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Inhibition of Influenza B and C viruses by Aprotinin

P.B.Golyando, A.V.Ovcharenko, O.P.Zhirnov
The D.I.Ivanovsky Virology Institute, Moscow 123098, Russia.

Aprotinin, a polypeptide proteinase inhibitor, was earlier reported to suppress influenza virus A multiplication. Here we show that replication of influenza virus B and C is also inhibited by aprotinin. Injection of aprotinin into the allantoic cavity of embryonated eggs infected with influenza viruses B/Hong Kong/72, B/Lee/40, C/USSR/77, and C/Taylor/47 markedly reduce virus multiplication. Under these conditions most virions produced were non-infectious and contained uncleaved (non-activated) fusion glycoproteins. Injections of another natural antiproteinases, such as heparin, an inhibitor of blood clotting factor Xa and thrombin, or the leech extract containing thrombin-specific inhibitors, the hirudins and bdellins, did not provide the virus-inhibiting effects in the infected embryonated eggs. It is also shown that mice infected with a mouse-adapted influenza B/Hong Kong/72 virus are protected from lethal bronchopneumonia by instillations of aprotinin.

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In Vitro Activity of a Novel Series of Polyoxosilicotungstates against Human Myxo-, Herpes- and Retroviruses

S. Ikeda[1], J. Neyts[1], N. Yamamoto[1], B. Murrer[2], B. Theobald[2], G. Bossard[3], G. Henson[3], M. Abrams[3], D. Picker[3] and E. De Clercq[1]
[1]Rega Institute for Medical Research, Minderbroedersstraat 10, B-3000 Leuven, Belgium, [2]Johnson Matthey, Technology Centre, Blount's Court, Sonning Common, Reading RG4 9NH, Great Britain, [3]Johnson Matthey Pharmaceutical Research, 1401 King Road, West Chester, Pa 19380, U.S.A.

A series of silicon-containing polyoxotungstates belonging to the "Keggin-type" ("Keggin", "Keggin sandwich") were evaluated for their antiviral activity against enveloped viruses (myxo-, herpes- and retroviruses). The "Keggin" compound JM2815 ($K_5[Si(TiCp)W_{11}O_{39}].12H_2O$) and the "Keggin sandwich" compound JM1590 ($K_{13}[Ce(SiW_{11}O_{39})_2].26H_2O$) showed the highest selectivity indices against human immunodeficiency virus type 1 (HIV-1) and type 2 (HIV-2), and the "Keggin" compound JM2820 ($[Me_3NH]_8[Si_2Nb_6W_{18}O_{77}]$) was the most potent inhibitor of herpes simplex virus type 1 (HSV-1) and type 2 (HSV-2) and human cytomegalovirus (HCMV) replication. These compounds proved active against HCMV and HSV when present during virus adsorption, and against influenza virus A and respiratory syncytial virus (RSV) also when added after virus adsorption. Polyoxosilicotungstates inhibited the binding of radiolabeled HCMV particles to the cells at concentrations that were antivirally active, and the compounds were able to displace HCMV particles that were bound to a heparin-Sepharose matrix. Presumably, the polyoxosilicotungstates interact with positively charged domains on the viral envelope site(s) involved in the attachment of the (HCMV) virions to the cell surface receptor heparan sulphate.