Glutamate Formiminotransferase Deficiency

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Glutamate formiminotransferase deficiency is an inherited disorder that affects physical and mental development. There are two forms of this condition, which are distinguished by the severity of symptoms.

Keywords: genetic conditions

1. Introduction

People with the mild form of glutamate formiminotransferase deficiency have minor delays in physical and mental development and may have mild intellectual disability. They also have unusually high levels of a molecule called formiminoglutamate (FIGLU) in their urine.

Individuals affected by the severe form of this disorder have profound intellectual disability and delayed development of motor skills such as sitting, standing, and walking. In addition to FIGLU in their urine, they have elevated amounts of certain B vitamins (called folates) in their blood.

The severe form of glutamate formiminotransferase deficiency is also characterized by megaloblastic anemia. Megaloblastic anemia occurs when a person has a low number of red blood cells (anemia), and the remaining red blood cells are larger than normal (megaloblastic). The symptoms of this blood disorder may include decreased appetite, lack of energy, headaches, pale skin, and tingling or numbness in the hands and feet.

2. Frequency

Glutamate formiminotransferase deficiency is a rare disorder; approximately 20 affected individuals have been identified. Of these, about one-quarter have the severe form of the disorder. Everyone reported with the severe form has been of Japanese origin. The remaining individuals, who come from a variety of ethnic backgrounds, are affected by the mild form of the condition.

3. Causes

Mutations in the *FTCD* gene cause glutamate formiminotransferase deficiency. The *FTCD* gene provides instructions for making the enzyme formiminotransferase cyclodeaminase. This enzyme is involved in the last two steps in the breakdown (metabolism) of the amino acid histidine, a building block of most proteins. It also plays a role in producing one of several forms of the vitamin folate, which has many important functions in the body.

FTCD gene mutations that cause glutamate formiminotransferase deficiency reduce or eliminate the function of the enzyme. It is unclear how these changes are related to the specific health problems associated with the mild and severe forms of glutamate formiminotransferase deficiency, or why individuals are affected by one form or the other.

3.1. The gene associated with Glutamate formiminotransferase deficiency

- FTCD

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

- Arakawa syndrome 1
- FIGLU-uria
- formiminoglutamic aciduria
- formiminotransferase deficiency

References

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