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Phenotypic characterization of pneumococcal serotype-1 variants presenting low hemolytic activity

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Background: *Streptococcus pneumoniae* is a significant human pathogen responsible for life-threatening diseases such as pneumonia, septicaemia and meningitis. Of the nearly 100 distinct pneumococcal serotypes, pneumococcal serotype-1 is described as one of main causes of invasive disease worldwide. One highly enigmatic feature of serotype-1 resides in its being rarely detected in human nasopharyngeal specimens.

Aim: The aim of this project was to compare serotype-1 lineage A (ST306) and C (ST615) with respect to their immunological and virulence properties using both *in vitro* and *in vivo* tools, as well as their differential gene expression profile.

Methods: A series of *in vitro* experiments were performed to assess the ability of serotype-1 to adhere and invade epithelial cells, and to determine its ability to inhibit phagocytosis and gain insight into the mechanisms involved. In parallel, three *in vivo* standardized mouse models of pneumococcal infection were exploited to examine the virulence properties of ST306 and ST615 and their ability to colonize the nasopharyngeal tissue. Finally, RNA-seq analysis of *in vitro* cultures of ST306 and ST615 was carried out in an attempt to identify differential expression patterns.

Results: ST615 serotype-1 was determined to be highly virulent, causing the death of 80-100% of infected mice by around 48 h post-infection, while all mice infected with ST306 survived when using pneumococcal doses inductive of invasive pneumonia model. In a nasopharyngeal carriage mouse model, ST306 serotype 1 was shown to be able to establish colonization persisting up to 28-day post-administration, although at a much lower density compared to ST615. While ST615 was capable of establishing nasopharyngeal colonization, clearance occurred earlier at day 14 compared to ST306. RNA gene expression analysis focused on virulence factors and critical biological functions determined that ST615 serotype-1 presented a profile consistent with its weak colonization and its invasive properties. The genes associated with capsule synthesis were not differentially expressed between ST615 and ST306 but that other virulence factors such as *psp*, *pavA*, *ply* and *cpbD* were differentially expressed.

Conclusions: Although ST306 and ST615 possess a unique and virulent capsule, ST306 was not able to cause pneumonia to mice model.

Biography

Reham Yahya has completed his PhD from University of Liverpool. She is working as Assistant Professor of Microbiology at King Saud University for Health Sciences.

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