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Identification of the binding roles of terminal and internal epitopes via enzymatic synthesized N-glycans with tandem epitopes

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In nature, glycans are displayed universally at the surface of living cells. They play important roles in numerous biological events through binding with corresponding glycan binding proteins (GBPs). Usually, the carbohydrate moiety involved in these bindings is composed of the sugar residues at the non-reducing terminal by linked to each other in certain manners and forming specific epitope determinants. Nevertheless, internal epitopes may also participate in the binding and initiate subsequent signaling process. To investigate whether the internal epitope involved in the glycan binding process, an array of symmetric bi-antennary N-glycans were synthesized with tandem epitopes, including LacNAc (Gal β 1,4-GlcNAc), sialyl LacNAc (Sia α 2,3-LacNAc), 6-sialyl LacNAc (Sia α 2,6-LacNAc), Lewis x (Gal β 1,4-(Fuca1,3-)GlcNAc), sialyl Lewis x (Sia α 2,3-Gal β 1,4-(Fuca1,3-)GlcNAc), α -Gal (Gal α 1,3-LacNAc), and disialic acid (Sia α 2,8-Sia), by enzymatic extension of N-glycan in the glycopeptide isolated from chicken egg yolk. For rapid production of glycans, one-pot multiple enzyme (OPME) strategy was employed, and the produced glycans were separated by high performance liquid chromatography monitored with UV detector. In total, 36 glycans were prepared to milligram scale and over 98% purity. Their binding profile to selected GBPs and viruses showed that internal glycan epitopes and modification of terminal epitopes exhibited obvious, but diverse effects to the binding of terminal epitopes.

Biography

Wanyi Guan has completed her PhD from Shandong University, China. She is currently a postdoc in Dr. Peng George Wang's group in Department of Chemistry in Georgia State University. Her research focuses on enzymatic and chemo-enzymatic synthesis of sugar nucleotide, glycans and their analogs.

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