MAYO CLINIC LABORATORIES

TEST OBSOLETE

Notification Date: August 26, 2025
Effective Date: October 2, 2025

Very Long Chain Acyl-CoA Dehydrogenase Deficiency, Full Gene Analysis, Varies

Test ID: VLCZ

Explanation:
On the effective date, this assay will be discontinued and replaced by the new assay shown below. The updated assay offers a more robust methodology, CNV detection, and a prioritization process for Newborn Screening-related samples to improve TAT.

Recommended Alternative Test:

Very Long-Chain Acyl-CoA Dehydrogenase (VLCAD) Deficiency, *ACADVL* Gene Sequencing with Deletion/Duplication, Varies

Test ID: ACADV

Useful for:
Confirmation of diagnosis of very long-chain acyl-CoA dehydrogenase deficiency as a follow-up to biochemical analyses.

Genetics Information:
- This test utilizes next-generation sequencing to detect single nucleotide and copy number variants in the *ACADVL* gene associated with very long-chain acyl-CoA dehydrogenase (VLCAD) deficiency. See Method Description for additional details.
- Identification of a disease-causing variant may assist with diagnosis, prognosis, clinical management, recurrence risk assessment, familial screening, and genetic counseling for VLCAD deficiency.

Reflex Tests:

Test ID	Reporting Name	Available Separately	Always Performed
CULFB	Fibroblast Culture for Genetic Test	Yes	No
CULAF	Amniotic Fluid Culture/Genetic Test	Yes	No
MATCC	Maternal Cell Contamination, B	Yes	No

Testing Algorithm:

Prenatal specimens:

- If an amniotic fluid specimen or cultured amniocytes are received, an amniotic fluid culture will be performed at an additional charge.
- If a chorionic villi specimen or cultured chorionic villi are received, a fibroblast culture will be performed at an additional charge.
- For any prenatal specimen that is received, maternal cell contamination testing will be performed at an additional charge.

Skin biopsy or cultured fibroblast specimens:

For skin biopsy or cultured fibroblast specimens, a fibroblast culture will be performed at an additional charge. If viable cells are not obtained, the client will be notified.

Ordering Guidance:

- Biochemical testing for the diagnosis of very long-chain acyl-CoA dehydrogenase deficiency should be considered molecular confirmation with this test. The recommended testing for initial evaluation is ACRN / Acylcarnitines, Quantitative, Plasma; PFAPC / Fatty Acid Profile, Comprehensive (C8-C26), Plasma; OAU / Organic Acids Screen, Random, Urine, and FAO / Fatty Acid Oxidation Probe Assay, Fibroblast Culture.
- Testing for the *ACADVL* gene as part of a customized panel is available. See CGPH / Custom Gene Panel, Hereditary, Next-Generation Sequencing, Varies. To modify this panel via CGPH, use the Inborn Errors of Metabolism disease state for step 1 on the Custom Gene Ordering Tool.
- Targeted testing for familial variants (also called site-specific or known variants testing) is available for variants identified in the *ACADVL* gene. See FMTT / Familial Variant, Targeted Testing, Varies. To obtain more information about this testing option, call 800-533-1710.

Methods:

Sequence Capture and Targeted Next-Generation Sequencing (NGS) followed by Polymerase Chain Reaction (PCR) and Sanger Sequencing

Reference Values:

An interpretive report will be provided.

Additional Testing Requirements:

All prenatal specimens must be accompanied by a maternal blood specimen; order MATCC / Maternal Cell Contamination, Molecular Analysis, Varies on the maternal specimen as this must be a different order number than the prenatal specimen.

Specimen Requirements:

Patient Preparation: A previous hematopoietic stem cell transplant from an allogenic donor will interfere with testing. For information about testing patients who have received a hematopoietic stem cell transplant, call 800-533-1710

Submit only 1 of the following specimens:

Specimen Type:	**Whole blood**
Container/Tube:	Lavender top (EDTA) or yellow top (ACD)
Specimen Volume:	3 mL
Collection Instructions:	1. Invert several times to mix blood. 2. Send whole blood specimen in original tube. **Do not aliquot**.
Specimen Stability Information:	Ambient (preferred) 4 days/Refrigerated 4 days/Frozen 4 days
Additional Information:	1. Specimens are preferred to be received within 4 days of collection. Extraction will be attempted for specimens received after 4 days, and DNA yield will be evaluated to determine if testing may proceed. 2. To ensure minimum volume and concentration of DNA is met, the requested volume must be submitted. Testing may be canceled if DNA requirements are inadequate.
Minimum Volume:	1 mL

Specimen Type:	**Cord blood**
Container/Tube:	Lavender top (EDTA) or yellow top (ACD)
Specimen Volume:	3 mL
Collection Instructions:	1. Invert several times to mix blood. 2. Send cord blood specimen in original tube. **Do not aliquot**.
Specimen Stability Information:	Ambient (preferred) 4 days/Refrigerated 4 days/Frozen 4 days
Additional Information:	1. Specimens are preferred to be received within 4 days of collection. Extraction will be attempted for specimens received after 4 days, and DNA yield will be evaluated to determine if testing may proceed. 2. To ensure minimum volume and concentration of DNA is met, the requested volume must be submitted. Testing may be canceled if DNA requirements are inadequate. 3. While a properly collected cord blood sample may not be at risk for maternal cell contamination, unanticipated complications may occur during collection. Therefore, maternal cell contamination studies are recommended to ensure the test results reflect that of the patient tested and are available at an additional charge. Order MATCC / Maternal Cell Contamination, Molecular Analysis, Varies on the maternal specimen.

Specimen Type:	**Saliva**
Patient Preparation:	Patient should not eat, drink, smoke, or chew gum 30 minutes prior to collection.
Supplies:	Saliva Swab Collection Kit (T786)
Specimen Volume:	1 Swab
Collection Instructions:	Collect and send specimen per kit instructions.
Specimen Stability information:	Ambient (preferred) 30 days/Refrigerated 30 days
Additional Information:	Saliva specimens are acceptable but not recommended. Due to lower quantity/quality of DNA yielded from saliva, some aspects of the test may not perform as well as DNA extracted from a whole blood sample. When applicable, specific gene regions that were unable to be interrogated will be

noted in the report. Alternatively, additional specimen may be required to complete testing.

Specimen Type:	**Skin biopsy**
Supplies:	Fibroblast Biopsy Transport Media (T115)
Container/Tube:	Sterile container with any standard cell culture media (eg, minimal essential media, RPMI 1640). The solution should be supplemented with 1% penicillin and streptomycin.
Specimen Volume:	4-mm Punch
Specimen Stability information:	Ambient (preferred) <24 hours/Refrigerated <24 hours
Additional Information:	1. Specimens are preferred to be received within 24 hours of collection. Culture and extraction will be attempted for specimens received after 24 hours and will be evaluated to determine if testing may proceed. 2. A separate culture charge will be assessed under CULFB / Fibroblast Culture for Biochemical or Molecular Testing. An additional 3 to 4 weeks are required to culture fibroblasts before genetic testing can occur.

Specimen Type:	**Cultured fibroblasts**
Source:	Skin
Container/Tube:	T-25 flask
Specimen Volume:	2 Flasks
Collection Instructions:	Submit confluent cultured fibroblast cells from a skin biopsy.
Specimen Stability information:	Ambient (preferred) <24 hours/Refrigerated <24 hours
Additional Information:	1. Specimens are preferred to be received within 24 hours of collection. Culture and extraction will be attempted for specimens received after 24 hours and will be evaluated to determine if testing may proceed. 2. A separate culture charge will be assessed under CULFB / Fibroblast Culture for Biochemical or Molecular Testing. An additional 3 to 4 weeks are required to culture fibroblasts before genetic testing can occur.

Specimen Type:	**Tissue biopsy**
Supplies:	Hank's Solution (T132)
Container/Tube:	Sterile container with sterile Hank's balanced salt solution, Ringer's solution, or normal saline
Specimen Volume:	0.5 to 3 cm(3) or larger
Specimen Stability information:	Ambient (preferred) <24 hours/Refrigerated <24 hours
Additional Information:	1. Specimens are preferred to be received within 24 hours of collection. Culture and extraction will be attempted for specimens received after 24 hours and will be evaluated to determine if testing may proceed. 2. A separate culture charge will be assessed under CULFB / Fibroblast Culture for Biochemical or Molecular Testing. An additional 3 to 4 weeks are required to culture fibroblasts before genetic testing can occur.

Specimen Type:	**Blood spot**
Supplies:	Card-Blood Spot Collection (Filter Paper) (T493)
Container/Tube:	
Preferred:	Collection card (Whatman Protein Saver 903 Paper)
Acceptable:	PerkinElmer 226 filter paper or blood spot collection card
Specimen Volume:	2 to 5 Blood spots
Collection Instructions:	1. An alternative blood collection option for a patient older than 1 year is a fingerstick. For detailed instructions, see How to Collect a Dried Blood Spot Samples. 2. Let blood dry on the filter paper at ambient temperature in a horizontal position for a minimum of 3 hours. 3. Do not expose specimen to heat or direct sunlight. 4. Do not stack wet specimens. 5. Keep specimen dry.
Specimen Stability information:	Ambient (preferred)/Refrigerated
Additional Information:	1. Blood spot specimens are acceptable but not recommended. Multiple extractions will be required to obtain sufficient yield for supplemental analysis, and there is significant risk for test failure due to insufficient DNA. 2. Due to lower concentration of DNA yielded from blood spot, some aspects of the test may not perform as well as DNA extracted from a whole blood sample. When applicable, specific gene regions that were unable to be interrogated will be noted in the report. Alternatively, additional specimen may be required to complete testing. 3. For collection instructions, see Blood Spot Collection Instructions 4. For collection instructions in Spanish, see Blood Spot Collection Card-Spanish Instructions (T777) 5. For collection instructions in Chinese, see Blood Spot Collection Card-Chinese Instructions (T800)

Specimen Type:	**Extracted DNA**
Container/Tube:	
Preferred:	Screw Cap Micro Tube, 2 mL with skirted conical base
Acceptable:	Matrix tube, 1 mL
Collection Instructions:	1. The preferred volume is at least 100 mcL at a concentration of 75 ng/mcL. 2. Include concentration and volume on tube.
Specimen Stability information:	Frozen (preferred) 1 year/Ambient/Refrigerated
Additional Information:	DNA must be extracted in a CLIA-certified laboratory or equivalent and must be extracted from a specimen type listed as acceptable for this test (including applicable anticoagulants). Our laboratory has experience with Chemagic, Puregene, Autopure, MagnaPure, and EZ1 extraction platforms and cannot guarantee that all extraction methods are compatible with this test. If testing fails, one repeat will be attempted, and if unsuccessful, the test will be reported as failed, and a charge will be applied. If applicable, specific gene regions that were unable to be interrogated due to DNA quality will be noted in the report.

PRENATAL SPECIMENS

Due to its complexity, consultation with the laboratory is required for all prenatal testing; call 800-533-1710 to speak to a genetic counselor.

Specimen Type:	**Amniotic fluid**
Container/Tube:	Amniotic fluid container
Specimen Volume:	20 mL
Specimen Stability information:	Ambient (preferred) <24 hours/Refrigerated <24 hours
Additional Information:	Specimen will only be tested after culture. 1. Specimens are preferred to be received within 24 hours of collection. Culture and extraction will be attempted for specimens received after 24 hours and will be evaluated to determine if testing may proceed. 2. A separate culture charge will be assessed under CULAF / Culture for Genetic Testing, Amniotic Fluid. An additional 2 to 3 weeks are required to culture amniotic fluid before genetic testing can occur. 3. **All prenatal specimens must be accompanied by a maternal blood specimen;** order MATCC / Maternal Cell Contamination, Molecular Analysis, Varies on the maternal specimen.

Specimen Type:	**Prenatal cultured fibroblasts** (eg, products of conception), amniocytes, or other confluent cultured cells. This does not include cultured chorionic villi.
Container/Tube:	T-25 flask
Specimen Volume:	2 Flasks
Collection Instructions:	Submit confluent cultured cells from another laboratory
Specimen Stability information:	Ambient (preferred) <24 hours/Refrigerated <24 hours
Additional Information:	1. Specimens are preferred to be received within 24 hours of collection. Culture and extraction will be attempted for specimens received after 24 hours and will be evaluated to determine if testing may proceed. 2. A separate culture charge will be assessed under CULFB / Fibroblast Culture for Biochemical or Molecular Testing. 3. **All prenatal specimens must be accompanied by a maternal blood specimen;** order MATCC / Maternal Cell Contamination, Molecular Analysis, Varies on the maternal specimen.

Specimen Type:	**Chorionic villi**
Container/Tube:	15-mL tube containing 15 mL of transport media
Specimen Volume:	20 mg
Specimen Stability information:	Ambient (preferred) <24 hours/Refrigerated <24 hours
Additional Information:	Specimen will only be tested after culture. 1. Specimens are preferred to be received within 24 hours of collection. Culture and extraction will be attempted for specimens received after 24 hours and will be evaluated to determine if testing may proceed. 2. A separate culture charge will be assessed under CULFB / Fibroblast Culture for Biochemical or Molecular Testing. An additional 3 to 4 weeks are required to culture fibroblasts before genetic testing can occur.

	3. **All prenatal specimens must be accompanied by a maternal blood specimen;** order MATCC / Maternal Cell Contamination, Molecular Analysis, Varies on the maternal specimen.
Specimen Type:	**Cultured chorionic villi**
Container/Tube:	T-25 flasks
Specimen Volume:	2 Full flasks
Collection Instructions:	Submit confluent cultured cells from another laboratory
Specimen Stability information:	Ambient (preferred) <24 hours/Refrigerated <24 hours
Additional Information:	Specimen can only be tested after culture. 1. Specimens are preferred to be received within 24 hours of collection. Culture and extraction will be attempted for specimens received after 24 hours and will be evaluated to determine if testing may proceed. 2. A separate culture charge will be assessed under CULFB / Fibroblast Culture for Biochemical or Molecular Testing. 3. **All prenatal specimens must be accompanied by a maternal blood specimen;** order MATCC / Maternal Cell Contamination, Molecular Analysis, Varies on the maternal specimen.

Specimen Stability Information:

Specimen Type	Temperature	Time	Special Container
Varies	Varies		

Cautions:

Clinical Correlations:

- Test results should be interpreted in the context of clinical findings, family history, and other laboratory data. Misinterpretation of results may occur if the information provided is inaccurate or incomplete.
- If testing was performed because of a clinically significant family history, it is often useful to first test an affected family member. Detection of a reportable variant in an affected family member would allow for more informative testing of at-risk individuals.
- To discuss the availability of additional testing options or for assistance in the interpretation of these results, contact Mayo Clinic Laboratories genetic counselors at 800-533-1710.

Technical Limitations:

- Next-generation sequencing may not detect all types of genomic variants. In rare cases, false-negative or false-positive results may occur. The depth of coverage may be variable for some target regions; assay performance below the minimum acceptable criteria or for failed regions will be noted. Given these limitations, negative results do not rule out the diagnosis of a genetic disorder. If a specific clinical disorder is suspected, evaluation by alternative methods can be considered.
- There may be regions of the gene that cannot be effectively evaluated by sequencing or deletion and duplication analysis as a result of technical limitations of the assay, including regions of homology, high guanine-cytosine (GC) content, and repetitive sequences. Confirmation of select reportable variants will be performed by alternate methodologies based on internal laboratory criteria.

- This test is validated to detect 95% of deletions up to 75 base pairs (bp) and insertions up to 47 bp. Deletions-insertions (delins) of 40 or more bp, including mobile element insertions, may be less reliably detected than smaller delins.
- This analysis targets single and multi-exon deletions/duplications; however, in some instances single exon resolution cannot be achieved due to isolated reduction in sequence coverage or inherent genomic complexity. Balanced structural rearrangements (such as translocations and inversions) may not be detected.
- This test is not designed to detect low levels of mosaicism or to differentiate between somatic mutations and germline variants. If there is a possibility that any detected variant is somatic, additional testing may be necessary to clarify the significance of results.
- For detailed information regarding gene specific performance and technical limitations, see Method Description or contact a laboratory genetic counselor.
- If the patient has had an allogeneic hematopoietic stem cell transplant or a recent non-leukoreduced blood transfusion, results may be inaccurate due to the presence of donor DNA. Call Mayo Clinic Laboratories for instructions for testing patients who have received a bone marrow transplant.

Reclassification of Variants:

- Currently, it is not standard practice for the laboratory to systematically review previously classified variants on a regular basis. The laboratory encourages healthcare professionals to contact the laboratory at any time to learn how the classification of a particular variant may have changed over time. Due to broadening genetic knowledge, it is possible that the laboratory may discover new information of relevance to the patient. Should that occur, the laboratory may issue an amended report.

Variant Evaluation:

- Evaluation and categorization of variants are performed using published American College of Medical Genetics and Genomics and the Association for Molecular Pathology recommendations as a guideline. Other gene-specific guidelines may also be considered. Variants are classified based on known, predicted, or possible pathogenicity and reported with interpretive comments detailing their potential or known significance. Variants classified as benign or likely benign are not reported.
- Multiple in silico evaluation tools may be used to assist in the interpretation of these results. The accuracy of predictions made by in silico evaluation tools is highly dependent upon the data available for a given gene, and periodic updates to these tools may cause predictions to change over time. Results from in silico evaluation tools should be interpreted with caution and professional clinical judgment.
- Rarely, incidental or secondary findings may implicate another predisposition or presence of active disease. Incidental findings may include, but are not limited to, results related to the sex chromosomes. These findings will be carefully reviewed to determine whether they will be reported.

CPT Code:

81406
88233-Tissue culture, skin or solid tissue biopsy (if appropriate)
88240-Cryopreservation (if appropriate)

Day(s) Performed: Varies

Report Available: 10 to 14 days

Questions

Contact Michelle Raths, Laboratory Resource Coordinator at 800-533-1710.