Gitelman syndrome

Gitelman syndrome is a kidney disorder that causes an imbalance of charged atoms (ions) in the body, including ions of potassium, magnesium, and calcium.

The signs and symptoms of Gitelman syndrome usually appear in late childhood or adolescence. Common features of this condition include painful muscle spasms (tetany), muscle weakness or cramping, dizziness, and salt craving. Also common is a tingling or prickly sensation in the skin (paresthesias), most often affecting the face. Some individuals with Gitelman syndrome experience excessive tiredness (fatigue), low blood pressure, and a painful joint condition called chondrocalcinosis. Studies suggest that Gitelman syndrome may also increase the risk of a potentially dangerous abnormal heart rhythm called ventricular arrhythmia.

The signs and symptoms of Gitelman syndrome vary widely, even among affected members of the same family. Most people with this condition have relatively mild symptoms, although affected individuals with severe muscle cramping, paralysis, and slow growth have been reported.

Frequency

Gitelman syndrome affects an estimated 1 in 40,000 people worldwide.

Causes

Gitelman syndrome is usually caused by mutations in the SLC12A3 gene. Less often, the condition results from mutations in the CLCNKB gene. The proteins produced from these genes are involved in the kidneys’ reabsorption of salt (sodium chloride or NaCl) from urine back into the bloodstream. Mutations in either gene impair the kidneys’ ability to reabsorb salt, leading to the loss of excess salt in the urine (salt wasting). Abnormalities of salt transport also affect the reabsorption of other ions, including ions of potassium, magnesium, and calcium. The resulting imbalance of ions in the body underlies the major features of Gitelman syndrome.

Inheritance Pattern

This condition is inherited in an autosomal recessive pattern, which means both copies of the gene in each cell have mutations. The parents of an individual with an autosomal recessive condition each carry one copy of the mutated gene, but they typically do not show signs and symptoms of the condition.
Other Names for This Condition
- familial hypokalemia-hypomagnesemia
- Gitelman's syndrome
- GS
- hypokalemia-hypomagnesemia, primary renotubular, with hypocalciuria
- tubular hypomagnesemia-hypokalemia with hypocalciuria

Diagnosis & Management

Genetic Testing Information
- What is genetic testing?
  /primer/testing/genetictesting
- Genetic Testing Registry: Familial hypokalemia-hypomagnesemia

Research Studies from ClinicalTrials.gov
- ClinicalTrials.gov
  https://clinicaltrials.gov/ct2/results?cond=%22Gitelman+syndrome%22

Additional Information & Resources

Health Information from MedlinePlus
- Health Topic: Kidney Diseases
  https://medlineplus.gov/kidneydiseases.html

Genetic and Rare Diseases Information Center
- Gitelman syndrome

Additional NIH Resources
- National Institute of Diabetes and Digestive and Kidney Diseases: The Kidneys and How They Work
  https://www.niddk.nih.gov/health-information/kidney-disease/kidneys-how-they-work
Educational Resources

- MalaCards: gitelman syndrome
  https://www.malacards.org/card/gitelman_syndrome

- Merck Manual Consumer Version
  https://www.merckmanuals.com/home/children-s-health-issues/congenital-kidney-
tubular-disorders/bartter-syndrome-and-gitelman-syndrome

- Orphanet: Gitelman syndrome
  https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=358

Patient Support and Advocacy Resources

- National Kidney Foundation
  https://www.kidney.org/

- Resource list from the University of Kansas Medical Center: Kidney/Urologic
  Conditions
  http://www.kumc.edu/gec/support/kidney.html

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28Gitelman+Syndrome%5BMAJR%5D%29+AND+%28Gitelman*%5BTIAB%5D%29+AND+english%5Bla%5D+AND+
  human%5Bmh%5D+AND+&%22last+3600+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM

- GITELMAN SYNDROME
  http://omim.org/entry/263800

Sources for This Summary

- Cruz DN, Shaer AJ, Bia MJ, Lifton RP, Simon DB; Yale Gitelman's and Bartter's Syndrome
  Collaborative Study Group. Gitelman's syndrome revisited: an evaluation of symptoms and health-
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/11168953

- Enríquez R, Adam V, Sirvent AE, García-García AB, Millán I, Amorós F. Gitelman syndrome due
s11255-010-9850-4. Epub 2010 Oct 8.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/20931281

- Jeck N, Konrad M, Peters M, Weber S, Bonzel KE, Seyberth HW. Mutations in the chloride channel
gene, CLCNKB, leading to a mixed Bartter-Gitelman phenotype. Pediatr Res. 2000 Dec;48(6):
  754-8.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/11102542

- Knoers NV, Levchenko EN. Gitelman syndrome. Orphanet J Rare Dis. 2008 Jul 30;3:22. doi:
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/18667063
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2518128/
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16580616

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/17061123

Reprinted from Genetics Home Reference: 

Reviewed: February 2011
Published: March 3, 2020

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