Overview

Useful For

Evaluation of tissues for potential involvement by:

- Chronic lymphoproliferative disorders
- Malignant lymphomas
- Acute lymphoblastic leukemia
- Acute myelogenous leukemia

Reflex Tests

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Reporting Name</th>
<th>Available Separately</th>
<th>Always Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCINT</td>
<td>Flow Cytometry Interp, 2-8 Markers</td>
<td>No, (Bill Only)</td>
<td>No</td>
</tr>
<tr>
<td>FCIMS</td>
<td>Flow Cytometry Interp, 9-15 Markers</td>
<td>No, (Bill Only)</td>
<td>No</td>
</tr>
<tr>
<td>FCINS</td>
<td>Flow Cytometry Interp, 16 or greater</td>
<td>No, (Bill Only)</td>
<td>No</td>
</tr>
</tbody>
</table>

Additional Tests

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Reporting Name</th>
<th>Available Separately</th>
<th>Always Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRST</td>
<td>Flow Cytometry, Cell Surface, First</td>
<td>No, (Bill Only)</td>
<td>Yes</td>
</tr>
<tr>
<td>ADD1</td>
<td>Flow Cytometry, Cell Surface, Addl</td>
<td>No, (Bill Only)</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Testing Algorithm

When this test is ordered, a screening panel and a professional interpretation will always be charged. The screening panel will be charged based on number of markers tested (FIRST for first marker, ADD1 for each additional marker). The interpretation will be set based on markers tested in increments of 9 to 15, or 16 and greater. In addition, reflex testing may occur to fully characterize a disease state or clarify any abnormalities from the screening test. Reflex tests will be performed at an additional charge for each marker tested (FIRST if applicable, ADD1 if applicable).

The tissue panel is initially performed to evaluate for monotypic B-cells by kappa and lambda light chain expression, and increased numbers of blasts and plasma cells by CD45 expression along with side scatter gating. The panel can also evaluate T cells with CD3, CD5, and CD7. Additionally, viability is assessed on all tissue specimens using 7-AAD exclusion.

This panel, together with the provided clinical history and morphologic review, is used to determine what, if any,
further testing is needed for disease diagnosis or classification. If additional testing is required, it will be added per algorithm to fully characterize a disease state with a charge per unique antibody tested.

In addition to reflexing flow cytometric panels, FISH or molecular testing may be recommended by the Mayo pathologist to facilitate diagnosis. They will contact the referring physician or pathologist to confirm the addition of these tests.

Special Instructions

- Hematopathology Patient Information

Method Name

Immunophenotyping

NY State Available

Yes

Specimen

Specimen Type

Tissue

Advisory Information

Lung tissue specimens are not acceptable for this test due to the highly contagious nature of COVID-19 that could be present. The use of immunohistochemical (IHC) stains is encouraged for immunophenotyping in these specimens.

Shipping Instructions

Specimen must arrive within 96 hours of collection.

Necessary Information

1. Date, time of collection, tissue type, and location are required.

2. A pathology/diagnostic report including the client surgical pathology case number, a brief history, reason for testing or clinical suspicion are required before the specimen will be processed.

Specimen Required

Supplies: Hank's Solution (T132)

Container/Tube: Sterile container with 15 mL of tissue culture medium (eg, Hank's balanced salt solution, RPMI, or equivalent)

Specimen Volume: 5 mm(3) or larger biopsy

Collection Instructions:

1. Collect fine-needle aspirate.

2. Send intact specimen (do not mince).

3. Specimen cannot be fixed.
**Forms**

1. **Hematopathology Patient Information** (T676) in Special Instructions

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

**Specimen Minimum Volume**

1 mm(3)

**Reject Due To**

| Fixed, paraffin-embedded, or minced tissue, lung tissue | Reject |

**Specimen Stability Information**

<table>
<thead>
<tr>
<th>Specimen Type</th>
<th>Temperature</th>
<th>Time</th>
<th>Special Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tissue</td>
<td>Refrigerated (preferred)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ambient</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Clinical and Interpretive**

**Clinical Information**

Cellular immunophenotyping, characterizing cells by using antibodies directed against cell surface markers, is generally regarded as a fundamental element in establishing a diagnosis of tissue involvement by hematolymphoid malignancies, when used in conjunction with morphologic assessment. It is also an essential component in subclassification of hematolymphoid malignancies, when present.

**Reference Values**

An interpretive report will be provided.

**Interpretation**

Normal tissues typically contain a mixture of B cells with polytypic surface immunoglobulin light chain expression and T cells with unremarkable expression of the T cell-associated antigens CD3, CD5, and CD7. Typically, no appreciable blast population is present by CD45 and side scatter analysis.

**Cautions**

It is well recognized that a negative flow cytometry result does not exclude tissue involvement by hematolymphoid malignancy. This may be attributable to sampling bias, although some malignancies, such as Hodgkin lymphoma, are not detected by this technique.

Viability will be assessed in all tissue specimens. Cases in which the viability is low (<50%) are prone to false-negative results and, therefore, must be interpreted with caution. In cases with viability less than 30%, testing will be attempted but may not be interpretable. Fine-needle aspiration and small biopsy specimens have a higher frequency of low cell counts and poor viability, which may be uninterpretable.

Even when abnormal, in most instances the results of flow cytometry are insufficient for complete subclassification of a hematolymphoid malignancy. Precise subclassification requires correlation with the histopathologic features in
paraffin-embedded materials and also, in some instances, the results of cytogenetic analyses.

The tissue used for flow cytometry cannot be subsequently submitted for histopathologic evaluation. For this reason, this technique should be avoided in small biopsy specimens.

**Clinical Reference**


**Performance**

**Method Description**

Flow cytometric immunophenotyping of tissues is performed using the following antibodies:

**Tissue Panel:** CD3, CD5, CD7, CD10, CD19, CD20, CD23, CD45, 7-AAD, and kappa and lambda light chains.

Possible additional panels:

**B-cell Panel:** CD5, CD11c, CD19, CD20, CD22, CD23, CD38, CD45, CD103, CD200 and kappa and lambda light chains

**T-cell Panel:** CD2, CD3, CD4, CD5, CD7, CD8, CD45, and gamma/delta

**KIR Panel:** CD3, CD8, CD16, CD56, CD57, CD94, CD158a, CD158b, CD158e (p70) and NKG2a

**V-Beta Panel:** CD3, CD8, T-cell receptors: VB1, VB2, VB3, VB4, VB5.1, VB5.2, VB5.3, VB7.1, VB7.2, VB8, VB9, VB11, VB12, VB13.1, VB13.2, VB13.6, VB14, VB16, VB17, VB18, VB20, VB21.3, VB22, and VB23.

**Acute Panel:** CD2, CD3, CD5, CD7, CD13, CD15, CD19, CD20, CD33, CD34, CD45, CD56, CD117 and HLA-DR

**B-cell ALL, minimal residual disease (MRD) panel:** CD9, CD10, CD19, CD20, CD34, CD38, CD45, CD66c

**Myeloperoxidase (MPO)/terminal deoxynucleotidyl transferase (TdT) (MPO/TdT) Panel:** cytoplasmic CD3, CD13, cytoplasmic CD22, CD34, CD45, cytoplasmic CD79a, nuclear TDT, and cytoplasmic MPO

Test Definition: LLPT
Leukemia Lymphoma Phenotype, Tissue

No

Day(s) and Time(s) Test Performed
Specimens are processed and reported Monday through Saturday

Analytic Time
1 day

Maximum Laboratory Time
4 days

Specimen Retention Time
Remaining tissue 7 days

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 using an analyte specific reagent. Its performance characteristics were 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
88184-Flow cytometry; first cell surface, cytoplasmic or nuclear marker x 1
88185-Flow cytometry; additional cell surface, cytoplasmic or nuclear marker (each)
88187-Flow Cytometry Interpretation, 2 to 8 Markers (if appropriate)
88188-Flow Cytometry Interpretation, 9 to 15 Markers (if appropriate)
88189-Flow Cytometry Interpretation, 16 or More Markers (if appropriate)

LOINC® Information

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Test Order Name</th>
<th>Order LOINC Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLPT</td>
<td>Leukemia Lymphoma Phenotype, Tissue</td>
<td>In Process</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Result ID</th>
<th>Test Result Name</th>
<th>Result LOINC Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CK139</td>
<td>LLPT Result</td>
<td>No LOINC Needed</td>
</tr>
<tr>
<td>Result ID</td>
<td>Test Result Name</td>
<td>Result LOINC Value</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>19573</td>
<td>Final Diagnosis:</td>
<td>34574-4</td>
</tr>
<tr>
<td>19575</td>
<td>Special Studies</td>
<td>30954-2</td>
</tr>
<tr>
<td>19571</td>
<td>Microscopic Description</td>
<td>22635-7</td>
</tr>
<tr>
<td>19562</td>
<td>Accession Number</td>
<td>57723-9</td>
</tr>
<tr>
<td>19563</td>
<td>Referring Pathologist/Physician</td>
<td>46608-6</td>
</tr>
<tr>
<td>19564</td>
<td>Ref Path/Phys Address</td>
<td>74221-3</td>
</tr>
<tr>
<td>19565</td>
<td>Place of Death:</td>
<td>21987-3</td>
</tr>
<tr>
<td>19566</td>
<td>Date and Time of Death:</td>
<td>81956-5</td>
</tr>
<tr>
<td>19567</td>
<td>Date of Autopsy:</td>
<td>75711-2</td>
</tr>
<tr>
<td>19568</td>
<td>Specimen:</td>
<td>31208-2</td>
</tr>
<tr>
<td>19569</td>
<td>Material:</td>
<td>81178-6</td>
</tr>
<tr>
<td>19570</td>
<td>Tissue Discription:</td>
<td>22634-0</td>
</tr>
<tr>
<td>19572</td>
<td>Clinical History:</td>
<td>22636-5</td>
</tr>
<tr>
<td>19574</td>
<td>Final Diagnosis:</td>
<td>34574-4</td>
</tr>
<tr>
<td>19576</td>
<td>Revision Description:</td>
<td>81317-0</td>
</tr>
<tr>
<td>19577</td>
<td>Signing Pathologist:</td>
<td>19139-5</td>
</tr>
<tr>
<td>19578</td>
<td>Special Procedures:</td>
<td>30954-2</td>
</tr>
<tr>
<td>19579</td>
<td>SP Signing Pathologist:</td>
<td>19139-5</td>
</tr>
<tr>
<td>19580</td>
<td><em>Previous Report Follows</em></td>
<td>22639-9</td>
</tr>
<tr>
<td>19581</td>
<td>Addendum:</td>
<td>35265-8</td>
</tr>
<tr>
<td>19582</td>
<td>Addendum Comment:</td>
<td>22638-1</td>
</tr>
<tr>
<td>19583</td>
<td>Addendum Pathologist:</td>
<td>19139-5</td>
</tr>
</tbody>
</table>