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Common Regulatory Mechanisms Reveals Links between Aberrant Glycosylation and Biological Hallmarks in Cancer

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Abstract : Glycosylation is the major posttranslational modification (PTM) process in cellular development. In tumour development, it is marked by structural alteration of carbohydrates (glycans) that is the result of aberrant glycosylation. Altered glycan structures affect cell surface ligand-receptor interactions that interfere with the regulation of cell adhesion, migration, and proliferation. The resulting changes in glycan biosynthesis pathways originate from altered expression of glycosyltransferases and glycosidases. While the alteration in glycosylation patterns is a recognized “hallmark of cancer”, the influential overview of the biology of cancer proposes eight hallmarks with no explicit suggestion to connectivity with glycosylation. Recently, we have discovered a connection between the glycosyltransferase gene expression and cancer type and subtype. Here we present an association between aberrant glycosylation and the biological hallmarks of breast cancer by exploring the common regulatory mechanisms at the genomic scale. The result of this study bridges the glycobiological and biological pathways that are accepted hallmarks of cancer by connecting their common regulatory pathways. This is an impetus for further investigation as target therapies of breast cancer are very likely to be uncovered from this.

Keywords : aberrant glycosylation, biological hallmarks, breast cancer, regulatory mechanism
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