



Hypokalemic periodic paralysis

Hypokalemic periodic paralysis is a condition that causes episodes of extreme muscle weakness typically beginning in childhood or adolescence. Most often, these episodes involve a temporary inability to move muscles in the arms and legs. Attacks cause severe weakness or paralysis that usually lasts from hours to days. Some people may have episodes almost every day, while others experience them weekly, monthly, or only rarely. Attacks can occur without warning or can be triggered by factors such as rest after exercise, a viral illness, or certain medications. Often, a large, carbohydrate-rich meal or vigorous exercise in the evening can trigger an attack upon waking the following morning. Although affected individuals usually regain their muscle strength between attacks, some develop persistent muscle weakness later in life.

People with hypokalemic periodic paralysis typically have reduced levels of potassium in their blood (hypokalemia) during episodes of muscle weakness. Researchers are investigating how low potassium levels may be related to the muscle abnormalities in this condition.

Frequency

Although its exact prevalence is unknown, hypokalemic periodic paralysis is estimated to affect 1 in 100,000 people. Men tend to experience symptoms of this condition more often than women.

Causes

Mutations in the *CACNA1S* or *SCN4A* gene can cause hypokalemic periodic paralysis. These genes provide instructions for making proteins that play essential roles in muscles used for movement (skeletal muscles). For the body to move normally, skeletal muscles must tense (contract) and relax in a coordinated way. Muscle contractions are triggered by the flow of certain positively charged atoms (ions) into muscle cells. The *CACNA1S* and *SCN4A* proteins form channels that control the flow of these ions. The channel formed by the *CACNA1S* protein transports calcium ions into cells, while the channel formed by the *SCN4A* protein transports sodium ions.

Mutations in the *CACNA1S* or *SCN4A* gene alter the usual structure and function of calcium or sodium channels. The altered channels are "leaky," allowing ions to flow slowly but continually into muscle cells, which reduces the ability of skeletal muscles to contract. Because muscle contraction is needed for movement, a disruption in normal ion transport leads to episodes of severe muscle weakness or paralysis.

A small percentage of people with the characteristic features of hypokalemic periodic paralysis do not have identified mutations in the *CACNA1S* or *SCN4A* gene. In these cases, the cause of the condition is unknown.

Inheritance Pattern

This condition is inherited in an autosomal dominant pattern, which means one copy of the altered gene in each cell is sufficient to cause the disorder.

Other Names for This Condition

- Familial Hypokalemic Periodic Paralysis
- HOKPP
- HypoKPP
- HypoPP
- Primary Hypokalemic Periodic Paralysis
- Westphall disease

Diagnosis & Management

Genetic Testing Information

- What is genetic testing?
[/primer/testing/geneticTesting](#)
- Genetic Testing Registry: Hypokalemic periodic paralysis
<https://www.ncbi.nlm.nih.gov/gtr/conditions/C0238358/>
- Genetic Testing Registry: Hypokalemic periodic paralysis 1
<https://www.ncbi.nlm.nih.gov/gtr/conditions/C3714580/>
- Genetic Testing Registry: Hypokalemic periodic paralysis, type 2
<https://www.ncbi.nlm.nih.gov/gtr/conditions/C2750061/>

Research Studies from ClinicalTrials.gov

- ClinicalTrials.gov
<https://clinicaltrials.gov/ct2/results?cond=%22hypokalemic+periodic+paralysis%22>

Other Diagnosis and Management Resources

- GeneReview: Hypokalemic Periodic Paralysis
<https://www.ncbi.nlm.nih.gov/books/NBK1338>
- MedlinePlus Encyclopedia: Hypokalemic periodic paralysis
<https://medlineplus.gov/ency/article/000312.htm>

Additional Information & Resources

Health Information from MedlinePlus

- Encyclopedia: Hypokalemic periodic paralysis
<https://medlineplus.gov/ency/article/000312.htm>
- Health Topic: Muscle Disorders
<https://medlineplus.gov/muscledisorders.html>
- Health Topic: Paralysis
<https://medlineplus.gov/paralysis.html>

Genetic and Rare Diseases Information Center

- Hypokalemic periodic paralysis
<https://rarediseases.info.nih.gov/diseases/6729/hypokalemic-periodic-paralysis>

Additional NIH Resources

- National Institute of Neurological Disorders and Stroke
<https://www.ninds.nih.gov/Disorders/All-Disorders/Familial-Periodic-Paralyses-Information-Page>

Educational Resources

- MalaCards: hypokalemic periodic paralysis, type 1
https://www.malacards.org/card/hypokalemic_periodic_paralysis_type_1_2
- MalaCards: hypokalemic periodic paralysis, type 2
https://www.malacards.org/card/hypokalemic_periodic_paralysis_type_2_2
- Merck Manual Consumer Version
<https://www.merckmanuals.com/home/children-s-health-issues/muscular-dystrophies-and-related-disorders/familial-periodic-paralysis>
- Neuromuscular Disease Center, Washington University
<https://neuromuscular.wustl.edu/mtime/mepisodic.html#hopp>
- Orphanet: Hypokalemic periodic paralysis
https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=681

Patient Support and Advocacy Resources

- Muscular Dystrophy Association
<https://www.mda.org/disease/endocrine-myopathies>
- Periodic Paralysis Association
<https://www.periodicparalysis.org/>

Clinical Information from GeneReviews

- Hypokalemic Periodic Paralysis
<https://www.ncbi.nlm.nih.gov/books/NBK1338>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28Hypokalemic+Periodic+Paralysis%5BMAJR%5D%29+AND+%28hypokalemic+periodic+paralysis%5BTIAB%5D%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D>

Catalog of Genes and Diseases from OMIM

- HYPOKALEMIC PERIODIC PARALYSIS, TYPE 1
<http://omim.org/entry/170400>
- HYPOKALEMIC PERIODIC PARALYSIS, TYPE 2
<http://omim.org/entry/613345>

Medical Genetics Database from MedGen

- Hypokalemic periodic paralysis
<https://www.ncbi.nlm.nih.gov/medgen/116058>

Sources for This Summary

- Cannon SC. An expanding view for the molecular basis of familial periodic paralysis. *Neuromuscul Disord.* 2002 Aug;12(6):533-43. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/12117476>
- Cannon SC. Channelopathies of skeletal muscle excitability. *Compr Physiol.* 2015 Apr;5(2):761-90. doi: 10.1002/cphy.c140062. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/25880512>
Free article on PubMed Central: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4754081/>
- Fouad G, Dalakas M, Servidei S, Mendell JR, Van den Bergh P, Angelini C, Alderson K, Griggs RC, Tawil R, Gregg R, Hogan K, Powers PA, Weinberg N, Malonee W, Ptáček LJ. Genotype-phenotype correlations of DHP receptor alpha 1-subunit gene mutations causing hypokalemic periodic paralysis. *Neuromuscul Disord.* 1997 Jan;7(1):33-8.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/9132138>
- Jurkat-Rott K, Lehmann-Horn F. Paroxysmal muscle weakness: the familial periodic paralyses. *J Neurol.* 2006 Nov;253(11):1391-8. Epub 2006 Nov 30. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/17139526>
- Lehmann-Horn F, Jurkat-Rott K, Rüdel R. Periodic paralysis: understanding channelopathies. *Curr Neurol Neurosci Rep.* 2002 Jan;2(1):61-9. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/11898585>
- Levitt JO. Practical aspects in the management of hypokalemic periodic paralysis. *J Transl Med.* 2008 Apr 21;6:18. doi: 10.1186/1479-5876-6-18. Erratum in: *J Transl Med.* 2014;12:198. Dosage error in article text.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/18426576>
Free article on PubMed Central: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2374768/>
- Miller TM, Dias da Silva MR, Miller HA, Kwiecinski H, Mendell JR, Tawil R, McManis P, Griggs RC, Angelini C, Servidei S, Petajan J, Dalakas MC, Ranum LP, Fu YH, Ptáček LJ. Correlating phenotype and genotype in the periodic paralyses. *Neurology.* 2004 Nov 9;63(9):1647-55.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/15534250>

- Sansone V, Meola G, Links TP, Panzeri M, Rose MR. Treatment for periodic paralysis. *Cochrane Database Syst Rev.* 2008 Jan 23;(1):CD005045. doi: 10.1002/14651858.CD005045.pub2. Review. *Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/18254068>
- Statland JM, Fontaine B, Hanna MG, Johnson NE, Kissel JT, Sansone VA, Shieh PB, Tawil RN, Trivedi J, Cannon SC, Griggs RC. Review of the Diagnosis and Treatment of Periodic Paralysis. *Muscle Nerve.* 2018 Apr;57(4):522-530. doi: 10.1002/mus.26009. Epub 2017 Nov 29. Review. *Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/29125635>
Free article on PubMed Central: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5867231/>
- Venance SL, Cannon SC, Fialho D, Fontaine B, Hanna MG, Ptacek LJ, Tristani-Firouzi M, Tawil R, Griggs RC; CINCH investigators. The primary periodic paralyses: diagnosis, pathogenesis and treatment. *Brain.* 2006 Jan;129(Pt 1):8-17. Epub 2005 Sep 29. Review. *Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/16195244>
- Vicart S, Sternberg D, Arzel-Hézode M, Franques J, Bendahhou S, Lory P, Hainque B, Fournier E, Nicole S, Fontaine B. Hypokalemic Periodic Paralysis. 2002 Apr 30 [updated 2014 Jul 31]. In: Pagon RA, Adam MP, Ardinger HH, Wallace SE, Amemiya A, Bean LJH, Bird TD, Ledbetter N, Mefford HC, Smith RJH, Stephens K, editors. *GeneReviews®* [Internet]. Seattle (WA): University of Washington, Seattle; 1993-2017. Available from <http://www.ncbi.nlm.nih.gov/books/NBK1338/>
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/20301512>
- Vicart S, Sternberg D, Arzel-Hézode M, Franques J, Bendahhou S, Lory P, Hainque B, Fournier E, Nicole S, Fontaine B. Hypokalemic Periodic Paralysis. 2002 Apr 30 [updated 2014 Jul 31]. In: Pagon RA, Adam MP, Ardinger HH, Wallace SE, Amemiya A, Bean LJH, Bird TD, Ledbetter N, Mefford HC, Smith RJH, Stephens K, editors. *GeneReviews®* [Internet]. Seattle (WA): University of Washington, Seattle; 1993-2017. Available from <http://www.ncbi.nlm.nih.gov/books/NBK1338/>
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/20301512>

Reprinted from Genetics Home Reference:

<https://ghr.nlm.nih.gov/condition/hypokalemic-periodic-paralysis>

Reviewed: March 2020

Published: August 17, 2020

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