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Risk assessment of aminoglycoside resistance genes at sub inhibitory concentrations: Cross resistance patterns [aph(3)IIIa, aac-aph] in *Enterococcus faecalis* 33-1, adaptive selection in *Lactobacillus plantarum* C27b MCC3011 and *in vitro* conjugal transfer

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Low level resistance is associated with constitutive expression of aminoglycoside resistance genes. Nevertheless, treatment with specific aminoglycosides facilitates induction of mRNA expression as well as confers resistance to structurally related antibiotics of this class. As vital drugs in human therapy this cross resistance mechanism in bacteria may challenge the efficacy of the entire aminoglycoside class. In the presence of two or more aminoglycoside resistance genes viz. *aac(6´)*Ie-aph(2″)Ia and aph(3″)IIIa (kanamycin resistance) in E. faecalis 33-1, it was interesting to observe the pattern of expression levels of each gene upon individual induction with increasing concentrations of gentamicin, kanamycin and streptomycin (2048, 4096, 8192, 16384 µg/mL). The expression of the bifunctional and kanamycin resistance genes increased with the increase in gentamicin and kanamycin concentration, respectively. Upon streptomycin and gentamicin induction, the expression levels increased at a low concentration (2048 µg/mL) with gradual decrease at higher concentrations for *aac(6´)*Ie-aph(2″)Iaand aph(3″)IIIa, respectively. Similar observation was made for aph(3″)IIIagene when induced with gentamicin at 8192 µg/mL. However, it was least expected to observe significant increase in expression of the aph(3″)IIIa gene which is not known to induce when treated with streptomycin and may have a novel mechanism. Similarly, the genotypic and phenotypic effects of continuous induction with sub-inhibitory concentrations of gentamicin for 30 days in Lactobacillus plantarum C27b MCC3011 harboring *aac(6´)*Ie-aph(2″)Ia gene were investigated. In addition, plasmid encoded horizontal gene transfer of the high level aminoglycoside resistance gene, *aac(6´)*Ie-aph(2″)Ia from viz. E*nterococcus avium, E. cecorum, E. faecalis* species into the recipient *strain E. faecalis* JH2-2 by filter mating indicated the possibilities gene transfer into pathogenic strains in the gut. Thus, this investigation demonstrates that exposure to sub lethal aminoglycoside concentrations facilitate cross resistance mechanisms, biofilm formation, conjugal transfer and adaptive selection of resistance genes in commensal lactic acid bacteria which can have deleterious effects.

Biography

Jaimee George has completed her post graduation in Microbiology from the University of Mysore, Karnataka. She is currently pursuing her PhD from Central Food Technological Research Institute, Mysore, India. She is presently working on the topic "Molecular assessment of aminoglycoside resistance in *Enterococcus* sp." has published two papers in reputed journals. Her work highlights the significance of aminoglycoside resistance in lactic acid bacteria isolated from farm animals and fermented food, its spread via horizontal gene transfer as well as its expression studies.

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