ACAD9: Acyl-CoA Dehydrogenase 9 Deficiency

Acyl-CoA dehydrogenase 9 deficiency, also known as ACAD9 deficiency, is a type of genetic condition categorized as a fatty acid oxidation disorder (also known as an FAOD). The body usually gets its energy by breaking down, or burning, fats and sugars. People with FAODs cannot properly break down certain types of fats. For those with ACAD9 deficiency, an enzyme needed to break down long-chain fats is unable to function properly. This prevents the body from creating needed energy during times of stress, illness, fasting, and exercise, which can lead to medical symptoms.

Alternative Names

- ACAD9

Genetics

People usually have two copies of the ACAD9 gene, one inherited from each parent. ACAD9 deficiency occurs when there are changes in both copies of the ACAD9 gene (autosomal recessive inheritance). Someone who has a change in only one copy of the ACAD9 gene is called a carrier, and they usually do not have any medical symptoms. If both parents are carriers, there is a 1 in 4 chance with each pregnancy that their child will have ACAD9 deficiency. Both males and females can have ACAD9 deficiency.

Frequency

The exact frequency of ACAD9 deficiency is unknown. Scientific papers have reported at least 70 people with ACAD9 deficiency worldwide.

Signs and Symptoms

ACAD9 deficiency can cause a range of signs and symptoms. Always check with your doctor if your child is doing something out of "their" normal, as every child may present with symptoms a little differently. Signs and symptoms may include:

- Enlarged, weakened heart muscle (hypertrophic cardiomyopathy)
- Liver disease
- Large head (macrocephaly)
- Specific type of neurological condition called Leigh's syndrome
- Difficulty in suckling
- Loss of head control and motor skills
- Loss of appetite
- Vomiting
- Seizures
- Weakness and lack of muscle tone (hypotonia)
- Extreme muscle tightness (spasticity)
- Movement disorders
- Loss of control in the joints (cerebellar ataxia)
- Loss of nerve function in feet, legs, and fingers (peripheral neuropathy)

Milder cases of ACAD9 deficiency may not be identified until adolescence or adulthood. These

individuals can present with nausea and extreme fatigue/tiredness after exercise.

Diagnosis

ACAD9 deficiency can be diagnosed by:

- Measuring biochemical markers in the blood or urine
- Measuring the amount of a fat product called acylcarnitine in the liver
- Performing a genetic test to look for changes in the ACAD9 gene, including whole exome sequencing

ACAD9 deficiency cannot be identified by newborn screening.

If there is a known family history of ACAD9 deficiency, or if parents know they are known carriers, prenatal testing can be performed on amniotic fluid (the fluid surrounding a baby) or chorionic villi (a specific part of the placenta).

Treatment and Management

Before beginning any treatment or therapy, please consult with your physician.

Treatment and management of ACAD9 deficiency may include:

- Prevention of low blood sugar (hypoglycemia)
- Monitoring lactic acid to detect a buildup called lactic acidosis
- Possible Vitamin B2 (riboflavin) supplements
- Routine treatment of heart and liver symptoms

Parents should call their health care provider immediately if babies show symptoms like excessive sleepiness, vomiting, diarrhea, a fever, poor appetite, or an infection. Medical treatment should be sought immediately if there is loss of consciousness or severe confusion (decompensation), as these are signs of dangerously low blood sugar.

Patients should discuss the appropriate preparation for anesthesia with their metabolic team.
All patients should have an emergency protocol letter, written and signed by their doctor, that details their prescribed treatment during crisis and in emergency room settings, to manage severe episodes.

Clinical Trials

For specific details on other clinical trials, visit the MitoAction Clinical Trials page or www.clinicaltrials.gov.

Resources

- The National Institutes of Health: ACAD9 deficiency
- The INFORM Network: ACAD9 Deficiency | Fatty Acid Oxidation Disorders Diagnosis

Connecting with others who are impacted by a rare disease allows for important information to be shared about day-to day life, prevents isolation, and gives hope. Please contact MitoAction for peer support opportunities at 888-MITO-411 or email mito411@mitoaction.org. Other resources we recommend are:

- New Patient Kit for FAODs
- Planning and Preparation
- Monthly Expert Series
- Energy in Action Podcast

MitoAction does not provide medical advice, diagnosis, treatment, or legal advice. It is essential that all those living with or caring for someone with a Mitochondrial or FAOD disease have an emergency protocol letter. These letters, which are written and signed by a doctor, share details about prescribed treatment during crises and in emergency room settings. Always check with your doctor if you or your child has concerns as everyone may present with symptoms differently. Before beginning any treatment or therapy, please consult with your physician.