EIF2B5 gene

eukaryotic translation initiation factor 2B subunit epsilon

Normal Function

The *EIF2B5* gene provides instructions for making one of five parts of a protein called eIF2B, specifically the epsilon subunit of this protein. The eIF2B protein helps regulate overall protein production (synthesis) in the cell by interacting with another protein, eIF2. The eIF2 protein is called an initiation factor because it is involved in starting (initiating) protein synthesis.

Under some conditions, eIF2B increases protein synthesis by helping to recycle molecules called GTP, which carry energy to the initiation factor. Under other conditions, it slows protein synthesis by binding tightly to the initiation factor, which converts the eIF2B protein into an inactive form and prevents recycling of GTP.

Proper regulation of protein synthesis is vital for ensuring that the correct levels of protein are available for the cell to cope with changing conditions. For example, cells must synthesize protein much faster if they are multiplying than if they are in a resting state.

Health Conditions Related to Genetic Changes

**Leukoencephalopathy with vanishing white matter**

Mutations in the *EIF2B5* gene have been identified in about 65 percent of people with leukoencephalopathy with vanishing white matter, including those with a severe, early-onset form that is seen among the Cree and Chippewayan populations of Quebec and Manitoba (Cree leukoencephalopathy) and some affected females with a variant of the disorder in which the neurological features are accompanied by ovarian failure (ovarioleukodystrophy). These mutations cause partial loss of eIF2B function. Impairment of eIF2B function makes it more difficult for the body’s cells to regulate protein synthesis and deal with changing conditions and stress. Researchers believe that cells in the white matter (nerve fibers covered by a fatty substance called myelin that insulates and protects nerves) may be particularly affected by an abnormal response to stress, resulting in the signs and symptoms of leukoencephalopathy with vanishing white matter.
**Chromosomal Location**

Cytogenetic Location: 3q27.1, which is the long (q) arm of chromosome 3 at position 27.1

Molecular Location: base pairs 184,135,023 to 184,145,311 on chromosome 3 (Homo sapiens Updated Annotation Release 109.20200228, GRCh38.p13) (NCBI)

Credit: Genome Decoration Page/NCBI

**Other Names for This Gene**

- CACH
- CLE
- EI2BE_HUMAN
- EIF-2B
- eIF-2B GDP-GTP exchange factor
- EIF2Bepsilon
- eukaryotic translation initiation factor 2B, subunit 5 (epsilon, 82kD)
- eukaryotic translation initiation factor 2B, subunit 5 epsilon, 82kDa
- LVWM

**Additional Information & Resources**

**Educational Resources**

- Eurekah Bioscience: Mechanism of Translation Initiation in Eukaryotes
  https://www.ncbi.nlm.nih.gov/books/NBK6597/

  https://www.ncbi.nlm.nih.gov/books/NBK26890/#A1387
Clinical Information from GeneReviews

- Childhood Ataxia with Central Nervous System Hypomyelination/Vanishing White Matter
  https://www.ncbi.nlm.nih.gov/books/NBK1258

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28EIF2B5%5BTIAB%5D%29+OR+%28CACH%5BTIAB%5D%29%29+AND+%28Genes%5BMH%5D%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1440+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM

- EUKARYOTIC TRANSLATION INITIATION FACTOR 2B, SUBUNIT 5
  http://omim.org/entry/603945

Research Resources

- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=EIF2B5%5Bgene%5D

- HGNC Gene Symbol Report

- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:8893

- NCBI Gene

- UniProt
  https://www.uniprot.org/uniprot/Q13144

Sources for This Summary

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/15723074

- OMIM: EUKARYOTIC TRANSLATION INITIATION FACTOR 2B, SUBUNIT 5
  http://omim.org/entry/603945

- Eurekah Bioscience: Mechanism of Translation Initiation in Eukaryotes
  https://www.ncbi.nlm.nih.gov/books/NBK6597/

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16246171
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/15054402

• Li W, Wang X, Van Der Knaap MS, Proud CG. Mutations linked to leukoencephalopathy with vanishing white matter impair the function of the eukaryotic initiation factor 2B complex in diverse ways. Mol Cell Biol. 2004 Apr;24(8):3295-306. 
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/15060152
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC381664/

• Molecular Biology of the Cell (fourth edition, 2002): The Phosphorylation of an Initiation Factor Globally Regulates Protein Synthesis
  https://www.ncbi.nlm.nih.gov/books/NBK26890/#A1387

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16246152

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16807905

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16998732

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16545608

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16825957

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16141786


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