Overview

Useful For

Evaluation of tissues for potential involvement by:

-Chronic lymphoproliferative disorders

-Malignant lymphomas

-Acute lymphoblastic leukemia

-Acute myelogenous leukemia

Reflex Tests

Test ID	Reporting Name	Available Separately	Always Performed
FCINT	Flow Cytometry Interp, 2-8 Markers	No, (Bill Only)	No
FCIMS	Flow Cytometry Interp, 9-15 Markers	No, (Bill Only)	No
FCINS	Flow Cytometry Interp,16 or greater	No, (Bill Only)	No

Additional Tests

Test ID	Reporting Name	Available Separately	Always Performed
FIRST	Flow Cytometry, Cell Surface, First	No, (Bill Only)	Yes
ADD1	Flow Cytometry, Cell Surface, Addl	No, (Bill Only)	Yes

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 makers 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, fluorescence in situ hybridization (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

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	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Tissue	Refrigerated (preferred)		
	Ambient		

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

1. Morice WG, Hodnefield JM, Kurtin PJ, Hanson CA: An unusual case of leukemic mantle cell lymphoma with a blastoid component showing loss of CD5 and aberrant expression of CD10. Am J Clin Pathol. 2004 July;122(1):122-127

2. Hanson CA: Acute leukemias and myelodysplastic syndromes. In: McClatchey KD, ed. Clinical Laboratory Medicine. Williams and Wilkins Inc;1994:939-969

3. Jaffe ES, Cossman J: Immunodiagnosis of lymphoid and mononuclear phagocytic neoplasms. In: Rose NR, Friedman H, Fahey JL, eds. Manual of Clinical Immunology. 3rd ed. ASM Press;Â 1987:779-790

4. Witzig TE, Banks PM, Stenson MJ, et al: Rapid immunotyping of B-cell non-Hodgkin's lymphomas by flow cytometry. Am J Clin Pathol. 1989;94:280-286

5. Jevremovic D, Dronca RS, Morice WG, et al: CD5+ B-cell lymphoproliferative disorders: Beyond chronic lymphocytic leukemia and mantle cell lymphoma. Leuk Res. 2010 Sep;34(9):1235-1238

6. Jevremovic D, Olteanu H: Flow cytometry applications in the diagnosis of T/NK-cell lymphoproliferative disorders. Cytometry B Clin Cytom. 2019 Mar;96(2):99-115

7. Shi M, Jevremovic D, Otteson GE, Timm MM, Olteanu H, Horna P: Single antibody detection of T-Cell receptor alpha beta clonality by flow cytometry rapidly identifies mature T-Cell neoplasms and monotypic small CD8-positive subsets of uncertain significance. Cytometry B Clin Cytom. 2020 Jan;98(1):99-107

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, TRBC1, and gamma/delta

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

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: CD10, CD19, CD20, CD22, CD24, CD34, CD38, CD45, CD58, and CD66c

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

Plasma Cell Panel: CD19, CD38, CD45, CD138, and cytoplasmic kappa and lambda light chains

-Mast Cell Panel: CD2, CD25, CD69, CD117.(Keren P, McCoy JP, Carey J, eds. Flow Cytometry in Clinical Diagnosis. 4th ed. ASCP Press; 2007; Betters DM: Use of flow cytometry in clinical practice. J Adv Pract Oncol. 2015

Sep-Oct;6[5]:435-440)

PDF Report

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

Test ID	Test Order Name	Order LOINC Value
LLPT	Leukemia Lymphoma Phenotype, Tissue	In Process

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