

## **NGLY1 gene**

N-glycanase 1

### **Normal Function**

The *NGLY1* gene provides instructions for making an enzyme called *N*-glycanase 1. This enzyme is involved in a process called deglycosylation, by which chains of sugar molecules (glycans) are removed from proteins. Specifically, *N*-glycanase 1 removes glycans from misfolded proteins. This step is thought to be essential for certain abnormal proteins to be broken down (degraded).

### **Health Conditions Related to Genetic Changes**

#### NGLY1-congenital disorder of deglycosylation

At least 13 mutations in the *NGLY1* gene have been found to cause *NGLY1*-congenital disorder of deglycosylation (*NGLY1*-CDDG). This condition affects many body systems, causing delayed development, movement abnormalities, problems with liver function, eye abnormalities, and a reduction or absence of tears (hypolacrima or alacrima). These mutations impair production of the *N*-glycanase 1 enzyme, resulting in a severe reduction or absence of the enzyme's function. Without the removal of glycans, certain misfolded proteins cannot be broken down. It is thought that the abnormal proteins accumulate and form clumps (aggregates) in cells. These aggregates may damage cells in the brain, liver, and eyes, leading to the signs and symptoms of *NGLY1*-CDDG.

### **Other Names for This Gene**

- CDDG
- CDGIV
- FLJ11005
- hPNGase
- peptide-N(4)-(N-acetyl-beta-glucosaminyl)asparagine amidase isoform 1
- peptide:N-glycanase
- PNG1
- PNGase

## Additional Information & Resources

### Tests Listed in the Genetic Testing Registry

- Tests of NGLY1 ([https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=55768\[geneid\]](https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=55768[geneid]))

### Scientific Articles on PubMed

- PubMed (<https://pubmed.ncbi.nlm.nih.gov/?term=%28%28NGLY1%5BTIAB%5D%29+OR+%28N-glycanase+1%5BTIAB%5D%29%29+OR+%28%28CDDG%5BTIAB%5D%29+OR+%28PNG1%5BTIAB%5D%29+OR+%28PNGase%5BTIAB%5D%29+OR+%28hPNGase%5BTIAB%5D%29+OR+%28N-glycanase%5BTIAB%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D%29>)

### Catalog of Genes and Diseases from OMIM

- N-GLYCANASE 1; NGLY1 (<https://omim.org/entry/610661>)

### Gene and Variant Databases

- NCBI Gene (<https://www.ncbi.nlm.nih.gov/gene/55768>)
- ClinVar ([https://www.ncbi.nlm.nih.gov/clinvar?term=NGLY1\[gene\]](https://www.ncbi.nlm.nih.gov/clinvar?term=NGLY1[gene]))

## References

- Enns GM, Shashi V, Bainbridge M, Gambello MJ, Zahir FR, Bast T, Crimian R, Schoch K, Platt J, Cox R, Bernstein JA, Scavina M, Walter RS, Bibb A, Jones M, Hegde M, Graham BH, Need AC, Oviedo A, Schaaf CP, Boyle S, Butte AJ, Chen R, Chen R, Clark MJ, Haraksingh R; FORGE Canada Consortium; Cowan TM, He P, Langlois S, Zoghbi HY, Snyder M, Gibbs RA, Freeze HH, Goldstein DB. Mutations in NGLY1 cause an inherited disorder of the endoplasmic reticulum-associated degradation pathway. *Genet Med*. 2014 Oct;16(10):751-8. doi: 10.1038/gim.2014.22. Epub 2014 Mar 20. Erratum In: *Genet Med*. 2014 Jul;16(7):568. Chen, Rui [added]. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/24651605>) or Free article on PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4243708/>)
- He P, Grotzke JE, Ng BG, Gunel M, Jafar-Nejad H, Cresswell P, Enns GM, Freeze HH. A congenital disorder of deglycosylation: Biochemical characterization of N-glycanase 1 deficiency in patient fibroblasts. *Glycobiology*. 2015 Aug;25(8):836-44. doi: 10.1093/glycob/cwv024. Epub 2015 Apr 21. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/25900930>) or Free article on PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4487302/>)
- Huang C, Harada Y, Hosomi A, Masahara-Negishi Y, Seino J, Fujihira H, Funakoshi

Y, Suzuki T, Dohmae N, Suzuki T. Endo-beta-N-acetylglucosaminidase forms N-GlcNAc protein aggregates during ER-associated degradation in Ngly1-defective cells. *Proc Natl Acad Sci U S A*. 2015 Feb 3;112(5):1398-403. doi:10.1073/pnas.1414593112. Epub 2015 Jan 20. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/25605922>) or Free article on PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4321286/>)

- Suzuki T, Huang C, Fujihira H. The cytoplasmic peptide:N-glycanase (NGLY1) - Structure, expression and cellular functions. *Gene*. 2016 Feb 10;577(1):1-7. doi:10.1016/j.gene.2015.11.021. Epub 2015 Nov 30. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/26611529>) or Free article on PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4691572/>)

## Genomic Location

The *NGLY1* gene is found on chromosome 3 (<https://medlineplus.gov/genetics/chromosome/3/>).

**Last updated August 1, 2017**