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The effect of anabiosis autoinducers on the bacterial genome

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Abstract

The mutagenic activity of chemical analogues of microbial anabiosis autoinducers (the autoregulatory d 1 factors of cell differentiation), which act to inhibit cell proliferation, to enhance cell tolerance, and to induce the transition of cells to anabiotic state, was studied using the Ames test. In the range of concentrations studied (0.1 to 100 μg/ml), alkyl-substituted hydroxybenzenes (AHBs) differing in hydrophobicity, i.e., methylresorcinol (C 1-AHB) and hexylresorcinol (C 6-AHB), as well as unsubstituted resorcinol, showed different growth-inhibiting and mutagenic effects. C 6-AHB was found to inhibit the growth of Salmonella typhimurium TA100 and to induce its mutagenesis at a rate of 1.8 revertants/nmol. C 1-AHB taken at low concentrations not only failed to inhibit bacterial growth but even stimulated it and exerted an antimutagenic effect. Unsubstituted resorcinol virtually did not influence bacterial growth and showed weak mutagenic activity. The growth-inhibiting effect of elevated C 6-AHB concentrations correlated with the degree of the transition of the original phenotype producing S-type colonies to a phenotype producing R-type colonies. The role of AHB homologues, as microbial autoregulators with mutagenic activity, in the regulation and correlation of two processes (the phenotypic dissociation of microbial populations and the formation of resting microbial forms) is discussed. The accumulation of AHBs in senescent microbial cultures may induce adaptive mutations, change the expression of genes, and promote the development of minor cell subpopulations (phenotypes), thus providing for the adaptation of these cultures to varying environmental conditions.

Keywords

Alkyl hydroxybenzenes, Ames test, Genome, Growth-inhibiting activity, Mutagen, Phenotypic dissociation, Salmonella