YWHAE gene

tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein epsilon

Normal Function

The *YWHAE* gene provides instructions for making the 14-3-3 epsilon (ε) protein, which is part of the large 14-3-3 protein family. Proteins in this family attach (bind) to other proteins involved in cell signaling. 14-3-3 proteins either turn on (activate) or turn off (inactivate) these other proteins. The 14-3-3ε protein helps to regulate a variety of processes including cell division and sensitivity to insulin, a hormone that helps control levels of blood glucose, also called blood sugar.

The 14-3-3ε protein is active in tissues throughout the body, although its function is sometimes unclear. In the brain, this protein is involved in directing the movement of nerve cells (neuronal migration) by binding to other proteins involved in this process. It is thought that the 14-3-3ε protein is critical for proper neuronal migration and normal brain development.

Health Conditions Related to Genetic Changes

Miller-Dieker syndrome

The characteristic signs and symptoms of Miller-Dieker syndrome are caused by a deletion of genetic material near the end of the short (p) arm of chromosome 17. The chromosomal region that is typically deleted contains multiple genes, including the *YWHAE* gene. As a result of the deletion, people with this condition have only one copy of the *YWHAE* gene in each cell instead of the usual two copies.

A deletion of one copy of the *YWHAE* gene in each cell reduces the amount of 14-3-3ε protein by about half. A shortage of 14-3-3ε protein increases the severity of lissencephaly (a problem with brain development in which the surface of the brain is abnormally smooth) in people with Miller-Dieker syndrome.

Schizophrenia

MedlinePlus Genetics provides information about Schizophrenia

Other disorders

A deletion that only involves the *YWHAE* gene can also cause health problems. People with a *YWHAE* gene deletion are missing one copy of the gene in each cell, which reduces the amount of 14-3-3ε protein that is produced by about half. A deficiency (shortage) of this protein is thought to cause short stature; intellectual disability; and distinctive facial features including a prominent forehead, wide nasal bridge, and small jaw. People with a *YWHAE* gene deletion do not have lissencephaly but tend to have other brain abnormalities.

Other Names for This Gene

- 14-3-3 epsilon
- 14-3-3E
- 1433E_HUMAN
- KCIP-1
- mitochondrial import stimulation factor L subunit
- protein kinase C inhibitor protein-1
- tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein, epsilon
- tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein, epsilon polypeptide
- tyrosine 3/tryptophan 5 -monooxygenase activation protein, epsilon polypeptide

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of YWHAE (https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=7531[geneid])

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28YWHAE%5BTIAB%5D%29+OR+%28%2814-3-3E%5BTIAB%5D%29+OR+%2814-3-3+epsilon%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+720+days%22%5Bdp%5D)

Catalog of Genes and Diseases from OMIM

- TYROSINE 3-MONOOXYGENASE/TRYPTOPHAN 5-MONOOXYGENASE ACTIVATION PROTEIN, EPSILON ISOFORM; YWHAE (https://omim.org/entry/605066)

Gene and Variant Databases

- NCBI Gene (https://www.ncbi.nlm.nih.gov/gene/7531)
- ClinVar (https://www.ncbi.nlm.nih.gov/clinvar?term=YWHAE[gene])

References

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Genomic Location

The *YWHAE* gene is found on chromosome 17 (https://medlineplus.gov/genetics/chromosome/17/).

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