Role of VisP and LpxO proteins on O-antigen assembly and *Salmonella enterica* serovar Typhimurium pathogenesis

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Bacterial chemical signaling is a mechanism employed by several bacterial species to interact within surrounding microbiota and their host. Upon this interaction the pathogenic bacteria regulate their virulence traits. The two-component system QseBC was described on chemical signaling of the Autoinducer-3/epinephrine/norepinephrine in *Salmonella enterica* serovar Typhimurium, and a novel branch of pathogenic cascade regulation was revealed. Among these mechanisms a novel protein was described, VisP (**Vi**rulence and **s**tress related **P**eriplasmic protein). VisP interacts with LpxO enzyme (Dioxygenase Fe2+/ α-ketoglutarate-dependent) with peptidoglycan layer (Moreira et al, 2013) on the periplasm. The O-antigen of the LPS layer provides protection against host defenses, and particularly its chain´s length plays an essential role. The O-antigen assembly has the Wzz system, which determines the O-antigen final chain length, and also presents a tri-modal distribution. It forms short (16units), long (35units) and very-long OAg (more than 100 unit repeats) chains. The Wzz_{ST} and Wzz_{fepE} proteins respectively regulate the L-OAg and VL-OAg synthesis. The *wzz_{ST}*, *wzz_{fepE}*, *visP* and *lpxO* genes were mutated via λ Red mutagenesis, obtaining single and double-mutants to further assess pathogenic genes expression levels, cell invasion, and J774 macrophages intracellular replication differences. These mechanisms are currently under study to further characterize them, evaluate their importance during pathogenesis. Our preliminary data have shown that VisP increases VL-OAg and L-OAg, conversely LpxO diminishes L-OAg chain length. Further studies are necessary for a complete clarification of these mechanisms, also related to TTSS (Type Three Secretion System) encoded by SPI-1 and SPI-2 (*Salmonella* Pathogenicity Island 1 and 2), as well as the full role of O-antigen during pathogenesis. The full comprehension of the complex relationship amongst pathogenic bacteria, the microbiota, and the host is an essential topic in microbial pathogenesis. The chemical signaling in bacteria is the central aspect of this association. The complete elucidation of these signals will be essential to understand their relationship, develop novel technologies and therapies.

Keywords: VisP, LpxO, *Salmonella enterica*, pathogenesis, chemical signaling.

CNPq

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