Familial hemiplegic migraine

Familial hemiplegic migraine is a form of migraine headache that runs in families. Migraines usually cause intense, throbbing pain in one area of the head, often accompanied by nausea, vomiting, and extreme sensitivity to light and sound. These recurrent headaches typically begin in childhood or adolescence and can be triggered by certain foods, emotional stress, and minor head trauma. Each headache may last from a few hours to a few days.

In some types of migraine, including familial hemiplegic migraine, a pattern of neurological symptoms called an aura precedes the headache. The most common symptoms associated with an aura are temporary visual changes such as blind spots (scotomas), flashing lights, zig-zagging lines, and double vision. In people with familial hemiplegic migraine, auras are also characterized by temporary numbness or weakness, often affecting one side of the body (hemiparesis). Additional features of an aura can include difficulty with speech, confusion, and drowsiness. An aura typically develops gradually over a few minutes and lasts about an hour.

Unusually severe migraine episodes have been reported in some people with familial hemiplegic migraine. These episodes have included fever, seizures, prolonged weakness, coma, and, rarely, death. Although most people with familial hemiplegic migraine recover completely between episodes, neurological symptoms such as memory loss and problems with attention can last for weeks or months. About 20 percent of people with this condition develop mild but permanent difficulty coordinating movements (ataxia), which may worsen with time, and rapid, involuntary eye movements called nystagmus.

Frequency

The worldwide prevalence of familial hemiplegic migraine is unknown. Studies suggest that in Denmark about 1 in 10,000 people have hemiplegic migraine and that the condition occurs equally in families with multiple affected individuals (familial hemiplegic migraine) and in individuals with no family history of the condition (sporadic hemiplegic migraine). Like other forms of migraine, familial hemiplegic migraine affects females more often than males.

Causes

Mutations in the \textit{CACNA1A}, \textit{ATP1A2}, \textit{SCN1A}, and \textit{PRRT2} genes have been found to cause familial hemiplegic migraine. The first three genes provide instructions for making proteins that are involved in the transport of charged atoms (ions) across cell membranes. The movement of these ions is critical for normal signaling between nerve cells (neurons) in the brain and other parts of the nervous system. The function of
the protein produced from the \textit{PRRT2} gene is unknown, although studies suggest it interacts with a protein that helps control signaling between neurons.

Communication between neurons depends on chemicals called neurotransmitters, which are released from one neuron and taken up by neighboring neurons. Researchers believe that mutations in the \textit{CACNA1A}, \textit{ATP1A2}, and \textit{SCN1A} genes can upset the balance of ions in neurons, which disrupts the normal release and uptake of certain neurotransmitters in the brain. Although the mechanism is unknown, researchers speculate that mutations in the \textit{PRRT2} gene, which reduce the amount of \textit{PRRT2} protein, also disrupt normal control of neurotransmitter release. The resulting changes in signaling between neurons lead people with familial hemiplegic migraine to develop these severe headaches.

There is little evidence that mutations in the \textit{CACNA1A}, \textit{ATP1A2}, \textit{SCN1A}, and \textit{PRRT2} genes play a role in common migraines, which affect millions of people each year. Researchers are searching for additional genetic changes that may underlie rare types of migraine, such as familial hemiplegic migraine, as well as the more common forms of migraine.

\textbf{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. In most cases, affected individuals have one affected parent. However, some people who inherit an altered gene never develop features of familial hemiplegic migraine. (This situation is known as reduced penetrance.) A related condition, sporadic hemiplegic migraine, has identical signs and symptoms but occurs in individuals with no history of the disorder in their family.

\textbf{Other Names for This Condition}

- hemiplegic migraine, familial
- hemiplegic-ophthalmoplegic migraine

\textbf{Diagnosis & Management}

\textbf{Genetic Testing Information}

- What is genetic testing? /primer/testing/genetictesting
Research Studies from ClinicalTrials.gov

- ClinicalTrials.gov
  https://clinicaltrials.gov/ct2/results?cond=%22familial+hemiplegic+migraine%22+OR+%22Migraine+with+Aura%22

Other Diagnosis and Management Resources

- GeneReview: Familial Hemiplegic Migraine
  https://www.ncbi.nlm.nih.gov/books/NBK1388
- GeneReview: PRRT2-Associated Paroxysmal Movement Disorders
  https://www.ncbi.nlm.nih.gov/books/NBK475803

Additional Information & Resources

Health Information from MedlinePlus

- Health Topic: Migraine
  https://medlineplus.gov/migraine.html

Genetic and Rare Diseases Information Center

- Familial hemiplegic migraine
  https://rarediseases.info.nih.gov/diseases/10975/familial-hemiplegic-migraine

Additional NIH Resources

- National Institute for Neurological Disorders and Stroke: Migraine Information Page
  https://www.ninds.nih.gov/Disorders/All-Disorders/Migraine-Information-Page

Educational Resources

- JAMA Patient Page: Migraine Headache
  https://jamanetwork.com/journals/jama/fullarticle/184146
- KidsHealth from the Nemours Foundation: Migraine Headaches
- MalaCards: familial hemiplegic migraine
  https://www.malacards.org/card/familial_hemiplegic_migraine
- Orphanet: Familial or sporadic hemiplegic migraine
  https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=569
- The Migraine Trust: Hemiplegic Migraine
  https://www.migrainetrust.org/about-migraine/types-of-migraine/hemiplegic-migraine/
Patient Support and Advocacy Resources

- Migraine Research Foundation
  https://migraineresearchfoundation.org/
- National Headache Foundation
- The Migraine Trust
  https://www.migrainetrust.org/

Clinical Information from GeneReviews

- Familial Hemiplegic Migraine
  https://www.ncbi.nlm.nih.gov/books/NBK1388
- PRRT2-Associated Paroxysmal Movement Disorders
  https://www.ncbi.nlm.nih.gov/books/NBK475803

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28Migraine+with+Aura%5BMAJR
  %5D%29+AND+%28familial+hemiplegic+migraine%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

- MIGRAINE, FAMILIAL HEMIPLEGIC, 1
  http://omim.org/entry/141500
- MIGRAINE, FAMILIAL HEMIPLEGIC, 2
  http://omim.org/entry/602481
- MIGRAINE, FAMILIAL HEMIPLEGIC, 3
  http://omim.org/entry/609634

Sources for This Summary

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/20301562

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/17395138

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/17987250

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/23077016

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/17502463

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/17495624

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