MAYO CLINIC LABORATORIES

Test Definition: CHRAF

Chromosome Analysis, Amniotic Fluid

Overview

Useful For

Prenatal diagnosis of chromosome abnormalities, including aneuploidy (ie, trisomy or monosomy) and balanced rearrangements

Reflex Tests

Test Id	Reporting Name	Available Separately	Always Performed
_ML15	Metaphases, <15	No, (Bill Only)	No
_M15	Metaphases, 15	No, (Bill Only)	No
_MG14	Metaphases, >15	No, (Bill Only)	No
_COL1	Colonies, 1-5	No, (Bill Only)	No
_COL6	Colonies, 6+	No, (Bill Only)	No
_KTG1	Karyotypes, >1	No, (Bill Only)	No
_STAC	Ag-Nor/CBL Stain	No, (Bill Only)	No

Genetics Test Information

Cultures from this specimen will be discarded 10 days after all cytogenetic test results have been reported. If additional testing is desired, call the laboratory at 800-533-1710.

Testing Algorithm

This test is not appropriate as a first-tier test for detecting gains or losses of chromosomal material in pregnancies with 1 or more major structural abnormalities.

This test includes a charge for cell culture of fresh specimens and professional interpretation of results. Analysis charges will be incurred for total work performed, and generally include 2 banded karyograms and the analysis of 20 metaphase cells. If no metaphase cells are available for analysis, no analysis charges will be incurred. If additional analysis work is required, additional charges may be incurred.

Special Instructions

- Informed Consent for Genetic Testing
- Informed Consent for Genetic Testing (Spanish)

Method Name

Cell Culture followed by Chromosome Analysis

NY State Available

Yes

Specimen

Specimen Type

Amniotic Fld

Ordering Guidance

This test should be performed for prenatal diagnostic purposes only. A chromosomal microarray (CMAP / Chromosomal Microarray, Prenatal, Amniotic Fluid/Chorionic Villus Sampling) is recommended, rather than chromosomal analysis, to detect clinically relevant gains or losses of chromosomal material in pregnancies with 1 or more major structural abnormalities. Chromosomal microarray can also be considered, rather than chromosome analysis, for patients undergoing invasive prenatal diagnostic testing with a structurally normal fetus.

Portions of the specimen may be used for other tests, such as measuring markers for neural tube defects (eg, AFPA / Alpha-Fetoprotein, Amniotic Fluid), molecular genetic testing, biochemical testing, and fluorescence in situ hybridization testing (including PADF / Prenatal Aneuploidy Detection, FISH). If additional molecular genetic or biochemical genetic testing is needed, order CULAF / Culture for Genetic Testing, Amniotic Fluid so amniocyte cultures may be set up specifically for the use in these tests.

Shipping Instructions

Advise Express Mail or equivalent if not on courier service.

Necessary Information

Provide a reason for referral and gestational age with each specimen and verify the specimen source. The laboratory will not reject testing if this information is not provided, but appropriate testing and interpretation may be compromised or delayed.

Specimen Required

Specimen Type: Amniotic fluid
Submission Container/Tube: Centrifuge tube
Specimen Volume: 20 to 25 mL
Collection Instructions:
1. Optimal timing for specimen collection is during 14 to 18 weeks of gestation, but specimens collected at other weeks of gestation are also accepted.
2. Discard the first 2 mL of amniotic fluid.
3. If ordering with PADF / Prenatal Aneuploidy Detection, FISH, submit a minimum of 14 mL.
4. If ordering with CMAP / Chromosomal Microarray, Prenatal, Amniotic Fluid/Chorionic Villus Sampling, submit a minimum of 24 mL.
5. If ordering with both PADF and CMAP, then submit a minimum of 26 mL.
Additional Information:
1. Unavoidably, about 1% to 2% of mailed-in specimens are not viable.
2. If the specimen does not grow in culture, the client will be notified within 7 days of receipt.
3. Bloody specimens are undesirable.

Specimen Type: Fetal body fluid
Container/Tube: Sterile tube
Specimen Volume: Entire specimen

Additional Information:

1. If the specimen does not grow in culture, the client will be notified within 7 days of receipt.
2. Clearly indicate on tube and paperwork that specimen is fetal body fluid.

Forms

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)

Specimen Minimum Volume

The following are the minimum volumes when only this test is ordered:

Amniotic fluid: 12 mL

Fetal body fluid: 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
Amniotic Fld	Refrigerated (preferred)		
	Ambient		

Clinical & Interpretive

Clinical Information

Chromosome analysis for prenatal diagnosis is appropriate in pregnancies with abnormal maternal screening or advanced maternal age and with clinical features suggestive of, or concerns for, aneuploidy syndromes, including Down syndrome, Turner syndrome, Klinefelter syndrome, trisomy 13 syndrome, and trisomy 18 syndrome.

Chromosomal abnormalities are the cause of a wide range of disorders associated with birth defects and congenital diseases. Many of these disorders can be diagnosed prenatally by analysis of amniocytes. This method permits diagnosis of chromosome abnormalities during the second trimester of pregnancy or later.

A chromosomal microarray (CMAP / Chromosomal Microarray, Prenatal, Amniotic Fluid/Chorionic Villus Sampling) is recommended, rather than chromosomal analysis, to detect clinically relevant gains or losses of chromosomal material in pregnancies with one or more major structural abnormalities. Chromosomal microarray can also be considered, rather than chromosome analysis, for patients undergoing invasive prenatal diagnostic testing with a structurally normal fetus.

Reference Values

An interpretative report will be provided.

Interpretation

Cytogenetic studies on amniotic fluid are considered nearly 100% accurate for the detection of large fetal chromosome abnormalities. However, subtle or cryptic abnormalities involving microdeletions/duplications usually can be detected only with the use of targeted fluorescence in situ hybridization testing or chromosomal microarray.

Approximately 3% of amniotic fluid specimens analyzed are found to have chromosome abnormalities. Some of these chromosome abnormalities are balanced and may not be associated with birth defects.

A normal karyotype does not rule out the possibility of birth defects, such as those caused by submicroscopic cytogenetic abnormalities, pathogenic molecular variants, and other environmental factors (ie, teratogen exposure). For these reasons, clinicians should inform their patients of the technical limitations of chromosome analysis prior to performing the amniocentesis.

Limitations:
-Abnormal results from amniotic fluid analysis may not represent fetal karyotype in all tissues.
-Only large abnormalities visible by manual inspection are detectable; subtle structural chromosome abnormalities may be missed
-Artifacts of cell culture may very rarely be misinterpreted as mosaicism in the sample.

It is recommended that a qualified professional in Medical Genetics communicate all results to the patient.

Cautions

Interfering factors:
-Improper syringes or transport vessels may be unsuitable for amniotic cells. Amniotic fluid should not be exposed to the syringe plunger tip for longer than a few seconds, and fluid should be transferred to a transport (centrifuge) tube as soon as possible following collection.
-Transport time should not exceed 2 days.
-A bloody specimen may interfere with attempts to culture cells and contamination by maternal cells may cause interpretive problems.
-Inadequate amount of fluid may not permit adequate analysis.
-Improper packaging may result in broken, leaky, and contaminated specimen during transport.
-Exposure of the specimen to temperature extremes (freezing or >30 degrees C) may kill cells and severely interferes with attempts to culture cells.

Clinical Reference

1. American College of Obstetricians and Gynecologists Committee on Genetics. Committee Opinion No. 581: the use of chromosomal microarray analysis in prenatal diagnosis. Obstet Gynecol. 2013;122(6):1374-1377
2. Society for Maternal-Fetal Medicine (SMFM). The use of chromosomal microarray for prenatal diagnosis. Am J Obstet Gynecol. 2016;215(4):B2-B9
3. Committee Opinion, 640. Cell-free DNA screening for fetal aneuploidy. Obstet Gynecol. 2015;126(3):e31-e37
4. Wilson KL, Czerwinski JL, Hoskovec JM, et al. NSGC practice guideline: prenatal screening and diagnostic testing options for chromosome aneuploidy. J Genet Couns. 2013;22(1):4-15

Performance

Method Description

The specimen is centrifuged, and the cell pellet mixed with culture media, then split into up to 8 primary culture dishes using the In Situ Culture and Analysis (ISCA) method to establish cultures. Cells are harvested after 5 to 7 days. In the harvest process, the cells are exposed to ethidium bromide, colcemid, and hypotonic solution and fixed with glacial acetic acid and methanol. Metaphase preparations are routinely stained by G-banding, but other staining methods may be employed as needed. Fifteen metaphases from 15 colonies and 3 or more primary cultures usually are examined. In cases where true mosaicism is suspected, up to 30 colonies and up to 6 primary cultures may be analyzed. Minimal evidence for the presence of an abnormality is defined as 2 or more metaphases with the same structural abnormality, chromosome gain (trisomy), or 3 or more metaphases lacking the same chromosome. Five or more digitized images of metaphases are stored in computer-based imaging systems, and karyograms are prepared from 2 or more representative metaphases.(Arsham, Marilyn S., et al. editors. The AGT Cytogenetics Laboratory Manual. 4th ed. Wiley-Blackwell; 2017; Spurbeck JL, Carlson RO, Allen JE, Dewald GW. Culturing and robotic harvesting of bone marrow, lymph nodes, peripheral blood, fibroblasts, and solid tumors with in situ techniques. Cancer Genet Cytogenet. 1988;32(1):59-66)

PDF Report

No

Day(s) Performed

Monday through Friday

Report Available

10 to 14 days

Specimen Retention Time

Any remaining supernatant or whole fluid aliquots are discarded 14 days after results are reported.

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

88235, 88291-Tissue culture for amniotic fluid or chorionic villus cells, Interpretation and report
88269 w/modifier 52-Chromosome analysis, in situ for amniotic fluid cells, <6 colonies, 1 karyotype with banding (if

appropriate)
88269-Chromosome analysis, in situ for amniotic fluid cells, 6 or greater colonies, 1 karyotype with banding (if appropriate)
88267, 88285-Chromosome analysis, amniotic fluid or chorionic villus, greater than 15 cells, 1 karyotype with banding (if appropriate)
88267 w/modifier 52-Chromosome analysis, amniotic fluid or chorionic villus, <15 cells, 1 karyotype with banding (if appropriate)

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
CHRAF	Chromosomes, Amniotic Fluid	62351-2

Result ID	Test Result Name	Result LOINC® Value
52297	Result Summary	50397-9
52299	Interpretation	69965-2
52298	Result	82939-0
CG765	Reason for Referral	42349-1
CG766	Specimen	31208-2
52300	Source	31208-2
52302	Method	85069-3
52301	Banding Method	62359-5
54640	Additional Information	48767-8
52303	Released By	18771-6