Rahul Saxena, J Bacteriol Parasitol 2014, 5:4
http://dx.doi.org/10.4172/2155-9597.S1.006

OMICS Group Conferences
Accelerating Scientific Discovery

2nd International Congress on
Bacteriology & Infectious Diseases
November 17-19, 2014 DoubleTree by Hilton Hotel Chicago-North Shore, USA

Crosstalk between acidic phospholipids present in bacterial membranes and the initiation of replication at *Escherichia coli* chromosomal origin (*oriC*) is beyond nucleotide exchange on DnaA, the initiator protein

Rahul Saxena
Georgetown University Medical Center, USA

The role of acidic phospholipids such as phosphotidylglycerol (PG) and cardiolipin (CL) has been linked to several functions, including chromosomal and cell division related events. In vivo, proper cellular levels of PG and CL are linked with continued cell growth and normal chromosomal replication in *Escherchia coli*. Reduced levels of acidic phospholipids, result in arrested-growth and inhibited chromosomal replication in otherwise wild-type *E. coli*. In vitro acidic phospholipids PG and CL present in a fluid bilayer promote the conversion of inactive ADP-DnaA to replicatively proficient ATP-DnaA. DnaA protein, a member of the AAA+ (ATPase associated with various cellular activities) family, initiates DNA synthesis at the chromosomal origin of replication, oriC, and regulates the transcription of several genes, including its own. Interestingly, DnaA with a point mutation in its membrane-binding amphipathic helix, DnaA(L366K), supports growth in cells deficient in acidic phospholipids. We have recently established that DnaA(L366K) can adopt architectures that are independent of its bound nucleotide, and instead the locus determines the functionality of higher order DnaA(L366K)-DNA nucleoprotein complexes. Besides the role of acidic phospholipid, PG is also associated with the maturation of outer membrane murein lipoprotein (Lpp). The pre-lipoprotein synthesized in the cytoplasm is directed to bacterial inner membrane via a signal sequence. This is preceded by the transfer of a diacylglycerol moiety from PG to pre-Lpp, resulting in the exposure of a specific peptidase site within diacylglycerated Lpp (DG-Lpp). The subsequent cleavage produces mature Lpp, which is transferred to the outer membrane. In pgsA null *E. coli*, the immature pre-lipoprotein is accumulated at inner membrane causing defective growth. Ongoing studies in the laboratory are to examine whether deficient levels of acidic phospholipids adversely affect initiation of chromosomal replication due accumulated Lpp intermediates, in a manner beyond the loss of nucleotide exchange on DnaA. Future goals include better defining the cross-talk between DnaA protein and acidic lipid domains in the bacterial membrane that helps control the spatial and temporal regulation of chromosomal replication in bacteria.

Biography

Rahul Saxena received his PhD in Biochemistry from the Institute of Microbial Technology, India in 2007, where he made important contributions on the structural-functional characterization of peptide deformylase (PDF), an enzyme involved in post-translational modification of proteins in the pathogenic organism Mycobacterium tuberculosis. He pursued postdoctoral studies at Georgetown University School of Medicine where his research has focused on understanding the role of acidic phospholipids present in the bacterial cell membrane in controlling chromosomal replication spatially and temporarily. Recently he was appointed to the faculty in the Department of Biochemistry and Molecular & Cellular Biology at Georgetown University Medical Center. His findings have been published in several peer-reviewed journals, as well as a portion of his work has been accepted to grant a US patent.

rahulimtech@gmail.com