



GALNT3 gene

polypeptide N-acetylgalactosaminyltransferase 3

Normal Function

The *GALNT3* gene provides instructions for making a protein called ppGalNacT3, which is found in many types of cells. This protein plays a major role in regulating phosphate levels within the body (phosphate homeostasis). Among its many functions, phosphate plays a critical role in the formation and growth of bones in childhood and helps maintain bone strength in adults. Phosphate levels are controlled in large part by the kidneys. The kidneys normally rid the body of excess phosphate by excreting it in urine, and they reabsorb this mineral into the bloodstream when more is needed.

The ppGalNacT3 protein regulates the activity of a protein called fibroblast growth factor 23, which is produced in bone cells and whose function is to signal the body to decrease phosphate reabsorption by the kidneys. The ppGalNacT3 protein attaches sugar molecules to particular regions of fibroblast growth factor 23 through a process called glycosylation. These sugar molecules are required for the protein's transport out of cells and to protect the protein from being broken down. When phosphate levels are increased, ppGalNacT3 glycosylates fibroblast growth factor 23 so it will not be broken down. Signaling from fibroblast growth factor 23 leads to a decrease in phosphate reabsorption, which helps to maintain normal phosphate levels in the body.

Health Conditions Related to Genetic Changes

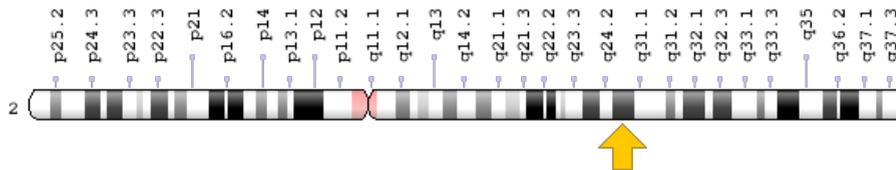
Hyperphosphatemic familial tumoral calcinosis

At least 25 mutations in the *GALNT3* gene have been found to cause hyperphosphatemic familial tumoral calcinosis (HFTC), a condition characterized by an increase in the levels of phosphate in the blood (hyperphosphatemia) and abnormal deposits of phosphate and calcium (calcinosis) in the body's tissues. *GALNT3* gene mutations result in the production of ppGalNacT3 protein with little or no function. As a result, ppGalNacT3 cannot glycosylate fibroblast growth factor 23. Fibroblast growth factor 23 becomes trapped within the cell and is broken down rather than being released from cells (secreted) as usual. Without fibroblast growth factor 23, more phosphate is reabsorbed back into the bloodstream by the kidneys, leading to hyperphosphatemia. Calcinosis results when the excess phosphate combines with calcium to form deposits that build up in soft tissues.

Chromosomal Location

Cytogenetic Location: 2q24.3, which is the long (q) arm of chromosome 2 at position 24.3

Molecular Location: base pairs 165,747,588 to 165,796,352 on chromosome 2 (Homo sapiens Updated Annotation Release 109.20200522, GRCh38.p13) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- GalNAc-T3
- GalNAc transferase 3
- GALT3_HUMAN
- polypeptide GalNAc transferase 3
- polypeptide GalNAc-transferase T3
- pp-GaNTase 3
- protein-UDP acetylgalactosaminyltransferase 3
- UDP-GalNAc:polypeptide N-acetylgalactosaminyltransferase 3
- UDP-N-acetyl-alpha-D-galactosamine:polypeptide N-acetylgalactosaminyltransferase 3 (GalNAc-T3)

Additional Information & Resources

Educational Resources

- Essentials of Glycobiology (second edition, 2009): Defects in O-GalNAc Glycans
<https://www.ncbi.nlm.nih.gov/books/NBK1939/#ch42.s11>

Clinical Information from GeneReviews

- Hyperphosphatemic Familial Tumoral Calcinosis
<https://www.ncbi.nlm.nih.gov/books/NBK476672>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28GALNT3%5BTIAB%5D%29+OR+%28ppGalNacT3%5BTIAB%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5BIa%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D>

Catalog of Genes and Diseases from OMIM

- UDP-N-ACETYL-ALPHA-D-GALACTOSAMINE:POLYPEPTIDE N-ACETYL GALACTOSAMINYLTRANSFERASE 3
<http://omim.org/entry/601756>

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
http://atlasgeneticsoncology.org/Genes/GC_GALNT3.html
- ClinVar
<https://www.ncbi.nlm.nih.gov/clinvar?term=GALNT3%5Bgene%5D>
- HGNC Gene Symbol Report
https://www.genenames.org/data/gene-symbol-report/#!/hgnc_id/HGNC:4125
- Monarch Initiative
<https://monarchinitiative.org/gene/NCBIGene:2591>
- NCBI Gene
<https://www.ncbi.nlm.nih.gov/gene/2591>
- UniProt
<https://www.uniprot.org/uniprot/Q14435>

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