Iron-refractory iron deficiency anemia

Iron-refractory iron deficiency anemia is one of many types of anemia, which is a group of conditions characterized by a shortage of healthy red blood cells. This shortage prevents the blood from carrying an adequate supply of oxygen to the body's tissues.

Iron-refractory iron deficiency anemia results from an inadequate amount (deficiency) of iron in the bloodstream. It is described as "iron-refractory" because the condition is totally resistant (refractory) to treatment with iron given orally and partially resistant to iron given in other ways, such as intravenously (by IV). In people with this form of anemia, red blood cells are abnormally small (microcytic) and pale (hypochromic). The symptoms of iron-refractory iron deficiency anemia can include tiredness (fatigue), weakness, pale skin, and other complications. These symptoms are most pronounced during childhood, although they tend to be mild. Affected individuals usually have normal growth and development.

Frequency

Although iron deficiency anemia is relatively common, the prevalence of the iron-refractory form of the disease is unknown. At least 50 cases have been described in the medical literature. Researchers suspect that iron-refractory iron deficiency anemia is underdiagnosed because affected individuals with very mild symptoms may never come to medical attention.

Causes

Mutations in the TMPRSS6 gene cause iron-refractory iron deficiency anemia. This gene provides instructions for making a protein called matriptase-2, which helps regulate iron levels in the body. TMPRSS6 gene mutations reduce or eliminate functional matriptase-2, which disrupts iron regulation and leads to a shortage of iron in the bloodstream. Iron is an essential component of hemoglobin, which is the molecule in red blood cells that carries oxygen. When not enough iron is available in the bloodstream, less hemoglobin is produced, causing red blood cells to be abnormally small and pale. The abnormal cells cannot carry oxygen effectively to the body's cells and tissues, which leads to fatigue, weakness, and other symptoms of anemia.

Inheritance Pattern

This condition is inherited in an autosomal recessive pattern, which means both copies of the gene in each cell have mutations. The parents of an individual with an autosomal recessive condition each carry one copy of the mutated gene, but they typically do not show signs and symptoms of the condition.
Other Names for This Condition

- anemia, hypochromic microcytic, with defect in iron metabolism
- IRIDA
- IRIDA syndrome
- iron-handling disorder, hereditary

Diagnosis & Management

Genetic Testing Information

- What is genetic testing?
  /primer/testing/genetictesting
- Genetic Testing Registry: Microcytic anemia

Research Studies from ClinicalTrials.gov

- ClinicalTrials.gov
  https://clinicaltrials.gov/ct2/results?cond=%22iron-refractory+iron+deficiency+anemia%22+OR+%22IRIDA+syndrome%22

Other Diagnosis and Management Resources

- MedlinePlus Medical Tests: Iron Tests
  https://medlineplus.gov/lab-tests/iron-tests/
- National Heart, Lung, and Blood Institute: How is Anemia Diagnosed?
  https://www.nhlbi.nih.gov/health-topics/anemia#Diagnosis
- National Heart, Lung, and Blood Institute: How is Anemia Treated?
  https://www.nhlbi.nih.gov/health-topics/anemia#Treatment

Additional Information & Resources

Health Information from MedlinePlus

- Encyclopedia: Anemia
  https://medlineplus.gov/ency/article/000560.htm
- Encyclopedia: Hypochromia
  https://medlineplus.gov/ency/article/003455.htm
- Encyclopedia: Iron Deficiency Anemia
  https://medlineplus.gov/ency/article/000584.htm
- Health Topic: Anemia
  https://medlineplus.gov/anemia.html
- Medical Tests: Iron Tests
  https://medlineplus.gov/lab-tests/iron-tests/
Genetic and Rare Diseases Information Center

- Iron-refractory iron deficiency anemia
  https://rarediseases.info.nih.gov/diseases/10957/iron-refractory-iron-deficiency-anemia

Additional NIH Resources

- National Heart, Lung, and Blood Institute: What is Anemia?
  https://www.nhlbi.nih.gov/health-topics/anemia

Educational Resources

- Boston Children's Hospital: Anemia
  http://www.childrenshospital.org/conditions-and-treatments/conditions/a/anemia
- Harvard University Information Center for Sickle Cell and Thalassemic Disorders
  http://sickle.bwh.harvard.edu/menu_iron.html
- MalaCards: iron-refractory iron deficiency anemia
  https://www.malacards.org/card/iron_refractory_iron_deficiency_anemia
- Merck Manual Consumer Version: Overview of Anemia
  https://www.merckmanuals.com/home/blood-disorders/anemia/overview-of-anemia
- Orphanet: IRIDA syndrome
  https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=209981

Patient Support and Advocacy Resources

- American Society of Hematology: Patient Groups
  https://www.hematology.org/education/patients/patient-groups

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28iron-refractory+iron+deficiency+anemia%5BTIAB%5D%29+OR+%28irida%5BTIAB%5D%29+OR+%28pseudo-iron-deficiency+anemia%5BTIAB%5D%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM

- IRON-REFRACTORY IRON DEFICIENCY ANEMIA
  http://omim.org/entry/206200
Sources for This Summary

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/21862411
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/23729726 
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3669438/
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/20232450
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/18408718 
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3104019/

Reprinted from Genetics Home Reference:

Reviewed: July 2014
Published: April 28, 2020

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