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## Sulfated polysaccharides with potent antiviral activity

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We have investigated the synthesis and biological activities of sulfated polysaccharides obtained by sulfation of both synthetic and naturally occurring polysaccharides. Ring-opening polymerization of anhydrosugar monomers is a superior method to afford stereo-regular polysaccharides with high molecular weights and define structures. Synthetic polysaccharides become good biomaterials for investigation of the relationship between the structure and biological activity. After sulfation, we found that sulfated polysaccharides had potent anti-HIV activity measured by 50% effective concentration (EC<sub>50</sub>) as low as 1 μg/mL. In addition, we found that curdlan sulfate, which was prepared by sulfation of the naturally occurring polysaccharide curdlan with a linear 1, 3-β-linked glucopyranoside structure, also completely inhibited the infection of MT-4 cells by HIV at concentrations as low as 3.3 μg/ml. In general, sulfated polysaccharides like heparin have high blood anticoagulant activity, making them unsuitable for AIDS treatment. However, curdlan sulfate has low blood anticoagulant activity (10 unit/mg) and low cytotoxicity. The structure of polysaccharides was analyzed by high resolution NMR measurements and antiviral mechanisms were elucidated by SPR, DLS, and zeta potential with poly-L-lysine as a model peptide of HIV surface protein. The sulfated synthetic and natural polysaccharides were found to have strong interactions with poly-L-lysine, suggesting that the anti-HIV activity was hypothetically due to the interaction of the negatively charged sulfated groups with the positively charged surface proteins of HIV. The antiviral activity of other viruses is also presented.

### Biography

Takashi Yoshida has completed his PhD in 1983 at the Graduate School of Engineering, Meiji University (Professor Shojiro Saito). Then, he worked at Nippon Dental University as a Research Associate (1983-1985) and moved to University of Tokyo as a Research Associate during 1985-1993 (Professor Toshiyuki Uryu). During 1988-1989, he had worked at York University (Canada) as a Post-doctoral Researcher. He became an Associate Professor at the Department of Polymer Science, Faculty of Science, Hokkaido University (1993-2001). Since 2001, he is a Professor at the Department of Bio and Environmental Chemistry, Faculty of Engineering, Kitami Institute of Technology. His research interests focuses on the study of bio macromolecules and environmental science.

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