Ribitol-phosphate—a newly identified posttranslational glycosylation unit in mammals: structure, modification enzymes, and relationship to human diseases.

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Abstract
Glycosylation is a crucial posttranslational modification that is involved in numerous biological events. Therefore, abnormal glycosylation can impair the functions of glycoproteins or glycolipids and is occasionally associated with cell dysfunction and human diseases. For example, aberrant glycosylation of dystroglycan, a cellular receptor for matrix and synaptic proteins, is associated with muscular dystrophy and lissencephaly. Dystroglycan sugar chains are required for high-affinity binding to ligand proteins, and thus disruption of dystroglycan-ligand linkages underlies disease conditions. Although their biological significance is well recognized, the sugar-chain structure of dystroglycan and its modification enzymes have long remained incompletely elucidated. However, recent seminal studies have finally revealed a highly regulated mechanism for dystroglycan glycosylation and have discovered a posttranslational unit, ribitol-phosphate, that was not previously known to be used in mammals. This review article introduces the structure, modification enzymes, and functions of the sugar chains of dystroglycan, and then discusses their relationship to human diseases and therapeutic strategies.

KEYWORDS: dystroglycan; fukutin; glycosylation; muscular dystrophy; ribitol-phosphate

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