Is It Possible to Treat Klebsiella pneumoniae Diseases by Non-Antibiotic Drugs?

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Klebsiella pneumoniae are optionally anaerobic gram-negative bacteria which cause a lot of virulent diseases in people with poor immunity. Existence of capsular polysaccharides(CPS) and antibiotic resistance are the main constitutional peculiarity of this strain. Nowadays development of novel medical products based on bacteriophages is becoming ? pressing problem. During our project we studied a possibility of using non-antibiotic drugs to treat Klebsiella pneumoniae diseases. In our project we worked with degradated cell materials. First part of our study was the determination of Klebsiella pneumoniae 03 and 05 CPS by analyzing 1H, 13C NMR spectra using 2D experiments and using chemical methods of determination the structures: Water-phenol isolation, Treatment with acid, Smith degradation, Sugar analysis, Absolute configuration determination. The structure of Klebsiella pneumoniae 03 CPS had been already known in literature (repeating furanose and pyranose forms of a,b-Gal). Klebsiella pneumoniae 05 polysacharide represents the brunched pentasaccharide chain and was unknown previously. The chain has -3)-b-D-Galp-(1-, -3)-a-D-GlcpA-(1-, -3)-a-D-Manp-(1-, -2)-a-D-Manp-(1-, -1)- a-D-Galp-4,6-pyr monosaccharides. Then we studied a mechanism of degradation the Klebsiella pneumoniae 05 CPS induced by recombination depolymerase of new bacteriophage K40. We determined a structure of oligosaccharide resulted in after treatment by analyzing 1H, 13C NMR spectra using 2D experiments and founded that tail protein of bacteriophage reacted with CPS breaking up a link between b-D-Galp and a-D-Manp. In conclusion we have made a significant contribution to the development of an approach to treatment these dangerous diseases.

Awards Won: