ABCA1 Gene

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ATP binding cassette subfamily A member 1

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1. Normal Function

The *ABCA1* gene belongs to a group of genes called the ATP-binding cassette family, which provides instructions for making proteins that transport molecules across cell membranes. The ABCA1 protein is produced in many tissues, with high amounts found in the liver and in immune system cells called macrophages. This protein moves cholesterol and certain fats called phospholipids across the cell membrane to the outside of the cell. These substances are then picked up by a protein called apolipoprotein A-I (apoA-I), which is produced from the *APOA1* gene. ApoA-I, cholesterol, and phospholipids combine to make high-density lipoprotein (HDL), often referred to as "good cholesterol" because high levels of this substance reduce the chances of developing heart and blood vessel (cardiovascular) disease. HDL is a molecule that carries cholesterol and phospholipids through the bloodstream from the body's tissues to the liver. Once in the liver, cholesterol and phospholipids are redistributed to other tissues or removed from the body. The process of removing excess cholesterol from cells is extremely important for balancing cholesterol levels and maintaining cardiovascular health.

2. Health Conditions Related to Genetic Changes

2.1 Familial HDL deficiency

Mutations in the *ABCA1* gene can cause a condition called familial HDL deficiency. People with this condition have reduced levels of HDL in their blood and may experience early-onset cardiovascular disease, often before age 50. While one copy of the altered *ABCA1* gene causes familial HDL deficiency, two copies of the altered gene cause a more severe related disorder called Tangier disease (described below).

Most *ABCA1* gene mutations that cause familial HDL deficiency change single protein building blocks (amino acids) in the ABCA1 protein. These mutations prevent the release of cholesterol and phospholipids from cells, decreasing the amount of these substances available to form HDL. As a result, the levels of HDL in the blood are low. A shortage (deficiency) of HDL is believed to increase the risk of cardiovascular disease.

2.2 Tangier disease

More than 30 mutations in the *ABCA1* gene have been found to cause Tangier disease. Almost all of these mutations change single amino acids in the ABCA1 protein. These mutations prevent the release of cholesterol and phospholipids from cells. As a result, these substances accumulate within cells, causing certain body tissues to enlarge and the tonsils to acquire a yellowish-orange color. A buildup of cholesterol can be toxic to cells, leading to impaired cell function or cell death. In addition, the inability to transport cholesterol and phospholipids out of cells results in very low HDL levels, which may increase the risk of cardiovascular disease. These combined factors cause the signs and symptoms of Tangier disease.

3. Other Names for This Gene

- ABC1
- ABCA1_HUMAN
- ATP binding cassette transporter 1
- ATP-binding cassette 1

- ATP-binding cassette, sub-family A (ABC1), member 1
- CERP
- cholesterol efflux regulatory protein
- FLJ14958
- HDLDT1
- high density lipoprotein deficiency, Tangier type, 1
- TGD

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