

CLCN7 gene

Cl-/H⁺ antiporter 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.

Other Names for This Gene

- chloride channel 7
- chloride channel protein 7
- chloride channel, voltage-sensitive 7
- CLC-7
- CLC7
- OPTA2
- PPP1R63

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of CLCN7 ([https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=1186\[geneid\]](https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=1186[geneid]))

Scientific Articles on PubMed

- PubMed (<https://pubmed.ncbi.nlm.nih.gov/?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; CLCN7 (<https://omim.org/entry/602727>)

Gene and Variant Databases

- NCBI Gene (<https://www.ncbi.nlm.nih.gov/gene/1186>)
- ClinVar ([https://www.ncbi.nlm.nih.gov/clinvar?term=CLCN7\[gene\]](https://www.ncbi.nlm.nih.gov/clinvar?term=CLCN7[gene]))

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Genomic Location

The *CLCN7* gene is found on chromosome 16 (<https://medlineplus.gov/genetics/chromosome/16/>).

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