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Induction of apoptosis in tumor cells by binase

Zelenikhin P., Kolpakov A., Cherepnev G., Ilinskaya O.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

The possibility of inducing apoptosis in K562 myelogenic erythroleukemia cells, A549 lung carcinoma cells, and normal human lymphocytes was studied for Bacillus intermedius RNase (binase) and its mutants Lys26 Ala and His101 Glu with impaired catalytic activity. Selective induction of apoptosis in leukemic blood cells by binase was demonstrated for the first time. Binase did not exert an antiproliferative or proapoptotic effect on peripheral blood lymphocytes of healthy donors. Low-molecular-weight (less than 50 kb in size) oligonucleosomal DNA fragments, which are early markers of apoptosis, were observed in human solid-tumor cells treated with binase. Studies with the binase mutants showed that a decrease in catalytic activity to 2.5% of the level characteristic of the wild-type enzyme deprives binase of its proapoptotic effect. The selective proapoptotic effect of binase on malignant cells provides evidence that bacterial RNases are promising for designing alternative antitumor drugs. © 2005 Pleiades Publishing, Inc.

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Keywords

A549 lung carcinoma cells, Apoptosis, Binase, Cytotoxic RNases, K562 myelogenic erythroleukemia cells, Lymphocytes, Lys26 Ala and His101 Glu binase mutants