MAYO CLINIC LABORATORIES

Test Definition: JLYMF

B-Cell Lymphoma, FISH, Tissue

Overview

Useful For

Providing essential information for an integrated pathologic diagnosis, an individualized treatment plan, and predicting patient response to treatment

Reflex Tests

Test Id	Reporting Name	Available Separately	Always Performed
JLYMP	Probe, Each Additional (JLYMF)-PC	No	No

Testing Algorithm

This test is designed to detect the most common genomic changes in B-cell lymphoma including *MYC::IGH* fusion and rearrangement of *MYC*, *BCL2*, and *BCL6* genes.

The oncologists and/or pathologists may order a single or all 4 fluorescence in situ hybridization (FISH) tests based on clinical needs. The lab will only perform the FISH tests that are ordered and report each separately within the same report. A charge and CPT code is applied for each probe set hybridized, analyzed, and reported.

Given the clinical importance of identifying the double-hit high grade B-cell lymphoma and the urgency of available results, one order to test all 4 probes for *MYC::IGH* fusion and rearrangement of *MYC*, *BCL2*, *BCL6* is highly recommended.

The common gene rearrangements caused by chromosome translocations in each type of B-cell lymphoma are provided in Clinical Information as a reference for oncologists and pathologists. The oncologists and pathologists will decide which FISH probe to test according to diagnostic algorithms and patient clinical status. For gene rearrangements that are not provided by this test, specimens should be referred to Mayo Clinic Laboratories in Rochester, MN.

Method Name

Fluorescence In Situ Hybridization (FISH)

NY State Available

No

Specimen

Specimen Type

Tissue

Ordering Guidance

This assay is designed to detect the common gene rearrangements caused by chromosome abnormalities in tumor tissue as part of the diagnosis of B-cell lymphoma. The assay can be ordered as a panel, or each probe set can be ordered individually.

This test **is not** for blood or bone marrow specimens.

Shipping Instructions

Advise Express Mail or equivalent if not on courier service.

Ship paraffin blocks on ice packs during warm months.

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.

Specimen Required

Submit only 1 of the following specimens:

Preferred

Specimen Type: Tissue block

Collection Instructions: Submit a formalin-fixed, paraffin-embedded tumor tissue block. Blocks prepared with alternative fixation methods will not be accepted; provide fixation method used.

Additional Information: Paraffin-embedded specimens can be from any anatomic location (skin, soft tissue, lymph node, etc).

Acceptable

Specimen Type: Tissue slides

Slides: 1 Hematoxylin and eosin-stained slide and 1 unstained slide for each probe set plus an additional unstained slide.

Collection Instructions:

1. Include 1 hematoxylin and eosin-stained slide for the entire test order.
2. For each probe set ordered, submit 1 consecutive, unstained, 4 to 5 micron-thick sections placed on positively charged slides, plus 1 additional unstained slide.

Forms

If not ordering electronically, complete, print, and send a Molecular Pathology Test Request (T726) with the specimen.

Specimen Minimum Volume

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

Reject Due To

Decalcified specimens	Reject
Non-formalin fixed, paraffin embedded tissue	Reject

Specimen Stability Information

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

Clinical & Interpretive

Clinical Information

The common gene rearrangements in B-cell lymphoma caused by chromosome translocations (see Table). This test is designed to detect the rearrangement involving the *MYC*, *BCL2*, and *BCL6* genes only.

Table. Common Chromosome Abnormalities in B-cell Lymphomas

Lymphoma type	Genomic changes	FISH probe
Burkitt (pediatric, < or =18 years old)	MYC rearrangement	5'/3' MYC
	MYC-IGH fusion	MYC/IGH
	BCL6 rearrangement	3'/5' BCL6
	BCL2 rearrangement	3'/5' BCL2
Diffuse large B-cell and double-hit high grade	MYC rearrangement	5'/3' MYC
	MYC-IGH fusion	MYC/IGH
	BCL6 rearrangement	3'/5' BCL6
	BCL2 rearrangement	3'/5' BCL2
Large BCL with IRF4 rearranged	6p24.3 rearrangement	3'/5' IRF4
	BCL2 rearrangement	3'/5' BCL2
	BCL6 rearrangement	3'/5' BCL6
Follicular	BCL2 rearrangement	3'/5' BCL2
	BCL6 rearrangement	3'/5' BCL6
	Predominantly diffuse subtype only: 1p36 deletion	1p36.1/1q22
Mantle cell	CCND1-IGH fusion	CCND1/IGH
	Blastoid subtype only: 17p deletion	TP53/D17Z1
	Blastoid subtype only: MYC	5'/3' MYC

	rearrangement	
MALT	MALT1 rearrangement	5'/3' MALT1
Splenic marginal zone	7q deletion	D7Z1/7q32
	17p deletion	TP53/D17Z1

Reference Values

An interpretive report will be provided.

Interpretation

The frequency of each gene rearrangement in a particular subtype of B-cell lymphoma varies from 100% to less than 10%; therefore, a negative result of a particular fluorescence in situ hybridization (FISH) test will not change the pathologic diagnosis.

The rearrangement of *MYC* is mainly caused by t(8;14)(q24.1;q32) translocation and less commonly by t(2;8)(p12;q24.1) and t(8;22)(q24.1;q11.2). The tri-color dual fusion probe detects *MYC::IGH* fusion caused by t(8;14). The dual color-MYC break apart probe used in this test detects the *MYC* rearrangement caused by all 3 different translocations. Similarly, the rearrangement of *BCL2* and *BCL6* have involved multiple partner genes, and these can be detected by *BCL2* and *BCL6* break-apart probes.

The diffuse large B-cell lymphoma is associated with *BCL2*, *BCL6*, and *MYC* rearrangements. A double-hit (rarely triple-hit) high-grade B-cell lymphoma is identified when a tumor shows *BCL2* or *BCL6* rearrangement along with *IGH::MYC* fusion or other types of *MYC* rearrangement.

The FISH results will be correlated with clinical, pathological, and immunologic features by a pathologist for final interpretation.

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.

Optimum fixation should be performed using 10% neutral buffered formalin. Other types of fixatives should not be used.

Paraffin-embedded tissues that have been decalcified are generally unsuccessful for fluorescence in situ hybridization analysis. Decalcified tissue will be rejected.

Supportive Data

Each probe was independently tested on a set of formalin-fixed, paraffin-embedded tissue specimens from patients diagnosed with a B-cell lymphoma. Normal cutoffs were calculated based on the results from 20 normal specimens. For each probe set, a series of chromosomally abnormal specimens were evaluated to confirm each probe set detected the anomaly it was designed to detect.

Clinical Reference

Campo E, Harris NL, Jaffe ES, eds. WHO Classification of Tumors of Haematopoietic and Lymphoid Tissues. IARC; 2017

Performance

Method Description

This test is performed using commercially available probes. Rearrangements involving *MYC, BCL2, or BCL6,* are detected using dual-color break-apart probes. *MYC::IGH* fusion is identified using a tri-color dual-fusion probe. Formalin-fixed, paraffin-embedded tissues are cut between 4 to 5 microns and mounted on positively charged glass slides. The selection of tissue and the target areas on the hematoxylin and eosin (H and E)-stained slide is performed by a pathologist. Using the H and E-stained slide as a reference, target areas are etched with a diamond-tipped etcher on the back of the unstained slide to be assayed. The probe set is hybridized to the appropriate target areas and 2 technologists each analyze 50 interphase nuclei (100 total) with the results expressed as the percent abnormal nuclei.(Unpublished Mayo method)

PDF Report

No

Day(s) Performed

Monday through Friday

Report Available

2 to 8 days

Specimen Retention Time

Images are saved indefinitely. Extra unstained slides (if provided) and hematoxylin and eosin-stained slide will be sent to histology after testing is complete.

Performing Laboratory Location

Mayo Clinic Jacksonville Clinical Lab

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

88377 (if 1 probe set)
88377 x 2 (if 2 probe sets)
88377 x 3 (if 3 probe sets)

88377 x 4 (if 4 probe sets)

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
JLYMF	B Cell Lymphoma, FISH, Tissue	101787-0

Result ID	Test Result Name	Result LOINC® Value
614554	Result Summary	50397-9
614555	Interpretation	59465-5
614557	Result	82939-0
614558	Reason for Referral	42349-1
614559	Specimen	31208-2
614560	Source	31208-2
614561	Tissue ID	80398-1
614562	Method	85069-3
614563	Additional Information	48767-8
614912	Disclaimer	62364-5
614913	Released By	18771-6