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Importance and Implication of Structural Analysis of Glycoproteins

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Glycoprotein is a protein with oligosaccharides, which is a typical form of co- and post-translational modification of proteins. Glycoproteins occupy more than half of a total protein synthesized in higher animals including human. They are almost secretory or membrane proteins that recognize ligands such as cell, virus and proteins, or participate at biochemical reactions, directly (Fig. 1).

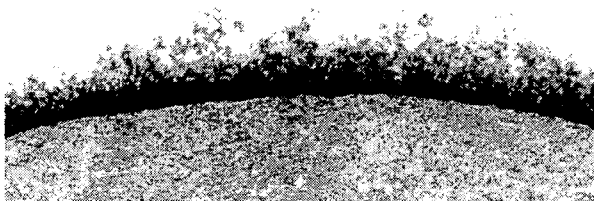


Fig.1. The surface of erythrocyte is covered with glycocalyx such as glycoproteins, glycolipids, polysaccharides, proteoglycans and so on.

It is one of the final targets of biology to identify functions of a given gene and/or protein. The function of a glycoprotein is related with attached oligosaccharides. It is expected that 20-40% (about 5,000-10,000 genes) of the human genome is drug-target and 50% of them is membrane proteins. Furthermore, more than half of the rest may be glycoproteins secreted into serum and is druggable proteins. At present, about 500 proteins were found and developed as drug-target. There are so many glycoproteins remained to be unraveled for pharmacotherapeutics. It needs obviously detailed structural analysis to address function of the proteins. It was, however, difficult to analyze glycoproteins due to complicated structure of the oligosaccharides and minute amount of the protein. Fortunately, techniques, tools, and equipment are being developed to characterize the structure of the glycoconjugates in these days although we haven't yet sensitivity to allow total glycan analysis on intact glycoprotein.

If you have a glycoprotein to be analyzed, then you may want to know if it is a real glycoprotein or not (Fig. 2). Once it is recognized as a glycoprotein, you are ready to go into the

New World of glycobiology. Glycans of a certain protein are characterized by monosaccharide composition, profile, linkage and sequence. It will be described that a basic concept of protein glycosylation and methods of structural analysis with examples of Congenital Disorder of Glycosylation and insect storage protein, arylphorin.

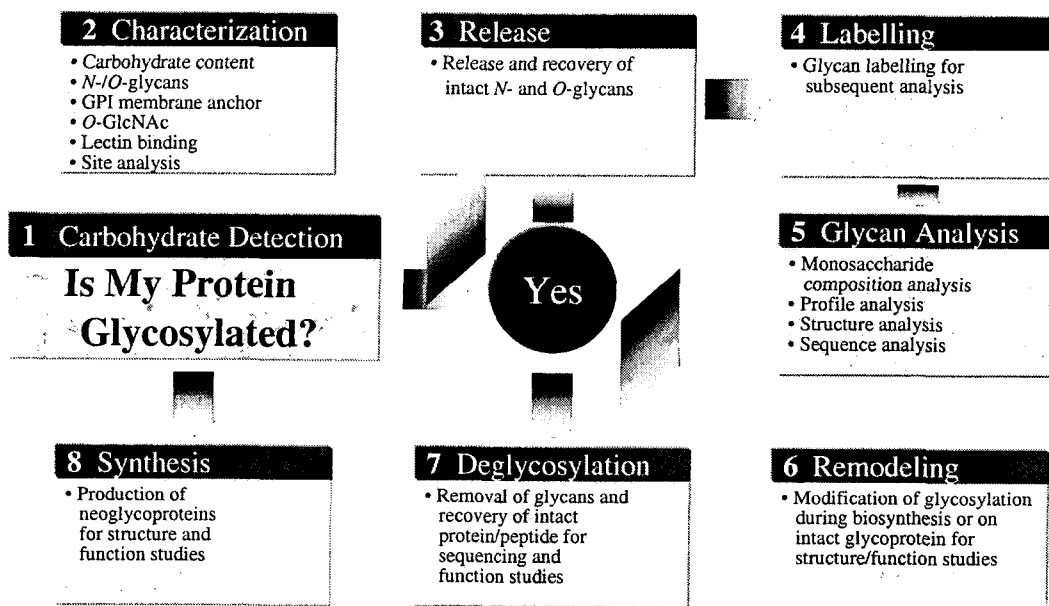


Fig.2. A Strategy for Protein Glycosylation Analysis.