Dopamine beta-hydroxylase deficiency

Dopamine beta (β)-hydroxylase deficiency is a condition that affects the autonomic nervous system, which controls involuntary body processes such as the regulation of blood pressure and body temperature. Problems related to this disorder can first appear during infancy. Early signs and symptoms may include episodes of vomiting, dehydration, decreased blood pressure (hypotension), difficulty maintaining body temperature, and low blood sugar (hypoglycemia).

Individuals with dopamine β-hydroxylase deficiency typically experience a sharp drop in blood pressure upon standing (orthostatic hypotension), which can cause dizziness, blurred vision, or fainting. This sudden drop in blood pressure is usually more severe when getting out of bed in the morning, during hot weather, and as a person gets older. People with dopamine β-hydroxylase deficiency experience extreme fatigue during exercise (exercise intolerance) due to their problems maintaining a normal blood pressure.

Other features of dopamine β-hydroxylase deficiency include droopy eyelids (ptosis), nasal congestion, and an inability to stand for a prolonged period of time. Affected males may also experience retrograde ejaculation, a discharge of semen backwards into the bladder. Less common features include an unusually large range of joint movement (hypermobility) and muscle weakness.

Frequency

Dopamine β-hydroxylase deficiency is a very rare disorder. Fewer than 20 affected individuals, all of Western European descent, have been described in the scientific literature.

Causes

Mutations in the DBH gene cause dopamine β-hydroxylase deficiency. The DBH gene provides instructions for producing the enzyme dopamine β-hydroxylase. This enzyme converts dopamine to norepinephrine, both of which are chemical messengers (neurotransmitters) that transmit signals between nerve cells.

DBH gene mutations result in the production of a nonfunctional dopamine β-hydroxylase enzyme. People who lack functional dopamine β-hydroxylase cannot convert dopamine to norepinephrine, which leads to a shortage of norepinephrine in the body. The lack of norepinephrine causes difficulty with regulating blood pressure and other autonomic nervous system problems seen in dopamine β-hydroxylase deficiency.
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
• dopamine β-hydroxylase
• noradrenaline deficiency
• norepinephrine deficiency

Diagnosis & Management
Genetic Testing Information
• What is genetic testing? https://primer/testing/genetictesting

Research Studies from ClinicalTrials.gov
• ClinicalTrials.gov https://clinicaltrials.gov/ct2/results?cond=%22dopamine+beta-hydroxylase+deficiency%22

Other Diagnosis and Management Resources
• Vanderbilt Autonomic Dysfunction Center https://ww2.mc.vanderbilt.edu/adc/4792

Additional Information & Resources
Health Information from MedlinePlus
• Health Topic: Autonomic Nervous System Disorders https://medlineplus.gov/autonomicnervoussystemdisorders.html

Genetic and Rare Diseases Information Center
• Dopamine beta hydroxylase deficiency https://rarediseases.info.nih.gov/diseases/1903/dopamine-beta-hydroxylase-deficiency
Additional NIH Resources

• National Institute of Neurological Disorders and Stroke: Dysautonomia Information Page
  https://www.ninds.nih.gov/Disorders/All-Disorders/Dysautonomia-Information-Page

Educational Resources

• MalaCards: dopamine beta-hydroxylase deficiency, congenital
  https://www.malacards.org/card/dopamine_beta_hydroxylase_deficiency_congenital

• Merck Manual Consumer Version: Autonomic Neuropathies

• Merck Manual Consumer Version: Dizziness or Light-Headedness When Standing Up

• Orphanet: Dopamine beta-hydroxylase deficiency
  https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=230

• Washington University, St. Louis: Neuromuscular Disease Center
  https://neuromuscular.wustl.edu/autonomic.html#dbh

Patient Support and Advocacy Resources

• Metabolic Support UK
  https://www.metabolicsupportuk.org/

Clinical Information from GeneReviews

• Dopamine Beta-Hydroxylase Deficiency
  https://www.ncbi.nlm.nih.gov/books/NBK1474

Scientific Articles on PubMed

• PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28dopamine+beta-hydroxylase+deficiency%5BTIAB%5D%29+OR+%28norepinephrine+deficiency%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

• ORTHOSTATIC HYPOTENSION 1
  http://omim.org/entry/223360
Medical Genetics Database from MedGen

- Dopamine beta-hydroxylase deficiency

Sources for This Summary

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/15088079

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/11857564

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/20301647

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/18368300

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16722595
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1459119/

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/12102462

Reprinted from Genetics Home Reference:

Reviewed: September 2008
Published: December 10, 2019

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