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Genomics and emergence of pan resistance bacteria

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Abstract

In recent century, because of excessive use and abuse of antibiotics both in community and in hospitals gram negative and gram positive bacteria are adapted to this hostile environment and many strains (Clones) are exhibiting resistance to multiple antibiotics (MDR). These strains are widely distributed in different geographical continents both in united state and Europe. Recently we have encountered with new clones of bacterial strains of bacteria particularly Acinetobacter, Pesudomonas and methicillin resistant Staphylococci that are almost resistant to all available antibiotics (Pan Resistance). Emergence of Pan resistant strains are created huge burden particularly in ICU of the hospitals where seriously ill patients are hospitalized. These clones are slowly spreading to different region in united state, East Asia and Middle East. Pan resistant strains caused high mortality and circumvent treatments with two or three drugs. They also exhibit high degree of MIC value. The reason behind of the emergence of pan resistance clones is go back to bacterial genome. Recent investigation in genomics revealed the genome of bacteria composed of two part, one conserve region composed most of housekeeping genes that are essential for survival of organism under any circumstances and the other part consist of mobile genetic elements, we call it pathogenicity island that its composition vary from one strain to the other strain of the same in the bacterial population. Recent investigation on pan resistance in our group suggested existence of such antibiotic resistance island in these strains that cluster in particular region of genome. These antibiotic resistance genes which many resided in different classes of integrons, IS elements and transposons can easily transfer simultaneously to a sensitive bacteria. The sequencing of pan resistance genomic DNA revealed that the new resistant clones emerge by simple mutation, recombination or transposition in this region of the bacterial genome (antibiotic resistance island). Antibiotic Resistance Island (ARI) in bacterial genome gives ability to the bacterium easily adapted to different antibiotic even during therapy of the patients.

Biography

M.R. Shakibaie earned his PhD from University of Pune India from 1992 to 1997. He completed one year postdoctrate research training at Aquatic Microbial Lab in Mysore, India during 2006. The title of his post doctorate study was; Horizontal transfer of antibiotic resistance genes among gram negative bacteria in sewage and lake water and influence of some physicochemical parameters of water on conjugation process.

Dr. Shakibaie joined the Division of Molecular Bacteriology, Department of Microbiology, Kerman University of Medical Sciences in 1998. He guided more than 15 M.Sc. and PhD thesis and 18 projected. He has more than 30 publications in field of antibiotic resistance in different journals