Organic Chemistry Seminar

Tuesday, February 6th, 2024
4:30 p.m. ~ WTHR 104

"Chemo-Enzymatic Synthesis of Complex Glycans to Examine Receptor Specificities of Pathogens of Zoonotic Concern"

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Almost all eukaryotic cell surface and secreted proteins are modified by covalently-linked glycans which are essential mediators of biological processes such as protein folding, cell signaling, fertilization, embryogenesis, and the proliferation of cells and their organization into specific tissues. Overwhelming data supports the relevance of glycosylation in pathogen recognition, inflammation, innate immune responses, the development of autoimmune diseases, and cancer. It has, however, been difficult to explore biological properties of individual glycans because these bio-molecules are not readily available. To address this challenge, we have developed chemo-enzymatic methodologies that make it possible to prepare large libraries of highly complex glycans found on cells of interest. The synthetic approaches were employed to prepare a collection of glycans found on the upper airway of humans that were printed as a microarray to probe receptor specificities of several respiratory viruses. To validate the array data, cell surface engineering strategies were developed to place synthetic glycans on the surface of cells for gain of function studies. The technological platform made it possible to examine the evolution of receptor specificities of influenza H3N2 viruses and beta-corona viruses. Furthermore, it was employed to determine receptor specificities of Lassa virus. Knowledge of glycan receptor usage of zoonotic pathogens is making it possible to implement surveillance strategies to prevent future pandemics.

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