Trichothiodystrophy

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Trichothiodystrophy, which is commonly called TTD, is a rare inherited condition that affects many parts of the body. The hallmark of this condition is brittle hair that is sparse and easily broken. Tests show that the hair is lacking sulfur, an element that normally gives hair its strength.

genetic conditions

1. Introduction

Trichothiodystrophy, which is commonly called TTD, is a rare inherited condition that affects many parts of the body. The hallmark of this condition is brittle hair that is sparse and easily broken. Tests show that the hair is lacking sulfur, an element that normally gives hair its strength.

The signs and symptoms of trichothiodystrophy vary widely. Mild cases may involve only the hair. More severe cases also cause delayed development, significant intellectual disability, and recurrent infections; severely affected individuals may survive only into infancy or early childhood.

Mothers of children with trichothiodystrophy may experience problems during pregnancy including pregnancy-induced high blood pressure (preeclampsia) and a related condition called HELLP syndrome that can damage the liver. Babies with trichothiodystrophy are at increased risk of premature birth, low birth weight, and slow growth.

2. Frequency

Trichothiodystrophy has an estimated incidence of about 1 in 1 million newborns in the United States and Europe. About 100 affected individuals have been reported worldwide.

3. Causes

Most cases of the photosensitive form of trichothiodystrophy result from mutations in one of three genes: *ERCC2*, *ERCC3*, or *GTF2H5*. The proteins produced from these genes work together as part of a group of proteins called the general transcription factor IIH (TFIIH) complex. This complex is involved in the repair of DNA damage, which can be caused by UV radiation from the sun. The TFIIH complex also plays an important role in gene transcription, which is the first step in protein production.

Mutations in the *ERCC2*, *ERCC3*, or *GTF2H5* genes reduce the amount of TFIIH complex within cells, which impairs both DNA repair and gene transcription. An inability to repair DNA damage probably underlies the sun sensitivity in affected individuals. Studies suggest that many of the other features of trichothiodystrophy may result from problems with the transcription of genes needed for normal development before and after birth.

Mutations in at least one gene, *MPLKIP*, have been reported to cause a non-photosensitive form of trichothiodystrophy. Mutations in this gene account for fewer than 20 percent of all cases of non-photosensitive trichothiodystrophy. Little is known about the protein produced from the *MPLKIP* gene, although it does not appear to be involved in DNA repair. It is unclear how mutations in the *MPLKIP* gene lead to the varied features of trichothiodystrophy.

In some cases, the genetic cause of trichothiodystrophy is unknown.

3.1 The genes associated with Trichothiodystrophy

- ERCC2
- ERCC3
- GTF2H5
- MPLKIP

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

- Amish brittle hair syndrome
- BIDS syndrome
- brittle hair-intellectual impairment-decreased fertility-short stature syndrome
- IBIDS
- PIBIDS
- TTD

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