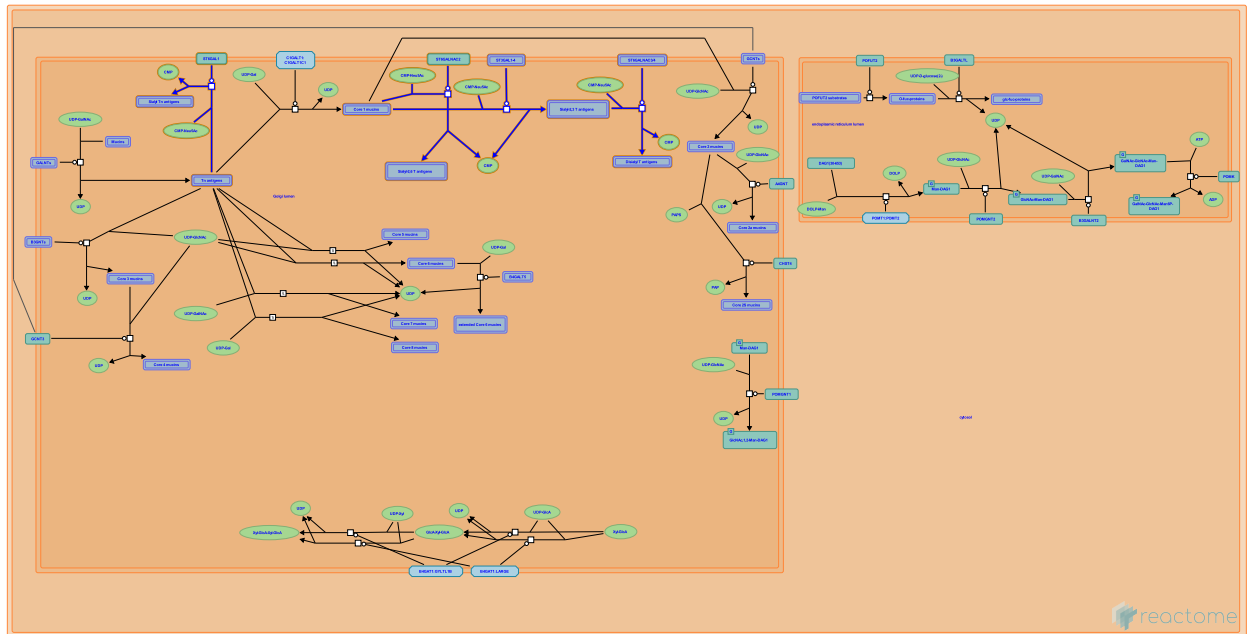


# Termination of O-glycan biosynthesis



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This is just an excerpt of a full-length report for this pathway. To access the complete report, please download it at the [Reactome Textbook](https://reactome.org/textbook).

04/05/2024

## 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

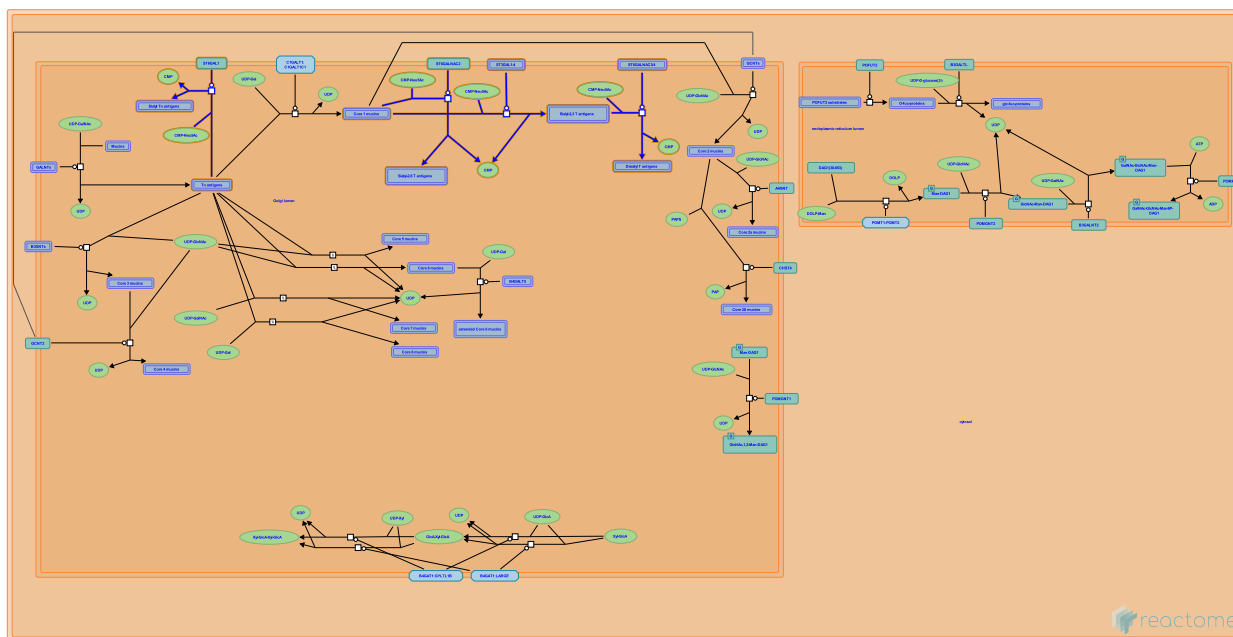
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Reactome database release: 88

This document contains 1 pathway and 4 reactions ([see Table of Contents](#))

## Termination of O-glycan biosynthesis ↗

Stable identifier: R-HSA-977068



O-glycan biosynthesis can be terminated (or modified) by the addition of sialic acid residues on Core 1 and 2 glycoproteins by sialyltransferases (Varki et al. 2009).

### Literature references

Varki, A., Schauer, R. (0). Sialic Acids. ↗

### Editions

2010-10-15	Authored, Edited	Jassal, B.
2011-11-04	Reviewed	Ferrer, A.
2021-10-12	Revised	Kolarich, D.

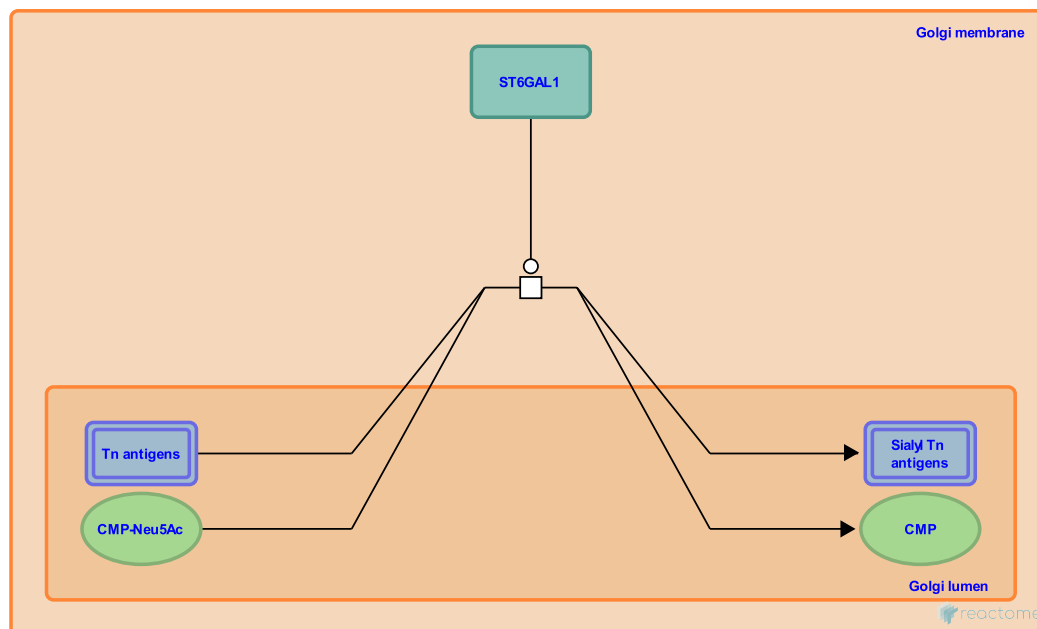
## ST6GAL1 transfers sialic acid to Tn antigens to form sTn antigens ↗

**Location:** [Termination of O-glycan biosynthesis](#)

**Stable identifier:** R-HSA-977071

**Type:** transition

**Compartments:** Golgi membrane, Golgi lumen



Beta-galactoside alpha-2,6-sialyltransferase 1 (ST6GAL1) transfers sialic acid (Neu5Ac) from the donor CMP-Neu5Ac to galactose-containing acceptor substrates such as Tn antigens (Stamenkovic et al. 1990, Marcos et al. 2004). The resultant sialyl Tn antigens are highly expressed in several human carcinomas and are associated with carcinoma aggressiveness and poor prognosis (Sewell et al. 2006, Lakshmanan et al. 2021).

### Literature references

- Almeida, R., Costa, J., Morais, V., Clausen, H., Kihlberg, J., Grandela, C. et al. (2004). Role of the human ST6GalNAc-I and ST6GalNAc-II in the synthesis of the cancer-associated sialyl-Tn antigen. *Cancer Res*, 64, 7050-7. ↗
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- Burchell, J., Bäckström, M., Karlsson, H., Sewell, R., Gätgens, J., Hansson, GC. et al. (2006). The ST6GalNAc-I sialyltransferase localizes throughout the Golgi and is responsible for the synthesis of the tumor-associated sialyl-Tn O-glycan in human breast cancer. *J Biol Chem*, 281, 3586-94. ↗

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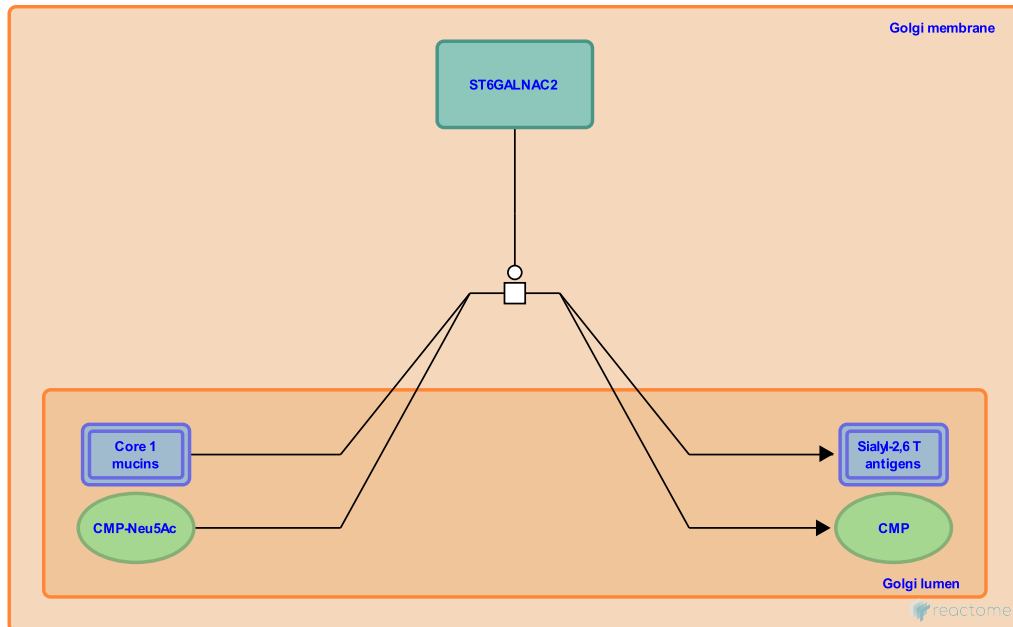
## ST6GALNAC2 transfers sialic acid to Core 1 mucins ↗

**Location:** Termination of O-glycan biosynthesis

**Stable identifier:** R-HSA-981814

**Type:** transition

**Compartments:** Golgi membrane, Golgi lumen



The huma gene ST6GALNAC2 encodes GalNAc alpha-2,6-sialyltransferase II which mediates the transfer of sialic acid (Neu5Ac) onto the T antigen (Samyn-Petit et al. 2000).

### Literature references

Harduin-Lepers, A., Delannoy, P., Samyn-Petit, B., Krzewinski-Recchi, MA., Steelant, WF. (2000). Molecular cloning and functional expression of human ST6GalNAc II. Molecular expression in various human cultured cells. *Biochim Biophys Acta*, 1474, 201-11. ↗

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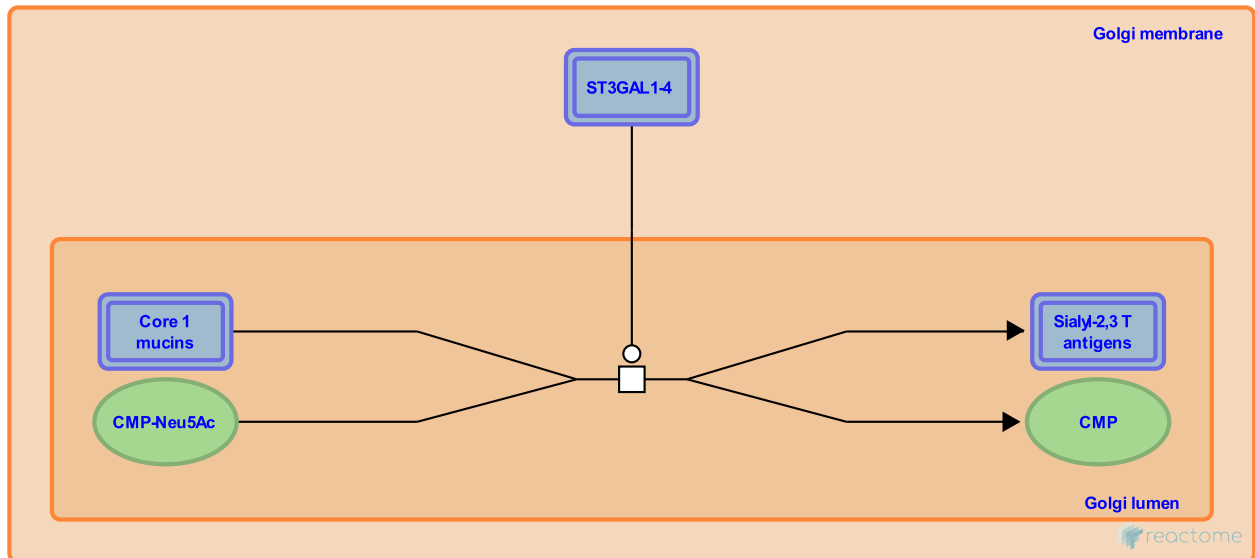
## ST3GAL1-4 transfers sialic acid to the T antigen at the alpha 3 position ↗

**Location:** [Termination of O-glycan biosynthesis](#)

**Stable identifier:** R-HSA-981497

**Type:** transition

**Compartments:** Golgi lumen, Golgi membrane



The human genes ST3GAL1-4 encode for sialyltransferases 1-4 respectively (Shang et al. 1999, Kim et al. 1996, Kitagawa & Paulson 1993, Basu et al. 1993). They add sialic acid (Neu5Ac) onto the T antigen forming an alpha-3-sialyl O-glycan.

**Followed by:** [ST6GALNAC3/4 transfers sialic acid to the sialyl T antigen to form the disialyl T antigen](#)

### Literature references

- Lee, YC., Kim, CH., Kim, YJ., Tsuji, S., Kim, KS., Choe, IS. et al. (1996). Molecular cloning and expression of human Gal beta 1,3GalNAc alpha 2,3-sialyltransferase (hST3Gal II). *Biochem Biophys Res Commun*, 228, 324-7. ↗
- Basu, S., Basu, M., Li, Z., Basu, SS. (1996). Characterization of two glycolipid: alpha 2-3sialyltransferases, SAT-3 (CMP-NeuAc:nLcOse4Cer alpha 2-3sialyltransferase) and SAT-4 (CMP-NeuAc:GgOse4Cer alpha 2-3sialyltransferase), from human colon carcinoma (Colo 205) cell line. *Biochemistry*, 35, 5166-74. ↗
- Kitagawa, H., Paulson, JC. (1993). Cloning and expression of human Gal beta 1,3(4)GlcNAc alpha 2,3-sialyltransferase. *Biochem Biophys Res Commun*, 194, 375-82. ↗
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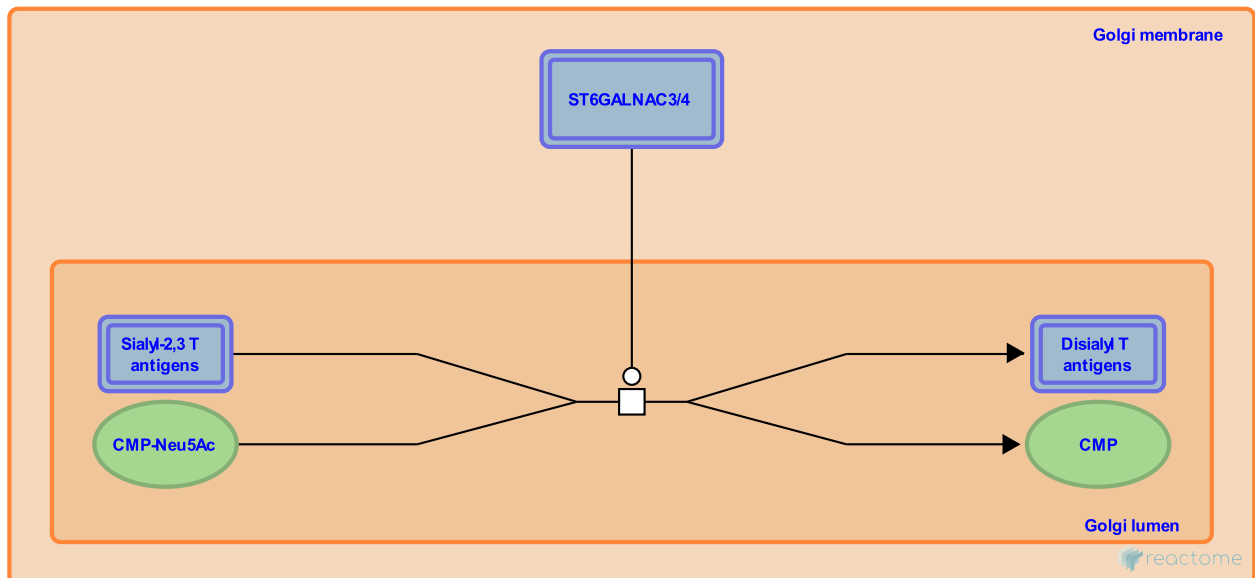
## ST6GALNAC3/4 transfers sialic acid to the sialyl T antigen to form the disialyl T antigen ↗

**Location:** [Termination of O-glycan biosynthesis](#)

**Stable identifier:** R-HSA-981809

**Type:** transition

**Compartments:** Golgi lumen, Golgi membrane



The human genes ST6GALNAC3 and 4 encode GalNAc alpha-2,6-sialyltransferase III and IV respectively which can add sialic acid (Neu5Ac) to sialyl T antigen to produce a disialyl T antigen. ST6GALNAC4 is characterised (Harduin-Lepers et al. 2000) while ST6GALNAC3 is thought to perform a similar function based on sequence similarity.

**Preceded by:** [ST3GAL1-4 transfers sialic acid to the T antigen at the alpha 3 position](#)

### Literature references

Vallejo-Ruiz, V., Augé, C., Zanetta, JP., Harduin-Lepers, A., Delannoy, P., Samyn-Petit, B. et al. (2000). Cloning, expression and gene organization of a human Neu5Ac alpha 2-3Gal beta 1-3GalNAc alpha 2,6-sialyltransferase: hST6GalNAcIV. *Biochem J*, 352, 37-48. ↗

### Editions

2010-10-15	Authored, Edited	Jassal, B.
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