Role of carbohydrates in development of biopharmaceuticals

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There are accumulated lines of evidence to show that glycan structures reflect their evolutionary backgrounds and functional aspects in various contexts, including differentiation, development, fertilization, inflammation, cell adhesion, and cell-cell recognition. The field now referred to as functional glycomics is very important in identifying the functions of glycans. Furthermore, alterations in the glycan parts of glycoproteins have been found to occur in various diseases, such as, for example, congenital disorders of glycosylation (CDGs), diabetes, rheumatoid arthritis, Alzheimer's disease, atherosclerosis and muscle dystrophy. Many reports have also appeared on alterations in glycan structures in various types of cancers. Due to the heterogeneity of glycans arising from their complex nontemplate-driven biosynthesis, glycans that are isolated from cells and tissues comprise a heterogeneous repertoire of structures. It should be noted that glycans are also controlled by the levels of glycosidases present, nucleotide donors, nucleotide transporters, substrate availability and the level of gene expression of the glycosyltransferases and glycosidases. Therefore, the characterization of glycan structures is of primary importance for understanding the functions of glycans. In addition, highly sensitive, high resolution analytical techniques are required. Easy and fast operations are also required for the high-throughput screening of glycans.

In this presentation, some important techniques that are used for the analysis of *N*-glycans released from some glycoproteins will be shown. Some significant applications to glycomics studies are also described.