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Antiviral activity of sulfated polysaccharides against newcastle disease virus

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Several studies have demonstrated that sulfated polysaccharides (PS) extracted from sea algae have antiviral properties and are much less cytotoxic than conventional antiviral drugs. Fucoidan and Ulvan are PS found in brown and green algae respectively.Newcastle Disease Virus (NDV) is a paramyxovirus causing fatal infections of poultry. This study aims to determine the antiviral activity and mechanism of action in vitro, for the Cladosiphon okamuranus fucoidan, the Ulva clathrata ulvan, and the mixture thereof against NDV La Sota strain. The antiviral activity was tested using syncytia formation, the assays were performed adding the compounds during all infection cycles to determine the 50% effective concentration (EC50), further, we determined in vitro the 50% cytotoxic concentration (CC50) for define therapeutic index (TI) (CC50/EC50).Sulfated polysaccharides showed potent antiviral activity with a TI > 800,000. In contrast, ribavirin had low activity and considerable cytotoxicity(TI 1.7). Neither PS showed virucidal effect. In time-of-addition studies, fucoidan inhibited viral infection at early stages (0 to 60 minutes post-infection), reducing attachment protein expression (HN) by 98%. In a fusion inhibition assay, PS significantly inhibited syncytia formation when they were administered before the cleavage of fusion protein. The mixture of PS shows a little bit more antiviral activity than each one alone.In an in ovo system, fucoidan significantly suppressed viral NDV RNA synthesis by 99.8%. These data show that PS could be a potent antiviral compounds for clinical and/or veterinary use and also provide a better understanding of the mode of antiviral action of PS.

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