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Inhibition effects of novel sulfonated derivative of β -cyclodextrin against influenza A virus

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The development of novel drugs against the influenza virus with high efficiency and low toxicity is an urgent and important task. Herein, we investigated the antiviral potential and a mechanism of antiviral activity of novel sulfonated derivative of β -cyclodextrin [(Gluox)7-C14]-(SO₃Na)₁₄ (SCD) against influenza virus A/WSN/33 (H1N1) in vitro and in vivo. The cytotoxicity of SCD examined with respect to uninfected MDCK and A549 cells was shown to be quite low: IC₅₀ values corresponding to survival of 50% cell population were 15±3.3 and 11.5±0.8 mg/mL for MDCK and A549 accordingly. Antiviral potential of SCD was evaluated in MDCK cells treated with serially diluted compound simultaneously with inoculation of the influenza virus. Quantification of virus titers 48 h post infection showed that influenza virus replication had been severely affected. We showed that SCD possesses virulicidal activity and virus was entirely inactivated after incubation with the compound for 6 h at 37°C. Incubation virus particles with SCD did not block neuraminidase activity but resulted in decreasing of virus hemagglutinin activity. The results of the time-of-addition assay suggested that SCD inhibited virus replication only after incubation of infected cells with the compound. The in vitro antiviral effects of SCD were confirmed in a murine pneumonia model of influenza. Our data showed that intranasal treatment of mice with SCD protected the animals from lethal infection and significantly decreased viral titers in lungs of infected animals. Therefore, SCD is promising candidates for the development of antiviral drugs for prevention and treatment of influenza infection.

Biography

Goncharova E P has completed her PhD at FBRI State Research Center of Virology and Biotechnology Vector. She is the Senior Researcher at the Institute of Chemical Biology and Fundamental Medicine, Siberian Branch of Russian Academy of Sciences, Russia. She has published more than 26 papers in reputed journals. Her research interests include oncolytic viruses, development of antiviral therapeutics and vaccines.

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