

COL6A1 gene

collagen type VI alpha 1 chain

Normal Function

The *COL6A1* gene provides instructions for making one component of type VI collagen, which is a flexible protein found in the space that surrounds cells. Specifically, the protein produced from the *COL6A1* gene is the alpha(α)1(VI) chain of type VI collagen. This chain combines with chains produced from other genes to produce a complete type VI collagen molecule.

Collagens are found in the extracellular matrix, which is an intricate lattice that forms in the space between cells and provides structural support. Type VI collagen is located in the extracellular matrix surrounding cells that make up the muscles used for movement (skeletal muscle cells) and cells that make up connective tissue, which provides strength and flexibility to structures throughout the body, including skin and joints. The extracellular matrix is necessary for cell stability and growth. Research suggests that type VI collagen links basement membranes, which are thin, sheet-like structures that are part of the extracellular matrix, to nearby cells.

Health Conditions Related to Genetic Changes

Collagen VI-related dystrophy

Variants (also known as mutations) in the *COL6A1* gene have been found to cause some cases of collagen VI-related dystrophy, which is a group of disorders that vary in severity but generally result in muscle weakness and joint deformities called contractures. These variants often change single protein building blocks (amino acids) in the α 1(VI) chain. The most frequently affected amino acid is glycine; changes to this building block disrupt the structure of the α 1(VI) chain. Other variants can also disrupt the structure of the α 1(VI) chain.

Variants in the *COL6A1* gene affect type VI collagen in different ways. Some variants lead to altered α 1(VI) chains that can be incorporated into the mature type VI collagen molecule, although they disrupt the molecule's structure and function. Other variants result in an altered chain that cannot be incorporated at all. Still other variants prevent the production of any functional α 1(VI) chain, which impedes formation of type VI collagen. All of these *COL6A1* gene variants lead to a reduction or absence of functional collagen VI molecules. While it is difficult to predict the severity of collagen VI-

related dystrophy based on the type of variant, in general, lower amounts of type VI collagen lead to more severe signs and symptoms that begin earlier in life.

Changes in $\alpha 1(VI)$ chain structure or production lead to an unstable extracellular matrix that is no longer attached to cells through the basement membrane. As a result, the stability of muscle cells and connective tissue progressively declines, which leads to the muscle weakness, contractures, and other signs and symptoms of collagen VI-related dystrophy.

Limb-girdle muscular dystrophy

MedlinePlus Genetics provides information about Limb-girdle muscular dystrophy

Other Names for This Gene

- alpha 1 (VI) chain (61 AA)
- CO6A1_HUMAN
- collagen alpha-1(VI) chain
- collagen type VI alpha 1
- collagen VI, alpha-1 polypeptide
- collagen, type VI, alpha 1

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of COL6A1 ([https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=1291\[geneid\]](https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=1291[geneid]))

Scientific Articles on PubMed

- PubMed (<https://pubmed.ncbi.nlm.nih.gov/?term=%28COL6A1%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>)

Catalog of Genes and Diseases from OMIM

- COLLAGEN, TYPE VI, ALPHA-1; COL6A1 (<https://omim.org/entry/120220>)

Gene and Variant Databases

- NCBI Gene (<https://www.ncbi.nlm.nih.gov/gene/1291>)
- ClinVar ([https://www.ncbi.nlm.nih.gov/clinvar?term=COL6A1\[gene\]](https://www.ncbi.nlm.nih.gov/clinvar?term=COL6A1[gene]))

References

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Genomic Location

The *COL6A1* gene is found on chromosome 21 (<https://medlineplus.gov/genetics/chromosome/21/>).

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