Familial focal epilepsy with variable foci

Familial focal epilepsy with variable foci (FFEVF) is an uncommon form of recurrent seizures (epilepsy) that runs in families. Seizures associated with FFEVF can begin at any time from infancy to adulthood. The seizures are described as focal or partial, which means they begin in one region of the brain and do not cause a loss of consciousness. In more than 70 percent of affected individuals, these seizures begin in one of two areas of the brain, either the temporal lobe or the frontal lobe. The region of the brain where the seizures start tends to stay the same over time. In rare instances, seizure activity that starts in one area spreads to affect the entire brain and causes a loss of consciousness, muscle stiffening, and rhythmic jerking. Episodes that begin as partial seizures and spread throughout the brain are known as secondarily generalized seizures.

Among family members with FFEVF, individuals may not have the same brain region affected (variable foci), meaning that one person's seizures may not begin in the same part of the brain as their affected relative.

Some individuals with FFEVF also have a brain malformation called focal cortical dysplasia. Seizures in these individuals are typically not well-controlled with medication.

Most people with FFEVF are intellectually normal, and there are no problems with their brain function between seizures. However, some people with FFEVF have developed psychiatric disorders (such as schizophrenia), behavioral problems, or intellectual disability. It is unclear whether these additional features are directly related to epilepsy in these individuals.

**Frequency**

The prevalence of FFEVF is unknown.

**Causes**

Most cases of FFEVF are caused by mutations in the *DEPDC5* gene with fewer cases caused by mutations in the *NPRL2* or *NPRL3* gene. These three genes provide instructions for making proteins that attach (bind) to each other to form a protein complex called GATOR1. This complex is found in cells throughout the body, where it regulates a signaling pathway involved in cell growth and division (proliferation), the survival of cells, and the creation (synthesis) of new proteins. The role of the GATOR1 complex is to block (inhibit) this pathway when it is not needed.

A mutation in any one of the three genes associated with FFEVF reduces GATOR1 complex formation, leading to an abnormally active signaling pathway. It is unclear how overactivity in this pathway leads to the focal seizures of FFEVF. Research
suggests that increased signaling in the brain leads to changes in the development of the junctions between nerve cells (synapses) and increased activation (excitation) of nerve cells, which can cause seizures. Increased excitation of nerve cells can also cause enlargement of these cells, which is characteristic of focal cortical dysplasia.

It is unknown why some individuals with the same mutation have seizures that start in different regions of the brain. Researchers believe that other, unknown genes may influence the features of FFEVF.

Some individuals with FFEVF do not have an identified mutation in any of these three genes. The cause of the condition in these individuals is unknown.

**Inheritance Pattern**

FFEVF is inherited in an autosomal dominant pattern, which means one copy of an altered gene in each cell is sufficient to cause the disorder. In most cases, an affected person inherits the mutation from one parent.

For unknown reasons, some people with FFEVF caused by a *DEPDC5* gene mutation never develop the condition, a situation known as reduced penetrance. Approximately 60 percent of individuals with *DEPDC5* gene mutations go on to develop FFEVF.

**Other Names for This Condition**

- familial partial epilepsy with variable foci
- FFEVF
- partial epilepsy with variable foci

**Diagnosis & Management**

**Genetic Testing Information**

- What is genetic testing? /primer/testing/genetictesting
Other Diagnosis and Management Resources

- GeneReview: DEPDC5-Related Epilepsy
  https://www.ncbi.nlm.nih.gov/books/NBK385626
- MedlinePlus Partial (Focal) Seizure
  https://medlineplus.gov/ency/article/000697.htm
- Seattle Children's Hospital: Epilepsy
  https://www.seattlechildrens.org/conditions/brain-nervous-system-mental-conditions/epilepsy

Additional Information & Resources

Health Information from MedlinePlus

- Health Topic: Seizures
  https://medlineplus.gov/seizures.html
- Partial (Focal) Seizure
  https://medlineplus.gov/ency/article/000697.htm

Genetic and Rare Diseases Information Center

- Familial focal epilepsy with variable foci

Additional NIH Resources

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

Educational Resources

- Centers for Disease Control and Prevention: Epilepsy
  https://www.cdc.gov/epilepsy/index.html
- Cincinnati Children’s Hospital: Cortical Dysplasia in Children
  https://www.cincinnatichildren.org/health/c/cortical-dysplasia
- Great Ormond Street Hospital for Children (UK): Epilepsy
  https://www.gosh.nhs.uk/conditions-and-treatments/conditions-we-treat/epilepsy
- Johns Hopkins Medicine: Epilepsy and Seizures
  https://www.hopkinsmedicine.org/health/conditions-and-diseases/epilepsy
- Merck Manual Consumer Version: Seizure Disorders
- Orphanet: Familial focal epilepsy with variable foci
  https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=98820
Patient Support and Advocacy Resources

- American Epilepsy Society
  https://www.aesnet.org/
- Brain Foundation (Australia)
  https://brainfoundation.org.au/
- CURE: Citizens United for Research in Epilepsy
  https://www.cureepilepsy.org/
- Epilepsy Foundation
  https://www.epilepsy.com/
- Epilepsy Society (UK)
  https://www.epilepsysociety.org.uk/

Clinical Information from GeneReviews

- DEPDC5-Related Epilepsy
  https://www.ncbi.nlm.nih.gov/books/NBK385626

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28familial+focal+epilepsy+with+variable+foci%5BTIAB%5D%29+OR+%28familial+partial+epilepsy+with+variable+foci%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

- EPILEPSY, FAMILIAL FOCAL, WITH VARIABLE FOCI 1
  http://omim.org/entry/604364
- EPILEPSY, FAMILIAL FOCAL, WITH VARIABLE FOCI 2
  http://omim.org/entry/617116
- EPILEPSY, FAMILIAL FOCAL, WITH VARIABLE FOCI 3
  http://omim.org/entry/617118

Medical Genetics Database from MedGen

- Epilepsy, familial focal, with variable foci 1
Sources for This Summary

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/27208208

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