Jacobsen Syndrome

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Jacobsen syndrome is a condition caused by a loss of genetic material from chromosome 11. Because this deletion occurs at the end (terminus) of the long (q) arm of chromosome 11, Jacobsen syndrome is also known as 11q terminal deletion disorder.

Keywords: genetic conditions

1. Introduction

The signs and symptoms of Jacobsen syndrome vary considerably. Most affected individuals have delayed development, including the development of speech and motor skills (such as sitting, standing, and walking). Most also have cognitive impairment and learning difficulties. Behavioral problems have been reported, including compulsive behavior (such as shredding paper), a short attention span, and easy distractibility. Many people with Jacobsen syndrome have been diagnosed with attention-deficit/hyperactivity disorder (ADHD). Jacobsen syndrome is also associated with an increased likelihood of autism spectrum disorders, which are characterized by impaired communication and socialization skills.

Jacobsen syndrome is also characterized by distinctive facial features. These include small and low-set ears, widely set eyes (hypertelorism) with droopy eyelids (ptosis), skin folds covering the inner corner of the eyes (epicanthal folds), a broad nasal bridge, downturned corners of the mouth, a thin upper lip, and a small lower jaw. Affected individuals often have a large head size (macrocephaly) and a skull abnormality called trigonocephaly, which gives the forehead a pointed appearance.

More than 90 percent of people with Jacobsen syndrome have a bleeding disorder called Paris-Trousseau syndrome. This condition causes a lifelong risk of abnormal bleeding and easy bruising. Paris-Trousseau syndrome is a disorder of platelets, which are blood cells that are necessary for blood clotting.

Other features of Jacobsen syndrome can include heart defects, feeding difficulties in infancy, short stature, frequent ear and sinus infections, and skeletal abnormalities. The disorder can also affect the digestive system, kidneys, and genitalia. The life expectancy of people with Jacobsen syndrome is unknown, although affected individuals have lived into adulthood.

2. Frequency

The estimated incidence of Jacobsen syndrome is 1 in 100,000 newborns. More than 200 affected individuals have been reported.

3. Causes

Jacobsen syndrome is caused by a deletion of genetic material at the end of the long (q) arm of chromosome 11. The size of the deletion varies among affected individuals, with most affected people missing 5 million to 16 million DNA building blocks (also written as 5 Mb to 16 Mb). In almost all affected people, the deletion includes the tip of chromosome 11. Larger deletions tend to cause more severe signs and symptoms than smaller deletions.

The features of Jacobsen syndrome are likely related to the loss of multiple genes on chromosome 11. Depending on its size, the deleted region can contain from about 170 to more than 340 genes. Many of these genes have not been well characterized. However, genes in this region appear to be critical for the normal development of many parts of the body, including the brain, facial features, and heart. Only a few genes have been studied as possible contributors to the specific features of Jacobsen syndrome; researchers are working to determine which additional genes may be associated with this condition.

3.1. The gene and chromosome associated with Jacobsen syndrome

- FLI1
- chromosome 11

4. Inheritance

Most cases of Jacobsen syndrome are not inherited. They result from a chromosomal deletion that occurs as a random event during the formation of reproductive cells (eggs or sperm) or in early fetal development. Affected people typically have no history of the disorder in their family, although they can pass the chromosome deletion to their children.

Between 5 and 10 percent of people with Jacobsen syndrome inherit the chromosome abnormality from an unaffected parent. In these cases, the parent carries a chromosomal rearrangement called a balanced translocation, in which a segment from chromosome 11 has traded places with a segment from another chromosome. In a balanced translocation, no genetic material is gained or lost. Balanced translocations usually do not cause any health problems; however, they can become unbalanced as they are passed to the next generation.

Children who inherit an unbalanced translocation can have a chromosomal rearrangement with some missing genetic material and some extra genetic material. Individuals with Jacobsen syndrome who inherit an unbalanced translocation are missing genetic material from the end of the long arm of chromosome 11 and have extra genetic material from another chromosome. These chromosomal changes result in the health problems characteristic of this disorder.

5. Other Names for This Condition

- 11q deletion disorder
- 11q deletion syndrome
- 11q terminal deletion disorder
- 11q- deletion syndrome
- 11q23 deletion disorder
- Jacobsen thrombocytopenia

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