

LARS2 gene

leucyl-tRNA synthetase 2, mitochondrial

Normal Function

The *LARS2* gene provides instructions for making an enzyme called mitochondrial leucyl-tRNA synthetase. This enzyme is important in the production (synthesis) of proteins in cellular structures called mitochondria, the energy-producing centers in cells. While most protein synthesis occurs in the fluid surrounding the nucleus (cytoplasm), some proteins are synthesized in the mitochondria.

During protein synthesis, in either the mitochondria or the cytoplasm, a type of RNA called transfer RNA (tRNA) helps assemble protein building blocks (amino acids) into a chain that forms the protein. Each tRNA carries a specific amino acid to the growing chain. Enzymes called aminoacyl-tRNA synthetases, including mitochondrial leucyl-tRNA synthetase, attach a particular amino acid to a specific tRNA. Mitochondrial leucyl-tRNA synthetase attaches the amino acid leucine to the correct tRNA, which helps ensure that leucine is added at the proper place in the mitochondrial protein.

Health Conditions Related to Genetic Changes

Perrault syndrome

At least three mutations in the *LARS2* gene have been found in individuals with Perrault syndrome, a condition characterized by hearing loss in affected males and females and abnormalities of the ovaries in affected females. The *LARS2* gene mutations involved in Perrault syndrome reduce or eliminate the activity of mitochondrial leucyl-tRNA synthetase. A shortage of functional mitochondrial leucyl-tRNA synthetase prevents the normal assembly of new proteins within mitochondria. Researchers speculate that impaired protein assembly disrupts mitochondrial energy production. However, it is unclear exactly how *LARS2* gene mutations lead to hearing problems and ovarian abnormalities in affected individuals.

Other Names for This Gene

- KIAA0028
- leucine translase
- leucine tRNA ligase 2, mitochondrial

- leucyl-tRNA synthetase 2
- LEURS
- MGC26121
- mtLeuRS
- PRLTS4
- probable leucine--tRNA ligase, mitochondrial
- probable leucyl-tRNA synthetase, mitochondrial

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of LARS2 ([https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=23395\[geneid\]](https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=23395[geneid]))

Scientific Articles on PubMed

- PubMed (<https://pubmed.ncbi.nlm.nih.gov/?term=%28LARS2%5BTIAB%5D%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D>)

Catalog of Genes and Diseases from OMIM

- LEUCYL-tRNA SYNTHETASE 2; LARS2 (<https://omim.org/entry/604544>)

Gene and Variant Databases

- NCBI Gene (<https://www.ncbi.nlm.nih.gov/gene/23395>)
- ClinVar ([https://www.ncbi.nlm.nih.gov/clinvar?term=LARS2\[gene\]](https://www.ncbi.nlm.nih.gov/clinvar?term=LARS2[gene]))

References

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- Pierce SB, Gersak K, Michaelson-Cohen R, Walsh T, Lee MK, Malach D, Klevit RE, King MC, Levy-Lahad E. Mutations in LARS2, encoding mitochondrial leucyl-tRNA synthetase, lead to premature ovarian failure and hearing loss in Perrault syndrome. *Am J Hum Genet.* 2013 Apr 4;92(4):614-20. doi:10.1016/j.ajhg.2013.03.007. Epub 2013 Mar 28. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/23433712>)

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- Schwenzer H, Zoll J, Florentz C, Sissler M. Pathogenic implications of humanmitochondrial aminoacyl-tRNA synthetases. Top Curr Chem. 2014;344:247-92. doi:10.1007/128_2013_457. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/23824528>)

Genomic Location

The *LARS2* gene is found on chromosome 3 (<https://medlineplus.gov/genetics/chromosome/3/>).

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