Ranjith Konduri, J Infect Dis Ther 2017, 5:6(Suppl)
DOI: 10.4172/2332-0877-C1-032

Global gene expression in *Escherichia coli*, isolated from the diseased ocular surface of the human eye with a potential to form biofilm

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The surface of the eye is colonized by several bacteria, which survive as resident or transient commensals. But following trauma or under immuno-compromised conditions these commensals cause infection of the eye (such as keratitis, endophthalmitis, orbital cellulitis etc.) often leading to loss of vision. Normally the infection is resolved following treatment with antibacterial agents. However, over the years many of these organisms have become resistant to drugs due to excessive and indiscriminate use of drugs. Resistance to drugs may be due to biofilm formation which makes the bacteria impervious to antibiotics. In the present study ocular *E. coli* from patients with ocular infectious disease is used as a model system and was screened for their ability to form biofilm, antibiotic susceptibility. In addition, to understand the molecular mechanisms underlying the biofilm formation and resistance to antibiotics in biofilm phase we used DNA microarray. Ten of twelve ocular *E. coli* isolates were resistant to at least one or more of nine antibiotics tested and majority of isolates were positive for biofilm formation. *E. coli* L-1216/2010 is best biofilm forming isolate confirmed by confocal and scanning microscopy. Further *E. coli* in the biofilm phase was 100 times more resistant to antibiotics tested compared to planktonic phase. DNA microarray analysis could differentiate *E. coli* biofilm forming cells from non-biofilm forming planktonic cells. It was noted that 30% (10.5% up and 19.5% down-regulated) genes were differentially regulated in the sessile biofilm forming cells compared to the non-biofilm cells. Genes encoding cell adhesion genes, extracellular matrix are upregulated in biofilm phase. In addition, some of the up-regulated genes encoding antimicrobial efflux virulence, toxin production, and other metabolites are known to affect the antibiotic susceptibility of planktonic. These genes serve as potential targets for hacking biofilms. This is the first study on whole genome expression of ocular *E. coli* isolates with a potential to form biofilm. Study on native pathogenic ocular isolates for biofilm and antibiotic susceptibility is more relevant than type strains which do not necessarily mimic native isolates.

Biography

Ranjith Konduri has done his MSc from the Department of Biotechnology, School of Life Sciences, Pondicherry University, Pondicherry. He has qualified GATE with percentile of 99.7%. Currently he has registered for PhD with infectious diseases as area of interest. The work involves the identification and functional characterization of genes involved in antibiotic resistance and biofilm formation. It aims to identify and understand various molecular mechanisms involved in cell adhesion for the dispersal of the biofilm. Very recently he has published a research article on Biofilm in Journal Gut Pathogens.

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