

Cytomimetic glycan microarray for profiling Glycan-Protein interactions

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Recent emergences of glycobiology, glycotecology and glycomics have been clarifying enormous roles of carbohydrates in both physiological and pathological recognition systems. Glycan arrays have become important tools for the analysis of carbohydrate-biomacromolecule interactions such as the specificities of lectins, antibodies, cells, and viruses. However, the critical limitations of glycan array applications are restricted epitopes available from both synthesis and isolation and less mode of glycan presentation on the array surface. Conventional glycan arrays are based on two dimensional (2D) surface chemistries that result in low signal intensity and substantial non-specific binding of target proteins because of an insufficient number of binding sites and the presence of surface-protein interactions. We present here cytomimetic glycan microarray platforms based on glycopolymer immobilization and glycosylated liposome immobilization strategies. First, an oriented and density controlled glyco-marcroliand array formation was demonstrated by end-point immobilization of glycopolymer imprinted with boronic acid ligands in different sizes. Glycoarray and SPR results confirmed the same trend of density-dependent binding of specific lectins. Second, liposomes carrying ganglioside and lipid-triphenylphosphine as anchor lipid were printed onto azide-modified glass slide via Staudinger ligation. Specific lectin and toxin bindings onto liposomal glycan arrays, containing GM1 and GM3 in different densities, were confirmed by florescence scanning. The reported glycan array platforms present multivalent glycans in defined orientation and density configurations that are critical for glycan recognition. It is, thus, uniquely useful tool for probing the ligand specificities of glycan-binding molecules and for molecular and cellular proteomic applications.

Biography

Dr. Sun is an associate professor at the Department of Chemistry, Cleveland State University and holds an Adjunct Faculty position at Department of Molecular Cardiology, Cleveland Clinic. Dr. Sun has published 70 peer-reviewed research articles and three book chapters and four patents as well. Dr. Sun is an Editorial Board Member of peer reviewed journal of Journal of Glycomics and Lipidomics (OMIC Publishing Groups) and Virus Adaptation and Treatment (Dove Medical Press), and has served as Guest Editor for Medicinal Research Reviews (Wiley InterScience) for a Special Issue (2010, 30 (2)) of Carbohydrate Recognition and Applications.