PEX7 Gene

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peroxisomal biogenesis factor 7

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1. Introduction

The *PEX7* gene provides instructions for making a protein called peroxisomal biogenesis factor 7, which is part of a group known as the peroxisomal assembly (PEX) proteins. Within cells, PEX proteins are responsible for importing certain enzymes into structures called peroxisomes. The enzymes in these sac-like compartments break down many different substances, including fatty acids and certain toxic compounds. They are also important for the production (synthesis) of fats (lipids) used in digestion and in the nervous system.

Peroxisomal biogenesis factor 7 transports several enzymes that are essential for the normal assembly and function of peroxisomes. The most important of these enzymes is alkylglycerone phosphate synthase (produced from the *AGPS* gene). This enzyme is required for the synthesis of specialized lipid molecules called plasmalogens, which are present in cell membranes throughout the body. Peroxisomal biogenesis factor 7 also transports the enzyme phytanoyl-CoA hydroxylase (produced from the *PHYH* gene). This enzyme helps process a type of fatty acid called phytanic acid, which is obtained from the diet. Phytanic acid is broken down through a multistep process into smaller molecules that the body can use for energy.

2. Health Conditions Related to Genetic Changes

2.1. Refsum disease

Mutations in the *PEX7* gene cause a small percentage of all cases of Refsum disease. The three mutations known to be responsible for this condition reduce the activity of peroxisomal biogenesis factor 7, which disrupts the import of several critical enzymes (including phytanoyl-CoA hydroxylase) into peroxisomes. Without enough of these enzymes, peroxisomes cannot break down fatty acids and other substances effectively.

In people with Refsum disease, a shortage of phytanoyl-CoA hydroxylase prevents peroxisomes from breaking down phytanic acid. Instead, this substance gradually builds up in the body's tissues. Over time, the accumulation of phytanic acid becomes toxic to cells. It is unclear, however, how an excess of this substance affects vision and smell and causes the other specific features of Refsum disease.

2.2. Rhizomelic chondrodysplasia punctata

More than three dozen mutations in the *PEX7* gene have been found to cause rhizomelic chondrodysplasia punctata type 1 (RCDP1). These mutations tend to be more severe than the mutations that cause Refsum disease. The genetic changes associated with RCDP1 often lead to a completely nonfunctional version of peroxisomal biogenesis factor 7 or prevent cells from making any of this protein. The most common mutation responsible for RCDP1 replaces the amino acid leucine at protein position 292 with a premature stop signal in the instructions for making peroxisomal biogenesis factor 7 (written as Leu292Ter or L292X). This mutation leads to a nonfunctional version of the protein.

The *PEX7* gene mutations responsible for RCDP1 prevent peroxisomal biogenesis factor 7 from transporting critical enzymes, particularly alkylglycerone phosphate synthase, into peroxisomes. A shortage of alkylglycerone phosphate synthase prevents the synthesis of plasmalogens. Problems with the production of these lipid molecules appear to cause the signs and symptoms of RCDP1. However, researchers are still working to determine how a lack of plasmalogens leads to skeletal abnormalities, intellectual disability, and the other features of this condition.

3. Other Names for This Gene

- peroxin-7
- peroxisomal PTS2 receptor
- peroxisome targeting signal 2 receptor
- PEX7_HUMAN
- PTS2R

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