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# **O-GlcNAc a sensor of cellular state: the role of nucleocytoplasmic glycosylation in modulating cellular function in response to nutrition and stress.**

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## **Abstract**

Myriad nuclear and cytoplasmic proteins in metazoans are modified on Ser and Thr residues by the monosaccharide O-linked beta-N-acetylglucosamine (O-GlcNAc). The rapid and dynamic change in O-GlcNAc levels in response to extracellular stimuli, morphogens, the cell cycle and development suggests a key role for O-GlcNAc in signal transduction pathways. Modulation of O-GlcNAc levels has profound effects on the functioning of cells, in part mediated through a complex interplay between O-GlcNAc and O-phosphate. In many well-studied proteins, the O-GlcNAc modification and phosphorylation are reciprocal. That is, they occur on different subsets of the protein population, as the site of attachment occurs on the same or adjacent Ser/Thr residues. Recently, O-GlcNAc has been implicated in the etiology of type II diabetes, the regulation of stress response pathways, and in the regulation of the proteasome.

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