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Revisiting the Importance of Virulence Determinant magA and Its Surrounding Genes in Klebsiella pneumoniae Causing Pyogenic Liver Abscesses: Exact Role in Serotype K1 Capsule Formation.

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Abstract

BACKGROUND: Mucoviscosity-associated gene A (magA) is proposed to play a decisive role in the pathogenesis of liver abscesses due to Klebsiella pneumoniae. Although some investigators consider MagA to be a putative O-antigen ligase, it is also reportedly associated with the K1 antigen.

METHODS: Using magA-positive serotype K1 K. pneumoniae STL43 isolated from a patient with liver abscess, we constructed 3 bacterial mutants by targeting genes within the same transcription unit, including magA, wcaG, and rfbP. The virulence of these mutants was determined by neutrophil phagocytosis and inoculation of mice. Transmission electron microscopy and Western blot analysis were used to define their surface polysaccharides.

RESULTS: STL43 was resistant, and all 3 mutants were highly susceptible, to phagocytosis. None of the mutant strains caused death in mice at the lethal dose of STL43. In contrast to previous reports, transmission electron microscopy revealed that all 3 mutants were nonencapsulated. Analysis of surface polysaccharides revealed that all 3 mutants retained their O antigen but lost their K antigen/capsule. Furthermore, amino acid analysis showed that MagA shared a conserved domain of Wzy, the serotype-specific capsular polysaccharide polymerase.

CONCLUSIONS: In accordance with the bacterial polysaccharide gene nomenclature (BPGN) scheme, MagA should be renamed Wzy(KpK1), the capsular polymerase specific to K. pneumoniae serotype K1.

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