ATN1 gene

atrophin 1

Normal Function

The *ATN1* gene provides instructions for making a protein called atrophin 1. Although the exact function of this protein is unknown, it appears to play an important role in nerve cells (neurons) in many areas of the brain. Researchers speculate that atrophin 1 may act as a transcriptional co-repressor. A transcriptional co-repressor is a protein that interacts with other DNA-binding proteins to suppress the activity of certain genes, although it cannot attach (bind) to DNA by itself.

One region of the *ATN1* gene contains a particular DNA segment known as a CAG trinucleotide repeat. This segment is made up of a series of three DNA building blocks (cytosine, adenine, and guanine) that appear multiple times in a row. In most people, the number of CAG repeats in the *ATN1* gene ranges from 6 to 35.

Health Conditions Related to Genetic Changes

Dentatorubral-pallidoluysian atrophy

Dentatorubral-pallidoluysian atrophy (DRPLA) is a progressive brain disorder that causes involuntary movements, mental and emotional problems, and a decline in thinking ability. DRPLA results from an increased number of copies (expansion) of the CAG trinucleotide repeat in the *ATN1* gene. Specifically, the CAG segment is repeated at least 48 times, and the repeat region may be two or three times its usual length. The extended CAG region changes the structure of atrophin 1 and how the protein interacts with other proteins to control gene function. This altered protein accumulates in neurons and interferes with normal cell functions. The dysfunction and eventual death of these neurons lead to involuntary movements, intellectual decline, and the other characteristic features of DRPLA.

Other disorders

Variants (also called mutations) in the *ATN1* gene can cause a very rare condition called congenital hypotonia, epilepsy, developmental delay, and digital anomalies (CHEDDA) syndrome. Individuals with this condition have severe intellectual and developmental delays. They also have a very limited or no ability to talk and cannot walk. People with CHEDDA can have weak muscle tone (hypotonia), recurring seizures (

epilepsy), vision and hearing problems, distinctive facial features, and skeletal abnormalities. Many affected individuals have brain malformations.

The *ATN1* gene variants that cause CHEDDA syndrome occur in one of the two copies of the gene in each cell and lead to a change in single protein building blocks (amino acids) in atrophin 1. As a result, the protein is altered and cannot function normally, though it is unclear how these changes lead to the specific features of CHEDDA syndrome.

Other Names for This Gene

- ATN1_HUMAN
- atrophin-1
- B37
- D12S755E
- dentatorubral-pallidoluysian atrophy protein
- DRPLA
- NOD

Additional Information & Resources

Tests Listed in the Genetic Testing Registry

- Tests of ATN1 (https://www.ncbi.nlm.nih.gov/gtr/all/tests/?term=1822[geneid])

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=((ATN1%5BTIAB%5D)+OR+(atrophin+1%5BTIAB%5D))+OR+((atrophin-1%5BTIAB%5D)+OR+(DRPLA%5BTIAB%5D))+AND+((Genes%5BMH%5D)+OR+(Genetic+Phenomena%5BMH%5D))+AND+english%5Bla%5D+AND+human%5Bmh%5D)

Catalog of Genes and Diseases from OMIM

- ATROPHIN 1; ATN1 (https://omim.org/entry/607462)

Gene and Variant Databases

- NCBI Gene (https://www.ncbi.nlm.nih.gov/gene/1822)
- ClinVar (https://www.ncbi.nlm.nih.gov/clinvar?term=ATN1[gene])

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Genomic Location

The *ATN1* gene is found on chromosome 12 (https://medlineplus.gov/genetics/chromos ome/12/).

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