# ATP6V0A4 gene

ATPase H+ transporting V0 subunit a4

## Normal Function

The *ATP6V0A4* gene provides instructions for making a part (subunit) of a large protein complex known as vacuolar $H^+$-ATPase (V-ATPase). V-ATPases are a group of similar complexes that act as pumps to move positively charged hydrogen atoms (protons) across membranes. Because acids are substances that can "donate" protons to other molecules, this movement of protons helps regulate the relative acidity (pH) of cells and their surrounding environment. Tight control of pH is necessary for most biological reactions to proceed properly.

The V-ATPase that includes the subunit produced from the *ATP6V0A4* gene is found in the inner ear and in nephrons, which are the functional structures within the kidneys. The kidneys filter waste products from the blood and remove them in urine. They also reabsorb needed nutrients and release them back into the blood. Each nephron consists of two parts: a renal corpuscle (also known as a glomerulus) that filters the blood, and a renal tubule that reabsorbs substances that are needed and eliminates unneeded substances in urine. The V-ATPase is involved in regulating the amount of acid that is removed from the blood into the urine, and also in maintaining the proper pH of the fluid in the inner ear (endolymph).

## Health Conditions Related to Genetic Changes

### Renal tubular acidosis with deafness

Several *ATP6V0A4* gene mutations have been identified in people with renal tubular acidosis with deafness, a disorder involving excess acid in the blood (metabolic acidosis), bone weakness, and hearing loss caused by changes in the inner ear (sensorineural hearing loss).

Mutations in the *ATP6V0A4* gene impair the function of the V-ATPase proton pump. As a result, the kidneys are less able to control the acidity of the blood, which leads to bone weakness caused by loss of bone minerals (demineralization) and other consequences of metabolic acidosis. The body's capability to control the pH of the fluid in the inner ear is also impaired, resulting in sensorineural hearing loss.

### Other disorders

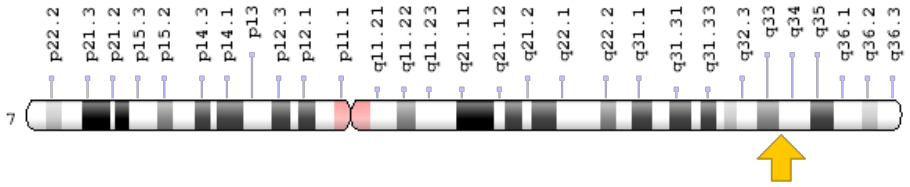
*ATP6V0A4* gene mutations have also been identified in people with renal tubular acidosis who have normal hearing when diagnosed, usually in infancy or early childhood. However, hearing loss sometimes does not develop until adulthood in

renal tubular acidosis with deafness (described above), so some of these individuals are later found to have that disorder.

## Chromosomal Location

Cytogenetic Location: 7q34, which is the long (q) arm of chromosome 7 at position 34

Molecular Location: base pairs 138,706,294 to 138,799,839 on chromosome 7 (Homo sapiens Updated Annotation Release 109.20190905, GRCh38.p13) (NCBI)




Credit: Genome Decoration Page/NCBI

## Other Names for This Gene

- A4
- ATP6N1B
- ATP6N2
- ATPase, H+ transporting, lysosomal (vacuolar proton pump) non-catalytic accessory protein 1B
- ATPase, H+ transporting, lysosomal V0 subunit a4
- H(+)-transporting two-sector ATPase, noncatalytic accessory protein 1B
- RdRTA2
- RTA1C
- RTADR
- STV1
- V-ATPase 116 kDa
- V-type proton ATPase 116 kDa subunit a
- V-type proton ATPase 116 kDa subunit a isoform 4
- vacuolar proton pump 116 kDa accessory subunit
- vacuolar proton pump, subunit 2
- vacuolar proton translocating ATPase 116 kDa subunit a kidney isoform

- VPH1
- VPP2

## Additional Information & Resources

Educational Resources

- Molecular Cell Biology (fourth edition, 2000): Active Transport by ATP-Powered Pumps
  https://www.ncbi.nlm.nih.gov/books/NBK21481/

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28ATP6V0A4%5BTIAB%5D%29+OR+%28%28STV1%5BTIAB%5D%29+OR+%28VPH1%5BTIAB%5D%29+OR+%28VPP2%5BTIAB%5D%29+OR+%28RDRTA2%5BTIAB%5D%29+OR+%28ATP6N1B%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

Catalog of Genes and Diseases from OMIM

- ATPase, H+ TRANSPORTING, LYSOSOMAL, V0 SUBUNIT A, ISOFORM 4
  http://omim.org/entry/605239

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_ATP6V0A4.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=ATP6V0A4%5Bgene%5D
- HGNC Gene Symbol Report
  https://www.genenames.org/data/gene-symbol-report/#!/hgnc_id/HGNC:866
- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:50617
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/50617
- UniProt
  https://www.uniprot.org/uniprot/Q9HBG4

## Sources for This Summary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