HCCS gene
holocytochrome c synthase

Normal Function

The HCCS gene carries instructions for producing an enzyme called holocytochrome c-type synthase. This enzyme is active in many tissues of the body and is found in the mitochondria, the energy-producing centers within cells.

Within the mitochondria, the holocytochrome c-type synthase enzyme helps produce a molecule called cytochrome c. Specifically, holocytochrome c-type synthase is involved in a reaction that adds an iron-containing molecule called heme to make mature cytochrome c, also called holocytochrome c, from a precursor form called apocytochrome c.

Cytochrome c is involved in a process called oxidative phosphorylation, by which mitochondria generate adenosine triphosphate (ATP), the cell’s main energy source. It also plays a role in the self-destruction of cells (apoptosis).

Health Conditions Related to Genetic Changes

Microphthalmia with linear skin defects syndrome

At least three HCCS gene mutations have been identified in individuals with microphthalmia with linear skin defects syndrome. Deletions of genetic material that include the HCCS gene have also been identified in affected individuals. HCCS gene mutations result in a holocytochrome c-type synthase enzyme that cannot perform its function. A deletion of genetic material that includes the HCCS gene prevents the production of the enzyme from that copy of the gene. This loss of functional holocytochrome c-type synthase enzyme can damage cells by impairing their ability to generate energy. In addition, without sufficient holocytochrome c-type synthase enzyme, the damaged cells may not be able to undergo apoptosis. These cells may instead die in a process called necrosis that causes inflammation and damages neighboring cells. During early development this spreading cell damage may lead to the eye and skin abnormalities characteristic of microphthalmia with linear skin defects syndrome.

Coloboma
Chromosomal Location

Cytogenetic Location: Xp22.2, which is the short (p) arm of the X chromosome at position 22.2

Molecular Location: base pairs 11,111,332 to 11,123,086 on the X chromosome (Homo sapiens Updated Annotation Release 109.20190905, GRCh38.p13) (NCBI)

Credit: Genome Decoration Page/NCBI

Other Names for This Gene

• CCHL
• CCHL_HUMAN
• DKFZp779I1858
• holocytochrome c synthase (cytochrome c heme-lyase)
• MCOPS7

Additional Information & Resources

Educational Resources

• Molecular Cell Biology (fourth edition, 2000): Proteins Are Targeted to Sub mitochondrial Compartments by Multiple Signals and Several Pathways
  https://www.ncbi.nlm.nih.gov/books/NBK21652/#A4708

Clinical Information from GeneReviews

• Microphthalmia with Linear Skin Defects Syndrome
  https://www.ncbi.nlm.nih.gov/books/NBK7041

Scientific Articles on PubMed

• PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28HCCS%5BTI%5D%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29+AND+english%5Blia%5D+AND+human%5Bmh%5D
Catalog of Genes and Diseases from OMIM

- HOLOCYTOCHROME C SYNTHASE
  http://omim.org/entry/300056

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_HCCS.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=HCCS%5Bgene%5D
- HGNC Gene Symbol Report
- Monarch Initiative
  https://monarchinitiative.org/gene/NCBIGene:3052
- NCBI Gene
- UniProt
  https://www.uniprot.org/uniprot/P53701

Sources for This Summary

- OMIM: HOLOCYTOCHROME C SYNTHASE
  http://omim.org/entry/300056
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/12444108
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/17033964
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1698567/
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/17893649

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