

Overview

Useful For

Detecting a neoplastic clone associated with the common chromosome abnormalities seen in patients with various B-cell lymphomas

Tracking known chromosome abnormalities and response to therapy in patients with B-cell lymphoma

Evaluating specimens in which standard cytogenetic analysis is unsuccessful

Reflex Tests

Test Id	Reporting Name	Available Separately	Always Performed
BLPMB	Probe, Each Additional (BLPMF)	No, (Bill Only)	No

Testing Algorithm

This test includes a charge for the probe application, analysis and professional interpretation of results for 1 probe set (2 individual fluorescence in situ hybridization [FISH] probes). Additional charges will be incurred for all reflex or additional probe sets performed.

This is not intended as a panel test and the desired probe(s) or suspected B-cell lymphoma subtype must be specified upon order. If the patient is being evaluated for known abnormalities, individual probe(s) must be listed in the probe request field. This test is only appropriate for the following known subtypes of B-cell lymphoma:

Pediatric Burkitt lymphoma testing (18 years or younger):

-Recommended probe request = 5'/3' MYC, MYC/IGH, MYC/IGK, MYC/IGL, 3'/5' BCL2, 3'/5' BCL6

Diffuse large B-cell, "double-hit", "triple hit" lymphoma testing:

-Recommended probe request = 5'/3' MYC, MYC/IGH, reflex with 3'/5' BCL2, 3'/5' BCL6

*If reflex is included in the probe request, break-apart BCL2 and BCL6 reflex testing would occur when a MYC disruption is observed

Follicular lymphoma testing:

-Recommended probe request = 3'/5' BCL2, 3'/5' BCL6

Mantle cell lymphoma (MCL) testing:

-Recommended probe request = CCND1/IGH, 5'/3' CCND1 as reflex

*If reflex is included in the probe request, break-apart CCND1 reflex testing would occur when an additional CCND1 FISH signal is detected to rule out a CCND1 gene disruption

Blastoid Mantle cell lymphoma testing:

-Recommended probe request = CCND1/IGH, TP53, 5'/3' MYC, MYC/IGH, 5'/3' CCND1 as reflex

*If reflex is included in the probe request, break-apart CCND1 reflex testing would occur when an additional CCND1 FISH signal is detected to rule out a CCND1 gene disruption

Splenic marginal zone lymphoma testing:

-Recommended probe request = D7Z1/7q32, TP53/D17Z1

See **Common Chromosome Abnormalities in B-cell Lymphomas** in **Clinical Information** for specific gene locations associated with these B-cell lymphoma subtypes.

If the laboratory is not provided a specific probe request or an appropriate B-cell lymphoma subtype, the following probes will be performed.

[-t\(3q27;var\) rearrangement, BCL6 break-apart](#)

-7q-, D7Z1/7q32

-8q24.1 rearrangement, MYC break-apart

-t(8;14)(q24.1;q32), MYC/IGH fusion

-t(11;14)(q13;q32), CCND1/IGH fusion

-17/17p-, TP53/D17Z1

-t(18q21;var) rearrangement, BCL2 break-apart

When this test and flow cytometry testing for leukemia/lymphoma are ordered concurrently, the flow cytometry result will be utilized to determine if sufficient clonal B-cells are available for FISH testing. If the result does not identify a sufficient clonal B-cell population, this FISH test order will be canceled, and no charges will be incurred. The B-cell lymphoma subtype will be used by the laboratory to determine appropriate FISH probes, if determined and applicable.

For more information see [Bone Marrow Staging for Known or Suspected Malignant Lymphoma Algorithm](#)

Special Instructions

- [Bone Marrow Staging for Known or Suspected Malignant Lymphoma Algorithm](#)

Method Name

Fluorescence In Situ Hybridization (FISH)

NY State Available

Yes

Specimen

Specimen Type

Varies

Ordering Guidance

This test should only be ordered if the sample is known to have a sufficient clonal B-cell population. If a flow cytometry result is available and does not identify a sufficient clonal B-cell population, this test order will be canceled, and no charges will be incurred.

If either the break-apart MYC or the MYC/IGH D-FISH probe sets are requested in isolation, both probe sets will be performed concurrently to optimize the detection of MYC rearrangements.

This assay detects chromosome abnormalities observed in blood or bone marrow samples of patients with B-cell

lymphoma. If a paraffin-embedded tissue specimen is submitted, the test will be canceled and BLYM / B-Cell Lymphoma, FISH, Tissue will be added and performed as the appropriate test.

For patients with B-cell acute lymphoblastic leukemia/lymphoma (B-ALL/LBL), order either BALAF / B-Cell Acute Lymphoblastic Leukemia/Lymphoma (ALL), FISH, Adult, Varies or BALPF / B-Cell Acute Lymphoblastic Leukemia/Lymphoma (ALL), FISH, Pediatric, Varies, depending on the age of the patient.

For testing paraffin-embedded tissue samples from patients with B-cell lymphoblastic Lymphoma, see BLBLF / B-Cell Lymphoblastic Leukemia/Lymphoma, FISH, Tissue.

Shipping Instructions

Advise Express Mail or equivalent if not on courier service.

Necessary Information

1. **A list of probes requested for analysis is required.** Probes available for this test are listed in the Testing Algorithm section.
2. A reason for testing and a flow cytometry and/or a bone marrow pathology report should be sent with each specimen. The laboratory will not reject testing if this information is not provided, however appropriate testing and/or interpretation may be compromised or delayed in some instances. [If this information is not provided, an appropriate indication for testing may be entered by Mayo Clinic Laboratories.](#)

Specimen Required

Submit only 1 of the following specimens:

Preferred:

Specimen Type: Bone marrow

Container/Tube:

Preferred: Yellow top (ACD)

Acceptable: Green top (heparin) or lavender top (EDTA)

Specimen Volume: 2 to 3 mL

Collection Instructions:

1. It is preferable to send the first aspirate from the bone marrow collection.
2. Invert several times to mix bone marrow.
3. Send bone marrow in original tube. **Do not aliquot.**

Acceptable:

Specimen Type: Blood

Container/Tube:

Preferred: Yellow top (ACD)

Acceptable: Green top (heparin) or lavender top (EDTA)

Specimen Volume: 6 mL

Collection Instructions:

1. Invert several times to mix blood.
2. Send whole blood in original tube. **Do not aliquot.**

Forms

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

Specimen Minimum Volume

Blood: 2 mL

Bone Marrow: 1 mL

Reject Due To

All specimens will be evaluated at Mayo Clinic Laboratories for test suitability.

Specimen Stability Information

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

Clinical & Interpretive

Clinical Information

Mature B-cell lymphomas represent a diverse group of neoplasms with a varied prognosis and clinical course based on the B-cell lymphoma subtype. Several characteristic genetic abnormalities have emerged as important diagnostic and prognostic markers in specific B-cell lymphoma subtypes (see Table).

Table. **Common Chromosome Abnormalities in B-cell Lymphomas**

Lymphoma subtype	Chromosome abnormality	FISH probe
Burkitt (pediatric, < or =18 years old)	8q24.1 rearrangement	5'/3' MYC
	t(2;8)(p12;q24.1)	IGK/MYC
	t(8;14)(q24.1;q32)	MYC/IGH
	t(8;22)(q24.1;q11.2)	MYC/IGL
	3q27 rearrangement (evaluated for exclusion)	3'/5' BCL6
	18q21 rearrangement (evaluated for exclusion)	3'/5' BCL2
Diffuse large B-cell, "double-hit" or "triple hit"	8q24.1 rearrangement	5'/3' MYC
	t(8;14)(q24.1;q32)	MYC/IGH
	-Reflex: t(2;8)(p12;q24.1)	IGK/MYC
	-Reflex: t(8;22)(q24.1;q11.2)	MYC/IGL
	-Reflex: 3q27 rearrangement	3'/5' BCL6
	-Reflex: 18q21 rearrangement	3'/5' BCL2
Follicular	18q21 rearrangement	3'/5' BCL2
	3q27 rearrangement	3'/5' BCL6
Mantle cell	t(11;14)(q13;q32)	CCND1/IGH
	-Reflex: 11q13 rearrangement	5'/3' CCND1
	Blastoid subtype only: deletion of 17p	TP53/D17Z1
	Blastoid subtype only: 8q24.1 rearrangement	5'/3' MYC
	Blastoid subtype only: t(8;14)(q24.1;q32)	MYC/IGH

Splenic marginal zone lymphoma	Deletion of 7q	D7Z1/7q32
	Deletion of 17p	TP53/D17Z1

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.

Detection of an abnormal clone supports a diagnosis of B-cell lymphoma. The specific abnormality detected may help to determine a specific B-cell lymphoma subtype.

The absence of an abnormal clone does not rule out the presence of lymphoma.

Cautions

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

Bone marrow is the preferred sample type for this fluorescence in situ hybridization test. If bone marrow is not available, a blood specimen may be used if there are neoplastic cells in the blood specimen (as verified by a hematopathologist).

Supportive Data

Each probe was independently tested and verified on unstimulated peripheral blood and bone marrow specimens. Normal cutoffs were calculated based on the results of 25 normal specimens. Each probe set was evaluated to confirm the probe set detected the abnormality it was designed to detect.

Clinical Reference

- [Swerdlow SH, Campo E, Harris NL, et al, eds: WHO Classification of Tumours of Haematopoietic and Lymphoid Tissues. 4th ed. IARC Press; 2017.](#) WHO Classification of Tumours. Vol 2
- King RL, McPhail ED, Meyer RG, et al: False-negative rates for MYC fluorescence in situ hybridization probes in B-cell neoplasms. *Haematologica*. 2019 Jun;104(6):e248-e251
- Pophali PA, Marinelli LM, Ketterling RP, et al: High level MYC amplification in B-cell lymphomas: is it a marker of aggressive disease? *Blood Cancer J*. 2020 Jan 13;10(1):5

Performance

Method Description

This test is performed using commercially available and laboratory-developed probes. Deletion of the 7q32 probe on chromosome 7 and the *TP53* gene region on chromosome 17 are detected using enumeration strategy probes. Rearrangements involving *MYC*, *BCL2* or *BCL6* are detected using dual-color break-apart (BAP) strategy probes. Dual-color, dual-fusion fluorescence in situ hybridization (D-FISH) strategy probe sets are used to detect t(2;8), t(8;14),

t(8;22), and t(11;14). For enumeration and BAP strategy probe sets, 100 interphase nuclei are scored; 200 interphase nuclei are scored when D-FISH probes are used, and results are expressed as the percent abnormal nuclei.(Unpublished Mayo method)

PDF Report

No

Day(s) Performed

Monday through Friday

Report Available

7 to 10 days

Specimen Retention Time

4 weeks

Performing Laboratory Location

Rochester

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. This test has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information

88271 x 2, 88275, 88291-FISH Probe, Analysis, Interpretation; 1 probe set
88271 x 2, 88275-FISH Probe, Analysis; each additional probe set (if appropriate)

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
BLPMF	B-cell Lymphoma, Specified FISH	In Process

Result ID	Test Result Name	Result LOINC® Value
614229	Result Summary	50397-9
614230	Interpretation	69965-2
614231	Result Table	93356-4
614232	Result	62356-1
GC105	Reason for Referral	42349-1

GC106	Probes Requested	78040-3
GC107	Specimen	31208-2
614233	Source	31208-2
614234	Method	31208-2
614235	Additional Information	48767-8
614236	Disclaimer	62364-5
614237	Released By	18771-6