Mutagenesis 1995 vol.10 N3, pages 165-170

Bacterial ribonuclease: Mutagenic effect in microbial test-systems

Ilinskaya O., Ivanchenko O., Karamova N.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Pure enzyme samples of ribonuclease from Bacillus intermedius 7P (known commercially as 'binase') were investigated for genotoxicity in four microbial tests: the Ames plate incorporation method, Ara(R)-assay; the prophage induction test; and the DNA-repair test. The weak mutagenic effect of binase at high concentrations (0.1 mg/plate, 1 mg/plate) was established by induction of forward Ara(R)-mutations and histidine-reverse mutations (both frameshift mutations and base pair substitution). Metabolic activation with rat or chicken liver, human placenta or plant (from tulip bulbs) microsomal fractions in vitro was seen to abolish the binase mutagenicity. Bacillus intermedius 7P ribonuclease appears to possess DNA damaging activity in uvrA- and polA- mutants, but not in the recA-deficient Escherichia coil strain, and exhibits an induction of recA-dependent mutagenesis detected by the 8-fold increase of the prophage-induction level in lysogenic Bacillus subtilis culture and by the 5-fold increase of this level in the Streptomyces lavendulae 3 lysogenic strain. The importance of the roles of both of enzyme catalytic activity and native structure is emphasized. A proposed mechanism for exogenous ribonuclease action is discussed. Bacillus intermedius 7P ribonuclease probably does not act as a direct genotoxic agent interacting with DNA, but could provoke nucleotide imbalance through its catalytic action on membrane-associated RNAs, which results in alteration of DNA replication and, as a consequence, in recA-dependent mutagenesis.