

Humic substances as active anti-HIV components for microbicides

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Background: At present there is a large data set on ability of humic substances to induce non-specific immune response in living organisms. In particular, antiviral activity of humic substances have been shown. However, the reported effects are mostly obtained for synthetic humic substances. Systematic studies on antiviral activity of natural humic materials are missing. The objective of this study was to assess anti-HIV activity of a broad set of natural humic materials. The set of humic materials tested included samples of coal and peat humic and fulvic acids as well as non-fractionated materials and more narrow fractions. All samples were isolated and purified in laboratory conditions using standard protocols of International Humic Substances Society (IHSS).

Methods: Anti-viral activity of compounds was defined in modeling HIV-infection using laboratory adapted HIV-1 strains and T-lymphoblastoid cell lines. The level of virus reproduction in infected cells at presence of tested compounds was detected with p24 HIV-1 antigen ELISA. The cytotoxicity was defined as the viability of T-lymphoblastoid cells cultivated at presence of different doses of tested compounds (MTT-test).

Results: All humic materials used in this study showed weak cytotoxicity (10-15%) at concentrations 1,0-1,5 mg/mL. While their anti-HIV activities were high enough. The ED50 values ranged from 3×10^{-3} to 4×10^{-2} mg/mL. The HIV-activity depended strongly on the source and fraction composition of HS.

Conclusions: Given low cytotoxicity and high efficacy of the humic materials, they can be considered as promising group of compounds suitable for further therapeutic developments. Hence, the performed experiments allowed us to propose new natural humic compounds as active and potent agents for microbicide formulations.