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Short Communication

Application of Glycoproteomics in the Field of Health Science

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ABOUT THE STUDY

Glycoproteomics is a technique for determining the locations and identities of a cell or tissue entire glycan and glycosylated protein repertoire. Glycosylation is one of the most common post-translational modifications and glycoproteins are involved in a variety of biological processes, including cell signaling, host–pathogen interaction, immune response, and disease including cancer and the ongoing COVID-19 pandemic. Glycans obstruct complete fragmentation of the protein backbone, and they have been removed in the past for the sake of simplicity at the expense of glycan information.

Simple and highly dynamic protein-bound glycan's can be found in the nucleus and cytoplasm of cells, where they play a role in regulation. Glycosylation is a non-templated dynamic and complicated process that involves the transformation of proteins and lipids. Immune cells, like all other cells, have cell surface-associated glycoproteins and glycolipids that sense environmental signals with the help of glycan-binding proteins and other substances. Pathogen-associated molecular patterns are glycan's present on the surface of bacteria that are recognized by several immune receptors produced on innate and adaptive immune cells. Even low-abundance glycan's and glycopeptides have been detected. A number of experimental processes have been developed for either N-linked glycan's, which are found at protein consensus sites, or O-linked glycan's, which have no identifiable consensus sequence. The large proportion of glycan's is found on the outermost surfaces of cellular and secretory macromolecules, and they are incredibly varied. Bacterial lipopolysaccharides, peptidoglycans, teichoic acids, capsular polysaccharides, and fungal mannans are examples of glycan-containing compounds. The immune system's detection of these glycosylated microbial patterns has been used to construct vaccines; pneumococcal vaccines, for example, are made up of a variety of capsular polysaccharides. Glycan's play an important and varied role in B cell and T cell development in the adaptive immune system. Multiple cell-surface and secreted proteins (such as CD43, CD45, selectins, galectins, and siglecs), various types of cell–cell interactions, and the detection of glycan-containing antigens are all involved in these processes. CD43 and CD45 are glycoproteins that contain both O- and N-glycans and are extensively expressed on the surface of B and T lymphocytes. Glycosylation of these proteins is regulated by many T cell functions, including cellular migration, T cell receptor signalling, cell survival, and death, and is controlled throughout cellular differentiation and activation. Glycosylation of specific proteins in blood and/or tumour tissues can be employed as a diagnostic biomarker and to monitor patient prognosis and treatment responses; glycoproteins such as CEA, MUC1, MUC16, and prostate-specific antigen are examples of such glycoproteins (PSA). Advanced glycation end products, which are glycated proteins and lipids that are increased in diabetes and linked to disease pathology, are produced by a similar non-enzymatic glycosylation mechanism. Glycans play a variety of important roles in cellular responses to external stimuli, as well as cellular growth and differentiation; alterations in glycosyl composition are associated to a variety of illnesses. Expert manual assessment is necessary at this stage of genuine glycoproteomic analysis to assign the glycan's composition and attachment location. Because of the presence of isomers, MS spectra are often complex and require manual interpretation. The ability to evaluate intact glycoproteins has been made possible by recent advances in MS instruments, fragmentation methods, and high-throughput procedures. Changes in protein glycosylation patterns can lead to immune recognition of these neo-glycan epitopes, resulting in autoimmunity. Glycoproteomics should be able to detect all glycoproteins in a sample down to the site level, as well as quantify and describe their respective glycoforms at that site [1-5].

CONCLUSION

The ultimate goal of glycoproteomics is to obtain dynamic snapshots of the distribution of divergent glycans on each glycoprotein in a cell in order to deduce how site-specific glycosylation may promote or inhibit contacts, signalling, and any close encounter. Finally, we must identify the population of each molecular species that originates from combinations of site-specific oligosaccharide diversity at many locations in order to fully understand the distinct biological activities of protein glycoforms. Further development of technical and analytical methods will allow glycoproteomics to directly resolve the structural features of the attached glycans in the future;

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nonetheless, glycomics remains a crucial and often necessary precursor to detailed glycoproteomic study at this time.

REFERENCES

1. Varki A. Biological roles of glycans. Glycobiology. 2017;27(1):3-49.
2. Vasudevan D, Haltiwanger RS. Novel roles for O-linked glycans in protein folding. Glycoconj J.2014;31(6):417-26.
3. Agre P, Bertozzi C, Bissell M, Campbell KP, Cummings RD, Desai UR, et al. Training the next generation of biomedical investigators in glycosciences. J Clin Invest. 2016;126(2):405-8.
4. Anthony RM, Ravetch JV. A novel role for the IgG Fc glycan: the anti-inflammatory activity of sialylated IgG Fcs. Ann N Y Acad Sci. 2010;30(1):9-14.
5. De Haan N, Reiding KR, Driessen G, van der Burg M, Wuhrer M. Changes in healthy human IgG Fc-glycosylation after birth and during early childhood. J Proteome Res. 2016;15(6):1853-61.