Overview

Useful For
Assisting in the classification and follow-up of certain malignant hematological disorders when bone marrow is not available

Reflex Tests

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<th>Test ID</th>
<th>Reporting Name</th>
<th>Available Separately</th>
<th>Always Performed</th>
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Testing Algorithm
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.

This test is not appropriate for detecting constitutional/congenital chromosome abnormalities. If this test is ordered with a reason for referral indicating a concern for a constitutional/congenital chromosome abnormality, the test will be cancelled and CHRCB / Chromosome Analysis, Congenital Disorders, Blood will be added and performed as the appropriate test.

If this test is ordered and the laboratory is informed that the patient is on a COG protocol, this test will be canceled and automatically reordered by the laboratory as COGBL / Chromosome Analysis, Hematologic Disorders, Childrenâ€™s Oncology Group Enrollment Testing, Blood.

Special Instructions
- Laboratory Screening Tests for Suspected Multiple Myeloma

Method Name
Cell Culture without Mitogens* followed by Chromosome Analysis*

*In addition to the cell culture without mitogens, a CpG stimulated culture will be added and 10 additional cells will be analyzed for any specimen received from a patient age 30 or older with a reason for referral of chronic lymphocytic leukemia (CLL), small lymphocytic lymphoma (SLL), lymphocytosis, Waldenstrom macroglobulinemia, or when CLLF / Chronic Lymphocytic Leukemia (CLL), FISH is ordered concurrently.

NY State Available
Yes

Specimen

Specimen Type
Whole blood

**Necessary Information**
A pathology and/or flow cytometry report may be requested by the Genomics Laboratory to optimize testing and aid in interpretation of results.

**Specimen Required**
Provide a reason for referral with each specimen. The laboratory will not reject testing if this information is not provided, but appropriate testing and interpretation may be compromised or delayed.

**Container/Tube:** Green top (sodium heparin)

**Specimen Volume:** 5-10 mL

**Collection Instructions:**
1. Invert several times to mix blood.
2. Other anticoagulants are not recommended and are harmful to the viability of the cells.

**Additional Information:** Advise Express Mail or equivalent if not on courier service.

**Forms**
If not ordering electronically, complete, print, and send a [Hematopathology/Cytogenetics Test Request](#) (T726) with the specimen.

**Specimen Minimum Volume**
3 mL

**Reject Due To**
All specimens will be evaluated at Mayo Clinic Laboratories for test suitability.

**Specimen Stability Information**

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<th>Temperature</th>
<th>Time</th>
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<tr>
<td>Whole blood</td>
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**Clinical and Interpretive**

**Clinical Information**

Chromosomal abnormalities play a central role in the pathogenesis, diagnosis, and monitoring of treatment of many hematologic disorders. Whenever possible, it is best to do chromosome studies for neoplastic hematologic disorders on bone marrow. Bone marrow studies are more sensitive and the chances of finding metaphases are about 95%, compared with only a 60% chance for blood studies. When it is not possible to collect bone marrow, chromosome studies on blood may be useful.

When blood cells are cultured in a medium without mitogens, the observation of any chromosomally abnormal clone
may be consistent with a neoplastic process.

Conventional chromosome studies of B-cell disorders are not always successful because B-lymphocytes do not proliferate well in cell culture. The agent CpG 7909 (CpG) is a synthetic oligodeoxynucleotide that binds to the Toll-like receptor 9 (TLR9) present on B cells, causing B-cell activation. In the laboratory setting, CpG may be used as a mitogen to stimulate B-cells in patient specimens, thus allowing identification of chromosome abnormalities. CpG stimulation reveals an abnormal karyotype in approximately 80% of patients with of chronic lymphocytic leukemia (CLL), and the karyotype is complex in 20% to 25% of cases. Several studies have reported that increased genetic complexity revealed by CpG-stimulated chromosome studies confers a less favorable time to first treatment, treatment response, and overall survival.

See Laboratory Screening Tests for Suspected Multiple Myeloma in Special Instructions.

**Reference Values**

An interpretative report will be provided.

**Interpretation**

The presence of an abnormal clone usually indicates a malignant neoplastic process.

The absence of an apparent abnormal clone in blood may result from a lack of circulating abnormal cells and not from an absence of disease.

On rare occasions, the presence of an abnormality may be associated with a congenital abnormality and, thus, not related to a malignant process. When this situation is suspected, follow-up with a medical genetics consultation is recommended.

**Cautions**

We recommend consultation with personnel from the Cytogenetics Laboratory when considering blood studies for hematologic disorders.

Bone marrow specimens are preferred over peripheral blood specimens for the diagnosis of neoplastic hematologic disorders. When peripheral blood must be used, FISH studies may detect some disorders better than conventional chromosome studies.

FISH studies will detect chromosome anomalies with prognostic significance much more often than conventional chromosome studies for:

- Chronic lymphocytic leukemia (CLL)
- Plasma cell proliferative disorders (PCPDs) such as multiple myeloma
- FISH studies also may be superior for other hematological disorders when compared to conventional chromosome studies utilizing blood specimens.

This test is not useful for the following reasons and disorders: multiple miscarriages, infertility, pregnancy loss, multiple congenital anomalies, developmental delay, Down syndrome, Turner syndrome, premature ovarian failure, amenorrhea, ambiguous genitalia, and other congenital abnormalities. The appropriate test for these situations is CHRCB / Chromosome Analysis, Congenital Disorders, Blood.

**Interfering factors:**
Technical:

- Cell lysis caused by forcing blood quickly through the needle at collection
- Use of an improper anticoagulant (sodium heparin is best) or improperly mixing the blood with the anticoagulant
- Excessive transport time
- Exposure of the specimen to temperature

Biological:

- Abnormalities missed due to sampling error
- Subtle structural chromosome abnormalities may be missed occasionally
- Neoplastic cells not dividing or not circulating in the bloodstream

Clinical Reference


Performance

Method Description

A cell count is performed to establish a plating volume. Based on the cell count, a corresponding volume of blood is added to 2 culture flasks containing culture medium and incubated for 24 to 48 hours at 37 degrees C. In the harvest process, the cells are exposed to colcemid and hypotonic solution, and are fixed with glacial acetic acid and methanol. Metaphase cells are dropped onto microscope slides and are stained by G-banding. Other staining methods are employed as needed. Twenty metaphases are usually examined. If a clone is suspected, but not confirmed within 20 metaphases, 30 metaphases will be analyzed. Minimal evidence for the presence of an abnormal clone is defined as 2 or more metaphases with the same structural abnormality or chromosome gain (trisomy), or 3 or more metaphases lacking the same chromosome. All cells analyzed are captured using a computerized imaging system, and 1 or more karyograms from each clone are prepared to document the abnormality and to permit systematic interpretation of the anomalies.(Unpublished Mayo method)

When a specimen is received from a patient age 30 or older with a reason for referral of chronic lymphocytic leukemia (CLL), small lymphocytic lymphoma (SLL), lymphocytosis, or Waldenstrom macroglobulinemia, a CpG-stimulated culture will be added and 10 additional cells will be analyzed. Additional metaphases may be analyzed from the unstimulated or CpG-stimulated cell cultures if necessary to provide an accurate interpretation. All metaphases are captured using a computerized imaging system, and 1 or more karyograms from each clone are prepared to document the type of abnormality and to permit systematic interpretation of the abnormalities.(Unpublished Mayo method)

PDF Report

No
Test Definition: CHRHB
Chromosomes, Hematologic, Blood

Day(s) and Time(s) Test Performed
Specimens are processed Monday through Sunday.
Results reported Monday through Friday, 8 a.m.-5 p.m.

Analytic Time
9 days

Maximum Laboratory Time
11 days

Specimen Retention Time
Three weeks.

Performing Laboratory Location
Rochester

Fees and 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 Regional Manager. 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. This test has not been cleared or approved by the U.S. Food and Drug Administration.

CPT Code Information
88237, 88291- Tissue culture for neoplastic disorders; bone marrow, blood, Interpretation and report
88264 w/ modifier 52-Chromosome analysis with less than 20 cells (if appropriate)
88264-Chromosome analysis with 20 to 25 cells (if appropriate)
88264,88285- Chromosome analysis with greater than 25 cells (if appropriate)
88283-Additional specialized banding technique (if appropriate)

LOINC® Information

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