ATXN2 gene
ataxin 2

Normal Function

The ATXN2 gene provides instructions for making a protein called ataxin-2. This protein is found throughout the body, but its function is unknown. Ataxin-2 is found in the fluid inside cells (cytoplasm) and seems to interact with a cell structure called the endoplasmic reticulum. The endoplasmic reticulum is involved in protein production, processing, and transport. Researchers believe that ataxin-2 may be involved in processing RNA, a chemical cousin of DNA. Ataxin-2 is also thought to play a role in the translation of genetic information to produce proteins.

One region of the ATXN2 gene contains a 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. Normally, the CAG segment is repeated approximately 22 times within the gene.

Health Conditions Related to Genetic Changes

Spinocerebellar ataxia type 2

Spinocerebellar ataxia type 2 (SCA2) is a condition characterized by progressive problems with movement. SCA2 results from a mutation in the ATXN2 gene known as a trinucleotide repeat expansion. This mutation increases the length of the repeated CAG segment in the ATXN2 gene. People with 32 or more repeats CAG repeats in the ATXN2 gene develop SCA2.

It is unclear how the abnormally long CAG segment affects the function of the ataxin-2 protein. The abnormal protein apparently leads to cell death, as people with SCA2 show a loss of brain cells. Certain brain cells called Purkinje cells seem to be particularly sensitive to the presence of abnormal ataxin-2. Purkinje cells are located in the part of the brain that coordinates movement (cerebellum) and are involved in chemical signaling between nerve cells (neurons). It is unknown how the abnormal ataxin-2 protein leads to the death of Purkinje and other brain cells. Over time, the loss of these cells causes the movement problems characteristic of SCA2.

Amyotrophic lateral sclerosis
Chromosomal Location

Cytogenetic Location: 12q24.12, which is the long (q) arm of chromosome 12 at position 24.12

Molecular Location: base pairs 111,452,214 to 111,599,676 on chromosome 12 (Homo sapiens Updated Annotation Release 109.20200522, GRCh38.p13) (NCBI)

Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- ataxin-2
- ATX2
- ATX2_HUMAN
- SCA2

Additional Information & Resources

Educational Resources

- Basic Neurochemistry (sixth edition, 1999): Trinucleotide expansion is one of the most important categories of mutation underlying neurodegenerative disorders
  https://www.ncbi.nlm.nih.gov/books/NBK27942/#A2851

- Washington University, St. Louis: Neuromuscular Disease Center
  https://neuromuscular.wustl.edu/ataxia/domatax.html#sca2

Clinical Information from GeneReviews

- Spinocerebellar Ataxia Type 2
  https://www.ncbi.nlm.nih.gov/books/NBK1275

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28ATXN2%5BTIAB%5D %29+OR+%28ataxin+2%5BTIAB%5D%29+AND+%28Genes%5BHM %29+OR+%28Genetic+Phenomena%5BHM %29+AND+english %5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22+AND+NCBI
Catalog of Genes and Diseases from OMIM

- ATAXIN 2
  http://omim.org/entry/601517

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_ATXN2.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=ATXN2%5Bgene%5D
- HGNC Gene Symbol Report
- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:6311
- NCBI Gene
- UniProt
  https://www.uniprot.org/uniprot/Q99700

Sources for This Summary

- OMIM: ATAXIN 2
  http://omim.org/entry/601517
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/18418684
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/19429075
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/18973756

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