

MATN3 gene

matrilin 3

Normal Function

The *MATN3* gene provides the instructions for making a protein called matrilin-3. This protein is found in the extracellular matrix, which is an intricate lattice of proteins and other molecules that forms in the spaces between cells. Specifically, matrilin-3 is located in the extracellular matrix surrounding the cells that make up ligaments and tendons, and near cartilage-forming cells (chondrocytes). Chondrocytes play an important role in bone formation (osteogenesis). In the bones of the spine, hips, and limbs, the process of osteogenesis starts with the formation of cartilage, which is then converted into bone.

The normal function of the *MATN3* gene is not fully understood; however, research suggests that matrilin-3 may play a role in the organization of collagen and other cartilage proteins. Collagens are proteins that provide strength and support to many body tissues, including cartilage. Matrilin-3 has been shown to interact with the COMP protein, type II collagen, and type IX collagen, which are all important in cartilage and bone formation.

Health Conditions Related to Genetic Changes

Multiple epiphyseal dysplasia

At least 14 different mutations in the *MATN3* gene have been shown to cause a mild form of multiple epiphyseal dysplasia. All of the mutations change one protein building block (amino acid) within or close to a region of matrilin-3 called the A-domain. One genetic change accounts for approximately 40 percent of all *MATN3* mutations. This mutation replaces the amino acid arginine with the amino acid tryptophan at position 121 (written as Arg121Trp or R121W).

Researchers believe that mutations in the *MATN3* gene prevent matrilin-3 from folding properly. Instead of being transported to the extracellular matrix of the chondrocytes, matrilin-3 remains in the endoplasmic reticulum. The endoplasmic reticulum is a structure inside the cell that is involved in protein processing and transport. This cell structure eventually becomes so large that it is no longer able to function normally, and the chondrocyte dies. The premature death of chondrocytes results in diminished growth of the long bones and short stature.

Other Names for This Gene

- EDM5
- MATN3_HUMAN

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of MATN3 ([https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=4148\[geneid\]](https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=4148[geneid]))

Scientific Articles on PubMed

- PubMed (<https://pubmed.ncbi.nlm.nih.gov/?term=%28%28MATN3%5BTIAB%5D%29+OR+%28matrilin+3%5BTIAB%5D%29%29+OR+%28EDM5%5BTIAB%5D%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D%29>)

Catalog of Genes and Diseases from OMIM

- MATRILIN 3; MATN3 (<https://omim.org/entry/602109>)

Gene and Variant Databases

- NCBI Gene (<https://www.ncbi.nlm.nih.gov/gene/4148>)
- ClinVar ([https://www.ncbi.nlm.nih.gov/clinvar?term=MATN3\[gene\]](https://www.ncbi.nlm.nih.gov/clinvar?term=MATN3[gene]))

References

- Briggs MD, Chapman KL. Pseudoachondroplasia and multiple epiphyseal dysplasia: mutation review, molecular interactions, and genotype to phenotype correlations. Hum Mutat. 2002 May;19(5):465-78. doi: 10.1002/humu.10066. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/11968079>)
- Briggs MD, Wright MJ, Mortier GR. Multiple Epiphyseal Dysplasia, Autosomal Dominant. 2003 Jan 8 [updated 2019 Apr 25]. In: Adam MP, Feldman J, Mirzaa GM, Pagon RA, Wallace SE, Bean LJH, Gripp KW, Amemiya A, editors. GeneReviews(R) [Internet]. Seattle (WA): University of Washington, Seattle; 1993-2024. Available from <http://www.ncbi.nlm.nih.gov/books/NBK1123/> Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/20301302>)
- Fresquet M, Jackson GC, Loughlin J, Briggs MD. Novel mutations in exon 2 of MATN3 affect residues within the alpha-helices of the A-domain and can result in the intracellular retention of mutant matrilin-3. Hum Mutat. 2008 Feb;29(2):330. doi:

10.1002/humu.9518. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/18205203>)

- Fresquet M, Jowitt TA, Ylostalo J, Coffey P, Meadows RS, Ala-Kokko L, Thornton DJ, Briggs MD. Structural and functional characterization of recombinant matrilin-3 A-domain and implications for human genetic bone diseases. *J Biol Chem*. 2007 Nov 30;282(48):34634-43. doi: 10.1074/jbc.M705301200. Epub 2007 Sep 18. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/17881354>) or Free article on PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2673055/>)
- Nicolae C, Ko YP, Miosge N, Niehoff A, Studer D, Enggist L, Hunziker EB, Paulsson M, Wagener R, Aszodi A. Abnormal collagen fibrils in cartilage of matrilin-1/matrilin-3-deficient mice. *J Biol Chem*. 2007 Jul 27;282(30):22163-75. doi: 10.1074/jbc.M610994200. Epub 2007 May 14. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/17502381>)

Genomic Location

The *MATN3* gene is found on chromosome 2 (<https://medlineplus.gov/genetics/chromosome/2/>).

Last updated February 1, 2008