TYMP gene
thymidine phosphorylase

Normal Function

The TYMP gene (previously known as ECGF1) provides instructions for making an enzyme called thymidine phosphorylase. Thymidine is a molecule known as a nucleoside, which (after a chemical modification) is used as a building block of DNA. Thymidine phosphorylase converts thymidine into two smaller molecules, 2-deoxyribose 1-phosphate and thymine. This chemical reaction is an important step in the breakdown of thymidine, which helps regulate the level of nucleosides in cells.

Thymidine phosphorylase plays an important role in maintaining the appropriate amount of thymidine in cell structures called mitochondria. Mitochondria convert the energy from food into a form that cells can use. Although most DNA is packaged in chromosomes within the nucleus, mitochondria also have a small amount of their own DNA (called mitochondrial DNA or mtDNA). Mitochondria use nucleosides, including thymidine, to build new molecules of mtDNA as needed.

Health Conditions Related to Genetic Changes

Mitochondrial neurogastrointestinal encephalopathy disease

About 50 mutations in the TYMP gene have been identified in people with mitochondrial neurogastrointestinal encephalopathy (MNGIE) disease. TYMP mutations greatly reduce or eliminate the activity of thymidine phosphorylase. A shortage of this enzyme allows thymidine to build up to very high levels in the body. An excess of thymidine appears to be damaging to mtDNA, disrupting its usual maintenance and repair. As a result, mutations can accumulate in mtDNA, causing it to become unstable. Mitochondria may also have less mtDNA than usual (mtDNA depletion). These genetic changes impair the normal function of mitochondria. Although mtDNA abnormalities underlie the digestive and neurological problems characteristic of MNGIE disease, it is unclear how defective mitochondria cause the specific features of the disorder.
Chromosomal Location

Cytogenetic Location: 22q13.33, which is the long (q) arm of chromosome 22 at position 13.33

Molecular Location: base pairs 50,525,752 to 50,530,085 on chromosome 22 (Homo sapiens Annotation Release 109, GRCh38.p12) (NCBI)

Credit: Genome Decoration Page/NCBI

Other Names for This Gene

• ECGF1
• endothelial cell growth factor 1 (platelet-derived)
• gliostatin
• hPD-ECGF
• MNGIE
• PD-ECGF
• PDECGF
• TdRPase
• TP
• TYPH_HUMAN

Additional Information & Resources

Educational Resources
Clinical Information from GeneReviews

- Mitochondrial DNA Maintenance Defects Overview
  https://www.ncbi.nlm.nih.gov/books/NBK487393
- Mitochondrial Neurogastrointestinal Encephalopathy Disease
  https://www.ncbi.nlm.nih.gov/books/NBK1179

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28TYMP+NOT+tympanometry +NOT+otitis%5BTIAB%5D%29+OR+%28thymidine+phosphorylase%5BTIAB %5D%29+OR+%28ECGF1%5BTIAB%5D%29+OR+%28MNGIE%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+1800+days%22+AND+5BP%5D

Catalog of Genes and Diseases from OMIM

- THYMIDINE PHOSPHORYLASE
  http://omim.org/entry/131222

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/TYMPID40397ch22q13.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=TYMP%5Bgene%5D
- HGNC Gene Symbol Report
- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:1890
- NCBI Gene
- UniProt
  https://www.uniprot.org/uniprot/P19971

Sources for This Summary

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/15571233
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/14720311
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/17549623

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16120316

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  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/11166160

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/9924029

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/10852545

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/17612528 
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