FTL Gene

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Ferritin light chain

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1. Normal Function

The *FTL* gene provides instructions for making the ferritin light chain, which is one part (subunit) of a protein called ferritin. Ferritin is made up of 24 subunits formed into a hollow spherical molecule. The 24 subunits consist of varying numbers of the ferritin light chain and another subunit called the ferritin heavy chain, which is produced from another gene. The proportion of the two subunits varies in different tissues.

Ferritin stores and releases iron in cells. Each ferritin molecule can hold as many as 4,500 iron atoms inside its spherical structure. This storage capacity allows ferritin to regulate the amount of iron in cells and tissues. Iron is needed for the body to produce red blood cells.

2. Health Conditions Related to Genetic Changes

2.1 Hyperferritinemia-Cataract Syndrome

At least 31 mutations in the *FTL* gene have been identified in people with hyperferritinemia-cataract syndrome. Individuals affected by this disorder have an excess of ferritin in the blood (hyperferritinemia) and tissues of the body. A buildup of this protein begins early in life, leading to clouding of the lenses of the eyes (cataracts) in infancy.

The mutations that cause hyperferritinemia-cataract syndrome are found in a segment of the gene called the iron responsive element (IRE). The IRE normally can attach (bind) to a protein called the iron regulatory protein (IRP). When this binding occurs, the activity (expression) of the *FTL* gene is stopped to prevent too much ferritin light chain from being produced. This normally occurs when iron levels are low, because under those circumstances less ferritin is needed to store the iron. Mutations in the IRE segment of the *FTL* gene prevent it from binding with IRP, interfering with the mechanism by which ferritin production is matched to iron levels and resulting in excess ferritin being formed.

2.2 Neuroferritinopathy

At least four mutations in the *FTL* gene have been identified in people with neuroferritinopathy, a disorder in which iron gradually accumulates in the brain. These mutations all affect an area of the gene known as exon 4. The most common mutation detected in people with this disorder inserts the DNA building block (nucleotide) adenine between positions 460 and 461 in the gene sequence. Researchers believe that most families with this mutation descend from a common ancestor who lived in northwest England before 1800. Three other known mutations are each found in a single individual or family affected by neuroferritinopathy.

Mutations in the *FTL* gene that cause neuroferritinopathy are believed to reduce ferritin's ability to store iron, resulting in the release of excess iron in nerve cells (neurons) of the brain. The cells may respond by producing more ferritin in an attempt to handle the free iron. Excess iron and ferritin accumulate in the brain, particularly in certain regions that help to control movement (basal ganglia), resulting in the movement problems and other neurological changes seen in neuroferritinopathy.

3. Other Names for This Gene

- ferritin L subunit
- ferritin L-chain

- ferritin light polypeptide-like 3
- ferritin, light polypeptide
- FRIL_HUMAN
- L apoferritin
- MGC71996
- NBIA3

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