MN1 gene

MN1 proto-oncogene, transcriptional regulator

Normal Function

The *MN1* gene provides instructions for making a protein whose function is unclear. The MN1 protein interacts with other proteins known as transcription factors. These proteins attach to specific areas of DNA and help control the activity of particular genes. Based on its interaction with transcription factors, the MN1 protein is thought to play a role in regulating the activity of other genes, particularly those that are needed for the development of the skull and brain.

Health Conditions Related to Genetic Changes

MN1 C-terminal truncation syndrome

At least 11 mutations in the *MN1* gene have been found to cause *MN1* C-terminal truncation (MCTT) syndrome. This condition is characterized by intellectual disability, developmental delay, distinctive facial features, and brain abnormalities.

All *MN1* gene mutations that cause MCTT syndrome occur near the end (terminal) portion of the gene. As a result, an abnormally short (truncated) protein is produced. These mutations are reflected in the condition name, *MN1* C-terminal truncation syndrome.

One mutation that has been found in multiple people with this condition replaces the protein building block (amino acid) arginine at position 1295 with a premature stop signal in the instructions for making the MN1 protein (written Arg1295Ter or R1295*). Like all mutations that cause MCTT syndrome, this mutation results in an abnormally short protein.

Research shows that shortened MN1 proteins are unable to interact with other proteins, and the abnormal proteins build up in the cell nucleus. It is likely that shortage of normal functioning MN1 prevents the regulation of many other genes, such as those involved in skull and brain development, resulting in the characteristic features of MCTT syndrome.

Other disorders

Certain mutations in the *MN1* gene have been associated with hearing loss and speech problems without other symptoms of MCTT syndrome (described above). The mutations

that cause these features occur in the front portion of the gene and result in the production of an abnormally short protein that gets quickly broken down. These mutations contrast with those that cause MCTT syndrome, which are at the end of the gene and result in buildup of the abnormal protein in the cell.

Some people with large deletions of DNA that include the *MN1* gene have been found to have developmental delay, intellectual disabilities, and craniofacial abnormalities. While these features are similar to those of MCTT syndrome, the conditions are distinct.

In addition, increased activity (overexpression) of the *MN1* gene typically indicates a poor outcome (prognosis) in people with cancers of blood-forming cells (leukemia). The genetic changes involved in this overexpression happens when a break occurs in the *MN1* gene which brings it together with part of another gene on another chromosome, creating a fusion gene. These changes are somatic, which means that they occur only in the tumor cells and are not inherited. People with MCTT syndrome do not appear to have an increased risk of leukemia.

Other Names for This Gene

- MGCR
- MGCR1
- MGCR1-PEN

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of MN1 (https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=4330[geneid])

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%22MN1+gene%22)

Catalog of Genes and Diseases from OMIM

- MN1 PROTOONCOGENE, TRANSCRIPTIONAL REGULATOR; MN1 (https://omim.org/entry/156100)

Gene and Variant Databases

- NCBI Gene (https://www.ncbi.nlm.nih.gov/gene/4330)
- ClinVar (https://www.ncbi.nlm.nih.gov/clinvar?term=MN1[gene])

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