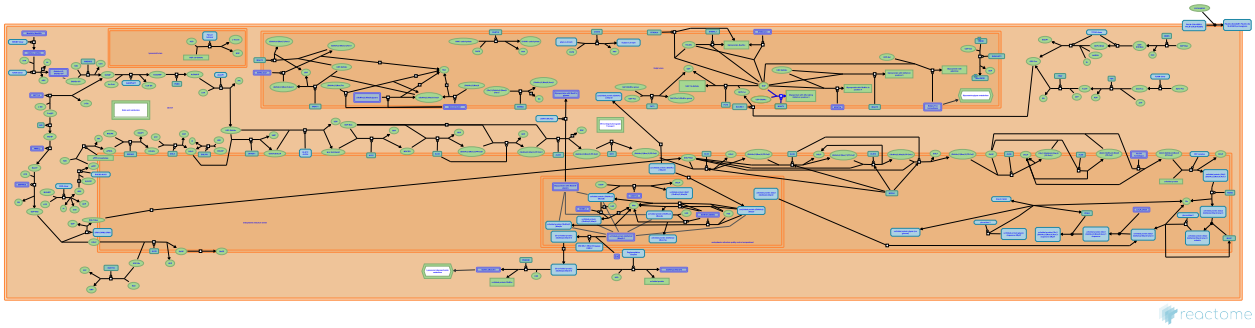
Reactions specific to the hybrid N-glycan synthesis pathway



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Introduction

Reactome is open-source, open access, manually curated and peer-reviewed pathway database. Pathway annotations are authored by expert biologists, in collaboration with Reactome editorial staff and cross-referenced to many bioinformatics databases. A system of evidence tracking ensures that all assertions are backed up by the primary literature. Reactome is used by clinicians, geneticists, genomics researchers, and molecular biologists to interpret the results of high-throughput experimental studies, by bioinformaticians seeking to develop novel algorithms for mining knowledge from genomic studies, and by systems biologists building predictive models of normal and disease variant pathways.

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Literature references

Fabregat, A., Sidiropoulos, K., Viteri, G., Forner, O., Marin-Garcia, P., Arnau, V. et al. (2017). Reactome pathway analysis: a high-performance in-memory approach. *BMC bioinformatics, 18*, 142. ↗

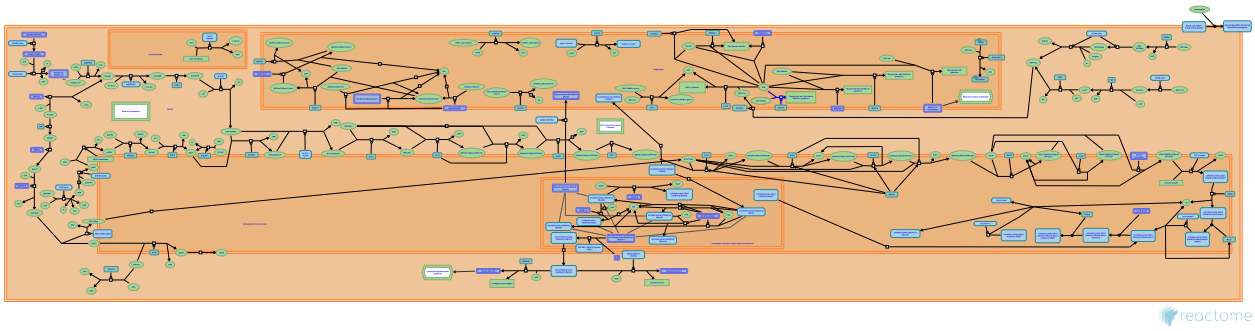
Sidiropoulos, K., Viteri, G., Sevilla, C., Jupe, S., Webber, M., Orlic-Milacic, M. et al. (2017). Reactome enhanced pathway visualization. *Bioinformatics, 33*, 3461-3467. ↗

Fabregat, A., Jupe, S., Matthews, L., Sidiropoulos, K., Gillespie, M., Garapati, P. et al. (2018). The Reactome Pathway Knowledgebase. *Nucleic Acids Res, 46*, D649-D655. ↗

Fabregat, A., Korninger, F., Viteri, G., Sidiropoulos, K., Marin-Garcia, P., Ping, P. et al. (2018). Reactome graph database: Efficient access to complex pathway data. *PLoS computational biology, 14*, e1005968. ↗

Reactions specific to the hybrid N-glycan synthesis pathway ↗

Stable identifier: R-HSA-975574



The transfer of a bisecting GlcNAc by MGAT3 commits the pathway toward the synthesis of hybrid glycans, because MAN2 is not able to operate on bisected oligosaccharides (Schachter et al 2000, Priatel JJ et al, 1997). The expression of MGAT3 over MGAT2 in a tissue can regulate the synthesis of hybrid toward complex N-glycans. The addition of a GlcNAc between the two arms also prevents the action of MGAT4, MGAT5 and FUT8.

Literature references

Schachter, H. (2000). The joys of HexNAc. The synthesis and function of N- and O-glycan branches. *Glycoconj J, 17*, 465-83. ↗

Editions

2009-11-10	Authored	Dall'Olio, GM.
2010-09-30	Edited	Jassal, B.
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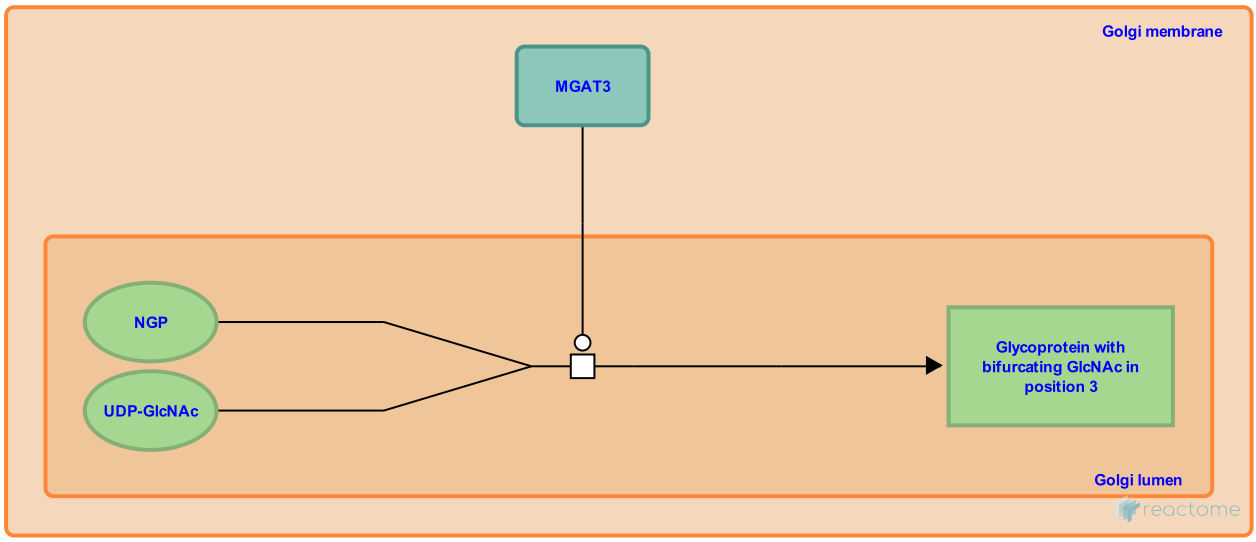
Addition of a bifurcating GlcNAc to the N-glycan by MGAT3

Location: Reactions specific to the hybrid N-glycan synthesis pathway

Stable identifier: R-HSA-975926

Type: transition

Compartments: Golgi lumen, Golgi membrane



The addition of a bisecting GlcNAc to a complex N-glycan by MGAT3 is one of the most important regulatory steps in N-glycosylation, directing the pathway toward the synthesis of complex and hybrid N-glycans. This addition changes the structure of the N-glycan and inhibits further modification by MGAT2, MGAT4, MGAT5A/B and FUT8. Defects in MGAT3 have been shown to be associated with predisposition to cancer and several developmental defects (Song et al 2010; Stanley 2002).

Literature references

Song, Y., Aglipay, JA., Bernstein, JD., Goswami, S., Stanley, P. (2010). The bisecting GlcNAc on N-glycans inhibits growth factor signaling and retards mammary tumor progression. *Cancer Res, 70*, 3361-71.

Stanley, P. (2002). Biological consequences of overexpressing or eliminating N-acetylglucosaminyltransferase-TIII in the mouse. *Biochim Biophys Acta, 1573*, 363-8.

Editions

2009-11-10	Authored	Dall'Olio, GM.
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