CSTB gene
cystatin B

Normal Function

The *CSTB* gene provides instructions for making a protein called cystatin B. This protein reduces the activity of (inhibits) enzymes called cathepsins. Cathepsins help break down certain proteins in the lysosomes (compartments in the cell that digest and recycle materials). While the specific function of cystatin B is unclear, it may help protect the cells' proteins from cathepsins that leak out of the lysosomes.

One region of the *CSTB* gene has a particular repeating sequence of 12 DNA building blocks (nucleotides) written as CCCCG-CCCCG-CG. This sequence, called a dodecamer repeat, is usually repeated two or three times within a part of the gene that helps regulate cystatin B protein production.

Health Conditions Related to Genetic Changes

**Unverricht-Lundborg disease**

In almost all affected individuals, Unverricht-Lundborg disease is caused by an increased number of copies (expansion) of the dodecamer repeat in the *CSTB* gene. Most people with this disorder have more than 30 repeats of the dodecamer sequence in both copies of the *CSTB* gene.

In a small number of individuals, one copy of the *CSTB* gene has the expanded dodecamer repeat while the second copy carries one of nine other identified mutations. Some of these mutations substitute one protein building block (amino acid) for another amino acid in the cystatin B protein. Others result in a shortened protein that may function improperly or not at all, or cause the protein to be pieced together incorrectly. Only one individual with Unverricht-Lundborg disease has been reported to have mutations other than the dodecamer repeat expansion in both copies of the gene in each cell.

The expanded dodecamer repeat in the *CSTB* gene seems to interfere with the production of cystatin B protein. Levels of cystatin B in affected individuals are only 5 to 10 percent of normal, and cathepsin levels are significantly increased. These changes are believed to cause the signs and symptoms of Unverricht-Lundborg disease, but the specific mechanism is unknown.
**Chromosomal Location**

Cytogenetic Location: 21q22.3, which is the long (q) arm of chromosome 21 at position 22.3

Molecular Location: base pairs 43,773,950 to 43,776,308 on chromosome 21 (Homo sapiens Updated Annotation Release 109.20200228, GRCh38.p13) (NCBI)

Credit: Genome Decoration Page/NCBI

**Other Names for This Gene**

- CPI-B
- CST6
- cystatin B (stefin B)
- CYTB_HUMAN
- EPM1
- liver thiol proteinase inhibitor
- PME
- stefin B
- STFB

**Additional Information & Resources**

Clinical Information from GeneReviews

- Unverricht-Lundborg Disease
  https://www.ncbi.nlm.nih.gov/books/NBK1142
Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28CSTB%5BTIAB%5D%29+OR+%28cystatin+B%5BTIAB%5D%29%29+OR+%28EPM1%5BTIAB%5D%29+OR+%28STFB%5BTIAB%5D%29+OR+%28cystatin+B%5BTIAB%5D%29+OR+%28CPI-B%5BTIAB%5D%29+OR+%28stefin+B%5BTIAB%5D%29+OR+%28liver+thiol+proteinase+inhibitor%5BTIAB%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1440+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM

- CYSTATIN B
  http://omim.org/entry/601145

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/CSTBID40181ch21q22.html

- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=CSTB%5Bgene%5D

- HGNC Gene Symbol Report

- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:1476

- NCBI Gene

- UniProt
  https://www.uniprot.org/uniprot/P04080

Sources for This Summary

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/10721698

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/15483648

- OMIM: CYSTATIN B
  http://omim.org/entry/601145
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/15780491

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/12918016

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/17003839

• Lalioti MD, Antonarakis SE, Scott HS. The epilepsy, the protease inhibitor and the dodecamer: progressive myoclonus epilepsy, cystatin b and a 12-mer repeat expansion. Cytogenet Genome Res. 2003;100(1-4):213-23. Review.  
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/14526183

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/12853462 
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC165608/

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/14510831

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/12215838

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/15778103

Reprinted from Genetics Home Reference:  

Reviewed: June 2008
Published: April 15, 2020

Lister Hill National Center for Biomedical Communications
U.S. National Library of Medicine
National Institutes of Health
Department of Health & Human Services

page 4