



CLCN7 gene

chloride voltage-gated channel 7

Normal Function

The *CLCN7* gene belongs to the CLC family of genes, which provide instructions for making chloride channels. These channels, which transport negatively charged chlorine atoms (chloride ions), play a key role in a cell's ability to generate and transmit electrical signals. Some CLC channels regulate the flow of chloride ions across cell membranes, while others transport chloride ions within cells.

The *CLCN7* gene provides instructions for making a chloride channel called ClC-7. These channels are abundant in cells throughout the body. They are particularly important for the normal function of osteoclasts, which are specialized cells that break down bone tissue. Osteoclasts are involved in bone remodeling, a normal process in which old bone is removed and new bone is created to replace it. Bones are constantly being remodeled, and the process is carefully controlled to ensure that bones stay strong and healthy.

ClC-7 channels help regulate the relative acidity (pH) of osteoclasts. These channels transport two negatively charged chloride ions out of these cells for every positively charged hydrogen atom (hydrogen ion) that flows in. In this way, ClC-7 channels help balance the acidic environment that osteoclasts use to dissolve bone tissue. The pH inside and outside osteoclasts must be carefully controlled for these cells to break down bone effectively.

Health Conditions Related to Genetic Changes

Osteopetrosis

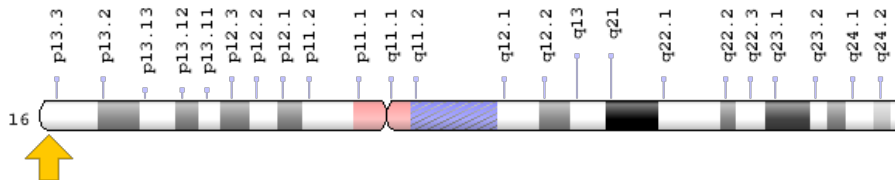
More than 50 mutations in the *CLCN7* gene have been identified in people with osteopetrosis. Mutations in this gene can cause several different forms of the disorder: autosomal recessive osteopetrosis (ARO), which is the most severe form; autosomal dominant osteopetrosis (ADO), which tends to be milder; and a moderate form known as intermediate autosomal osteopetrosis (IAO).

Mutations in the *CLCN7* gene impair the function of ClC-7 channels. The defective channels cannot transport chloride ions effectively, which disrupts the regulation of pH in osteoclasts. As a result, osteoclasts are unable to break down bone normally. When old bone is not broken down as new bone is formed, bones throughout the skeleton become unusually dense. The bones are also structurally abnormal, making them prone to fracture. These problems with bone remodeling underlie all of the major forms of osteopetrosis.

Chromosomal Location

Cytogenetic Location: 16p13.3, which is the short (p) arm of chromosome 16 at position 13.3

Molecular Location: base pairs 1,444,933 to 1,475,084 on chromosome 16 (Homo sapiens Updated Annotation Release 109.20200522, GRCh38.p13) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- chloride channel 7
- chloride channel protein 7
- chloride channel, voltage-sensitive 7
- CLC-7
- CLC7
- CLCN7_HUMAN
- FLJ26686
- FLJ39644
- FLJ46423
- H(+)/Cl(-) exchange transporter 7
- OPTA2
- OPTB4
- PPP1R63

Additional Information & Resources

Educational Resources

- Molecular Biology of the Cell (fourth edition, 2002): An Osteoclast Shown in Cross-Section (image)
<https://www.ncbi.nlm.nih.gov/books/NBK26889/?rendertype=figure&id=A4192>
- Molecular Biology of the Cell (fourth edition, 2002): Osteoblasts Secrete Bone Matrix, While Osteoclasts Erode It
<https://www.ncbi.nlm.nih.gov/books/NBK26889/#A4189>

Clinical Information from GeneReviews

- CLCN7-Related Osteopetrosis
<https://www.ncbi.nlm.nih.gov/books/NBK1127>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28CLCN7%5BTIAB%5D%29+OR+%28chloride+channel+7%5BTIAB%5D%29%29+OR+%28%28CLC-7%5BTIAB%5D%29+OR+%28CLC7%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+3600+days%22%5Bdp%5D>

Catalog of Genes and Diseases from OMIM

- CHLORIDE CHANNEL 7
<http://omim.org/entry/602727>

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
http://atlasgeneticsoncology.org/Genes/GC_CLCN7.html
- ClinVar
<https://www.ncbi.nlm.nih.gov/clinvar?term=CLCN7%5Bgene%5D>
- HGNC Gene Symbol Report
https://www.genenames.org/data/gene-symbol-report/#!/hgnc_id/HGNC:2025
- Monarch Initiative
<https://monarchinitiative.org/gene/NCBIGene:1186>
- NCBI Gene
<https://www.ncbi.nlm.nih.gov/gene/1186>
- UniProt
<https://www.uniprot.org/uniprot/P51798>

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