AUH gene

AU RNA binding methylglutaconyl-CoA hydratase

Normal Function

The *AUH* gene provides instructions for producing an enzyme called 3-methylglutaconyl-CoA hydratase. This enzyme is found in cell structures called mitochondria, which convert energy from food into a form that cells can use. Within mitochondria, this enzyme plays an important role in breaking down proteins into smaller molecules that cells can use to produce energy. Specifically, 3-methylglutaconyl-CoA hydratase is responsible for the fifth step in breaking down the protein building block (amino acid) leucine. The enzyme converts a molecule called 3-methylglutaconyl-CoA into another molecule called 3-hydroxy-3-methylglutaryl-CoA.

3-methylglutaconyl-CoA hydratase also has the ability to attach (bind) to RNA, a chemical cousin of DNA. Researchers are working to determine the purpose of this RNA-binding ability.

Health Conditions Related to Genetic Changes

3-methylglutaconyl-CoA hydratase deficiency

At least 11 mutations in the *AUH* gene have been found to cause 3-methylglutaconyl-CoA hydratase deficiency. This condition causes neurological problems such as movement disorders and problems with thinking ability (cognition). The mutations that cause this condition lead to an absence of 3-methylglutaconyl-CoA hydratase enzyme activity. Without any functional 3-methylglutaconyl-CoA hydratase, the breakdown of leucine is incomplete. As a result, 3-methylglutaconyl-CoA is diverted into an alternative pathway and broken down into multiple acids: 3-methylglutaconic acid, 3-methylglutaric acid, and 3-hydroxyisovaleric acid. These acids accumulate in the body's fluids, causing elevated levels of acid in the blood (metabolic acidosis) and release of large amounts of these acids in urine (aciduria). Researchers speculate that an accumulation of these acids in the fluid that surrounds and protects the brain and spinal cord (the cerebrospinal fluid or CSF) can damage these structures and contribute to the neurological features of 3-methylglutaconyl-CoA hydratase deficiency.

Other Names for This Gene

- 3-methylglutaconyl Coenzyme A hydratase

- 3-methylglutaconyl-CoA hydratase
- AU RNA binding protein/enoyl-CoA hydratase
- AU RNA binding protein/enoyl-Coenzyme A hydratase
- AU RNA-binding protein/enoyl-Coenzyme A hydratase
- AU-specific RNA-binding protein
- AUMH_HUMAN
- enoyl-Coenzyme A hydratase
- methylglutaconyl-CoA hydratase

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of AUH (https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=549[geneid])

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28%28AUH%5BTIAB%5D%29+OR+%283-methylglutaconic+aciduria+type+I%5BTIAB%5D%29%29+OR+%28%283-methylglutaconyl-CoA+hydratase%5BALL%5D%29+OR+%28Methylglutaconyl-CoA+hydratase%5BALL%5D%29%29+AND+%28Genes%5BMH%5D%29+AND+english%5Bla%5D+AND+human%5Bmh%5D)

Catalog of Genes and Diseases from OMIM

- AU-SPECIFIC RNA-BINDING PROTEIN; AUH (https://omim.org/entry/600529)

Gene and Variant Databases

- NCBI Gene (https://www.ncbi.nlm.nih.gov/gene/549)
- ClinVar (https://www.ncbi.nlm.nih.gov/clinvar?term=AUH[gene])

References

- IJlst L, Loupatty FJ, Ruiter JP, Duran M, Lehnert W, Wanders RJ.3-Methylglutaconic aciduria type I is caused by mutations in AUH. Am J Hum Genet. 2002 Dec;71(6):1463-6. doi: 10.1086/344712. Epub 2002 Nov 14. Erratum In: Am JHum Genet. 2003 Sep;73(3):709. Citation on PubMed (https://pubmed.ncbi.nlm.nih.gov/12434311) or Free article on PubMed Central (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC378594/)
- Kurimoto K, Fukai S, Nureki O, Muto Y, Yokoyama S. Crystal structure of

humanAUH protein, a single-stranded RNA binding homolog of enoyl-CoA hydratase.Structure. 2001 Dec;9(12):1253-63. doi: 10.1016/s0969-2126(01)00686-4. Citation on PubMed (https://pubmed.ncbi.nlm.nih.gov/11738050)

- Ly TB, Peters V, Gibson KM, Liesert M, Buckel W, Wilcken B, Carpenter K, Ensenauer R, Hoffmann GF, Mack M, Zschocke J. Mutations in the AUH gene cause3-methylglutaconic aciduria type I. Hum Mutat. 2003 Apr;21(4):401-7. doi:10.1002/humu.10202. Citation on PubMed (https://pubmed.ncbi.nlm.nih.gov/12655555)
- Wortmann SB, Kluijtmans LA, Engelke UF, Wevers RA, Morava E. The3-methylglutaconic acidurias: what's new? J Inherit Metab Dis. 2012Jan;35(1):13-22. doi: 10.1007/s10545-010-9210-7. Epub 2010 Sep 30. Citation on PubMed (https://pubmed.ncbi.nlm.nih.gov/20882351) or Free article on PubMed Central (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3249181/)
- Wortmann SB, Kremer BH, Graham A, Willemsen MA, Loupatty FJ, Hogg SL, EngelkeUF, Kluijtmans LA, Wanders RJ, Illsinger S, Wilcken B, Cruysberg JR, Das AM,Morava E, Wevers RA. 3-Methylglutaconic aciduria type I redefined: a syndromewith late-onset leukoencephalopathy. Neurology. 2010 Sep 21;75(12):1079-83. doi:10.1212/WNL.0b013e3181f39a8a. Citation on PubMed (https://pubmed.ncbi.nlm.nih.gov/20855850)

Genomic Location

The *AUH* gene is found on chromosome 9 (https://medlineplus.gov/genetics/chromosome/9/).

Last updated June 1, 2014