Test Definition: CSFP

Carrier Screen, Focused Panel, Varies

Overview

Useful For

Expanded carrier screening for reproductive risk assessment purposes

This test is **not useful for** clinical diagnosis of an affected individual.

Genetics Test Information

This panel includes testing for select disease-associated variants in 7 genes for the purpose of carrier screening. This includes testing for select variants associated with the following conditions: alpha thalassemia, beta thalassemia, cystic fibrosis, fragile X syndrome, sickle cell anemia, and spinal muscular atrophy. For more information, see Targeted Variants Detected by Focused Carrier Screening Tests.

Special Instructions

- Molecular Genetics: Congenital Inherited Diseases Patient Information
- Informed Consent for Genetic Testing
- Informed Consent for Genetic Testing (Spanish)
- Targeted Variants Detected by Focused Carrier Screening Tests

Highlights

This testing is intended for individuals who are currently pregnant or planning to become pregnant and their reproductive partner, to determine their risks to have children with select inherited conditions.

This test utilizes a targeted genotyping array to assess for over 500 genetic targets associated with serious genetic conditions.

Method Name

Targeted Genotyping Array/Polymerase Chain Reaction (PCR)

NY State Available

Yes

Specimen

Specimen Type

Varies

Ordering Guidance

This test is specifically for carrier screening purposes and is not intended for diagnostic purposes.

If the reproductive partner is also having this test performed, call the lab for a revised risk assessment.

Targeted testing for familial variants (also called site-specific or known mutation testing) is available for all genes on this panel under FMTT / Familial Variant, Targeted Testing, Varies. Call 800-533-1710 to obtain more information about this testing option.

Specimen Required

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.

Specimen Type: Extracted DNA
Container/Tube:
Preferred: Screw Cap Micro Tube, 2mL 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.

Forms

1. **New York Clients-Informed consent is required.** Document on the request form or electronic order that a copy is on file. The following documents are available:
-Informed Consent for Genetic Testing (T576)
-Informed Consent for Genetic Testing-Spanish (T826)
2. Molecular Genetics: Congenital Inherited Diseases Patient Information (T521)

Specimen Minimum Volume

See Specimen Required

Reject Due To

All specimens will be evaluated at Mayo Clinic Laboratories for test suitability.

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Varies	Varies		

Clinical & Interpretive

Clinical Information

An individual may be a carrier of an autosomal recessive condition without exhibiting signs or symptoms, which is often reflected in the absence of a relevant family history. As such, a couple without a known family history may be unaware of their potential risk of having a child with a genetic condition. Carrier screening, either prior to or during pregnancy, can help couples assess their risk of having a child affected with a genetic disorder.

Carrier screening for genetic variants associated with cystic fibrosis (CF) and spinal muscular atrophy (SMA) is deemed standard practice by the American College of Obstetricians and Gynecologists and the American College of Medical Genetics and Genomics (1,2). However, screening solely for CF and SMA may overlook other prevalent conditions. This focused test identifies select variants associated with cystic fibrosis, fragile X syndrome, spinal muscular atrophy, alpha thalassemia, beta thalassemia, sickle cell anemia, and other hemoglobinopathies. It is recommended that carrier screening tests be offered to all individuals and their reproductive partners, irrespective of their ancestry (2).

For individuals with a family history of a genetic condition, testing for the previously identified familial variant is recommended. To confirm the familial variant is covered by this test and to discuss additional testing options, contact the Mayo Clinic Laboratories genetic counselors at 800-533-1710.

This assay is intended for carrier screening only and should not be used for diagnostic testing. If diagnostic testing is desired, contact the Mayo Clinic Laboratories genetic counselors at 800-533-1710 to discuss additional testing options.

Reference Values

An interpretive report will be provided.

Interpretation

All reported variants are evaluated according to American College of Medical Genetics and Genomics recommendations.(3) Variants are classified based on known, predicted, or possible pathogenicity and reported with interpretive comments detailing their potential or known significance.

Cautions

A negative result does not eliminate the risk of carrier status for any of the included conditions, due to the possibility that the patient carries a variant that is not interrogated with this assay or the rare chance of a false-negative result for a

tested variant. For tested variants, the negative predictive value of this screen is greater than 98%. The patient's residual risk to be a carrier after a negative screen is dependent on ethnic background and family history.

A positive control was not available for all variants targeted on this panel. For more information regarding availability of a positive control for each variant see Targeted Variants Detected by Focused Carrier Screening Tests.

The negative predictive value of these targets is unknown.

Rare variants (ie, polymorphisms) exist that could lead to false-negative or false-positive results. If results obtained do not match the clinical findings, additional testing should be considered.

All detected variants are evaluated according to American College of Medical Genetics and Genomics recommendations.(3) This assay was designed to specifically target known pathogenic or likely pathogenic variants. In rare cases, DNA variants of undetermined significance may be identified. The laboratory encourages healthcare providers to contact the laboratory at any time to learn how the status of a particular variant may have changed over time.

Multiple in-silico evaluation tools may have been used to assist in the interpretation of these results. Of note, the sensitivity and specificity of these tools for the determination of pathogenicity is currently unvalidated.

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.

Hematopoietic stem cell transplants from allogenic donors will interfere with testing. Call Mayo Clinic Laboratories for instructions for testing patients who have received a Hematopoietic stem cell transplant.

An online research opportunity called GenomeConnect (genomeconnect.org), a project of ClinGen, is available for the recipient of this genetic test. This patient registry collects deidentified genetic and health information to advance the knowledge of genetic variants. Mayo Clinic is a collaborator of ClinGen. This may not be applicable for all tests.

Clinical Reference

1. Deignan JL, Gregg AR, Grody WW, et al. Updated recommendations for CFTR carrier screening: A position statement of the American College of Medical Genetics and Genomics (ACMG). Genet Med. 2023;25(8):100867. doi:10.1016/j.gim.2023.100867
2. Committee Opinion No. 691. Carrier screening for genetic conditions. Obstet Gynecol. 2017;129(3):e41-e55. doi:10.1097/AOG.0000000000001952
3. Richards S, Aziz N, Bale S, et al. Standards and guidelines for the interpretation of sequence variants: a joint consensus recommendation of the American College of Medical Genetics and Genomics and the Association for Molecular Pathology. Genet Med. 2015;17(5):405-424. doi:10.1038/gim.2015.30
4. Langfelder-Schwind E, Karczeki B, Strecker MN, et al. Molecular testing for cystic fibrosis carrier status practice guidelines: recommendations of the National Society of Genetic Counselors. J Genet Couns. 2014; 23:5-15
5. Monaghan K, Lyon E, Spector E. ACMG Standards and Guidelines for fragile X testing: a revision to the disease-specific supplements to the Standards and Guidelines for Clinical Genetics Laboratories of the American College of Medical Genetics and Genomics. Genet Med. 2013;15(7):575-586
6. Sugarman EA, Nagan N, Zhu H, et al. Pan-ethnic carrier screening and prenatal diagnosis for spinal muscular atrophy:

clinical laboratory analysis of >72,400 specimens. Eur J Hum Genet. 2012;20(1):27-32. doi:10.1038/ejhg.2011.134
7. Deignan JL, Astbury C, Cutting GR, et al. CFTR variant testing: a technical standard of the American College of Medical Genetics and Genomics (ACMG). Genet Med. 2020;22(8):1288-1295. doi:10.1038/s41436-020-0822-5
8. Gregg AR, Aarabi M, Klugman S, et al. ACMG Professional Practice and Guidelines Committee: Screening for autosomal recessive and X-linked conditions during pregnancy and preconception: a practice resource of the American College of Medical Genetics and Genomics (ACMG). Genet Med. 2021 Oct;23(10):1793-1806. doi: 10.1038/s41436-021-01203-z

Performance

Method Description

The targeted genotyping array utilizing the Thermofisher GeneTitan platform is used to detect select variants in the following genes associated with heritable conditions: *CFTR*, *HBA1*, *HBA2*, *HBB*, *SMN1*. *SMN2* may be reported in conjunction with relevant genotype findings.

A polymerase chain reaction (PCR)-based assay is used to detect expansions of a CGG trinucleotide tract in the 5'UTR of the *FMR1* gene. Methylation status is **not** included in this assay. For details regarding the targeted mutations identified by this test see Targeted Variants Detected by Focused Carrier Screening Tests.

Multiplex ligation-dependent probe amplification, PCR, relative quantitative PCR, droplet digital PCR, and Sanger sequencing are used to confirm variants detected by microarray when appropriate.(Unpublished Mayo method)

PDF Report

Supplemental

Day(s) Performed

Varies

Report Available

7 to 21 days

Specimen Retention Time

Whole blood: 28 days (if available); Extracted DNA: 3 months

Performing Laboratory Location

Mayo Clinic Laboratories - Rochester Main Campus

Fees & Codes

Fees

- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact Customer Service.

Test Classification

This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. It has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information

81220
81329
81479
81257
81363
81222
81479 (if appropriate for government payers)

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
CSFP	Carrier Screen, Focused Panel	98039-1

Result ID	Test Result Name	Result LOINC® Value
608337	Result Summary	50397-9
608338	Result	82939-0
608339	Additional Results	82939-0
608340	Offspring Risk	105127-5
608341	Clinical Summary	55752-0
608342	Additional Information	48767-8
608343	Other Identified Alleles	48008-7
608344	Method	85069-3
608345	Disclaimer	62364-5
608346	Specimen	31208-2
608347	Source	31208-2
608348	Released By	18771-6