Lactic ACID BACTERIA AND THEIR ANTIBACTERIAL POTENTIAL

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Just as defensin molecules are produced by human cell to attack foreign microorganisms, bacteriocin molecules are produced by lactic acid bacteria to scare off other fellow bacteria from the limited nutrient resources in its eco-environment. Genes responsible for the bacteriocin(bcn) production form an operon-like gene cluster, resulting in coordinated expression and secretion into surrounding media. Gene cluster of carnobacteriocins(class IIa bcn) as well as and that of nisin(class I bcn) consisted of four groups of functionally related genes; structural genes for bcn or autoinducer(cbnB2 cbnBM1 cbnS/nisA), immunity genes(cbiBM1 cbiB2/nisI nisE nisF nisG), modification/secretion genes(cbnD cbnT/nisB nisC nisP nisT), and regulatory genes(cbnK cbnR/nisK nisR). Mature carnobacteriocin B2/BM1 and nisin A showed additional function as autoinducer molecules by binding to the two-component signal transduction system which consisted of membrane-bound histidine protein kinase(CbnK/NisK) and response regulator(CbnR/NisR). The signal-received response regulator in turn bound to two direct repeats in promoters, activating transcription of the bcn genes. Cbn S worked as an independent inducer. Molecular signal resided in the carboxy terminal of the inducer molecules. These inducing system for the production of bacteriocins seemed to comprise a new class of quorum-sensing mechanism in lactic acid bacteria. Expressed prebacteriocin underwent processing during its transport through membranes by CbnD CbnT or NisB NisC NisP NisT complex. Antibacterial potentiality of the bacteriocin seemed to depend on its molecular interaction with the docking molecule on the surface of the susceptible bacteria, as shown in the effect of various carbohydrates in the reacting media. Expansion of antibacterial potentiality by heterologous expression was feasible when the two systems shared processing and transporting mechanism.