SCN8A-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 SCN8A-related syndrome.
What is SCN8A-related syndrome?

SCN8A-related syndrome happens when there are changes to the SCN8A gene. These changes can keep the gene from working as it should.

**Key role**

The SCN8A gene produces a protein that sits on the surface of brain cells and allows sodium to enter the cell. This protein is important for brain cells to make and transmit signals between cells. The protein is essential for these brain cells to work properly.

**Symptoms**

Because the SCN8A gene is important in the growth and function of brain cells, many people who have SCN8A-related syndrome have:

- Epilepsy
- Developmental delay, or intellectual disability, or both
- Autism spectrum disorder or features of autism
- Movement problems
- Concerns with sleep

People who have gene changes in SCN8A can have different conditions, depending on the type of gene change they have. Some people have seizures and intellectual disability. Others have intellectual disability and autism but no seizures. These different groups of symptoms are thought to be related to the type of gene change.

Scientists think that gene changes that increase the activity of SCN8A cause seizures with or without intellectual disability. In contrast, gene changes that lower the activity of SCN8A are thought to cause developmental delay, intellectual disability, or autism without seizures.

Additional research is needed on this topic. However, SCN8A-related syndrome shares some similarities with SCN2A-related syndrome, which is caused by changes in the SCN2A gene. Gene changes in SCN2A that increase the activity of SCN2A usually cause seizures that begin early in life. Gene changes that lower the activity of SCN2A tend to be linked to seizures that begin later in life or to neurodevelopmental conditions without seizures.
What causes SCN8A-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 SCN8A 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 SCN8A plays a key role in development, de novo changes in this gene can have a meaningful effect.

Research shows that SCN8A-related syndrome is often the result of a de novo change in SCN8A. Many parents who have had their genes tested do not have the SCN8A gene change found in their child who has the syndrome. In some cases, SCN8A-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 SCN8A gene?

No parent causes their child’s SCN8A-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 SCN8A-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 SCN8A-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 SCN8A-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 SCN8A-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 SCN8A-related syndrome is 50 percent.

For a person who has SCN8A-related syndrome, the risk of having a child who has the syndrome is about 50 percent.
How many people have SCN8A-related syndrome?

As of 2019, more than 100 people in the world with changes in the SCN8A gene had been described in the medical literature. The first case of SCN8A-related syndrome was described in 2006. Scientists expect to find more people who have the syndrome as access to genetic testing improves.

Do people who have SCN8A-related syndrome look different?

People who have SCN8A-related syndrome generally don't look very different. In one study, 3 out of 22 people had small heads.
How is SCN8A-related syndrome treated?

Epilepsy is common in SCN8A-related syndrome. People who have the condition should be under the care of a doctor, such as a pediatric epileptologist, who is familiar with the best medications for this disorder. Seizure control is important to prevent severe injuries.

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.

It is important to seek care and therapies to help the person’s brain and nervous system develop and operate as well as it can. Soon after diagnosis, this can include:

- Brain studies. An electroencephalogram, also called an EEG, can show changes in the brain’s electrical activity. This may help a person’s doctor learn how to best treat their epilepsy.

Right now, there is no specific advice about how to treat other symptoms. 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:

- 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 SCN8A-related syndrome should begin as early as possible, ideally before a child begins school.
SCN8A-related syndrome is very rare. As of 2019, studies described more than 100 people who have the syndrome. More research has been done on people who have SCN8A-related syndrome with seizures than on those who have autism without severe seizures.

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.

**Medical, behavior, and development concerns linked to SCN8A-related syndrome**

**Brain**

Many people who have SCN8A-related syndrome have seizures. The seizures fall into different categories, including:

- Generalized tonic-clonic seizures, which involve the entire body
- Infantile spasms
- Absence seizures, which involve brief staring spells
- Focal seizures, which begin in a specific part of the brain

For those who have epilepsy, seizures usually begin in childhood.

- In one study of 22 people who have gene changes in SCN8A and epilepsy, 21 of 22 people had seizures beginning in early childhood. One person had seizures beginning at age 3.

Some people who have SCN8A-related syndrome do not have seizures.
Medical, behavior, and development concerns linked to SCN8A-related syndrome

Motor concerns

14 out of 22 of those who had seizures that began in childhood also had motor conditions, such as dystonia, a movement disorder that causes uncontrolled muscle contractions, or dyskinesia, a disorder that causes uncontrolled muscle movements.

Behavior and development

Almost everyone who has SCN8A-related syndrome has intellectual disability. Some people have autism or features of autism.
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 and click “Join Us Today”.

- Learn more about Simons Searchlight
  www.simonssearchlight.org/frequently-asked-questions

- Simons Searchlight page on SCN8A
  www.simonssearchlight.org/research/what-we-study/scn8a

- Simons Searchlight SCN8A Facebook community
  www.facebook.com/groups/428325407775287
Sources and References

The content in this guide comes from published studies about SCN8A-related syndrome. Below you can find details about each study, as well as links to summaries or, in some cases, the full article.

