



## GRIN2B gene

glutamate ionotropic receptor NMDA type subunit 2B

### Normal Function

The *GRIN2B* gene provides instructions for making a protein called GluN2B. This protein is found in nerve cells (neurons) in the brain, primarily during development before birth. The GluN2B protein is one component (subunit) of a subset of specialized protein structures called NMDA receptors. There are several types of NMDA receptors, made up of different combinations of proteins.

NMDA receptors are glutamate-gated ion channels. When brain chemicals called glutamate and glycine attach to the receptor, a channel opens, allowing positively charged particles (cations) to flow through. The flow of cations activates (excites) neurons to send signals to each other. The cation flow also plays a role in the process by which the neurons mature to carry out specific functions (differentiation). NMDA receptors are involved in normal brain development, changes in the brain in response to experience (synaptic plasticity), learning, and memory.

### Health Conditions Related to Genetic Changes

#### GRIN2B-related neurodevelopmental disorder

Several dozen mutations in the *GRIN2B* gene have been found to cause *GRIN2B*-related neurodevelopmental disorder, which is characterized by intellectual disability and delayed development of speech and motor skills. Other neurological problems that commonly occur in this disorder include seizures, weak muscle tone (hypotonia), movement disorders, and behavioral problems.

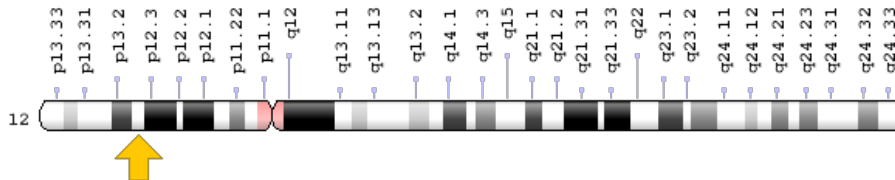
Many *GRIN2B* gene mutations lead to production of a nonfunctional GluN2B protein or prevent the production of any GluN2B protein from one copy of the gene in each cell. A shortage of this protein may reduce the number of functional NMDA receptors, which would reduce receptor activity in cells. Other mutations lead to the production of abnormal GluN2B proteins that likely alter how the NMDA receptors function; some mutations reduce NMDA receptor signaling while others increase it. Researchers are unsure how abnormal activity of NMDA receptors prevents normal growth and development of the brain or why too much or too little activity lead to similar neurological problems in people with *GRIN2B*-related neurodevelopmental disorder.

#### Autism spectrum disorder

## Chromosomal Location

Cytogenetic Location: 12p13.1, which is the short (p) arm of chromosome 12 at position 13.1

Molecular Location: base pairs 13,537,337 to 13,982,012 on chromosome 12 (Homo sapiens Updated Annotation Release 109.20200522, GRCh38.p13) (NCBI)



Credit: Genome Decoration Page/NCBI

## Other Names for This Gene

- GluN2B
- glutamate [NMDA] receptor subunit epsilon-2
- glutamate receptor ionotropic, NMDA 2B precursor
- glutamate receptor subunit epsilon-2
- glutamate receptor, ionotropic, N-methyl D-aspartate 2B
- hNR3
- N-methyl D-aspartate receptor subtype 2B
- NMDAR2B
- NR2B

## Additional Information & Resources

### Educational Resources

- Basic Neurochemistry: Molecular, Cellular and Medical Aspects (sixth edition, 1999): N-Methyl-d-aspartate Receptors Have Multiple Regulatory Sites [https://www.ncbi.nlm.nih.gov/books/NBK28270/#\\_A1117\\_](https://www.ncbi.nlm.nih.gov/books/NBK28270/#_A1117_)
- Biology of the NMDA Receptor (2009): NMDA Receptors and Brain Development <https://www.ncbi.nlm.nih.gov/books/NBK5287/>

### Scientific Articles on PubMed

- PubMed  
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28GRIN2B%5BTIAB%5D%29+OR+%28glutamate+ionotropic+receptor+NMDA+type+subunit+2B%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+1080+days%22%5Bdp%5D>

### Catalog of Genes and Diseases from OMIM

- GLUTAMATE RECEPTOR, IONOTROPIC, N-METHYL-D-ASPARTATE, SUBUNIT 2B  
<http://omim.org/entry/138252>

### Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology  
[http://atlasgeneticsoncology.org/Genes/GC\\_GRIN2B.html](http://atlasgeneticsoncology.org/Genes/GC_GRIN2B.html)
- ClinVar  
<https://www.ncbi.nlm.nih.gov/clinvar?term=GRIN2B%5Bgene%5D>
- HGNC Gene Symbol Report  
[https://www.genenames.org/data/gene-symbol-report/#!/hgnc\\_id/HGNC:4586](https://www.genenames.org/data/gene-symbol-report/#!/hgnc_id/HGNC:4586)
- Monarch Initiative  
<https://monarchinitiative.org/gene/NCBIGene:2904>
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<https://www.ncbi.nlm.nih.gov/gene/2904>
- UniProt  
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