SLC22A5 gene
solute carrier family 22 member 5

Normal Function

The SLC22A5 gene provides instructions for making a protein called OCTN2 that is found in the heart, liver, muscles, kidneys, and other tissues. This protein is positioned within the cell membrane, where it transports a substance known as carnitine into the cell. Carnitine is mainly obtained from the diet and is needed to bring certain types of fats (fatty acids) into mitochondria, the energy-producing centers within cells. Fatty acids are a major source of energy for the heart and muscles. During periods without food (fasting), fatty acids are also an important energy source for the liver and other tissues.

Health Conditions Related to Genetic Changes

Primary carnitine deficiency

More than 60 mutations in the SLC22A5 gene have been found to cause primary carnitine deficiency. Some of these mutations create a premature stop signal in the instructions for making the OCTN2 protein, resulting in an abnormally short, nonfunctional protein. Other mutations change single protein building blocks (amino acids) in the OCTN2 protein.

Mutations in the SLC22A5 gene result in an absent or dysfunctional OCTN2 protein. As a result, there is a shortage (deficiency) of carnitine within cells. Without carnitine, fatty acids cannot enter mitochondria and be used to make energy. Reduced energy production can lead to some features of primary carnitine deficiency, such as muscle weakness and hypoglycemia. Fatty acids may also build up in cells and damage the heart, liver, and muscles. This abnormal buildup causes the other signs and symptoms of the disorder.

Crohn disease
Chromosomal Location

Cytogenetic Location: 5q31.1, which is the long (q) arm of chromosome 5 at position 31.1

Molecular Location: base pairs 132,369,704 to 132,395,614 on chromosome 5 (Homo sapiens Updated Annotation Release 109.20190607, GRCh38.p13) (NCBI)

Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- CDSP
- high-affinity sodium dependent carnitine cotransporter
- novel organic cation transporter 2
- OCTN2
- organic cation transporter 5
- organic cation/carnitine transporter 2
- S22A5_HUMAN
- SCD
- solute carrier family 22 (organic cation transporter), member 5
- solute carrier family 22 (organic cation/carnitine transporter), member 5

Additional Information & Resources

Educational Resources

- Biochemistry (fifth edition, 2002): Carnitine Carries Long-Chain Activated Fatty Acids into the Mitochondrial Matrix
  https://www.ncbi.nlm.nih.gov/books/NBK22581/#A3054

Clinical Information from GeneReviews

- Systemic Primary Carnitine Deficiency
  https://www.ncbi.nlm.nih.gov/books/NBK84551
Scientific Articles on PubMed
- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28SLC22A5%5BTIAB%5D%29+OR+%28solute+carrier+family+22+member+5%29+OR+%28OCTN2%5BTIAB%5D%29+AND+carnitine+deficiency%29+AND+english%5Bla%5D+AND+human%5Bmh%5D

Catalog of Genes and Diseases from OMIM
- SOLUTE CARRIER FAMILY 22 (ORGANIC CATION TRANSPORTER), MEMBER 5
  http://omim.org/entry/603377

Research Resources
- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_SLC22A5.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=SLC22A5%5Bgene%5D
- HGNC Gene Symbol Report
- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:6584
- NCBI Gene
- UniProt
  https://www.uniprot.org/uniprot/O76082
- University of Utah SLC22A5 Mutation Database
  http://www.arup.utah.edu/database/OCTN2/OCTN2_welcome.php

Sources for This Summary
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/14665638
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/14506273
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/15499185
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/12883891

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/11509010

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/20574985

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/9916797

• OMIM: SOLUTE CARRIER FAMILY 22 (ORGANIC CATION TRANSPORTER), MEMBER 5  
  http://omim.org/entry/603377

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/12889657

Reprinted from Genetics Home Reference:  

Reviewed: July 2006  
Published: September 10, 2019

Lister Hill National Center for Biomedical Communications  
U.S. National Library of Medicine  
National Institutes of Health  
Department of Health & Human Services