

Investigating the Host-Binding Properties of *Neisseria Gonorrhoeae* in South African Population

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ABSTRACT

Background: The second most prevalent bacterial STI, gonorrhoeae, is caused by the multidrug-resistant gonococcal strain *Neisseria gonorrhoeae* (*N. gonorrhoeae*). The CEACA (carcinoembryonic antigen-related cell adhesion molecule) acts as receptors for *N. gonorrhoeae* on a cellular level. The OPA (Colony opacity) proteins of *N. gonorrhoeae* attach to CEACAMs found in the epithelial cells (CEACAM 1, CEACAM 5, and CEACAM 6) to facilitate the colonization of *N. gonorrhoeae* in the mucosa membrane. However, the expression of CEACAM 3 (present in human granulocytes), results in the uptake and elimination of *N. gonorrhoeae*. CEACAM 3 restricts the dissemination of gonococci. The aim of the study was to determine the virulence factor-host binding profile of gonococcal strains isolated from a South African population.

Method: The *N. gonorrhoeae* strain (G51) was used in this study from pregnant women in South Africa. Eight unique OPA proteins were identified in this study via Sanger sequencing. These OPA proteins were cloned and expressed in *Escherichia coli*. Thereafter, these OPA proteins were induced for protein expression by IPTG. Human CEACAMs' soluble N-terminal domains were expressed in 293 cells, and binding tests using various OPA-expressed bacteria were conducted. In a volume of 1 ml, cell culture supernatants containing the CEACAM N domain were added for the binding assays, and the combination was then incubated for 1 h and washed twice with PBS. Prior to SDS-PAGE and Western blotting, the bacteria were boiled in the SDS sample buffer.

Results: The majority of the distinct OPA proteins, except for two of them, bound to at least one of the recombinant CEACAM domains (CEACAM 1,3, and 5). It is clear from the binding patterns that strain G51's CEACAM-recognizing OPA proteins can be divided into two groups. The first group contains many OPA proteins that bind only to CEACAMs found on epithelial cells. The second group contains OPA proteins that binds to epithelial CEACAMs and to the granulocyte restricted CEACAM 3.

Conclusion: The binding patterns looks promising and more data on how virulence factor-host binding profile of gonococcal strains isolated from a South African population will be performed and further patterns will be identified and discussed.

Keywords: Carcinoembryonic antigen-related cell adhesion molecule, Colony opacity, Human granulocytes, *Neisseria gonorrhoeae*

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