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Biomimetic glycan microarray for bioanalytical and biomedical applications

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Abstract

Recent emergences of glycobiology, glycotechnology and glycomics have been clarifying enormous roles of carbohydrates in biological recognition systems. Particularly, cell surface carbohydrates existing as glycoprotein, glycolipids, and proteoglycans are playing significant roles in crucial physiological and pathological events, such as cell-cell signaling, immune recognition events, pathogen host interaction, etc. Therefore, cell surface carbohydrate provide a starting point to develop essential approaches for analyzing and probing carbohydrate-recognizing interactions. For example, glycan microarrays have become powerful high-throughput tool for examining binding interactions of carbohydrates with lectins, antibodies, cells, and viruses. The challenges of developing carbohydrate based techniques mainly come from the weak affinity of carbohydrate-protein interaction, the lack of versatile carbohydrate scaffolds with well-defined structures and the less developed high-information content. This presentation describes our recent biomimetic efforts for glycan microarray design, fabrication and their bioanalytical applications. First, an oriented and density controlled glyco-marcroligand microarray formation based on end-point immobilization of glycopolymer will be discussed. Second, membrane mimetic glyco-lipid bilayers microarray will be discussed. The reported biomimetic glycan microarrays present multivalent glycans in defined orientation and density configurations that are critical for glycan recognition and thus facilitate enhanced performance for probing the ligand specificities of glycan-binding molecules. The biomimetic glycan microarray can be applied for clinical antibody detection and profiling, vaccine development, biomarker discovery, and drug screening applications. In addition, it can be used for environmental monitoring, food safety, diagnosis, and bio-defense applications.

Biography

Sun obtained his Ph.D. degree of Pharmaceutical Sciences from Kitasato University, Japan and currently is a professor of Pharmaceutical Chemistry and Biomedical Engineering and holds an Adjunct Faculty position at Department of Molecular Cardiology, Cleveland Clinic. Sun has published 70 peer-reviewed research articles. Sun is an Executive Editor of *Journal of Glycomics and Lipidomics* (OMIC Publishing Groups) and Editorial Board Member of *Virus Adaptation and Treatment* (Dove Medical Press), *International Journal of Organic Chemistry* (Scientific Research Publishing Group) and had served as a Guest Editor for *Medicinal Research Reviews* (Wiley InterScience).