FOXP1-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 FOXP1-related syndrome.
What is FOXP1-related syndrome?

FOXP1-related syndrome happens when there are changes to the FOXP1 gene. These changes can keep the gene from working as it should.

The FOXP1 gene is important in the development of the brain and body. It plays a key role in areas of the brain that control language.

The FOXP1 gene can also affect the development of other body parts, including the heart, ears, eyes, and genitals. FOXP1-related syndrome can have mild to moderate effects on the development of communication and social and learning skills. It can affect how a person acts or interacts with others.

Because the FOXP1 gene is important in the development and function of brain cells, many people who have FOXP1-related syndrome have:

- Delayed development and/or intellectual disability.
- Speech and language delay.
- Autism spectrum disorder or features of autism.
- Other behavioral issues.
Our genes contain the instructions, or code, that tell our cells how to grow, develop, and work. Every child gets two copies of the FOXP1 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 genetic change.

What causes FOXP1-related syndrome?
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 FOXP1 plays a key role in development, de novo changes in this gene can have a meaningful effect.

Research shows that FOXP1-related syndrome is often the result of a de novo change in FOXP1. Many parents who have had their genes tested do not have the FOXP1 gene change found in their child who has the syndrome. In some cases, FOXP1-related syndrome happens because the gene change was passed down from a parent.
Why does my child have a change in the FOXP1 gene?

No parent causes their child’s FOXP1-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 took place on its own and could not have been foreseen or stopped.

What are the chances that other family members or future children will have FOXP1-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 FOXP1-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 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 FOXP1-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 FOXP1-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 FOXP1-related syndrome is 50 percent.

For a person who has FOXP1-related syndrome, their risk of having a child who has the syndrome is 50 percent.
How many people have FOXP1-related syndrome?

As of 2018, doctors had found about 50 people in the world with changes in the FOXP1 gene. The first case of FOXP1-related syndrome was described in 2009. Scientists expect to find more people who have the syndrome as access to genetic testing improves.

Do people who have FOXP1-related syndrome look different?

In general, people who have FOXP1-related syndrome generally do not look very different from others. How people look varies among those who have FOXP1-related syndrome. It can include some but not all of these features:

- Face – large forehead, down-slanting eyes, and a short nose with a broad tip.
- Hands and feet – curved fingers, or curved toes, or both with stiff joints that may be tight.
How is FOXP1-related syndrome treated?

Scientists and doctors have only just begun to study FOXP1-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) for school.

Specialists advise that therapies for FOXP1-related syndrome should begin as early as possible, ideally before a child begins school.
FOXP1-related syndrome is very rare. Doctors and scientists have just recently begun to study it. As of 2018, studies found around 50 people who have FOXP1-related syndrome. This section includes a summary of information from major published studies. 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 FOXP1-related syndrome

Behavioral and mental health concerns

People who have FOXP1-related syndrome can have autism, or autistic features, or both. They can also have behavior issues that include attention deficit hyperactivity disorder (ADHD), attention deficit disorder (ADD), obsessive-compulsive disorder (OCD), anxiety, aggression, and self-harm behavior.

Nearly 80 percent or 11 out of 14 people in one study had behavior concerns- in addition to, or instead of autism-as described above.

Almost three quarters or 8 out of 11 people in one study had autism or autistic features.
**Speech**

People who have FOXP1-related syndrome generally have limited communication skills. They have more trouble with speaking and getting their message across to others than they do with understanding words and sentences. People who have the syndrome often start talking late. Their first words are usually spoken between the ages of 3 and 6 years. For some, vocabulary may be very limited. They may use other ways to communicate, such as sign language, gestures, and assistive communication devices. One study of 20 people found that all had moderate to severe speech delay.

**Learning**

Most people who have FOXP1-related syndrome have some degree of intellectual disability. For most, limits in mental functioning are in the mild to moderate range of intellectual disability. Children need a lot of support with their learning and may need to attend a special school where the right support is available. Adults who have the syndrome may need supervision. One study of 18 people found that all had intellectual disability.
Medical and physical concerns linked to FOXP1-related syndrome

Brain

Some people who have FOXP1-related syndrome have a different brain structure than people who do not have the syndrome. Scientists do not yet know how these brain differences impact those who have FOXP1-related syndrome.

- 25%: 4 of 16 or 25 percent of people in one study had seizures.
- 48%: In one study, MRI images for 11 of the 23 or 48 percent of the people showed structural brain differences including certain brain areas that were small in size.
Medical and physical concerns linked to FOXP1-related syndrome

Sitting and walking

People who have FOXP1-related syndrome are usually late in developing skills such as sitting and walking. Most start walking by themselves between the ages of 2 and 3 years. Some people have low muscle tone and are described as ‘floppy.’ Their joints may also appear to be extremely flexible. A study of 18 people found that all were delayed in skills like walking, running, and climbing.

Muscle tone

Some people who have FOXP1-related syndrome have low muscle tone. This can cause children to be late in developing skills such as rolling over, sitting, crawling, and walking. Low muscle tone may also cause the feeding problems seen in some children.

Feeding

Among infants, only a few of those who have FOXP1-related syndrome have a hard time feeding. Most children gain weight and grow well. Smaller studies of FOXP1-related syndrome found that 3 children had problems with chewing and sipping from a straw.

Two-thirds, 67 percent, or 8 out of 12 people in one study had low muscle tone.
Eyes and eyesight
Eye problems found in people who have FOXP1-related syndrome include crossed eyes and challenges with seeing objects that are far away. In a study of 48 people, nearly two-thirds had eyesight problems.

Ears and hearing
Hearing loss was reported in 5 out of 20 or one-quarter of the people.

Congenital anomalies
Congenital anomalies, also called birth defects, vary by person. Congenital abnormalities found in people who have FOXP1-related syndrome usually involved the heart or ears.

In one study, more than half or 15 out of 27 males who have FOXP1-related syndrome had undescended testes.

About half or 13 out of 25 people who have FOXP1-related syndrome in one study had differences in the structure of the heart, also called a congenital heart defect. The most common difference reported was an opening in the heart, atrial septal defect. Not all people who have this condition had serious symptoms.
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 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 FOXP1
  www.simonssearchlight.org/research/what-we-study/foxp1

- Simons Searchlight Facebook group
  www.facebook.com/groups/FOXP1/about
Sources and References

The content in this guide comes from published studies about FOXP1-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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