

From Glycobiology to Glycotechnology

by

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Abstract

Glycoproteins are biopolymers that contain one or more oligosaccharide chain covalently linked to a protein. During the past 15 years, it has been generally accepted that the asparagine-linked oligosaccharide of glycoprotein is crucial for the function of glycoprotein. Therefore in the biotechnology, many useful human glycoproteins [*ie.* erythropoietin, tissue plasminogen activator, interferon(β and γ), *etc.*] are produced by transfecting each human corresponding gene to mammalian cells that have the machinery to synthesize asparagine-linked oligosaccharide. In the present paper, our recent studies on the biosynthesis of lipid-linked oligosaccharide which is the precursor of the asparagine-linked oligosaccharide of glycoprotein were described. We have succeeded in the cloning of human genes of the GDP-mannose dependent mannosyltransferases which are involved in the first half of biosynthesis of the lipid-linked oligosaccharide. This approach may enable us, not only to clarify the regulation of the biosynthesis of lipid-linked oligosaccharide, but also to apply for the enzymatic synthesis of functional oligosaccharide, and for the diagnosis of human congenital disorders of glycosylation (CDG).

Keywords: sugar, carbohydrate, biotechnology, glycotechnology, glycobiology, glycoconjugates, glycoprotein, asparagine-linked oligosaccharide, lipid intermediate, gene cloning, cDNA, glycosylation, glycosyltransferase, mannosyltransferase, congenital disorders of glycosylation

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