MAYO CLINIC LABORATORIES

Test Definition: MPLVS

MPL Exon 10 Mutation Detection, Varies

Overview

Useful For
Aiding in the distinction between a reactive cytosis and a myeloproliferative neoplasm

Testing Algorithm
For more information see:
-Myeloproliferative Neoplasm: A Diagnostic Approach to Bone Marrow Evaluation
-Myeloproliferative Neoplasm: A Diagnostic Approach to Peripheral Blood Evaluation

Special Instructions
- Myeloproliferative Neoplasm: A Diagnostic Approach to Peripheral Blood Evaluation
- Myeloproliferative Neoplasm: A Diagnostic Approach to Bone Marrow Evaluation
- Hematopathology Patient Information

Method Name
Sanger Sequencing

NY State Available
Yes

Specimen

Specimen Type
Varies

Specimen Required
Submit only 1 of the following specimens:

Specimen Type: Whole blood
Container/Tube: Lavender top (EDTA) or yellow top (ACD)
Specimen Volume: 3 mL
Collections Instructions:
1. Invert several times to mix blood.
2. Send specimen in original tube. **Do not aliquot.**
3. Label specimen as whole blood.
Specimen Stability: Ambient (preferred)/Refrigerate

Specimen Type: Bone marrow
Container/Tube: Lavender top (EDTA) or yellow top (ACD)
Specimen Volume: 2 mL

Collections Instructions:
1. Invert several times to mix bone marrow.
2. Send specimens in original tube. **Do not aliquot.**
3. Label specimen as bone marrow.
Specimen Stability: Ambient (preferred)/Refrigerate

Specimen Type: Extracted DNA from whole blood or bone marrow
Container/Tube: 1.5- to 2- mL tube
Specimen Volume: Entire specimen
Collection Instructions:
1. DNA must be extracted from blood or bone marrow within 7 days of collection.
2. Label specimen as extracted DNA and source of specimen
3. Provide volume and concentration of the DNA.
Specimen Stability Information: Frozen (preferred) 1 year/Refrigerated/Ambient
Additional Information: DNA must be extracted in a CLIA-certified laboratory or equivalent and must be extracted from a specimen type listed as acceptable for this test (including applicable anticoagulants). We cannot guarantee that all extraction methods are compatible with this test. If testing fails, one repeat will be attempted, and if unsuccessful, the test will be reported as failed and a charge will be applied.

Forms

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

Specimen Minimum Volume

Whole blood, Bone marrow: 0.5 mL; Extracted DNA: 50 mcL at 20 ng/mcL concentration

Reject Due To

Gross hemolysis	Reject
Bone marrow biopsies	Reject
Slides	Reject
Paraffin shavings	Reject
Moderately to severely clotted	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Varies	Varies	7 days	

Clinical & Interpretive

Clinical Information

DNA sequence variants in exon 10 of the myeloproliferative leukemia virus oncogene (*MPL*) have been detected in approximately 5% of patients with primary myelofibrosis (PMF) and essential thrombocythemia (ET), which are hematopoietic neoplasms classified within the broad category of myeloproliferative neoplasms. *MPL* codes for a transmembrane tyrosine kinase, and the most common *MPL* variants are single base pair substitutions at codon 515. These alterations have been shown to promote constitutive, cytokine-independent activation of the JAK/STAT signaling pathway and contribute to the oncogenic phenotype. At least 8 different *MPL* exon 10 variants have been identified in PMF and ET to date, and variants outside of exon 10 have not yet been reported. The vast majority of *MPL* variants have been found in specimens testing negative for the most common variant identified in myeloproliferative neoplasms, *JAK2* V716F, although a small number of cases with both types of variants have been reported. *MPL* variants have not been identified in patients with polycythemia vera, chronic myelogenous leukemia, or other myeloid neoplasms.

Identification of *MPL* variants can aid in the diagnosis of a myeloproliferative neoplasm and is highly suggestive of either PMF or ET.

Reference Values

An interpretive report will be provided.

Interpretation

The results will be reported as 1 of 2 states:
-Negative for *MPL* exon 10 variant
-Positive for *MPL* exon 10 variant
If the result is positive, a description of the variant at the nucleotide level and the altered protein sequence is reported.

Positive variant status is highly suggestive of a myeloproliferative neoplasm but must be correlated with clinical and other laboratory features for a definitive diagnosis. Negative variant status does not exclude the presence of a myeloproliferative or other neoplasm.

Cautions

A positive result is not specific for a particular diagnosis and clinicopathologic correlation is necessary in all cases.

A negative result does not exclude the presence of a myeloproliferative or other neoplasm.

Supportive Data

Analytical sensitivity is approximately 20%, meaning there must be about 20% of the altered DNA in the specimen for reliable detection.

Clinical Reference

1. Defour JP, Chachoua I, Pecquet C, Constantinescu SN. Oncogenic activation of MPL/thrombopoietin receptor by 17 mutations at W515: implications for myeloproliferative neoplasms. Leukemia. 2016;30(5):1214-1216. doi:10.1038/leu.2015.271
2. Pikman Y, Lee BH, Mercher T, et al. MPLW515L is a novel somatic activating mutation in myelofibrosis with myeloid metaplasia. PLoS Med. 2006;3(7):e270
3. Pardanani AD, Levine RL, Lasho T, et al. MPL515 mutations in myeloproliferative and other myeloid disorders: a study of 1182 patients. Blood. 2006;108(10):3472-3476
4. Kilpivaara O, Levine RL. JAK2 and MPL mutations in myeloproliferative neoplasms: discovery and science. Leukemia.

2008;22(10):1813-1817. doi:10.1038/leu.2008.229
5. Greenfield G, McMullin MF, Mils K. Molecular pathogenesis of the myeloproliferative neoplasms. J Hematol Oncol. 2021;14(1):103

Performance

Method Description
Genomic DNA is extracted from the blood or bone marrow sample, and the *MPL* exon 10 amplified using standard polymerase chain reaction. The entire exon 10 sequence is obtained using Sanger sequencing with analysis on an automated genetic analyzer.(Unpublished Mayo method)

PDF Report
No

Day(s) Performed
Monday through Friday

Report Available
5 to 8 days

Specimen Retention Time
Whole blood/Bone marrow: 2 weeks; Extracted DNA: 3 months

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
81339-*MPL* (myeloproliferative leukemia virus oncogene, thrombopoietin receptor, TPOR) (eg, myeloproliferative disorder), exon 10 sequence

LOINC® Information

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Test ID	Test Order Name	Order LOINC® Value
MPLVS	MPL Exon 10 Mutation Detection, V	62948-5

Result ID	Test Result Name	Result LOINC® Value
MP051	Specimen Type	31208-2
602600	Interpretation	69047-9
602601	Signing Pathologist	19139-5