Very long-chain acyl-CoA dehydrogenase deficiency

Description

Very long-chain acyl-CoA dehydrogenase (VLCAD) deficiency is a condition that prevents the body from converting certain fats into energy, particularly during periods without food (fasting).

There are three forms of VLCAD deficiency, and they are defined by when the signs and symptoms of the condition begin. The early-onset form is the most severe and begins in infancy. Signs and symptoms can include lack of energy (lethargy) and muscle weakness. People with VCLAD deficiency can have low blood sugar (glucose), known as hypoglycemia. Affected individuals are also at risk for serious complications such, as liver abnormalities and life-threatening heart problems.

Individuals with childhood-onset VLCAD deficiency typically experience an enlarged liver (hepatomegaly) and low blood glucose. This form is sometimes referred to as the hepatic or hypoketotic hypoglycemic form because of these signs. Additional signs and symptoms include other liver problems or muscle weakness.

The adult-onset form, which begins in adolescence or adulthood, usually involves muscle pain and the breakdown of muscle tissue (rhabdomyolysis). The destruction of muscle tissue releases a large amount of a protein called myoglobin, which is processed by the kidneys and released in the urine (myoglobinuria). Myoglobinuria causes the urine to be red or brown.

In both children and adults, problems related to VLCAD deficiency can be triggered by periods of fasting, illness, exercise, and exposure to hot or cold temperatures. In children, this disorder is sometimes mistaken for Reye syndrome, a severe disorder that may develop in children while they appear to be recovering from viral infections such as chicken pox or flu. Most cases of Reye syndrome occur in children who take aspirin during these viral infections.

Frequency

VLCAD deficiency is estimated to affect 1 in 40,000 to 120,000 people.

Causes

Variants (also called mutations) in the *ACADVL* gene cause VLCAD deficiency. This

gene provides instructions for making an enzyme called very long-chain acyl-CoA dehydrogenase, which is required to break down (metabolize) a group of fats called very long-chain fatty acids. These fatty acids are found in foods and the body's fat tissues. Fatty acids are a major source of energy for the heart and muscles. During periods of fasting, fatty acids are also an important energy source for the liver and other tissues.

Variants in the *ACADVL* gene lead to a shortage (deficiency) of the VLCAD enzyme within cells. When cells do not have enough of this enzyme, very long-chain fatty acids are not broken down properly. As a result, these fats are not converted to energy, which can lead to signs and symptoms of the disorder such as lethargy and hypoglycemia. Very long-chain fatty acids or partially metabolized fatty acids may also build up in tissues and damage the heart, liver, and muscles. This abnormal buildup causes the other signs and symptoms of VLCAD deficiency.

Learn more about the gene associated with Very long-chain acyl-CoA dehydrogenase deficiency

- ACADVL

Inheritance

This condition is inherited in an autosomal recessive pattern, which means both copies of the gene in each cell must have a variant to cause the disorder. The parents of an individual with an autosomal recessive condition each carry one copy of the altered gene, but they typically do not show signs and symptoms of the condition.

Other Names for This Condition

- ACADVL
- Acyl-CoA dehydrogenase very long chain deficiency
- Very long-chain acyl coenzyme A dehydrogenase deficiency
- Very long-chain acyl-coenzyme A dehydrogenase deficiency
- VLCAD deficiency
- VLCAD-C
- VLCAD-H

Additional Information & Resources

Genetic Testing Information

- Genetic Testing Registry: Very long chain acyl-CoA dehydrogenase deficiency (https://www.ncbi.nlm.nih.gov/gtr/conditions/C3887523/)

Genetic and Rare Diseases Information Center

- Very long chain acyl-CoA dehydrogenase deficiency (https://rarediseases.info.nih.gov/diseases/5508/index)

Patient Support and Advocacy Resources

- National Organization for Rare Disorders (NORD) (https://rarediseases.org/)

Clinical Trials

- ClinicalTrials.gov (https://clinicaltrials.gov/search?cond=%22Very long-chain acyl-CoA dehydrogenase deficiency%22)

Catalog of Genes and Diseases from OMIM

- ACYL-CoA DEHYDROGENASE, VERY LONG-CHAIN, DEFICIENCY OF; ACADVLD (https://omim.org/entry/201475)

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28very+long-chain+acyl+coenzyme+a+dehydrogenase+deficiency%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1440+days%22%5Bdp%5D)

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