PROPIONIC ACID SECRETED BY *PROPIONIBACTERIUM ACNES* MAY MODIFY THE CELLULAR PROPERTIES OF KERATINOCYTES

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Propionibacterium acnes (*P. acnes*) bacterium is a member of the skin microflora, but may also serve as an opportunistic pathogen contributing to the pathogenesis of acne vulgaris. Earlier we have shown that various *P. acnes* strains (*889, 6609, ATCC 118*28) belonging to different phylogroups differentially affect the cellular properties of cultured human keratinocytes in a strain-specific and dose-dependent manner. High doses of the pathogenic *889* and *ATCC 11828* strains also resulted characteristic morphological changes and membrane damage, which lead to the cytotoxicity of human *in vitro* cultures keratinocytes (HPV-KER).

Our aim was to further analyze the interaction of human *in vitro* cultured keratinocyes and identify bacterially-derived factors that may mediate the previously observed effects.

In order to systematically quantify the *P. acnes*-induced cytotoxicity we performed spectrophotometric lactate dehydrogenase (LDH) and hemoglobin (HgB) assays using supernatant samples of bacterial treated HPV-KER cells and erythrocytes. The amount of released free LDH and HgB exhibited strain- and dose-dependent differences. We also noted the differential acidification of the pH in the culture supernatants. *P. acnes* is known to secrete propionic acid (PA), a characteristic, acidic end-product of bacterial fermentation in these species. In order to analyze whether *P. acnes*-derived PA has any role in the observed cellular changes we treated HPV-KER cells with the acid and analyzed the cell morphology. Microscopic analysis of the PA treated cultures revealed cells with similar irregular membrane morphologies observed earlier upon high dose *P. acnes 889* and *ATCC 11828* treatments. Finally, we measured the amount of secreted short chain fatty acids (SCFA) in the *P. acnes 889, 6609* and *ATCC 11828*-treated HPV-KER supernatant samples by mass spectrometry. These studies revealed marked differences in the amount of secreted PA; high dose treatment of the *889* and *ATCC 11828* strains leading to higher levels.

P. acnes-induced cellular changes depend on the type and amount of the applied bacterial strains. The observed differences may be due to variations of the amount of a secreted metabolic end-product, PA. Together with other bacterially-derived molecules it may be an active contributor of the *P. acnes*-induced cellular changes.

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