VCP gene

valosin containing protein

Normal Function

The *VCP* gene provides instructions for making an enzyme called valosin-containing protein. This enzyme is found throughout the body and has a wide variety of functions within cells. It is involved in cell division, joining (fusing) membranes within cells, reassembling cell structures after cells have divided, preventing the self-destruction of cells (apoptosis), and repairing damaged DNA.

Valosin-containing protein is part of the ubiquitin-proteasome system, which is the machinery that breaks down (degrades) unneeded proteins within cells. This system provides quality control by disposing of damaged, misshapen, and excess proteins. It also regulates the level of proteins involved in several critical cell activities, such as the timing of cell division and growth. Researchers believe that most of the functions of valosin-containing protein are directly or indirectly related to the ubiquitin-proteasome system.

Health Conditions Related to Genetic Changes

Inclusion body myopathy with early-onset Paget disease and frontotemporal dementia

More than 30 mutations in the *VCP* gene have been identified in people who have inclusion body myopathy with early-onset Paget disease and frontotemporal dementia (IBMPFD). This rare disease causes muscle weakness (myopathy) and can also include a painful bone condition called Paget disease of bone and a brain condition called frontotemporal dementia that worsens over time.

The mutations associated with IBMPFD each change a single protein building block (amino acid) in valosin-containing protein. Changes in the structure of this enzyme impair its ability to break down other proteins as part of the ubiquitin-proteasome system. As a result, excess and abnormal proteins build up in muscle, bone, and brain cells. The proteins form clumps (aggregates) that interfere with the normal functions of these cells. It remains unclear how damage to muscle, bone, and brain cells leads to the specific features of IBMPFD.

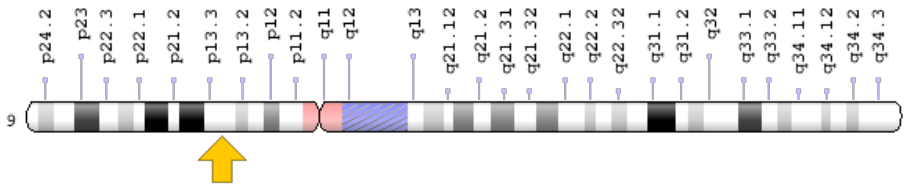
Amyotrophic lateral sclerosis

Charcot-Marie-Tooth disease

Chromosomal Location

Cytogenetic Location: 9p13.3, which is the short (p) arm of chromosome 9 at position 13.3

Molecular Location: base pairs 35,056,064 to 35,072,742 on chromosome 9 (Homo sapiens Annotation Release 109, GRCh38.p12) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- 15S Mg(2+)-ATPase p97 subunit
- CDC48
- IBMPFD
- MGC8560
- MGC131997
- MGC148092
- p97
- TER ATPase
- TERA
- TERA_HUMAN
- transitional endoplasmic reticulum ATPase
- yeast Cdc48p homolog

Additional Information & Resources

Educational Resources

- Eurekah Bioscience Collection: Assembly of Protein Aggregates in Neurodegeneration: Mechanisms Linking the Ubiquitin/Proteasome Pathway and Chaperones
  https://www.ncbi.nlm.nih.gov/books/NBK6166/
- The Cell: A Molecular Approach (second edition, 2000): Protein Degradation
  https://www.ncbi.nlm.nih.gov/books/NBK9957/

Clinical Information from GeneReviews

- Inclusion Body Myopathy with Paget Disease of Bone and/or Frontotemporal Dementia
  https://www.ncbi.nlm.nih.gov/books/NBK1476

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28VCP%5BTI%5D%29+OR+%28valosin-containing+protein%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D

Catalog of Genes and Diseases from OMIM

- VALOSIN-CONTAINING PROTEIN
  http://omim.org/entry/601023

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/VCPID42786ch9p13.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=VCP%5Bgene%5D
- HGNC Gene Symbol Report
  https://www.genenames.org/data/gene-symbol-report/#!/hgnc_id/HGNC:12666
- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:7415
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/7415
- UniProt
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