PIGA Gene

Subjects: Genetics & Heredity
Contributor: Lily Guo

phosphatidylinositol glycan anchor biosynthesis class A

Keywords: genes

1. Introduction

The *PIGA* gene provides instructions for making a protein called phosphatidylinositol glycan class A. This protein takes part in a series of steps that produce a molecule called GPI anchor. Specifically, phosphatidylinositol glycan class A is involved in the first step of the sequence, which produces an intermediate molecule called N-acetylglucosaminyl phosphatidylinositol, or GlcNAc-PI. This step takes place in the endoplasmic reticulum of the cell, a structure involved in protein processing and transport. The PIGA protein forms a complex with several other proteins, and this complex helps to start the reaction that produces GlcNAc-PI.

The GPI anchor, the ultimate product of the sequence, attaches many different proteins to the cell membrane, thereby ensuring that these proteins are available when needed at the surface of the cell.

2. Health Conditions Related to Genetic Changes

2.1. Paroxysmal nocturnal hemoglobinuria

Some gene mutations are acquired during a person's lifetime and are present only in certain cells. These changes, which are called somatic mutations, are not inherited. In people with paroxysmal nocturnal hemoglobinuria, somatic mutations of the *PIGA* gene occur in blood-forming cells called hematopoietic stem cells. Hematopoietic stem cells produce red blood cells (erythrocytes) that carry oxygen, white blood cells (leukocytes) that protect the body from infection, and platelets (thrombocytes) that are involved in blood clotting.

Individuals with paroxysmal nocturnal hemoglobinuria have one or more *PIGA* gene mutations in their hematopoietic stem cells, which leads to abnormal blood cells. As the abnormal hematopoietic stem cells multiply, populations of abnormal blood cells are formed, alongside normal blood cells produced by normal hematopoietic stem cells. The proportion of abnormal blood cells in the body affects the severity of the signs and symptoms of paroxysmal nocturnal hemoglobinuria.

Researchers have identified more than 100 somatic mutations in the *PIGA* gene. Some of these mutations alter the numbers or types of protein building blocks (amino acids) in phosphatidylinositol glycan class A, which impair its function. Other mutations result in the insertion of a premature stop signal in the instructions for making phosphatidylinositol glycan class A. As a result, an abnormally small protein, which is usually unstable, is produced.

3. Other Names for This Gene

- GLCNAC-PI synthesis protein
- GPI anchor biosynthesis
- GPI3
- phosphatidylinositol glycan anchor biosynthesis, class A
- phosphatidylinositol glycan anchor biosynthesis, class A (paroxysmal nocturnal hemoglobinuria)
- phosphatidylinositol glycan, class A (paroxysmal nocturnal hemoglobinuria)
- phosphatidylinositol N-acetylglucosaminyltransferase subunit A
- phosphatidylinositol-glycan biosynthesis, class A protein
- PIG-A
- PIGA_HUMAN

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