



GRIN1-related syndrome





This guide is not meant to take the place of medical advice.

Please consult with your doctor about your genetic results and health care choices. The information in this guide was up to date at the time it was written in 2021. But new information may come to light with new research. You may find it helpful to share this guide with friends and family members or doctors and teachers of the person who has GRIN1-related syndrome.





What is GRIN1-related syndrome?

GRIN1-related syndrome happens when there are changes to the GRIN1 gene. These changes can keep the gene from working as it should.

Key role

The GRIN1 gene plays a key role in communication between brain cells, memory, and learning.

Symptoms

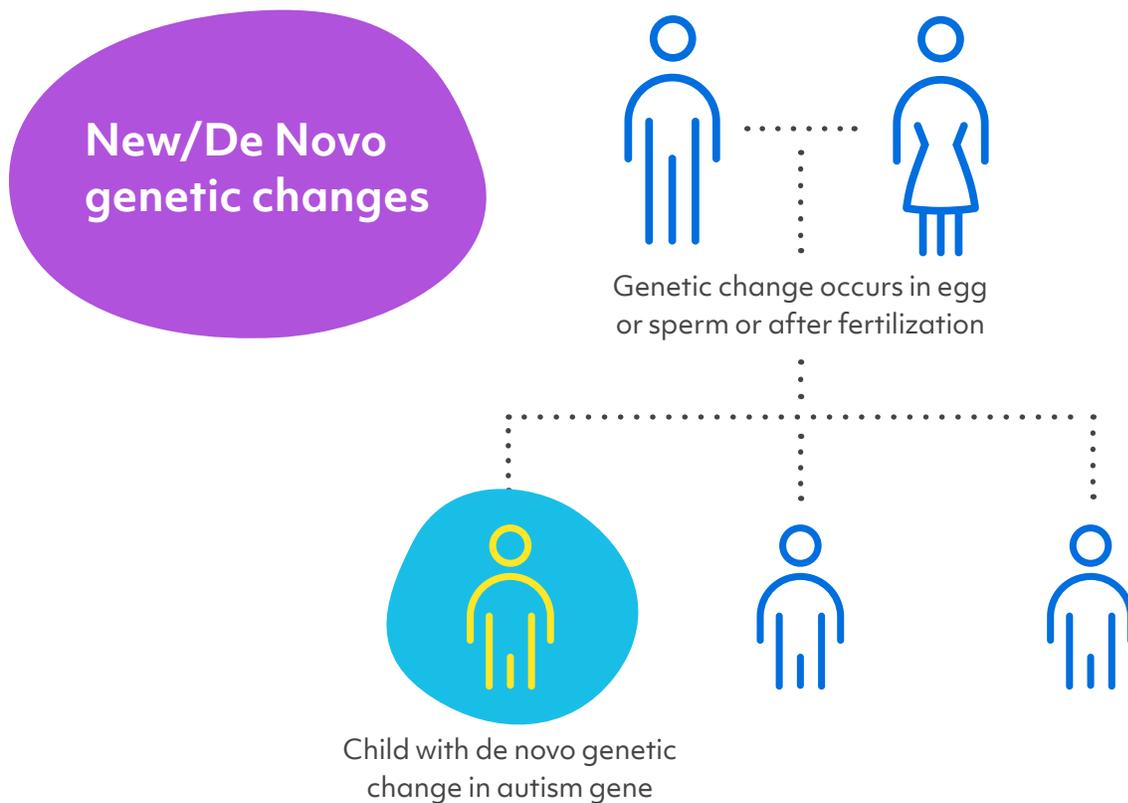
Because the GRIN1 gene is important in the development and function of brain cells, many people who have GRIN1-related syndrome have:

- Intellectual disability
- Developmental delay
- Seizures
- Low muscle tone
- Movement disorders

What causes GRIN1-related syndrome?

Our genes contain the instructions, or code, that tell our cells how to grow, develop, and work. Every child gets two copies of the GRIN1 gene: one copy from their mother, from the egg, and one copy from their father, from the sperm. In most cases, parents pass on exact copies of the gene to their child. But the process of copying genes is not perfect. A change in the genetic code can lead to physical issues, developmental issues, or both.

Sometimes a random change happens in the sperm or egg. This change to the genetic code is called a 'de novo', or new, change. The child can be the first in the family to have the gene change.

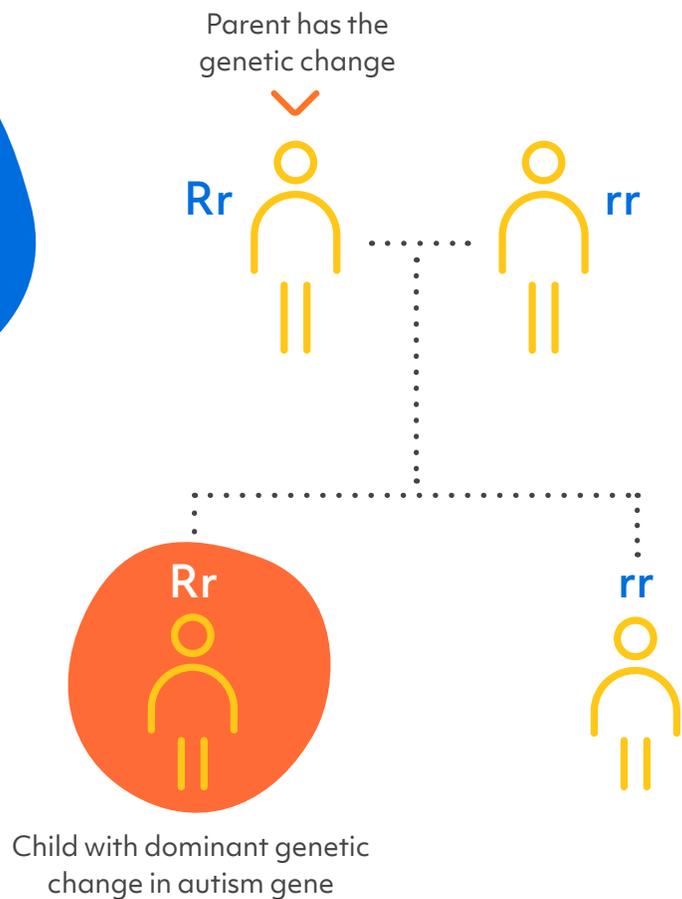


De novo changes can take place in any gene. We all have some de novo changes, most of which don't affect our health. But because GRIN1 plays a key role in development, de novo changes in this gene can have a meaningful effect.

Research shows that GRIN1-related syndrome is often the result of a de novo change in GRIN1. Many parents who have had their genes tested do not have the GRIN1 gene change found in their child. In other cases, GRIN1-related syndrome happens because the gene change was passed down from a parent. This is called dominant inheritance.



Dominant inheritance
Children have a 50% chance of inheriting the genetic change



Why does my child or I have a change in the GRIN1 gene?

No parent causes their child's GRIN1-related syndrome. We know this because no parent has any control over the gene changes that they do or do not pass on to their children. Please keep in mind that nothing a parent does before or during the pregnancy causes this to happen. The gene change takes place on its own and cannot be predicted or stopped.





What are the chances that other family members or future children will have GRIN1-related syndrome?

Each family is different. A geneticist or genetic counselor can give you advice on the chance that this will happen again in your family.

The risk of having another child who has GRIN1-related syndrome depends on the genes of both birth parents.

- If neither birth parent has the same gene change found in their child, the chance of having another child who has the syndrome is on average 1 percent. This 1 percent chance is higher than the chance of the general population. The increase in risk is due to the very unlikely chance that more of the mother's egg cells or the father's sperm cells carry the same change in the gene.
- If one birth parent has the same gene change found in their child, the chance of having another child who has the syndrome is 50 percent.

For a symptom-free sibling, a brother or sister, of someone who has GRIN1-related syndrome, the risk of having a child who has the syndrome depends on the symptom-free sibling's genes and their parents' genes.

- If neither parent has the same gene change found in their child who has the syndrome, the symptom-free sibling has a nearly 0 percent chance of having a child who has GRIN1-related syndrome.
- If one birth parent has the same gene change found in their child who has the syndrome, the symptom-free sibling has a small chance of also having the same gene change. If the symptom-free sibling has the same gene change as their sibling who has the syndrome, the symptom-free sibling's chance of having a child who has GRIN1-related syndrome is 50 percent.

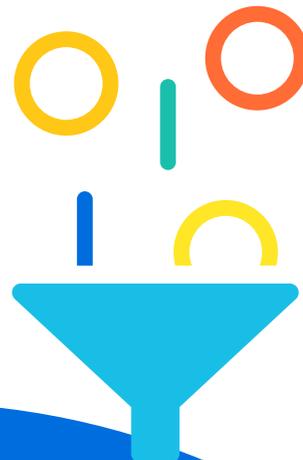
For a person who has GRIN1-related syndrome, the risk of having a child who has the syndrome is about 50 percent.

How many people have GRIN1-related syndrome?

As of 2021, about 72 people in the world with changes in the GRIN1 gene had been described in medical research. The first case of GRIN1-related syndrome was described in 2011. Scientists expect to find more people who have the syndrome as access to genetic testing improves.

Do people who have GRIN1-related syndrome look different?

People who have GRIN1-related syndrome do not look different.



How is GRIN1-related syndrome treated?

Scientists and doctors have only just begun to study GRIN1-related syndrome. At this point, there are no medicines designed to treat the syndrome. A genetic diagnosis can help people decide on the best way to track the condition and manage therapies. Doctors can refer people to specialists for:

- Physical exams and brain studies.
- Genetics consults.
- Development and behavior studies.
- Other issues, as needed.

A developmental pediatrician, neurologist, or psychologist can follow progress over time and can help:

- Suggest the right therapies. This can include physical, occupational, speech, or behavioral therapy.
- Guide individualized education plans (IEPs).

Specialists advise that therapies for GRIN1-related syndrome should begin as early as possible, ideally before a child begins school.

If seizures happen, consult a neurologist. There are many types of seizures, and not all types are easy to spot. To learn more, you can refer to resources such as the Epilepsy Foundation's website: www.epilepsy.com/learn/types-seizures.

GRIN1-related syndrome is very rare. Doctors and scientists have just recently begun to study it. This section includes a summary of information from major published articles. It highlights how many people have different symptoms. To learn more about the articles, see the [Sources and references](#) section of this guide.

Behavior and development concerns linked to GRIN1-related syndrome

Learning

Everyone studied so far has developmental delay and intellectual disability. Among these people, intellectual disability is mild in 5 percent, moderate in 7 percent, severe in 71 percent, and very severe in 17 percent.

- 5% have **mild intellectual disability**
- 7% have **moderate intellectual disability**
- 71% have **severe intellectual disability**
- 17% have **very severe intellectual disability**



Speech

Of those studied so far, about one-half do not speak.



Behavior

About one-third have repetitive movements such as rocking or hand-flapping. Some have features of autism. Some have problems sleeping. A small number engage in self injury.



Medical and physical concerns linked to GRIN1-related syndrome

Brain

Two-thirds of people with GRIN1-related syndrome have seizures. Medication can control seizures in about one-third of those affected.

Walking

Most are unable to walk. In one study that looked at 22 people, 1 person could walk.

Other motor concerns

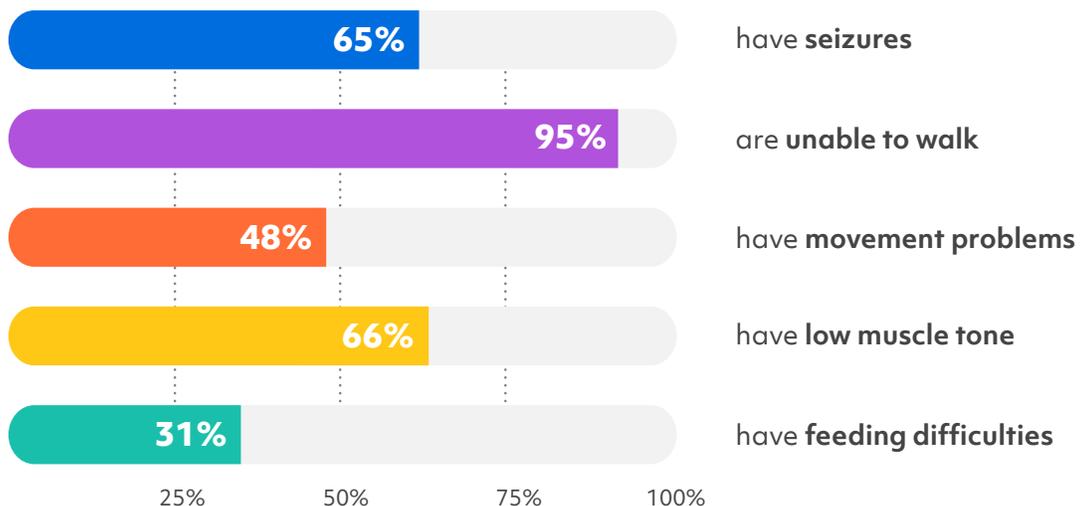
Nearly one-half have movement problems. These can include jerking or writhing movements; involuntary movements; and awkward postures.

Muscle tone

Two-thirds have low muscle tone.

Feeding and digestion issues

Nearly one-third have feeding difficulties.



Medical and physical concerns linked to GRIN1-related syndrome

Birth defects

Some have defects in a region of the brain called the **cortex**, which controls thinking and voluntary movement and processes sensory information, such as light and sound. One study found that **out of 57 people with these defects, 11 had changes in the GRIN1 gene.**

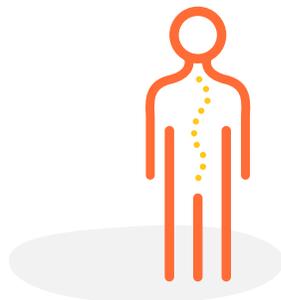


Eyes and eyesight

One-third have vision problems that are linked to the way the brain processes visual information. In some, the eyes frequently roll upwards.

Growth

About one-quarter have a **small head.**



Joints and spine

A few have an unusually curved spine, also called **scoliosis.**



Where can I find support and resources?

CureGRIN Foundation
www.curegrin.org

CureGRIN Foundation Facebook group
www.facebook.com/cureGRIN

GRIN1 Parent Support Group on Facebook
www.facebook.com/groups/GRIN1parentsupportgroup

Giggling GRIN1s Facebook group
www.facebook.com/groups/863279987050017

Simons Searchlight is another research program sponsored and run by the Simons Foundation Autism Research Initiative, also known as SFARI. As part of the next step in your research journey, Simons Searchlight offers you the opportunity to partner with scientists and other families who have the same gene change. Simons Searchlight is a registry for more than 150 genetic changes that are associated with neurodevelopmental conditions, including autism spectrum disorder. Simons Searchlight makes it easier for researchers to access the information they need to advance research on a condition.

To register for Simons Searchlight, go to the Simons Searchlight website at www.simonssearchlight.org and click “Join Us Today”.

- **Learn more about Simons Searchlight**
www.simonssearchlight.org/frequently-asked-questions
- **Simons Searchlight webpage with more information on GRIN1**
www.simonssearchlight.org/research/what-we-study/grin1
- **Simons Searchlight GRIN1 Facebook community**
www.facebook.com/groups/730741464028223

Sources and References

The content in this guide comes from published studies about GRIN1-related syndrome. Below you can find details about each study, as well as links to summaries or, in some cases, the full article.

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