Carnitine Acylcarnitine Translocase Deficiency
CACT Deficiency

Carnitine acylcarnitine translocase (CACT) deficiency, also known as CACT deficiency, is a type of genetic condition categorized as a fatty acid oxidation disorder (also known as a 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 CACT deficiency, the enzyme that helps move long-chain fats into the mitochondria to be broken down 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.

Genetics

People usually have two copies of the SLC25A20 gene, one inherited from each parent. CACT deficiency occurs when there are changes in both copies of the SLC25A20 gene (autosomal recessive inheritance). Someone who has a change in only one copy of the SLC25A20 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 CACT deficiency. Both males and females can have CACT deficiency.

Frequency

The exact frequency of CACT deficiency is unknown, but it is thought to be very rare. Scientific papers have reported less than 60 known cases of CACT deficiency worldwide.

Signs and Symptoms

CACT deficiency can cause a range of signs and symptoms. Whether your child was diagnosed via newborn screening may also affect when, if, and how these symptoms present. 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:

- Extreme tiredness or fatigue (lethargy)
- Irritability
- Difficulty walking
- High ammonia levels in the blood (hyperammonemia)
- Enlarged liver (hepatomegaly)
- Enlarged, weakened heart (cardiomyopathy)
- Abnormal heart rhythms (arrhythmias)
- Total failure of heart and lung function
- Life threatening low blood sugar with lack of ketones (hypoketotic hypoglycemia)

Milder forms of CACT deficiency may be identified with future research.

Diagnosis

CACT deficiency can be diagnosed by:

- Measuring biochemical markers in the blood or urine (acylcarnitine analysis and organic acid analysis)
- Measuring the amount of CACT activity in the blood or skin cells
- Performing a genetic test to look for changes in the SLC25A20 gene

CACT deficiency can be identified by newborn screening.

If there is a known family history of CACT 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 CACT deficiency may include:

- Regular eating schedules to prevent of low blood sugar (hypoglycemia)
- Possible nutritional supplements like medium-chain triglycerides (MCT oil)
- Possible carnitine supplements (Carnitor) based on protein activity and free carnitine levels
- Continuous feeding directly into the stomach in extreme cases
- Intravenous (IV) sugar-containing fluids called D10 during metabolic crisis
- Dialysis if blood ammonia does not reverse when low blood sugar is corrected

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

There have been new developments in the treatment of CACT deficiency including clinical trials investigating:

- The use of an artificial fat in the place of MCT oil
- The use of a medication originally developed to lower blood cholesterol called bezafibrate, which may increase the amount of CACT protein in cells

For more specific details on clinical trials visit www.mitoaction.org/clinicaltrials or www.clincialtrials.gov

Resources

- The National Institutes of Health: Carnitine-acylcarnitine translocase deficiency - About the Disease
- The INFORM Network: CACT 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 FAOD peer support opportunities at 888-MITO-411 or email mito411@mitoaction.org