Leber congenital amaurosis

Description

Leber congenital amaurosis, also known as LCA, is an eye disorder that is present from birth (congenital). This condition primarily affects the retina, which is the specialized tissue at the back of the eye that detects light and color. People with this disorder typically have severe visual impairment beginning at birth or shortly afterward. The visual impairment tends to be severe and may worsen over time.

Leber congenital amaurosis is also associated with other vision problems, including an increased sensitivity to light (photophobia), involuntary movements of the eyes (nystagmus), and extreme farsightedness (hyperopia). The pupils, which usually expand and contract in response to the amount of light entering the eye, do not react normally to light. Instead, they expand and contract more slowly than normal, or they may not respond to light at all.

A specific behavior called Franceschetti's oculo-digital sign is characteristic of Leber congenital amaurosis. This sign consists of affected individuals poking, pressing, and rubbing their eyes with a knuckle or finger. Poking their eyes often results in the sensation of flashes of light called phosphenes. Researchers suspect that this behavior may contribute to deep-set eyes in affected children.

In very rare cases, delayed development and intellectual disability have been reported in people with the features of Leber congenital amaurosis. Because of the visual loss, affected children may become isolated. Providing children with opportunities to play, hear, touch, understand and other early educational interventions may prevent developmental delays in children with Leber congenital amaurosis.

At least 20 genetic types of Leber congenital amaurosis have been described. The types are distinguished by their genetic cause, patterns of vision loss, and related eye abnormalities.

Frequency

Leber congenital amaurosis occurs in 2 to 3 per 100,000 newborns. It is one of the most common causes of blindness in children.

Causes

Leber congenital amaurosis can result from variants (also known as mutations) in at least 20 genes, all of which are necessary for function of the retina and normal vision. These genes play a variety of roles in the development and function of the retina. For example, some of the genes associated with this disorder are necessary for the normal development of light-detecting cells called photoreceptors. Other genes are involved in phototransduction, the process by which light entering the eye is converted into electrical signals that are transmitted to the brain. Still other genes play a role in the function of cilia, which are microscopic finger-like projections that stick out from the surface of many types of cells. Cilia are found in the retina's photoreceptors and are necessary for vision.

Variants in any of the genes associated with Leber congenital amaurosis disrupt the development and function of the retina, resulting in early vision loss. Variants in the *CEP290*, *CRB1*, *GUCY2D*, and *RPE65* genes are the most common causes of Leber congenital amaurosis, while variants in the other genes generally account for a smaller percentage of cases. In about 30 percent of all people with Leber congenital amaurosis, the cause of the disorder is unknown, though research is ongoing.

Learn more about the genes associated with Leber congenital amaurosis

- CEP290
- CRB1
- CRX
- GDF6
- GUCY2D
- PRPH2
- RPE65

Additional Information from NCBI Gene:

- AIPL1
- IMPDH1
- IQCB1
- KCNJ13
- LCA5
- LRAT
- NMNAT1
- RD3
- RDH12
- RPGRIP1
- SPATA7

- TULP1
- USP45

Inheritance

Leber congenital amaurosis usually has an autosomal recessive pattern of inheritance. Autosomal recessive inheritance means both copies of the gene in each cell have variants. The parents of an individual with an autosomal recessive condition each carry only one copy of the altered gene, and therefore they typically do not show any signs and symptoms of the disease.

When Leber congenital amaurosis is caused by varaints in the *CRX* or *IMPDH1* genes, the disorder has an autosomal dominant pattern of inheritance. Autosomal dominant inheritance means one copy of the altered gene in each cell is sufficient to cause the disorder. In most of these cases, an affected person inherits a gene mutation from one affected parent. Other cases result from new variants and occur in people with no history of the disorder in their family.

Other Names for This Condition

- Amaurosis, Leber congenital
- Congenital amaurosis of retinal origin
- Congenital retinal blindness
- CRB
- Dysgenesis neuroepithelialis retinae
- Hereditary epithelial dysplasia of retina
- Hereditary retinal aplasia
- Heredoretinopathia congenitalis
- LCA
- Leber abiotrophy
- Leber congenital tapetoretinal degeneration
- Leber's amaurosis

Additional Information & Resources

Genetic Testing Information

- Genetic Testing Registry: Leber congenital amaurosis (https://www.ncbi.nlm.nih.gov/gtr/conditions/C0339527/)
- Genetic Testing Registry: Leber congenital amaurosis 1 (https://www.ncbi.nlm.nih.gov/gtr/conditions/C2931258/)
- Genetic Testing Registry: Leber congenital amaurosis 10 (https://www.ncbi.nlm.nih.

gov/gtr/conditions/C1857821/)

- Genetic Testing Registry: Leber congenital amaurosis 11 (https://www.ncbi.nlm.nih.gov/gtr/conditions/C1840284/)
- Genetic Testing Registry: Leber congenital amaurosis 12 (https://www.ncbi.nlm.nih.gov/gtr/conditions/C1857743/)
- Genetic Testing Registry: Leber congenital amaurosis 13 (https://www.ncbi.nlm.nih.gov/gtr/conditions/C2675186/)
- Genetic Testing Registry: Leber congenital amaurosis 14 (https://www.ncbi.nlm.nih.gov/gtr/conditions/C2750063/)
- Genetic Testing Registry: Leber congenital amaurosis 15 (https://www.ncbi.nlm.nih.gov/gtr/conditions/C3151206/)
- Genetic Testing Registry: Leber congenital amaurosis 16 (https://www.ncbi.nlm.nih.gov/gtr/conditions/C3280062/)
- Genetic Testing Registry: Leber congenital amaurosis 17 (https://www.ncbi.nlm.nih.gov/gtr/conditions/C3715164/)
- Genetic Testing Registry: Leber congenital amaurosis 18 (https://www.ncbi.nlm.nih.gov/gtr/conditions/C4013102/)
- Genetic Testing Registry: Leber congenital amaurosis 2 (https://www.ncbi.nlm.nih.gov/gtr/conditions/C1859844/)
- Genetic Testing Registry: Leber congenital amaurosis 3 (https://www.ncbi.nlm.nih.gov/gtr/conditions/C1858677/)
- Genetic Testing Registry: Leber congenital amaurosis 4 (https://www.ncbi.nlm.nih.gov/gtr/conditions/C1858386/)
- Genetic Testing Registry: Leber congenital amaurosis 5 (https://www.ncbi.nlm.nih.gov/gtr/conditions/C1858301/)
- Genetic Testing Registry: Leber congenital amaurosis 6 (https://www.ncbi.nlm.nih.gov/gtr/conditions/C1854260/)
- Genetic Testing Registry: Leber congenital amaurosis 7 (https://www.ncbi.nlm.nih.gov/gtr/conditions/C3151192/)
- Genetic Testing Registry: Leber congenital amaurosis 8 (https://www.ncbi.nlm.nih.gov/gtr/conditions/C3151202/)
- Genetic Testing Registry: Leber congenital amaurosis 9 (https://www.ncbi.nlm.nih.gov/gtr/conditions/C1837873/)

Genetic and Rare Diseases Information Center

- Leber congenital amaurosis (https://rarediseases.info.nih.gov/diseases/634/index)

Patient Support and Advocacy Resources

- National Organization for Rare Disorders (NORD) (https://rarediseases.org/)

Clinical Trials

- ClinicalTrials.gov (https://clinicaltrials.gov/search?cond=%22Leber congenital amaurosis%22)

Catalog of Genes and Diseases from OMIM

- LEBER CONGENITAL AMAUROSIS 1; LCA1 (https://omim.org/entry/204000)
- LEBER CONGENITAL AMAUROSIS 2; LCA2 (https://omim.org/entry/204100)
- LEBER CONGENITAL AMAUROSIS 5; LCA5 (https://omim.org/entry/604537)
- LEBER CONGENITAL AMAUROSIS 3; LCA3 (https://omim.org/entry/604232)
- LEBER CONGENITAL AMAUROSIS 4; LCA4 (https://omim.org/entry/604393)
- LEBER CONGENITAL AMAUROSIS 9; LCA9 (https://omim.org/entry/608553)
- LEBER CONGENITAL AMAUROSIS 10; LCA10 (https://omim.org/entry/611755)
- LEBER CONGENITAL AMAUROSIS 12; LCA12 (https://omim.org/entry/610612)
- LEBER CONGENITAL AMAUROSIS 17; LCA17 (https://omim.org/entry/615360)
- LEBER CONGENITAL AMAUROSIS 19; LCA19 (https://omim.org/entry/618513)
- LEBER CONGENITAL AMAUROSIS 13; LCA13 (https://omim.org/entry/612712)
- LEBER CONGENITAL AMAUROSIS 15; LCA15 (https://omim.org/entry/613843)
- LEBER CONGENITAL AMAUROSIS 16; LCA16 (https://omim.org/entry/614186)
- LEBER CONGENITAL AMAUROSIS 14; LCA14 (https://omim.org/entry/613341)
- LEBER CONGENITAL AMAUROSIS 6; LCA6 (https://omim.org/entry/613826)
- LEBER CONGENITAL AMAUROSIS 7; LCA7 (https://omim.org/entry/613829)
- LEBER CONGENITAL AMAUROSIS 8; LCA8 (https://omim.org/entry/613835)
- LEBER CONGENITAL AMAUROSIS 11; LCA11 (https://omim.org/entry/613837)

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28%28Leber*%5BTI%5D%29+AND+%28amaurosis%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D)

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