MAYO CLINIC LABORATORIES

# Test Definition: BLPMF

B-Cell Lymphoma, Specified FISH, Varies

## 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
1. 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
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
3. 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. It 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 | 101920-7 |

| 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 |