

GCDH Gene

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Glutaryl-CoA dehydrogenase

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1. Normal Function

The *GCDH* gene provides instructions for making the enzyme glutaryl-CoA dehydrogenase. This enzyme is found in mitochondria, the energy-producing centers of cells. The GCDH enzyme is involved in the breakdown of the amino acids lysine, hydroxylysine, and tryptophan, which are building blocks of proteins.

2. Health Conditions Related to Genetic Changes

2.1 Glutaric Acidemia Type I

Mutations in the *GCDH* gene prevent production of the glutaryl-CoA enzyme, or result in the production of a defective enzyme that cannot fulfill its role in the breakdown of lysine, hydroxylysine, and tryptophan. This enzyme deficiency allows these amino acids and their intermediate breakdown products to build up to abnormal levels, which damages the nervous system, especially when the body is under stress.

More than 150 *GCDH* gene mutations that cause glutaric acidemia type I have been reported in populations around the world. Most of these mutations result in the substitution of one amino acid for another amino acid in the enzyme. In the Old Order Amish community, all known glutaric acidemia type I cases derive from the replacement of the amino acid alanine with the amino acid valine at position 421 (written as Ala421Val or A421V). A few specific mutations have been seen in certain Native American populations. Individuals with glutaric acidemia type I who belong to the Lumbee community of North Carolina have been found to have a mutation in which the amino acid glutamic acid is replaced with the amino acid lysine at position 414, written as Glu414Lys or E414K. A mutation that replaces a particular DNA building block (nucleotide) called guanine with the nucleotide thymine (written as IVS1, G-T, +5) is prevalent in the Ojibwa population of Canada. As a result of this mutation, an abnormally shortened version of the enzyme is produced. Many different mutations occur in other populations.

3. Other Names for This Gene

- ACAD5
 - GCD
 - GCDH_HUMAN
 - glutaryl-CoA dehydrogenase, mitochondrial
 - glutaryl-Coenzyme A dehydrogenase isoform a precursor
 - glutaryl-Coenzyme A dehydrogenase isoform b precursor
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