Coats Plus Syndrome

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Coats plus syndrome is an inherited condition characterized by an eye disorder called Coats disease plus abnormalities of the brain, bones, gastrointestinal system, and other parts of the body.

Keywords: genetic conditions

1. Introduction

Coats disease affects the retina, which is the tissue at the back of the eye that detects light and color. The disorder causes blood vessels in the retina to be abnormally enlarged (dilated) and twisted. The abnormal vessels leak fluid, which can eventually cause the layers of the retina to separate (retinal detachment). These eye abnormalities often result in vision loss.

People with Coats plus syndrome also have brain abnormalities including abnormal deposits of calcium (calcification), the development of fluid-filled pockets called cysts, and loss of a type of brain tissue known as white matter (leukodystrophy). These brain abnormalities worsen over time, causing slow growth, movement disorders, seizures, and a decline in intellectual function.

Other features of Coats plus syndrome include low bone density (osteopenia), which causes bones to be fragile and break easily, and a shortage of red blood cells (anemia), which can lead to unusually pale skin (pallor) and extreme tiredness (fatigue). Affected individuals can also have serious or life-threatening complications including abnormal bleeding in the gastrointestinal tract, high blood pressure in the vein that supplies blood to the liver (portal hypertension), and liver failure. Less common features of Coats plus syndrome can include sparse, prematurely gray hair; malformations of the fingernails and toenails; and abnormalities of skin coloring (pigmentation), such as light brown patches called café-au-lait spots.

Coats plus syndrome and a disorder called leukoencephalopathy with calcifications and cysts (LCC; also called Labrune syndrome) have sometimes been grouped together under the umbrella term cerebroretinal microangiopathy with calcifications and cysts (CRMCC) because they feature very similar brain abnormalities. However, researchers recently found that Coats plus syndrome and LCC have different genetic causes, and they are now generally described as separate disorders instead of variants of a single condition.

2. Frequency

Coats plus syndrome appears to be a rare disorder. Its prevalence is unknown.

3. Causes

Coats plus syndrome results from mutations in the *CTC1* gene. This gene provides instructions for making a protein that plays an important role in structures known as telomeres, which are found at the ends of chromosomes. Telomeres are short, repetitive segments of DNA that help protect chromosomes from abnormally sticking together or breaking down (degrading). In most cells, telomeres become progressively shorter as the cell divides. After a certain number of cell divisions, the telomeres become so short that they trigger the cell to stop dividing or to self-destruct (undergo apoptosis). The CTC1 protein works as part of a group of proteins known as the CST complex, which is involved in the copying (replication) of telomeres. The CST complex helps prevent telomeres from being degraded in some cells as the cells divide.

Mutations in the *CTC1* gene impair the function of the CST complex, which affects the replication of telomeres. However, it is unclear how *CTC1* gene mutations impact telomere structure and function. Some studies have found that people with *CTC1* gene mutations have abnormally short telomeres, while other studies have found no change in telomere length.

Researchers are working to determine how telomeres are different in people with *CTC1* gene mutations and how these changes could underlie the varied signs and symptoms of Coats plus syndrome.

3.1. The Gene Associated with Coats Plus Syndrome

- CTC1

4. Inheritance

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.

5. Other Names for This Condition

- cerebroretinal microangiopathy with calcifications and cysts
- CRMCC

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