

Antiviral activity of binase against the pandemic influenza A (H1N1) virus

Mahmud R., Ilinskaya O.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

The lack of effective antiviral drugs restricts the control of the dangerous RNA-containing influenza A (H1N1) virus. Extracellular ribonuclease of Bacilli (binase) was shown to manifest antiviral activity during single- and multi-cycle viral replication in the range of concentrations non-toxic to epithelial cells and 0.01-0.1 multiplicity of infection. During antiviral treatment for 15-30 min, the concentration of 1 µg/ml binase reduced the amount of focus-forming units of viruses by a factor of 3-10 and suppressed the virus-induced cytopathic effect in A549 human lung cells. The possible mechanisms of interaction between the virus and enzyme are discussed. Positive charges in both binase and viral hemagglutinin cause electrostatic interaction with negatively charged sialic acid on the host cell's surface followed by its penetration into the cell. Capsid elimination and release of viral RNA from endosome to the cytoplasm allows catalytic RNA cleavage by internalized binase. The data obtained confirm that binase is an effective antiviral agent against the pandemic influenza A (H1N1) virus. Certain progress in this field is associated with clarifying the detailed mechanism underlying the antiviral action of binase and development of the most effective way for its practical use. © 2013 Park-media, Ltd.

Keywords

A549 epithelial cell, Antiviral activity, Bacillus intermedius ribonuclease, Cytotoxicity, Influenza A (H1N1) virus