McLeod Neuroacanthocytosis Syndrome

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McLeod neuroacanthocytosis syndrome is primarily a neurological disorder that occurs almost exclusively in boys and men.

Keywords: genetic conditions

1. Introduction

This disorder affects movement in many parts of the body. People with McLeod neuroacanthocytosis syndrome also have abnormal star-shaped red blood cells (acanthocytosis). This condition is one of a group of disorders called neuroacanthocytoses that involve neurological problems and abnormal red blood cells.

McLeod neuroacanthocytosis syndrome affects the brain and spinal cord (central nervous system). Affected individuals have involuntary movements, including jerking motions (chorea), particularly of the arms and legs, and muscle tensing (dystonia) in the face and throat, which can cause grimacing and vocal tics (such as grunting and clicking noises). Dystonia of the tongue can lead to swallowing difficulties. Seizures occur in approximately half of all people with McLeod neuroacanthocytosis syndrome. Individuals with this condition may develop difficulty processing, learning, and remembering information (cognitive impairment). They may also develop psychiatric disorders, such as depression, bipolar disorder, psychosis, or obsessive-compulsive disorder.

People with McLeod neuroacanthocytosis syndrome also have problems with their muscles, including muscle weakness (myopathy) and muscle degeneration (atrophy). Sometimes, nerves that connect to muscles atrophy (neurogenic atrophy), leading to loss of muscle mass and impaired movement. Individuals with McLeod neuroacanthocytosis syndrome may also have reduced sensation and weakness in their arms and legs (peripheral neuropathy). Life-threatening heart problems such as irregular heartbeats (arrhythmia) and a weakened and enlarged heart (dilated cardiomyopathy) are common in individuals with this disorder.

The signs and symptoms of McLeod neuroacanthocytosis syndrome usually begin in mid-adulthood. Behavioral changes, such as lack of self-restraint, the inability to take care of oneself, anxiety, depression, and changes in personality may be the first signs of this condition. While these behavioral changes are typically not progressive, the movement and muscle problems and intellectual impairments tend to worsen with age.

2. Frequency

McLeod neuroacanthocytosis syndrome is rare; approximately 150 cases have been reported worldwide.

3. Causes

Mutations in the *XK* gene cause McLeod neuroacanthocytosis syndrome. The *XK* gene provides instructions for producing the XK protein, which carries the blood antigen Kx. Blood antigens are found on the surface of red blood cells and determine blood type. The XK protein is found in various tissues, particularly the brain, muscle, and heart. The function of the XK protein is unclear; researchers believe that it might play a role in transporting substances into and out of cells. On red blood cells, the XK protein attaches to another blood group protein, the Kell protein. The function of this blood group complex is unknown.

XK gene mutations typically lead to the production of an abnormally short, nonfunctional protein or cause no protein to be produced at all. A lack of XK protein leads to an absence of Kx antigens on red blood cells; the Kell antigen is also less prevalent. The absence of Kx antigen and reduction of Kell antigen is known as the "McLeod phenotype," and refers only to the red blood cells. It is not known how the lack of XK protein leads to the movement problems and other features of McLeod neuroacanthocytosis syndrome.

3.1. The Gene Associated with McLeod Neuroacanthocytosis Syndrome

XK

4. Inheritance

McLeod neuroacanthocytosis syndrome is inherited in an X-linked recessive pattern. The gene associated with this condition is located on the X chromosome, which is one of the two sex chromosomes. In males (who have only one X chromosome), one altered copy of the gene in each cell is sufficient to cause the condition. In females (who have two X chromosomes), a mutation must be present in both copies of the gene to cause the disorder. Males are affected by X-linked recessive disorders much more frequently than females. Rarely, females with a mutation in one copy of the *XK* gene can have the characteristic misshapen blood cells and movement problems associated with McLeod neuroacanthocytosis syndrome. A characteristic of X-linked inheritance is that fathers cannot pass X-linked traits to their sons.

5. Other Names for This Condition

McLeod syndrome

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