

ACNE, ROSACEA, AND RELATED DISORDERS (INCLUDING HIDRADENITIS SUPPURATIVA)

PROPIONIBACTERIUM ACNES ACTIVATES THE NLRP3 INFLAMMASOME IN HUMAN SZ95 SEBOCYTES

Zhengjun Li⁽¹⁾ - Qing Sun⁽²⁾ - Myung Im⁽³⁾

Chungnam National University School Of Medicine, Qilu Hospital Of Shandong University, Department Of Dermatology, Jinan, China⁽¹⁾ - Qilu Hospital Of Shandong University, Department Of Dermatology, Jinan, China⁽²⁾ - Chungnam National University School Of Medicine, Department Of Dermatology, Daejeon, Republic Of Korea⁽³⁾

Introduction: Propionibacterium acne and sebaceous glands are considered to have an important role in the development of acne. Although information regarding the activation of innate immunity by P. acnes in the sebaceous gland is limited, different P. acnes phylotypes and a higher prevalence of follicular P. acnes macrocolonies/biofilms in sebaceous follicles of skin biopsies from acne compared with control skin and occasionally single P. acnes clusters in single sebaceous glands have been detected.

Objective: To investigate the potential role of inflammasome in acne pathogenesis, we examined whether P. acnes activates the inflammasome in human sebaceous glands in vivo and in vitro.

Materials and Methods: We used human sebocytes as a model system, and determined P. acnes triggers IL-1b-mediated inflammatory responses via inflammasome activation using ELISA assay and Western blot.

Results: We found that IL-1b expression was upregulated in sebaceous glands of acne lesions. After stimulation of human sebocytes with P. acnes, the activation of caspase-1 and secretion of IL-1b were enhanced significantly. Moreover, knocking down the expression of NLRP3 abolished P. acnes-induced IL-1b production in sebocytes. The activation of the NLRP3 inflammasome by P. acnes was dependent on protease activity and reactive oxygen species generation. Finally, we found that NALP3-deficient mice display an impaired inflammatory response to P. acnes.

Conclusions: These results suggest that human sebocytes are important immunocompetent cells that induce the NLRP3 inflammasome, and that P. acnes-induced IL-1b activation in sebaceous glands may have a role in combating skin infections and in acne pathogenesis.