USH2A gene

usherin

Normal Function

The *USH2A* gene provides instructions for making a protein called usherin. Usherin is an important component of basement membranes, which are thin, sheet-like structures that separate and support cells in many tissues. Usherin is found in basement membranes in the inner ear and in the retina, which is the layer of light-sensitive tissue at the back of the eye. Although the function of usherin has not been well established, studies suggest that it is part of a group of proteins (a protein complex) that plays an important role in the development and maintenance of cells in the inner ear and retina. The protein complex may also be involved in the function of synapses, which are junctions between nerve cells where cell-to-cell communication occurs.

Health Conditions Related to Genetic Changes

Retinitis pigmentosa

Several dozen mutations in the *USH2A* gene have been reported to cause retinitis pigmentosa, a vision disorder that causes the light-sensing cells of the retina to gradually deteriorate. *USH2A* gene mutations are the most common cause of the autosomal recessive form of retinitis pigmentosa, accounting for 10 to 15 percent of all cases. This form of the disorder is described as nonsyndromic, which means that it is not associated with other signs and symptoms as part of a genetic syndrome (such as Usher syndrome, described below).

The *USH2A* gene mutations that cause retinitis pigmentosa change single protein building blocks (amino acids) in the usherin protein. Through a mechanism that is not well understood, these genetic changes lead to the gradual breakdown of specialized light receptor cells called photoreceptors in the retina. A loss of these cells underlies the progressive vision loss characteristic of this condition.

Usher syndrome

More than 400 mutations in the *USH2A* gene have been identified in people with Usher syndrome type II, which is characterized by a combination of hearing loss and vision loss associated with retinitis pigmentosa. Specifically, *USH2A* gene mutations cause a form of the disorder known as Usher syndrome type IIA (USH2A), which accounts for

more than half of all cases of Usher syndrome type II.

Several of these mutations change single amino acids in the usherin protein. These mutations often lead to the production of an abnormally short version of the protein or prevent the cell from making any functional usherin. Other mutations insert or delete small amounts of DNA in the *USH2A* gene, which probably impairs the normal function of usherin. Researchers have not determined how a missing or altered usherin protein leads to the hearing impairment and vision loss that are characteristic of Usher syndrome type IIA.

It is unclear why some *USH2A* gene mutations result in Usher syndrome type IIA, while other mutations cause retinitis pigmentosa without hearing loss.

Other Names for This Gene

- US2
- USH2
- USH2A_HUMAN

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of USH2A (https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=7399[geneid])

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28%28USH2A%5BTIAB%5D%29+OR+%28Usher+syndrome+2A%5BTIAB%5D%29+OR+%28usherin%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D)

Catalog of Genes and Diseases from OMIM

- USHERIN; USH2A (https://omim.org/entry/608400)

Gene and Variant Databases

- NCBI Gene (https://www.ncbi.nlm.nih.gov/gene/7399)
- ClinVar (https://www.ncbi.nlm.nih.gov/clinvar?term=USH2A[gene])

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Genomic Location

The *USH2A* gene is found on chromosome 1 (https://medlineplus.gov/genetics/chromosome/1/).

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