TMCO1 gene

transmembrane and coiled-coil domains 1

Normal Function

The *TMCO1* gene provides instructions for making a protein that forms specialized structures called channels through which positively charged calcium atoms (calcium ions) flow. The protein is found in the membrane of a cell structure called the endoplasmic reticulum, which acts as a storage center for calcium ions. When there is too much calcium in the endoplasmic reticulum, four TMCO1 proteins come together to form a channel that releases the excess calcium into the surrounding fluid inside the cell (cytoplasm).

The TMCO1 protein helps regulate the balance of calcium ions inside the endoplasmic reticulum. Calcium acts as a signal for many cellular functions including cell growth and division and gene activity. The proper balance of these ions in cells and in cell compartments is important for the development and function of various tissues and organs.

Health Conditions Related to Genetic Changes

Cerebro-facio-thoracic dysplasia

At least four *TMCO1* gene mutations have been found to cause cerebro-facio-thoracic dysplasia, which is characterized by severe intellectual disability, distinctive facial features, and bone abnormalities that primarily involve the ribs and spinal bones (vertebrae). The gene mutations that cause cerebro-facio-thoracic dysplasia lead to production of abnormally short TMCO1 proteins that are likely broken down quickly. Without this protein, TMCO1 channels cannot form, and excess calcium builds up in the endoplasmic reticulum. The imbalance of calcium in this compartment disrupts development of a variety of tissues and organs, including the brain and structures in the head, face, and torso, resulting in the features of cerebro-facio-thoracic dysplasia.

Other disorders

Genetic variations in the *TMCO1* gene or in regions of the DNA that control the gene's activity are associated with the development of an eye disorder called primary open-angle glaucoma, which is a common cause of vision loss worldwide. This condition results from damage to the nerves that connect the eyes and the brain (the optic nerves)

and typically develops in older adults. *TMCO1* gene variations appear to be a risk factor for primary open-angle glaucoma in certain populations, including people of European descent, but not in others. How these genetic variations contribute to the condition is unknown. Additional genetic and environmental factors are thought to play a role in development of this eye disorder.

Other Names for This Gene

- TMCC4

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of TMCO1 (https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=54499[geneid])

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28%28TMCO1%5BTIAB%5D%29+OR+%28transmembrane+and+coiled-coil+domains+1%5BTIAB%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+2160+days%22%5Bdp%5D)

Catalog of Genes and Diseases from OMIM

- TRANSMEMBRANE AND COILED-COIL DOMAINS PROTEIN 1; TMCO1 (https://omim.org/entry/614123)

Gene and Variant Databases

- NCBI Gene (https://www.ncbi.nlm.nih.gov/gene/54499)
- ClinVar (https://www.ncbi.nlm.nih.gov/clinvar?term=TMCO1[gene])

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Genomic Location

The *TMCO1* gene is found on chromosome 1 (https://medlineplus.gov/genetics/chromosome/1/).

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