NBEA-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 2019. 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 NBEA-related syndrome.
What is NBEA-related syndrome?

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

**Key role**
The NBEA gene plays a key role in the communication that happens between brain cells.

**Symptoms**
Because the NBEA gene is important in brain function, many people who have NBEA-related syndrome have:

- Developmental delay
- Autism
- Seizures
- Small head size
What causes NBEA-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 NBEA 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 NBEA plays a key role in brain function, de novo changes in this gene can have a meaningful effect.

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

No parent causes their child’s NBEA-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 NBEA-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 NBEA-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 NBEA-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 NBEA-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 NBEA-related syndrome is 50 percent.

For a person who has NBEA-related syndrome, the risk of having a child who has the syndrome is about 50 percent.
How many people have NBEA-related syndrome?

As of 2019, about 24 people in the world with changes in the NBEA gene had been described in the medical literature. The first case of NBEA-related syndrome was described in 2003. Scientists expect to find more people who have the syndrome as access to genetic testing improves.

Do people who have NBEA-related syndrome look different?

In general, people who have NBEA-related syndrome don’t look very different. Some people, less than 20 percent, have a smaller than average head size.
How is NBEA-related syndrome treated?

Scientists and doctors have only just begun to study NBEA-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 NBEA-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.
NBEA-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 describing 24 people who have the syndrome. To learn more about the articles, see the Sources and references section of this guide.

Behavior and development concerns linked to NBEA-related syndrome

**Speech**

Speech delay is very common in people who have the syndrome.

24 out of 24 have speech delay

**Learning**

Learning issues are very common.

24 out of 24 have some level of developmental delay or intellectual disability, or both.

**Behavior**

Nearly one-third of people who have the syndrome have behavior issues, including aggression and attention deficit hyperactivity disorder, also called ADHD. One-half have autism or symptoms of autism.

- 7 out of 24 have behavior issues
- 4 out of 24 have aggression
- 4 out of 24 have attention deficits and hyperactivity
- 12 out of 24 have autism or symptoms of autism
Medical and physical concerns linked to NBEA-related syndrome

**Brain**
Nearly two-thirds of people who have the syndrome have seizures. Seizures are most likely to begin between 1 years and 4 years of age. People in this group often have abnormal EEGs.

**Sitting and walking**
Children who have the syndrome start walking from 11 months to 3.5 years of age.

**Muscle tone**
One-third have low muscle tone. This can delay motor skills such as rolling over, sitting, crawling, and walking.

- 8 out of 24 have low muscle tone, also called hypotonia.
- 3 out of 24 have uncontrolled muscle contractions, also called dystonia.

**Other motor concerns**
One-quarter of people move in an unusual way such as walking with a wide, uncoordinated gait.

---

15 out of 24 have seizures

8 out of 24 have low muscle tone, also called hypotonia.

3 out of 24 have uncontrolled muscle contractions, also called dystonia.

6 out of 24 have unusual movements
Where can I find support and resources?

**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 200 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](http://www.simonssearchlight.org) and click “Join Us Today”.

- Learn more about Simons Searchlight [www.simonssearchlight.org/frequently-asked-questions](http://www.simonssearchlight.org/frequently-asked-questions)
- Simons Searchlight page on NBEA [www.simonssearchlight.org/research/what-we-study/nbea](http://www.simonssearchlight.org/research/what-we-study/nbea)
- Simons Searchlight NBEA Facebook community [www.facebook.com/groups/2409139515995679](http://www.facebook.com/groups/2409139515995679)
Sources and References

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

  www.ncbi.nlm.nih.gov/pubmed/11102458

  www.ncbi.nlm.nih.gov/pmc/articles/PMC1735479

  www.ncbi.nlm.nih.gov/pubmed/30269351