Macromolecular glycan mimetics to fight virus infections

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Virus infections represent a major health threat and are associated with a significant socioeconomic burden. While vaccination is the most effective prevention strategy; cost and availability have limited their uptake in some instances.

One promising approach to fight viral infections is by targeting the entry into host cells, which is a critical step of the infection process. It is well-known, that this first step of infection is often mediated by pathogen engagement with host glycans, glycoconjugates, and polysaccharides. Host cell surfaces are decorated with a dense layer of carbohydrate structures known as the glycocalyx, thus offering a multitude of potential interaction partners for the pathogen. Hence, synthetic mimetics of the glycocalyx, such as glycopolymers or glycomacromolecules have gained increasing attention as molecular decoys that can block pathogen-host cell interactions via competitive inhibition.

Here, we present our recent work on the synthesis of defined mimetics of different components of the glycocalyx for pathogen targeting. Inspired by nature, we developed highly sulfated glycopolymers that act at glycosaminoglycan (GAG) mimetics and show efficient inhibition of viruses, such as Herpes Simplex Virus (HSV), Influenza A Virus (IAV), and Merkel Cell Polyomavirus (MCPyV) among others.[1,2] We have also used our established solid phase polymer synthesis, to design and synthesize sequence-defined glycooligomers mimicking matriglycan, a glycopolymer subunit of α-dystroglycan, which is a well-established receptor for arena viruses including the Lassa virus.

Bibliographic references:

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