

## **K19 capsular polysaccharide of acinetobacter baumannii is produced via a Wzy polymerase encoded in a small genomic island rather than the KL19 capsule gene cluster**

Kenyon J., Shneider M., Senchenkova S., Shashkov A., Siniagina M., Malanin S., Popova A., Miroshnikov K., Hall R., Knirel Y.

*Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia*

---

### **Abstract**

© 2016 The Authors. Polymerization of the oligosaccharides (K units) of complex capsular polysaccharides (CPSs) requires a Wzy polymerase, which is usually encoded in the gene cluster that directs K unit synthesis. Here, a gene cluster at the *Acinetobacter* K locus (KL) that lacks a *wzy* gene, KL19, was found in *Acinetobacter baumannii* ST111 isolates 28 and RBH2 recovered from hospitals in the Russian Federation and Australia, respectively. However, these isolates produced long-chain capsule, and a *wzy* gene was found in a 6.1 kb genomic island (GI) located adjacent to the *cpn60* gene. The GI also includes an acetyltransferase gene, *atr25*, which is interrupted by an insertion sequence (IS) in RBH2. The capsule structure from both strains was  $\rightarrow 3$ - $\alpha$ -D-GalpNAc-(1 $\rightarrow$ 4)- $\alpha$ -D-GalpNAcA-(1 $\rightarrow$ 3)- $\beta$ -D-QuipNAc4NAc-(1 $\rightarrow$ , determined using NMR spectroscopy. Biosynthesis of the K unit was inferred to be initiated with QuiNAc4NAc, and hence the Wzy forms the  $\beta$ -(1 $\rightarrow$ 3) linkage between QuipNAc4NAc and GalpNAc. The GalpNAc residue is 6-O-acetylated in isolate 28 only, showing that *atr25* is responsible for this acetylation. The same GI with or without an IS in *atr25* was found in draft genomes of other KL19 isolates, as well as ones carrying a closely related CPS gene cluster, KL39, which differs from KL19 only in a gene for an acyltransferase in the QuiNAc4NR synthesis pathway. Isolates carrying a KL1 variant with the *wzy* and *atr* genes each interrupted by an IS<sub>Aba125</sub> also have this GI. To our knowledge, this study is the first report of genes involved in capsule biosynthesis normally found at the KL located elsewhere in *A. baumannii* genomes.

<http://dx.doi.org/10.1099/mic.0.000313>

---