SLC11A2 Gene

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solute carrier family 11 member 2

genes

1. Normal Function

The *SLC11A2* gene provides instructions for making a protein called divalent metal transporter 1 (DMT1). Four different versions (isoforms) of the DMT1 protein are produced from the *SLC11A2* gene. Each isoform is specific to one or more tissues, but some form of the DMT1 protein is found in all tissues. The primary role of the DMT1 protein is to transport positively charged iron atoms (ions) within cells; however, the protein can transport some other metal ions as well.

In a section of the small intestine called the duodenum, the DMT1 protein is located within finger-like projections called microvilli. These projections absorb nutrients from food as it passes through the intestine and then release them into the bloodstream. In all other cells, including immature red blood cells called erythroblasts, DMT1 is located in the membrane of endosomes, which are specialized compartments that are formed at the cell surface to carry proteins and other molecules to their destinations within the cell. DMT1 transports iron from the endosomes to the cytoplasm so it can be used by the cell.

2. Health Conditions Related to Genetic Changes

2.1. Hypochromic microcytic anemia with iron overload

At least seven mutations in the *SLC11A2* gene have been found to cause hypochromic microcytic anemia with iron overload. This condition is characterized by a shortage of red blood cells (anemia) that is apparent at birth. The red blood cells that are produced are abnormally small (microcytic) and pale (hypochromic). There is also progressive accumulation of iron in the liver.

Most *SLC11A2* gene mutations that cause this condition change single protein building blocks (amino acids) in the DMT1 protein. These mutations lead to reduced production of the DMT1 protein, decreased protein function, or impaired ability of the protein to get to the correct location in cells. In erythroblasts, a shortage of DMT1 protein diminishes the amount of iron transported within cells, even though there is an abundance of iron in the blood. As a result, the development of healthy red blood cells is impaired, leading to a shortage of these cells. In the

duodenum, a shortage of DMT1 protein decreases iron absorption. To compensate, cells increase production of functional DMT1 protein, which increases iron absorption. Because the red blood cells cannot use the iron that is absorbed, it accumulates in the liver, eventually impairing liver function. The lack of iron in red blood cells and the accumulation of iron in the liver lead to the signs and symptoms of hypochromic microcytic anemia with iron overload.

3. Other Names for This Gene

- DCT1
- divalent cation transporter 1
- DMT-1
- DMT1
- natural resistance-associated macrophage protein 2
- NRAMP 2
- NRAMP2
- solute carrier family 11 (proton-coupled divalent metal ion transporter), member 2
- solute carrier family 11 (proton-coupled divalent metal ion transporters), member 2

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