Familial HDL deficiency

Familial HDL deficiency is a condition characterized by low levels of high-density lipoprotein (HDL) in the blood. HDL is a molecule that transports cholesterol and certain fats called phospholipids through the bloodstream from the body’s tissues to the liver. Once in the liver, cholesterol and phospholipids are redistributed to other tissues or removed from the body. HDL is often referred to as "good cholesterol" because high levels of this substance reduce the chances of developing heart and blood vessel (cardiovascular) disease. People with familial HDL deficiency may develop cardiovascular disease at a relatively young age, often before age 50.

Severely reduced levels of HDL in the blood is a characteristic feature of a related disorder called Tangier disease. People with Tangier disease have additional signs and symptoms, such as disturbances in nerve function; enlarged, orange-colored tonsils; and clouding of the clear covering of the eye (corneal clouding). However, people with familial HDL deficiency do not have these additional features.

Frequency

Familial HDL deficiency is a rare disorder, although the prevalence is unknown.

Causes

Mutations in the \(ABCA1\) gene or the \(APOA1\) gene cause familial HDL deficiency. The proteins produced from these genes work together to remove cholesterol and phospholipids from cells.

The \(ABCA1\) gene provides instructions for making a protein that removes cholesterol and phospholipids from cells by moving them across the cell membrane. The movement of these substances across the membrane is enhanced by another protein called apolipoprotein A-I (apoA-I), which is produced by the \(APOA1\) gene. Once outside the cell, the cholesterol and phospholipids combine with apoA-I to form HDL. ApoA-I also triggers a reaction that converts cholesterol to a form that can be fully integrated into HDL and transported through the bloodstream.

\(ABCA1\) gene mutations and some \(APOA1\) gene mutations prevent the release of cholesterol and phospholipids from cells. Other mutations in the \(APOA1\) gene reduce the protein’s ability to stimulate the conversion of cholesterol. These \(ABCA1\) and \(APOA1\) gene mutations decrease the amount of cholesterol or phospholipids available to form HDL, resulting in low levels of HDL in the blood. A shortage (deficiency) of HDL is believed to increase the risk of cardiovascular disease.
Inheritance Pattern

Familial HDL deficiency is inherited in an autosomal dominant pattern, which means an alteration in one copy of either the \textit{ABCA1} or the \textit{APOA1} gene in each cell is sufficient to cause the disorder. People with alterations in both copies of the \textit{ABCA1} gene develop the related disorder Tangier disease.

Other Names for This Condition

- familial hypoalphalipoproteinemia
- FHA
- HDL deficiency, type 2
- HDLD
- low serum HDL cholesterol
- primary hypoalphalipoproteinemia

Diagnosis & Management

Genetic Testing Information

- What is genetic testing? /primer/testing/genetictesting

Research Studies from ClinicalTrials.gov

- ClinicalTrials.gov https://clinicaltrials.gov/ct2/results?cond=%22familial+HDL+deficiency%22+OR+%22Hypoalphalipoproteinemias%22

Additional Information & Resources

Health Information from MedlinePlus

- Health Topic: Cholesterol https://medlineplus.gov/cholesterol.html
- Health Topic: Heart Diseases https://medlineplus.gov/heartdiseases.html

Genetic and Rare Diseases Information Center

- Familial HDL deficiency https://rarediseases.info.nih.gov/diseases/2872/familial-hdl-deficiency
Educational Resources

• American Heart Association: Good vs. Bad Cholesterol

• Centers for Disease Control and Prevention: Heart Disease
  https://www.cdc.gov/heartdisease/

• Kaiser Permanente: Familial Hypoalphalipoproteinemia
  https://mydoctor.kaiserpermanente.org/ncal/specialty/genetics/resources/conditions/familial_hypoalphalipoproteinemia.jsp

Patient Support and Advocacy Resources

• American Heart Association
  https://www.heart.org/

• National Lipid Association
  https://www.lipid.org/

Scientific Articles on PubMed

• PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28familial+hdl+deficiency%5BTIAB%5D%29+OR+%28primary+hypoalphalipoproteinemia%5BTIAB%5D%29+OR+%28familial+hypoalphalipoproteinemia%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22+AND+hypoalphalipoproteinemia%5Btiab%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22+AND+hypoalphalipoproteinemia%5Btiab%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22+AND+hypoalphalipoproteinemia%5Btiab%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22

Catalog of Genes and Diseases from OMIM

• HYPOALPHALIPOPROTEINEMIA, PRIMARY, 1
  http://omim.org/entry/604091

Sources for This Summary

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/9555873

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/10533863
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/10998475

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/12615680


Reviewed: November 2012  
Published: August 4, 2020

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