FLNB gene

filamin B

Normal Function

The *FLNB* gene provides instructions for making a protein called filamin B. This protein helps build the network of protein filaments (cytoskeleton) that gives structure to cells and allows them to change shape and move. Filamin B attaches (binds) to another protein called actin and helps the actin to form the branching network of filaments that makes up the cytoskeleton. It also links actin to many other proteins to perform various functions within the cell, including the cell signaling that helps determine how the cytoskeleton will change as tissues grow and take shape during development.

Filamin B is involved in the development of the skeleton before birth. It is active (expressed) in many cells and tissues of the body, including cartilage-forming cells called chondrocytes. Cartilage is a tough, flexible tissue that makes up much of the skeleton during early development. Most cartilage is later converted to bone (a process called ossification), except for the cartilage that continues to cover and protect the ends of bones and is present in the nose, airways (trachea and bronchi), and external ears. Filamin B appears to be important for normal cell growth and division (proliferation) and maturation (differentiation) of chondrocytes and for the ossification of cartilage.

Health Conditions Related to Genetic Changes

Atelosteogenesis type 1

At least seven *FLNB* gene mutations have been identified that cause atelosteogenesis type 1, a disorder that affects the development of bones throughout the body. The mutations change single protein building blocks (amino acids) in the filamin B protein or delete a small section of the protein sequence, resulting in an abnormal protein. This abnormal protein appears to have a new, atypical function that interferes with normal proliferation or differentiation of chondrocytes, impairing ossification and leading to the signs and symptoms of atelosteogenesis type 1.

Atelosteogenesis type 3

At least six *FLNB* gene mutations have been identified that cause atelosteogenesis type 3, a disorder that affects the development of bones throughout the body. These mutations change single amino acids in the filamin B protein or delete a small section of the protein sequence, resulting in an abnormal protein. This abnormal protein appears to have a new, atypical function that interferes with normal proliferation or differentiation of chondrocytes, impairing ossification and leading to the signs and symptoms of atelosteogenesis type 3.

Boomerang dysplasia

At least two *FLNB* gene mutations have been identified that cause boomerang dysplasia, a disorder that affects the development of bones throughout the body. These mutations change single amino acids in the filamin B protein or delete a small section of the protein sequence, resulting in an abnormal protein. This abnormal protein appears to have a new, atypical function that interferes with normal proliferation or differentiation of chondrocytes, impairing ossification and leading to the signs and symptoms of boomerang dysplasia.

Larsen syndrome

At least 13 *FLNB* gene mutations have been identified that cause Larsen syndrome, a disorder that affects the development of bones throughout the body. These mutations change single amino acids in the filamin B protein or delete a small section of the protein sequence, resulting in an abnormal protein. This abnormal protein appears to have a new, atypical function that interferes with normal proliferation or differentiation of chondrocytes, impairing ossification and leading to the signs and symptoms of Larsen syndrome.

It is not clear why similar mutations in the *FLNB* gene can result in four different disorders: atelosteogenesis type 1, atelosteogenesis type 3, boomerang dysplasia, or Larsen syndrome. Certain mutations in regions of the *FLNB* gene known as exons 2 through 5 seem to have the most harmful effects, usually resulting in the more severe disorders, atelosteogenesis type 1 and boomerang dysplasia. Atelosteogenesis type 3 and Larsen syndrome, which are less severe, are usually caused by apparently milder mutations in exons 2 through 5 or by mutations in exons 27 through 33. In a few cases, the same mutation has been associated with more than one of these disorders in different people.

Spondylocarpotarsal synostosis syndrome

At least five *FLNB* gene mutations have been identified that cause spondylocarpotarsal synostosis syndrome, a disorder that affects the development of bones throughout the body. These mutations, which may occur in any region of the gene, result in the production of an abnormally short filamin B protein that is unstable and breaks down rapidly. Loss of the filamin B protein appears to result in out-of-place (ectopic) ossification, resulting in fusion of the bones in the spine, wrists, and ankles and other signs and symptoms of spondylocarpotarsal synostosis syndrome.

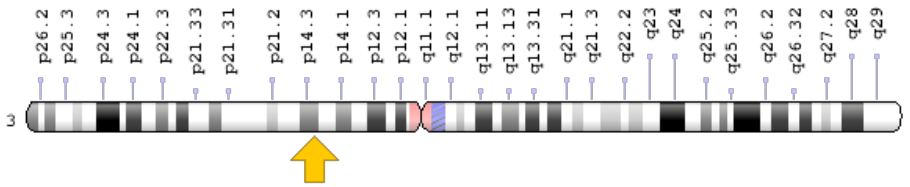
Other disorders

Several common variations (polymorphisms) in the *FLNB* gene have been associated with low bone mineral density (osteoporosis), which weakens the bones and makes them prone to fracture. *FLNB* gene variations may affect the maintenance of bone structure throughout the lifespan and result in differences in bone mineral density.

Chromosomal Location

Cytogenetic Location: 3p14.3, which is the short (p) arm of chromosome 3 at position 14.3

Molecular Location: base pairs 58,008,422 to 58,172,251 on chromosome 3 (Homo sapiens Updated Annotation Release 109.20200522, GRCh38.p13) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- ABP-278
- ABP-280 homolog
- actin-binding-like protein
- actin binding protein 278
- beta-filamin
- FH1
- filamin-3
- filamin-B
- filamin B, beta
- filamin homolog 1
- FLN-B
- FLN1L
- FLNB_HUMAN
- LRS1
- TABP
- TAP
- thyroid autoantigen

- truncated ABP
- truncated actin-binding protein

Additional Information & Resources

Educational Resources

- Developmental Biology (6th edition, 2000): Osteogenesis: The Development of Bones
  https://www.ncbi.nlm.nih.gov/books/NBK10056/#A3483

Clinical Information from GeneReviews

- FLNB Disorders
  https://www.ncbi.nlm.nih.gov/books/NBK2534

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28FLNB%5BTIAB%5D%29+OR+%28%28ABP-278%5BTIAB%5D%29+OR+%28ABP-280%5BTIAB%5D%29+OR+%28AOI%5BTIAB%5D%29+OR+%28beta-filamin%5BTIAB%5D%29+OR+%28filamin-B%5BTIAB%5D%29+OR+%28LRS1%5BTIAB%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM

- FILAMIN B
  http://omim.org/entry/603381

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_FLNB.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=FLNB%5Bgene%5D
- HGNC Gene Symbol Report
  https://www.genenames.org/data/gene-symbol-report/#!/hgnc_id/HGNC:3755
- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:2317
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/2317
- UniProt
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