ANKRD11-related syndrome
- or -
KBG 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 ANKRD11-related syndrome.
What is ANKRD11-related syndrome?

ANKRD11-related syndrome happens when there are changes to the ANKRD11 gene or when a piece of DNA that includes the ANKRD11 gene is missing. These changes can keep the gene from working as it should. The syndrome is also known as KBG.

**Key role**
The ANKRD11 gene plays a key role in the growth of the brain and bones. It’s also important for the growth of new cells and for connections between brain cells.

**Symptoms**
Because the ANKRD11 gene is important in the development and function of brain cells, many people who have ANKRD11-related syndrome have:

- Intellectual disability and developmental delay
- Behavioral issues
- Large upper front teeth, also called macrodontia, and other unusual facial features
- Skeletal differences, such as a curved spine and shortened fingers, shortened toes, or both
What causes ANKRD11-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 ANKRD11 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 ANKRD11 plays a key role in development, de novo changes in this gene can have a meaningful effect.

Research shows that ANKRD11-related syndrome is often the result of a de novo change in ANKRD11. Many parents who have had their genes tested do not have the ANKRD11 gene change found in their child who has the syndrome. In some cases, ANKRD11-related syndrome happens because the gene change is passed down from a parent.
Why does my child or I have a change in the ANKRD11 gene?

No parent causes their child’s ANKRD11-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 ANKRD11-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 ANKRD11-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 ANKRD11-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 ANKRD11-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 ANKRD11-related syndrome is 50 percent.

For a person who has ANKRD11-related syndrome, the risk of having a child who has the syndrome is about 50 percent.
How many people have ANKRD11-related syndrome?

As of 2019, doctors had described about 100 people in the world with changes in the ANKRD11 gene. The first case of ANKRD11-related syndrome was described in 1975. Scientists expect to find more people who have the syndrome as access to genetic testing improves.

Do people who have ANKRD11-related syndrome look different?

People who have ANKRD11-related syndrome may look different. Appearance can vary and can include some but not all of these features:

- Triangular shaped face and short head, also called brachycephaly
- Prominent bridge of nose, bulbous nose, forward-facing nostrils
- Broad or bushy eyebrows, eyebrows that meet at the center of the forehead, widely spaced eyes
- Long area between nose and lips, thin upper lip
- Ears that stick out
How is ANKRD11-related syndrome treated?

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 ANKRD11-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: epilepsy.com/learn/types-seizures.
ANKRD11-related syndrome is very rare. As of 2019, studies found around 100 people who have ANKRD11-related syndrome.

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 ANKRD11-related syndrome

Speech
More than 90 percent of people who have ANKRD11-related syndrome have some degree of developmental delay, especially in speech. The average age for first words is 36 months.

Learning
Most people have mild intellectual disability. People who have the syndrome can range from having moderate disability to normal intelligence. Few people complete regular high school without support, but some adults have completed trade school. More than one-half of adults had jobs and were self-sufficient.

Behavior
At least one-half of people who have the syndrome have behavior issues. This can range from poor concentration and restless movement to obsessions and difficulty in changing routines. Anxiety, shyness, and difficulty understanding social situations are common. About 10 to 15 percent of people have attention deficit hyperactivity disorder, also called ADHD.
Feeding and digestion issues
About 20 percent of people have problems eating, especially during infancy. Other issues include vomiting, constipation, and acid reflux, also called gastroesophageal reflux disease or GERD.

Medical and physical concerns linked to ANKRD11-related syndrome

Teeth
Almost everyone who has the syndrome has large teeth, specifically the permanent front teeth, also called upper central incisors.

Joints and spine
About three-quarters of people have differences in their skeletons, such as curvature of the spine, also called scoliosis. Most people have shortened bones in their fingers and toes.

Growth
One-half to three-quarters of people are short. Birth weight, length, and head size are usually normal.

Brain
About one-half of people have an atypical EEG or electroencephalogram, which measures the brain’s electrical activity. This can occur with or without seizures. Seizures can start at any point from infancy to the teenage years. Some people may have changes in brain structure.

Ears and hearing
About one-quarter have hearing problems.
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 ANKRD11
  www.simonssearchlight.org/research/what-we-study/ankrd11

- Simons Searchlight Facebook group
  www.facebook.com/groups/searchlight.ankrd11

KBG Foundation
www.kbgfoundation.com
Sources and References

The content in this guide comes from published articles about ANKRD11-related syndrome. Below you can find details about the articles, as well as links to the full articles.

  www.ncbi.nlm.nih.gov/books/NBK487886/?report=reader#_NBK487886_pubde

- Genetics Home Reference. ANKRD11 gene