ALPL gene
alkaline phosphatase, biomineralization associated

Normal Function

The ALPL gene provides instructions for making an enzyme called tissue-nonspecific alkaline phosphatase (TNSALP). This enzyme plays an important role in the growth and development of bones and teeth. It is also active in many other tissues, particularly in the liver and kidneys. This enzyme acts as a phosphatase, which means that it removes clusters of oxygen and phosphorus atoms (phosphate groups) from other molecules.

TNSALP is essential for the process of mineralization, in which minerals such as calcium and phosphorus are deposited in developing bones and teeth. Mineralization is critical for the formation of bones that are strong and rigid and teeth that can withstand chewing and grinding.

Health Conditions Related to Genetic Changes

Hypophosphatasia

About 300 mutations in the ALPL gene have been identified in people with hypophosphatasia. Most of these mutations change a single protein building block (amino acid) in TNSALP. Other mutations insert or delete genetic material in the ALPL gene or change the way the gene's instructions are used to build the enzyme.

Mutations in the ALPL gene lead to the production of an abnormal version of TNSALP that cannot participate effectively in the mineralization of developing bones and teeth. A shortage of functional TNSALP allows substances that are normally processed by the enzyme to build up in the body. Researchers believe that a buildup of one of these compounds, inorganic pyrophosphate, underlies the defective mineralization of bones and teeth in people with hypophosphatasia.

ALPL mutations that almost completely eliminate the activity of TNSALP usually result in the more severe forms of hypophosphatasia. Other mutations, which reduce but do not eliminate the activity of the enzyme, are often responsible for milder forms of the condition.
**Chromosomal Location**

Cytogenetic Location: 1p36.12, which is the short (p) arm of chromosome 1 at position 36.12

Molecular Location: base pairs 21,508,982 to 21,578,412 on chromosome 1 (Homo sapiens Annotation Release 109, GRCh38.p12) (NCBI)

Credit: Genome Decoration Page/NCBI

**Other Names for This Gene**

- alkaline phosphatase, liver/bone/kidney
- alkaline phosphomonoesterase
- AP-TNAP
- glycero phosphatase
- HOPS
- MGC161443
- PPBT_HUMAN
- tissue non-specific alkaline phosphatase
- tissue-nonspecific ALP
- TNALP
- TNAP
- TNSALP

**Additional Information & Resources**

Clinical Information from GeneReviews

- Hypophosphatasia
  https://www.ncbi.nlm.nih.gov/books/NBK1150
Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28ALPL%5BTIAB%5D%29+OR+%28alkaline+phosphatase+AND+hypophosphatasia%5BTIAB%5D%29%29+OR+%28%28tissue+nonspecific+alkaline+phosphatase%5BTIAB%5D%29+OR+%28tissue+non-specific+alkaline+phosphatase%5BTIAB%5D%29+OR+%28TNAP%5BTIAB%5D%29+OR+%28TNSALP%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%5Bdp%5D

Catalog of Genes and Diseases from OMIM

- ALKALINE PHOSPHATASE, LIVER
  http://omim.org/entry/171760

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_ALPL.html

- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=ALPL%5Bgene%5D

- HGNC Gene Symbol Report

- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:249

- NCBI Gene

- Tissue nonspecific alkaline phosphatase (ALPL) gene mutation database
  http://www.sesep.uvsq.fr/03_hypo_mutations.php

- UniProt
  https://www.uniprot.org/uniprot/P05186

Sources for This Summary

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/15694177

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/11395499
  **Citation on PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/10737975

  **Citation on PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/26219705

  **Citation on PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/17253930

  **Citation on PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/12815606

  **Citation on PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/26893260

  **Citation on PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/7988481

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