HEALTH BASICS

TCOF1

TCOF1 is a gene involved in early development of the face and skull.

WHAT IT IS
A gene providing instructions for making the treacle protein

WHERE IT COMES UP
Genetic test reports and Treacher Collins syndrome evaluations

WHY IT MATTERS
Harmful variants can cause Treacher Collins syndrome

WHAT IT IS NOT
A gene, not a disease or diagnosis

WHO TO ASK
A clinical geneticist or genetic counsellor

HOW IT IS CHECKED
DNA sequencing with deletion and duplication analysis

Overview

TCOF1 is a gene. Genes are sections of DNA that carry instructions for how the body develops and works. Most people have two copies of TCOF1 , one inherited from each biological parent.

TCOF1 provides instructions for making a protein called treacle. This protein is especially important during early development before birth, including formation of the face, jaw, ears, and skull.

Changes in DNA are called variants. Many variants have no effect on health. Some harmful, or pathogenic , variants in TCOF1 can cause Treacher Collins syndrome. This is a genetic condition that affects development of structures in the face and head.

The gene itself is not a disease and does not have symptoms. Finding the word TCOF1 in a report also does not, by itself, establish a diagnosis. The meaning depends on the exact variant, how the laboratory classified it, and the person's medical and family history.

How it works

The treacle protein is found mainly in a part of the cell called the nucleolus. The nucleolus helps

produce ribosomes, which cells use to build proteins.

Treacle takes part in making and processing ribosomal RNA, an important component of ribosomes. It also has roles in how cells respond to certain kinds of DNA damage.

These jobs are important in neural crest cells. Early in an embryo's development, neural crest cells move to different parts of the body and help form facial bones, cartilage, ears, and other tissues.

A disease-causing TCOF1 variant usually leaves the body without enough working treacle. This is called haploinsufficiency , meaning one working gene copy does not produce enough protein for typical development. The resulting effect on neural crest cells can lead to Treacher Collins syndrome.

The effects can differ greatly, even among relatives with the same variant. A genetic result cannot reliably predict every physical feature or how much medical support someone will need.

Why it matters for your health

A pathogenic or likely pathogenic TCOF1 variant can help confirm Treacher Collins syndrome when the clinical findings fit. Features of that condition may include underdevelopment of the cheekbones or lower jaw, differences in the eyelids or ears, hearing loss, or a cleft palate. Some people have feeding or airway problems. Intelligence is usually not affected by the condition itself.

These are features of Treacher Collins syndrome, not symptoms of the gene.

TCOF1 -related Treacher Collins syndrome follows an autosomal dominant inheritance pattern. This means one pathogenic copy of the gene is enough to cause the condition. A person with such a variant has a 1 in 2 chance of passing that variant on in each pregnancy. The chance is the same for each pregnancy, but the severity cannot be predicted from inheritance alone.

Some variants are inherited from a parent. Others are de novo , meaning they arose in the egg, sperm, or early embryo rather than being found in either parent's usual blood sample. Rarely, a parent may have the variant in only some egg or sperm cells or in a portion of the body. This is called mosaicism.

Not every person with Treacher Collins syndrome has an identifiable TCOF1 variant. Variants in other genes, including POLR1B , POLR1C , and POLR1D , can also be involved. Test coverage and current knowledge also affect whether a cause is found.

What can go wrong

The main health condition connected with pathogenic TCOF1 variants is Treacher Collins syndrome . Health concerns associated with that condition can include hearing loss, dental or bite problems, cleft palate, feeding difficulty, sleep-related breathing problems, or a narrowed airway. Which concerns are present differs from person to person.

A genetic result can also be misunderstood. Laboratories generally place variants into categories such as benign, likely benign, uncertain significance, likely pathogenic, or pathogenic.

A variant of uncertain significance , often shortened to VUS, means there is not enough evidence to know whether the change affects health. A VUS does not confirm Treacher Collins syndrome and should not be treated as though it were a pathogenic result. Its classification may change as new evidence becomes available.

Testing can also miss some relevant changes. Standard DNA sequencing may not detect every deletion, duplication, mosaic variant, or change outside the regions examined. A negative result therefore needs to be interpreted alongside the reason testing was ordered and the methods the laboratory used.

Medical concerns should be assessed according to the person's needs, not the gene result alone. For someone with Treacher Collins syndrome, hearing and airway issues may require particular attention because they can affect communication, sleep, feeding, or breathing.

What you can do

If TCOF1 appears on a genetic report, keep a complete copy. The exact DNA description and the laboratory's classification matter more than the gene name alone.

Useful questions for a genetics service include:

A clinical geneticist or genetic counsellor can explain inheritance and discuss whether family testing is informative. If a familial pathogenic variant is known, reproductive testing options exist. Learning about these options does not commit you to using them.

Routine follow-up for someone with Treacher Collins syndrome may involve a craniofacial team, hearing specialists, ear, nose and throat clinicians, dental professionals, speech services, or eye care. The appropriate visits depend on the person's actual findings. A TCOF1 result alone does not show which treatments are needed.

Seek prompt medical assessment for new feeding difficulty, choking, worsening hearing, or signs of disturbed breathing during sleep. These concerns are urgent when they interfere with

eating, drinking, sleep, or normal activity.

Call emergency services for severe trouble breathing, blue or grey lips, loss of consciousness, or choking that does not clear. These are emergency signs because of the breathing problem, not because someone carries a TCOF1 variant.

If you only encountered TCOF1 in general reading and have no relevant diagnosis, family history, or test result, there is usually nothing specific you need to record or test.

- Is the variant pathogenic, likely pathogenic, uncertain, or benign?
- Does the result explain the clinical findings?
- Did the test check for deletions and duplications as well as small variants?
- Would testing biological parents or other relatives clarify the result?
- Could the classification change, and how would updates be communicated?
- What does the result mean for future pregnancies or other family members?

Common questions

Does everyone have the TCOF1 gene?

Yes. TCOF1 is part of the usual human genome. The health question is whether a person has a particular variant that changes how the gene works.

Does a TCOF1 variant always cause Treacher Collins syndrome?

No. Most DNA differences are harmless. The exact variant must be interpreted using laboratory evidence, medical findings, family information, and established variant-classification methods.

Can a blood test diagnose it?

Genetic testing usually uses DNA from blood or saliva, although other samples may sometimes be used. A pathogenic or likely pathogenic variant can support a diagnosis. A VUS or negative result does not provide the same conclusion.

Can the result predict how severely someone will be affected?

Usually not. People with the same pathogenic variant, including members of one family, can have different features and support needs.

Should relatives be tested?

Sometimes. Testing may clarify whether a variant was inherited and which relatives could carry it. Testing is most informative when the family's exact pathogenic or likely pathogenic variant

is known. A genetics service can explain what a result could and could not answer.

Can TCOF1 change during life?

The inherited DNA sequence is generally stable. A pathogenic variant linked to Treacher Collins syndrome affects development before birth; it does not normally appear because of lifestyle or something a person did.

Sources

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