SLC12A1 gene

solute carrier family 12 member 1

Normal Function

The *SLC12A1* gene provides instructions for making a protein known as NKCC2. This protein is a $Na^+/K^+/2Cl^-$ cotransporter, which means that it moves charged atoms (ions) of sodium (Na^+), potassium (K^+), and chlorine (Cl^-) into cells.

The NKCC2 protein is essential for normal kidney function. The NKCC2 protein works with other transport proteins to regulate the movement of ions into and out of kidney cells. Together, these proteins provide the mechanism by which kidneys reabsorb salt (sodium chloride or NaCl) from the urine back into the bloodstream. The retention of salt affects the body's fluid levels and helps maintain blood pressure.

Health Conditions Related to Genetic Changes

Bartter syndrome

More than 40 mutations in the *SLC12A1* gene have been identified in people with Bartter syndrome type I. This form of the disorder is very severe, causing life-threatening health problems that become apparent before or soon after birth.

Most of the *SLC12A1* gene mutations responsible for Bartter syndrome change single protein building blocks (amino acids) in the NKCC2 protein. Other mutations delete amino acids from the protein or lead to the production of an abnormally short version of the NKCC2 protein. Each of the known mutations prevents the NKCC2 protein from transporting ions into kidney cells. As a result, the kidneys cannot reabsorb salt normally and excess salt is lost through the urine (salt wasting). The abnormal salt loss disrupts the normal balance of sodium, potassium, and other ions in the body. These imbalances underlie the major features of Bartter syndrome.

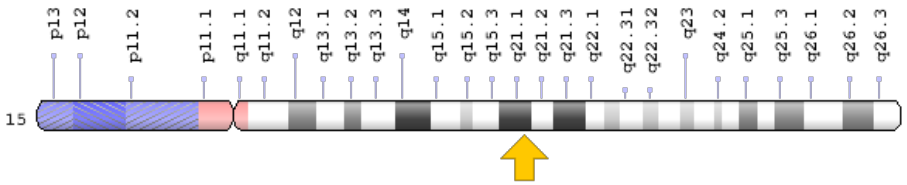
Other disorders

Studies suggest that normal variants (polymorphisms) in the *SLC12A1* gene may help explain variations in blood pressure seen in different people. Certain rare polymorphisms appear to protect against high blood pressure (hypertension), and researchers speculate that other genetic variants might increase the risk of developing high blood pressure. Changes in the *SLC12A1* gene may affect blood pressure by altering the kidneys' ability to reabsorb salt into the bloodstream.

Chromosomal Location

Cytogenetic Location: 15q21.1, which is the long (q) arm of chromosome 15 at position 21.1

Molecular Location: base pairs 48,206,301 to 48,304,078 on chromosome 15 (Homo sapiens Updated Annotation Release 109.20190607, GRCh38.p13) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- BSC1
- bumetanide-sensitive sodium-(potassium)-chloride cotransporter 2
- kidney-specific Na-K-Cl symporter
- Na-K-2Cl cotransporter
- NKCC2
- S12A1_HUMAN
- solute carrier family 12 (sodium/potassium/chloride transporter), member 1
- solute carrier family 12 (sodium/potassium/chloride transporters), member 1

Additional Information & Resources

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28SLC12A1%5BTIAB%5D%29+OR+%28NKCC2%5BTIAB%5D%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

- SOLUTE CARRIER FAMILY 12 (SODIUM/POTASSIUM/CHLORIDE TRANSPORTER), MEMBER 1
  http://omim.org/entry/600839

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_SLC12A1.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=SLC12A1%5Bgene%5D
- HGNC Gene Symbol Report
  https://www.genenames.org/data/gene-symbol-report/#!/hgnc_id/HGNC:10910
- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:6557
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/6557
- UniProt
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