{1,3}, Kornélia Szabó³

1. Department of Dermatology and Allergology, University of Szeged, Hungary

2. Institute of Clinical Microbiology, University of Szeged, Hungary

3. MTA-SZTE Dermatological Research Group, Szeged, Hungary

The human skin is heavily colonized by a specialized microbial community called the microbiome, which plays a complex role in the protection from the attack of external pathogens. This microbial flora can interact with the cells in the healthy skin and play a role in the maintenance of skin homeostasis, but also known to contribute to the pathogenesis of different diseases.

Our aim was to analyze whether the *Propionibacterium acnes* (*P. acnes*) bacterium, a member of the skin microbiome, or the bacterium induced pro-inflammatory mediator, TNF α has any effect on the barrier properties of our epidermis.

For that, a confluent monolayer of *in vitro* cultured human immortalized keratinocytes (HPV-KER cells) were treated with different *P.acnes* strains and external TNF α in different doses, and changes in the barrier properties were analyzed in real time using the xCELLigence system. We also analyzed the effect of the bacterium on the mRNA expression changes of tight junction proteins claudin 1, 2, 4 (CLDN1, 2, 4), occludin1 (OCL1) and ZO1 in these cultures using real-time RT-PCR.

Our results suggest that the bacterium induced an elevation, followed by a drop of the measured impedance values in the keratinocyte monolayers, possibly due to dynamic alterations of the barrier properties. The extent of these changes depended on the used *P. acnes* strain and the applied doses. Addition of TNF α (1, 5, 10 ng/ml), a cytokine that is a known mediator of the *P. acnes*-induced innate immune and inflammatory events in keratinocytes also lead to a marked decrease of the measured impedance of the HPV-KER monolayers.

Real-time RT-PCR analysis of tight junction genes suggested that CLDN2 and 4 mRNAs were not present in these cells. However, the expression of CLDN1 decreased, whereas ZO1 and OCL1 mRNA levels increased in response to the bacterial treatment.

Our results suggest that our microbiome can modulate the barrier properties of the epidermis. It is possibly achieved, in one hand, through the direct regulation of genes playing a key role in the formation of cell-to-cell contacts. On the other hand, secreted factors, such as the TNF α pro-inflammatory mediator, may also have a direct effect and can loosen the epidermal barrier, possibly leading to the easier penetration of keratinocyte- as well as bacterial-derived factors to deeper tissue compartments. These findings strengthen the importance of a balanced interaction among the epidermal cells and our microbiome for the maintenance of healthy skin functions.

Presentation form: poster presentation

Section: clinical