CHD3-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 CHD3-related syndrome.
What is CHD3-related syndrome?

CHD3-related syndrome happens when there are changes to the CHD3 gene. These changes can keep the gene from working as it should.

Key role
CHD3 plays a key role in the growth of the brain.

Symptoms
Many people who have CHD3-related syndrome have:

- Intellectual disability
- Developmental delays
- Impaired language and speech skills
- Large heads and facial features that are similar to others with the syndrome
What causes CHD3-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 CHD3 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 occurs 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 genetic 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 CHD3 plays a key role in development, de novo changes in this gene can have a meaningful effect.

Research shows that CHD3-related syndrome is often the result of a de novo change in CHD3. Many parents who have had their genes tested do not have the CHD3 gene change found in their child who has the syndrome. In some cases, CHD3-related syndrome happens because the gene change is passed down from a parent. This is called dominant inheritance.
Why does my child have a change in the CHD3 gene?

No parent causes their child's CHD3-related syndrome. We know this because no parent has any control over the genetic 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 genetic 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 CHD3-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 CHD3-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 CHD3-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 CHD3-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 CHD3-related syndrome is 50 percent.

For a person who has CHD3-related syndrome, the risk of having a child who has the syndrome is about 50 percent.
How many people have CHD3-related syndrome?

As of 2019, about 35 people in the world with changes in the CHD3 gene had been described in the medical literature. The first case of CHD3-related syndrome was described in 2018. Scientists expect to find more people who have the syndrome as access to genetic testing improves.

Do people who have CHD3-related syndrome look different?

People who have CHD3-related syndrome may look different. Appearance can vary and can include some but not all of these features:

- More than half of those who have the syndrome have a large head.
- They may also have widely-spaced eyes, a broad forehead, sparse eyebrows, low-set ears, and a pointed chin.
How is CHD3-related syndrome treated?

Scientists and doctors have only just begun to study CHD3-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 CHD3-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.
People who have CHD3-related syndrome are often slow to develop speech and language skills. One study of 33 people found that the children who had CHD3-related syndrome spoke their first word at an average age of 2 years and 10 months, with a range of 1.5 to 5.5 years. People who have CHD3-related syndrome may have a hard time expressing themselves but understand others fairly well. They may be difficult to understand. Other speech-related challenges can include: stuttering and difficulty moving the muscles involved in speech, also called speech apraxia.

Learning
People who have CHD3-related syndrome often have developmental delays, intellectual disability, or both. IQ ranges from 70–85 (just below or within the typical range), to below 35 (severe intellectual disability).

Speech
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Behavior
One study found that about 30 percent of those who have CHD3-related syndrome also have autism or autism-like symptoms. This can include repetitive behaviors, such as hand flapping.
Medical and physical concerns linked to CHD3-related syndrome

Muscle tone
About 75 percent of people who have the syndrome had low muscle tone.

Eyes and eyesight
Some people have issues with vision. This can include:

- long-sightedness, or difficulty seeing things at short range
- difficulty coordinating both eyes, also called crossed eyes or strabismus
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 webpage with more information on CHD3
  www.simonssearchlight.org/research/what-we-study/chd3

- Simons Searchlight CHD3 Facebook community
  www.facebook.com/groups/2252498664847936
Sources and References

The content in this guide comes from a published study about CHD3-related syndrome. Below you can find details about this study, as well as a link to a summary and the full article.
