GLYCAN MICROARRAYS – ESSENTIAL TOOLS FOR GLYCAN RECEPTOR TYPING OF EMERGING INFLUENZA VIRUSES

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The binding of influenza virus haemagglutinin (HA) to sialic acid (Sia)-terminating glycans on host respiratory epithelia is a critical step in viral infection and a key determinant of virus transmissibility and pathogenicity. While HA specificity for sialic acid linkage (α2-3 for avian-adapted viruses and α2-6 for human-adapted viruses) is widely recognized as a major factor in cross-species transmission, increasing evidence suggests that additional glycan structural features significantly influence viral binding, affecting species, tissue, and cellular tropism. Glycan microarrays have proven to be powerful tools for characterizing receptor-binding specificities of influenza viruses. The neoglycolipid-based microarray system has been instrumental in defining the binding characteristics of the 2009 H1N1 pandemic virus [1,2] and highly pathogenic H5N1 viruses isolated from human patients in Vietnam [3].
This communication highlights recent advancements in expanding the sialyl glycan library via chemoenzymatic synthesis, coupled with the Fmoc-Amino-Azido (FAA) glycan derivatization strategy [4]. The newly constructed sialyl glycan microarrays have been used to screen H5 influenza strains of clade 2.3.4.4b, responsible for recent outbreaks in avian and mammalian species, including cattle influenza strains from the US, and severe human infections. Robust microarray data were obtained using both live and inactivated viruses, as well as recombinant HA proteins [5]. Moreover, the FAA-glycan probes can be readily converted into biotinylated probes for label-free kinetic analysis of virus-glycan interactions in the Biolayer Interferometry (BLI) system. This integrated workflow, combining high-throughput microarray analyses with detailed kinetic measurements in BLI, holds great potential to deepen our understanding of glycan-mediated influenza virus interactions and support surveillance efforts.

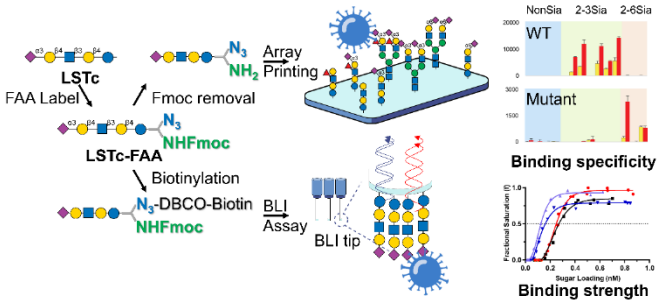

Figure 1. Multifunctional glycan probes for analyzing glycan-mediated influenza virus interactions using glycan microarray and biolayer interferometry platforms.

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References:
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