World Academy of Science, Engineering and Technology
International Journal of Medical and Health Sciences
Vol:14, No:02, 2020

Activation of NLRP3 Inflammasomes by Helicobacter pylori Infection in Innate Cellular Model and Its Correlation to IL-1β Production

Authors : Islam Nowisser, Noha Farag, Mohamed El Azizi

Abstract : Helicobacter pylori is a highly important human pathogen which inhabits about 50% of the population worldwide. Infection with this bacteria is very hard to treat, with high probability of recurrence. H. pylori causes severe gastric diseases, including peptic ulcer, gastritis, and gastric cancer, which has been linked to chronic inflammation. The infection has been reported to be associated with high levels of pro-inflammatory cytokines, especially IL-1β and TNF-α. The aim of the current study is to investigate the molecular mechanisms by which H. pylori activates NLRP3 inflammasome and its contribution to Il-1 β production in an innate cellular model. H. pylori PMSS1 and G27 standard strains, as well as the PMSS1 isogenic mutant strain PMSS1ΔVacA and G27ΔVacA, G27ΔCagA in addition to clinical isolates obtained from biopsy samples from the antrum and corpus mucosa of chronic gastritis patients, were used to establish infection in RAW-264.7 macrophages. The production levels of TNF-α and IL-1β was assessed using ELISA. Since expression of these cytokines is often regulated by the transcription factor complex, nuclear factor-kB (NF-kB), the activation of NF-κB in H. pylori infected cells was also evaluated by luciferase assay. Genomic DNA was extracted from bacterial cultures of H. pylori clinical isolates as well as the standard strains and their corresponding mutants, where they were evaluated for the cagA pathogenicity island and vacA expression. The correlation between these findings and expression of the cagA Pathogenicity Island and vacA in the bacteria was also investigated. The results showed IL-1β, and TNF-α production significantly increased in raw macrophages following H. pylori infection. The cagA+ and vacA+ H. pylori strains induced significant production of IL-1β compared to cagA- and vacA- strains. The activation pattern of NF-κB was correlated in the isolates to their cagA and vacA expression profiles. A similar finding could not be confirmed for TNF-α production. Our study shows the ability of H. pylori to activate NF-kB and induce significant IL-1β production as a possible mechanism for the augmented inflammatory response seen in subjects infected with cagA+ and vacA+ H. pylori strains that would lead to the progression to more severe form of the disease.

Keywords : Helicobacter pylori, IL-1β, inflammatory cytokines, nuclear factor KB, TNF-α
Conference Title : ICI 2020 : International Conference on Immunology
Conference Location : London, United Kingdom
Conference Dates : February 13-14, 2020