MAYO CLINIC LABORATORIES

Test Definition: TLBLF

T-Cell Lymphoblastic Leukemia/Lymphoma, FISH, Tissue

Overview

Useful For

Detecting, at diagnosis, recurrent common chromosome abnormalities associated with T-cell acute lymphoblastic leukemia/lymphoma (T-ALL) in paraffin-embedded tissue specimens

Monitoring response to therapy by tracking known chromosome abnormalities in patients with T-ALL/T-lymphoblastic lymphoma

Reflex Tests

Test Id	Reporting Name	Available Separately	Always Performed
_I300	Interphases, >=100	No	No
_I099	Interphases, 25-99	No	No
_IL25	Interphases, <25	No	No
_PB03	Probe, +3	No	No
_PB02	Probe, +2	No	No
_PADD	Probe, +1	No	No
_PBCT	Probe, +2	No	No

Testing Algorithm

This test includes a charge for the probe application, analysis, and professional interpretation of results for one probe set (2 individual fluorescence in situ hybridization [FISH] probes). Additional charges will be incurred for all reflex or additional probe sets performed. Analysis charges will be incurred based on the number of cells analyzed per probe set. If no cells are available for analysis, no analysis charges will be incurred.

This test may be ordered in 2 distinct ways allowing different combinations of probes to be analyzed based on the clinical question.
1. Standard (diagnostic) T-lymphoblastic leukemia/lymphoma (TLBL) FISH panel
2. Individual TLBL FISH probes chosen, per **client request**, from probes listed below

If individual TLBL FISH probes are needed, the specific probes requested must be noted on the request form or in the reason for referral. If no FISH probes are indicated, the standard (diagnostic) panel will be performed.

The standard (diagnostic) panel includes testing for the following abnormalities using the FISH probes listed:
1p33 rearrangement or *STIL* deletion, request probe TAL1/STIL
t(5;14)(q35;q32) or *TLX3::BCL11B* fusion, request probe TLX3/BCL11B
t(7q34;var) or 7q34 rearrangement, request probe TRB break-apart
t(9;22) or *ABL1* amplification, request probe ABL1/BCR
t(10;11)(p12;q14) or *MLLT10::PICALM* fusion, request probe MLLT10/PICALM
t(11q23;var) or 11q23 rearrangement, request probe KMT2A break-apart

t(14q11.2;var) or 14q11.2 rearrangement, request probe TRA break-apart

In the following situations, additional (reflex) testing may be performed at the laboratory's discretion and may be influenced by other FISH testing.

When a *TRB (TCR beta)* rearrangement is identified, the dual-fusion FISH (D-FISH) probe set for t(7;10)(q34;q24) *TRB::TLX1* fusion may be used in an attempt to identify the translocation partner. To request this probe specifically, request probe TRB/TLX1.

When a *KMT2A* rearrangement is identified, 1 or more D-FISH probe sets may be used in an attempt to identify the translocation partner. Reflex testing is performed for the following abnormalities:
t(4;11)(q21;q23) or *KMT2A::AFF1* fusion, request probe AFF1/KMT2A
t(6;11)(q27;q23) or *KMT2A::AFDN* fusion, request probe AFDN/KMT2A
t(9;11)(p22;q23) or *KMT2A::MLLT3* fusion, request probe MLLT3/KMT2A
t(10;11)(p12;q23) or *KMT2A::MLLT10* fusion, request probe MLLT10/KMT2A
t(11;19)(q23;p13.1) or *KMT2A::MLLT1* fusion, request probe KMT2A/ELL
t(11;19)(q23;p13.3) or *KMT2A::ELL* fusion, request probe KMT2A/MLLT1

When a *TRA* rearrangement is identified, the D-FISH probe set for t(10;14)(q24;q11.2) *TRA::TLX1* fusion may be used in an attempt to identify the translocation partner. To request this probe specifically, request probe TLX1/TRA.

Appropriate ancillary probes may be performed at consultant discretion to render comprehensive assessment. Any additional probes will have the results included within the final report and will be performed at an additional charge.

Method Name
Fluorescence In Situ Hybridization (FISH)

NY State Available
Yes

Specimen

Specimen Type
Tissue

Ordering Guidance
This test does not include a pathology consultation. If a pathology consultation is requested, order PATHC / Pathology Consultation, and appropriate testing will be added at the discretion of the pathologist and performed at an additional charge.

Mayo Clinic Hematopathology consultants are involved in the pre-analytic phase (tissue adequacy and probe selection, when applicable).

This test is **not appropriate** for testing blood and bone marrow from patients with T-lymphoblastic leukemia/lymphoma (T-LBL). If a non-paraffin embedded bone marrow or blood specimen is received for this test, the test will be canceled and automatically reordered by the laboratory as TALAF / T-Cell Acute Lymphoblastic Leukemia/Lymphoma (ALL), FISH, Adult, Varies or TALFP / Pediatric T-Lymphoblastic Leukemia/Lymphoma Panel, FISH, Varies, depending on the age of the patient.

Shipping Instructions

Advise Express Mail or equivalent if not on courier service.

Necessary Information

1. A pathology report is required for testing to be performed. If not provided, appropriate testing and/or interpretation may be compromised or delayed. Acceptable pathology reports include working drafts, preliminary pathology, or surgical pathology reports.

2. The following information must be included in the report provided:

-Patient name

-Block number - must be on all blocks, slides, and paperwork

-Date of collection

-Tissue source

3. A reason for testing must be provided. If this information is not provided, an appropriate indication for testing may be entered by Mayo Clinic Laboratories.

4. A list of probes is required if select probes are necessary or if the patient is being tracked for known abnormalities. See Table in Clinical Information.

Specimen Required

Submit only 1 of the following specimens:

Preferred:

Specimen Type: Tissue block (fresh tissue is **not acceptable**)

Collection Instructions:

1. Submit a formalin-fixed, paraffin-embedded tumor tissue block.
2. Blocks prepared with alternative fixation methods (eg, Prefer, Bouin's) will be attempted but are less favorable for successful results. Provide fixation method used.

Additional Information:

1. Paraffin-embedded specimens can be from any anatomic location (skin, soft tissue, lymph node, etc).
2. Decalcified paraffin-embedded specimens will have testing attempted; however, the success rate is approximately 50%. **Testing may be canceled** if sufficient tumor tissue is not present.
3. **Submitted fresh tissue specimens will be canceled upon receipt**. If only fresh tissue is available, embed in paraffin prior to sending.

Acceptable

Specimen Type: Tissue slides

Slides: 1 Hematoxylin and eosin stained and 2 unstained for each probe set

Collection Instructions:

1. Include 1 hematoxylin and eosin-stained slide for the entire test order.

2. If individual probe sets are chosen: For each probe set ordered, submit 2 consecutive, unstained, 5 micron-thick sections placed on positively charged slides.
3. If a complete T-lymphoblastic leukemia/lymphoma (TLBL) panel is ordered: submit 16 consecutive, unstained, 5 micron-thick sections placed on positively charged slides.

Forms
If not ordering electronically, complete, print, and send 1 of the following forms with the specimen:
-Hematopathology/Cytogenetics Test Request (T726)
-Children's Oncology Group Test Request (T829)

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
Tissue	Ambient (preferred)		
	Refrigerated		

Clinical & Interpretive

Clinical Information
T-lymphoblastic lymphoma (T-LBL) is the non-leukemic form of T-acute lymphoblastic leukemia (T-ALL). In the United States, the incidence of ALL is roughly 6000 new cases per year, or approximately 1 in 50,000. ALL accounts for approximately 70% of all childhood leukemia cases (ages 0 to 19 years), making it the most common childhood cancer. Approximately 85% of pediatric ALL cases are B-cell lineage (B-ALL) and 15% are T-cell lineage (T-ALL). T-ALL is more common in adolescents than younger children and accounts for 25% of adult ALL. When occurring as a primary lymphoblastic lymphoma, approximately 90% are T-cell lineage versus only 10% B-cell lineage. T-LBL characteristically presents in adolescents and young adults as a mediastinal mass with or without concurrent bone marrow involvement. It is not uncommon that the only sample available with T-LBL involvement is a paraffin-embedded mediastinal or lymph node biopsy specimen.

Specific genetic abnormalities can be identified in the majority of T-ALL/LBL cases, although many of the classic abnormalities are "cryptic" by conventional chromosome studies and must be identified by fluorescence in situ hybridization (FISH) studies and are associated with various prognoses. One predictive marker, amplification of the *ABL1* gene region, has been identified in 5% of T-ALL/LBL, and these patients may be responsive to targeted tyrosine kinase inhibitors. A combination of cytogenetic and FISH testing is currently recommended in all pediatric and adult patients to characterize the T-ALL/LBL clone for prognostic genetic subgroups.

Reference Values
An interpretive report will be provided.

Interpretation

A neoplastic clone is detected when the percent of cells with an abnormality exceeds the normal reference range for any given probe set.

A positive result is not diagnostic for T-lymphoblastic lymphoma (T-LBL) but may provide relevant prognostic information.

The absence of an abnormal clone does not rule out the presence of a neoplastic disorder.

Cautions

This test is not approved by the US Food and Drug Administration and is best used as an adjunct to existing clinical and pathologic information.

Fixatives other than formalin (eg, Prefer, Bouin's) may not be successful for fluorescence in situ hybridization (FISH) assays. Non-formalin fixed specimens will not be rejected.

Paraffin-embedded tissues that have been decalcified will be attempted but may not be successful for FISH analysis. The success rate of FISH studies on decalcified tissue is approximately 50%.

Fluorescent in situ hybridization studies will be attempted if sufficient tumor is present for analysis. The pathologist reviewing the hematoxylin and eosin-stained slide may find it necessary to cancel testing if insufficient tissue/tumor is available for testing.

If no FISH signals are observed post-hybridization, the case will be released indicating a lack of FISH results.

Clinical Reference

WHO Classification of Tumours Editorial Board, eds. Haematolymphoid tumours. 5th ed. IARC Press; 2024. WHO Classification of Tumours, Volume 11

Performance

Method Description

This test is performed using commercially available and laboratory-developed probes. Rearrangements involving *TAL1/STIL, TRB, KMT2A*, and *TRA* are detected using a dual-color break-apart (BAP) strategy probe. Dual-color, dual-fusion fluorescence in situ hybridization (D-FISH) strategy probe sets are used to detect t(5;14), t(9;22), t(10;11), and in reflex testing when rearrangements of *KMT2A, TRB*, or *TRA* genes are detected. Amplification of the *ABL1* gene region is detected using a D-FISH probe strategy.

Paraffin-embedded tissue samples are cut at 5 microns and mounted on positively charged glass slides. The selection of tissue and the identification of target areas on the hematoxylin and eosin (H and E)-stained slide are performed by a pathologist. Using the H and E-stained slide as a reference, target areas are etched with a diamond-tipped engraving tool on the back of the unstained slide to be assayed. Each probe set is hybridized to the appropriate target areas, as

indicated on the H and E, and 100 interphase nuclei are scored within the targeted areas. The results are expressed as the percent of abnormal nuclei.(Unpublished Mayo method)

PDF Report
No

Day(s) Performed
Monday through Friday

Report Available
7 to 10 days

Specimen Retention Time
Slides used for analysis are retained by the laboratory in accordance with regulatory requirements. Client provided paraffin blocks and extra unstained slides (if provided) will be returned after testing is complete.

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
88271 x 2, 88291-DNA probe, each (first probe set), Interpretation and report
88271 x 2-DNA probe, each; each additional probe set (if appropriate)
88271-DNA probe, each; coverage for sets containing 3 probes (if appropriate)
88271 x 2-DNA probe, each; coverage for sets containing 4 probes (if appropriate)
88271 x 3-DNA probe, each; coverage for sets containing 5 probes (if appropriate)
88274 w/modifier 52-Interphase in situ hybridization, <25 cells, each probe set (if appropriate)
88274-Interphase in situ hybridization, 25 to 99 cells, each probe set (if appropriate)
88275-Interphase in situ hybridization, 100 to 300 cells, each probe set (if appropriate)

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value

TLBLF	T-Lymphoblastic Leuk/Lymph, FISH,Ts	101663-3

Result ID	Test Result Name	Result LOINC® Value
113467	Result Summary	50397-9
113468	Interpretation	69965-2
113626	Result Table	93356-4
113469	Result	62356-1
GC005	Reason for Referral	42349-1
113470	Specimen	31208-2
113471	Source	31208-2
113472	Tissue ID	80398-1
113473	Method	85069-3
113474	Additional Information	48767-8
113475	Disclaimer	62364-5
113476	Released By	18771-6