Norrie Disease

https://medlineplus.gov/genetics/condition/norrie-disease/

You Are Here:

Home

→

Genetics

→

Genetic Conditions

→

Norrie disease

Norrie disease

Description

Norrie disease is an inherited eye disorder that leads to blindness in male infants at birth or soon after birth. It causes abnormal development of the retina, the layer of sensory cells that detect light and color, with masses of immature retinal cells accumulating at the back of the eye. As a result, the pupils appear white when light is shone on them, a sign called leukocoria. The irises (colored portions of the eyes) or the entire eyeballs may shrink and deteriorate during the first months of life, and cataracts (cloudiness in the lens of the eye) may eventually develop.About 30 percent of individuals with Norrie disease develop progressive hearing loss, and 30 to 50 percent of people affected experience developmental delays in motor skills such as sitting up and walking. Other problems may include mild to moderate intellectual disability, often with psychosis, and abnormalities that can affect circulation, breathing, digestion, excretion, or reproduction.

Frequency

Norrie disease is a rare disorder; more than 400 cases have been reported in the scientific literature.

Causes

Mutations in the NDP gene cause Norrie disease. The NDP gene provides instructions for making a protein called norrin. Norrin participates in the Wnt cascade, a sequence of steps that affect the way cells and tissues develop. In particular, norrin seems to play a critical role in the specialization of retinal cells for their unique sensory capabilities. It is also involved in the establishment of a blood supply to tissues of the retina and the inner ear, and the development of other body systems.In order to initiate the Wnt cascade, norrin must bind (attach) to another protein called frizzled-4. Mutations in the norrin protein interfere with its ability to bind to frizzled-4, resulting in the signs and symptoms of Norrie disease.

Learn more about the gene associated with Norrie disease

NDP

Inheritance

This condition is inherited in an X-linked recessive pattern. A condition is considered X-linked if the

mutated gene that causes the disorder is located on the X chromosome, one of the two sex chromosomes. In males (who have only one X chromosome), one altered copy of the gene in each cell is sufficient to cause the condition. In females (who have two X chromosomes), a mutation must be present in both copies of the gene to cause the disorder. Males are affected by X-linked recessive disorders much more frequently than females. A characteristic of X-linked inheritance is that fathers cannot pass X-linked traits to their sons.In X-linked recessive inheritance, a female with one altered copy of the gene in each cell is called a carrier. She can pass on the gene, but generally does not experience signs and symptoms of the disorder.In rare cases, however, carrier females have shown some retinal abnormalities or mild hearing loss associated with Norrie disease. Females with one NDP gene mutation who show features of Norrie disease do so because of a process called X-inactivation. Early in embryonic development in females, one of the two X chromosomes is permanently turned off (inactivated) in somatic cells (cells other than egg and sperm cells). X-inactivation ensures that females, like males, have only one active copy of the X chromosome in each body cell. Usually X-inactivation occurs randomly, so that each X chromosome is active in about half the body's cells. This means that in females with an NDP gene mutation, the X chromosome with an NDP gene mutation is active in about half of cells, and the X chromosome with the normal NDP gene is active in about half. Because X-inactivation leads to some cells that produce functional norrin protein and some cells that do not, females can have some features of Norrie disease.

Other Names for This Condition

Anderson-Warburg syndrome Atrophia bulborum hereditaria Congenital progressive oculo-acoustico-cerebral degeneration Episkopi blindness Fetal iritis syndrome Norrie syndrome

Norrie's disease Norrie-Warburg syndrome Oligophrenia microphthalmus Pseudoglioma congenita Whitnall-Norman syndrome

Additional Information & Resources

Genetic Testing Information

Genetic Testing Registry: Atrophia bulborum hereditaria

Genetic and Rare Diseases Information Center

Norrie disease

Patient Support and Advocacy Resources

National Organization for Rare Disorders (NORD)

Clinical Trials

ClinicalTrials.gov

Catalog of Genes and Diseases from OMIM

NORRIE DISEASE; ND

Scientific Articles on PubMed

PubMed

References

Braunger BM, Tamm ER. The different functions of Norrin. Adv Exp Med Biol. 2012;723:679-83. doi: 10.1007/978-1-4614-0631-0_86. No abstract available. Citation on PubMed

Michaelides M, Luthert PJ, Cooling R, Firth H, Moore AT. Norrie disease and peripheral venous insufficiency. Br J Ophthalmol. 2004 Nov;88(11):1475. doi: 10.1136/bjo.2004.042556. No abstract available. Erratum In: Br J Ophthalmol. 2005 May;89(5):645. Citation on PubMed or Free article on PubMed Central

National Organization for Rare Disorders (NORD)

Rehm HL, Zhang DS, Brown MC, Burgess B, Halpin C, Berger W, Morton CC, Corey DP, Chen ZY. Vascular defects and sensorineural deafness in a mouse model of Norrie disease. J Neurosci. 2002 Jun 1;22(11):4286-92. doi: 10.1523/JNEUROSCI.22-11-04286.2002. Citation on PubMed

Rodriguez-Munoz A, Garcia-Garcia G, Menor F, Millan JM, Tomas-Vila M, Jaijo T. The importance of biochemical and genetic findings in the diagnosis of atypical Norrie disease. Clin Chem Lab Med. 2018 Jan 26;56(2):229-235. doi: 10.1515/cclm-2017-0226. Citation on PubMed

Scruggs BA, Reding MQ, Schimmenti LA. NDP-Related Retinopathies. 1999 Jul 30 [updated 2023 Mar 23]. In: Adam MP, Feldman J, Mirzaa GM, Pagon RA, Wallace SE, Bean LJH, Gripp KW, Amemiya A, editors. GeneReviews(R) [Internet]. Seattle (WA): University of Washington, Seattle; 1993-2024. Available from http://www.ncbi.nlm.nih.gov/books/NBK1331/

Citation on PubMed

Smith SE, Mullen TE, Graham D, Sims KB, Rehm HL. Norrie disease: extraocular clinical manifestations in 56 patients. Am J Med Genet A. 2012 Aug;158A(8):1909-17. doi: 10.1002/ajmg.a.35469. Epub 2012 Jul 11. Citation on PubMed

Wang Z, Liu CH, Huang S, Chen J. Wnt Signaling in vascular eye diseases. Prog Retin Eye Res. 2019 May;70:110-133. doi: 10.1016/j.preteyeres.2018.11.008. Epub 2018 Dec 1. Citation on PubMed or Free article on PubMed Central

Xu Q, Wang Y, Dabdoub A, Smallwood PM, Williams J, Woods C, Kelley MW, Jiang L, Tasman W, Zhang K, Nathans J. Vascular development in the retina and inner ear: control by Norrin and Frizzled-4, a high-affinity ligand-receptor pair. Cell. 2004 Mar 19;116(6):883-95. doi: 10.1016/s0092-8674(04)00216-8. Citation on PubMed

Yang H, Li S, Xiao X, Guo X, Zhang Q. Screening for NDP mutations in 44 unrelated patients with familial exudative vitreoretinopathy or Norrie disease. Curr Eye Res. 2012 Aug;37(8):726-9. doi: 10.3109/02713683.2012.675615. Epub 2012 May 7. Citation on PubMed

Enlarge image

Related Health Topics

Eye Diseases

Genetic Disorders

MEDICAL ENCYCLOPEDIA

Genetics

Understanding Genetics

What is the prognosis of a genetic condition?

How can gene variants affect health and development?

What does it mean if a disorder seems to run in my family?

What are the different ways a genetic condition can be inherited?

How are genetic conditions treated or managed?

Disclaimers

The information on this site should not be used as a substitute for professional medical care or advice. Contact a health care provider if you have questions about your health.

Learn how to cite this page