Test Definition: MPCDS

mSMART, Plasma Cell Proliferative Disorder, FISH, Bone Marrow

Overview

Useful For

Aiding in the diagnosis of new cases of multiple myeloma or other plasma cell proliferative disorders as a part of a profile

Identifying prognostic markers based on the anomalies found

Reflex Tests

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

Testing Algorithm

This test is designed for diagnostic specimens from patients with multiple myeloma or other plasma cell proliferative disorders.

For **diagnostic** samples, all probes in the initial panel will be evaluated if sufficient plasma cells are identified. The initial panel includes testing for the following the probes listed:
17p-, TP53/D17Z1
1q gain, TP73/1q22
14q32 rearrangement, IGH break-apart
8q24.1 rearrangement, MYC break-apart

Based on the results from the initial panel, reflex testing may be performed to identify the following abnormalities using the probes listed:
t(11;14)(q13;q32), CCND1/IGH fusion
t(14;16)(q32;q23) IGH/MAF fusion
t(4;14)(p16.3;q32) FGFR3/IGH fusion
t(14;20)(q32;q12) IGH/MAFB fusion
t(6;14)(p21;q32) CCND3/IGH fusion

Hyperdiploidy will be evaluated and reported by flow cytometry as part of this evaluation and incorporated into the final interpretation. For samples with an unsuccessful flow evaluation for hyperdiploidy and with sufficient plasma cells, fluorescence in situ hybridization testing for the following abnormalities will be performed using the probes listed:
+3/+7, D3Z1/D7Z1
+9/+15, D9Z1/D15Z4

For specimens sent for **follow-up** testing after completion of initial testing, the following probes will be evaluated if sufficient plasma cells are identified:
17p-, TP53/D17Z1

1q gain, TP73/1q22
8q24.1 rearrangement, MYC break-apart

Based on the results from the initial follow-up panel, reflex testing may be performed to identify the following high- risk abnormalities that were originally identified in the diagnostic specimen, using the probes listed:
t(14;16)(q32;q23) IGH/MAF fusion
t(4;14)(p16.3;q32) FGFR3/IGH fusion
t(14;20)(q32;q12) IGH/MAFB fusion
If a diagnostic sample was uninformative for a probe set due to an insufficient number of plasma cells, attempts may be made to achieve results for the missing probe on a subsequent sample (if sufficient plasma cells are identified).

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
Only orderable as part of a profile. For more information see MSMRT / Mayo Algorithmic Approach for Stratification of Myeloma and Risk-Adapted Therapy Report, Bone Marrow.

Fluorescence In Situ Hybridization (FISH)

NY State Available
Yes

Specimen

Specimen Type
Bone Marrow

Specimen Required
Only orderable as part of a profile. For more information see MSMRT / Mayo Algorithmic Approach for Stratification of Myeloma and Risk-Adapted Therapy Report, Bone Marrow.

Specimen Type: Redirected bone marrow
Preferred: Yellow top (ACD)
Acceptable: Lavender top (EDTA) or green top (heparin)
Specimen Volume: 4 mL

Specimen Minimum Volume
2 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
Bone Marrow	Ambient (preferred)		
	Refrigerated		

Clinical & Interpretive

Clinical Information

Multiple myeloma is a hematologic neoplasm that generally originates in the bone marrow and develops from malignant plasma cells. There are 4 main categories of plasma cell proliferative disorders: monoclonal gammopathy of undetermined significance (MGUS), monoclonal immunoglobulin deposition diseases (amyloidosis), plasmacytoma, and multiple myeloma. MGUS, which occurs in 3% to 4% of individuals over age 50 years, represents the identification of an asymptomatic monoclonal protein, yet approximately 1% per year will progress to multiple myeloma. Amyloidosis represents a rare group of deposition disorders including primary amyloidosis vs. light-chain and heavy-chain disease. Plasmacytomas represent isolated collections of bone or extramedullary plasma cells with a risk for development of multiple myeloma. Generalized bone pain, anemia, limb numbness or weakness, symptoms of hypercalcemia, and recurrent infections are all symptoms that may indicate multiple myeloma.

As myeloma progresses, the malignant plasma cells interfere with normal blood product formation in the bone marrow, resulting in anemia and leukopenia. Myeloma also causes an overstimulation of osteoclasts, causing excessive breakdown of bone tissue without the normal corresponding bone formation. These bone lesions are seen in approximately 66% of myeloma patients. In advanced disease, bone loss may reach a degree where the patient suffers fractures easily.

Multiple myeloma is increasingly recognized as a disease characterized by marked cytogenetic, molecular, and proliferative heterogeneity. This heterogeneity is manifested clinically by varying degrees of disease aggressiveness. Patients with more aggressive multiple myeloma experience suboptimal responses to some therapeutic approaches; therefore, identifying these patients is critically important for selecting appropriate treatment options.

Reference Values

Only orderable as part of a profile. For more information see MSMRT / Mayo Algorithmic Approach for Stratification of Myeloma and Risk-Adapted Therapy Report, Bone Marrow.

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.

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

Cautions

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

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. Kumar SK, Rajkumar SV: The multiple myelomas-current concepts in cytogenetic classification and therapy. Nat Rev Clin Oncol. 2018 Jul;15(7):409-421. doi: 10.1038/s41571-018-0018-y
3. Rajkumar SV, Landgren O, Mateos MV: Smoldering multiple myeloma. Blood. 2015 May 14;125(20):3069-3075. doi: 10.1182/blood-2014-09-568899
4. Muchtar E, Dispenzieri A, Kumar SK, et al: Interphase fluorescence in situ hybridization in untreated AL amyloidosis has an independent prognostic impact by abnormality type and treatment category. Leukemia. 2017 Jul;31(7);1562-1569. doi: 10.1038/leu.2016.369
5. Lakshman A, Paul S, Rajkumar SV, et al: Prognostic significance of interphase FISH in monoclonal gammopathy of undetermined significance. Leukemia. 2018 Aug;32(8);1811-1815. doi: 10.1038/s41375-018-0030-3
6. Bochtler T, Hegenbart U, Kunz C, et al: Prognostic impact of cytogenetic aberrations in AL amyloidosis patients after high-dose melphalan: a long-term follow-up study. Blood. 2016 Jul 28;128(4):594-602. doi: 10.1182/blood-2015-10-676361
7. Treatment guidelines: multiple myeloma. mSMART 3.0. Accessed May 09, 2023. Available at www.msmart.org/mm-treatment-guidelines

Performance

Method Description

This test is performed using commercially available and laboratory-developed probes. Deletion or monosomy of chromosome 17, copy number gain of 1q, and additional copies of chromosomes 3, 7, 9, and 15 are detected using enumeration strategy probes. Translocations involving *IGH* are detected using dual-color, dual-fusion fluorescence in situ hybridization strategy probes. Rearrangement of *IGH* and *MYC* are detected using a break-apart strategy probe. For each probe set, 50 plasma cells (if possible) are scored and the result for each probe is reported. (Unpublished Mayo method)

PDF Report

No

Day(s) Performed

Monday through Friday

Report Available

7 to 10 days

Specimen Retention Time

14 days

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, 88274, 88291-FISH Probe, Analysis, Interpretation; 1 probe set
88271 x 2, 88274-FISH Probe, Analysis; each additional probe set (if appropriate)

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
MPCDS	mSMART Eval, PCPDs, FISH	93357-2

Result ID	Test Result Name	Result LOINC® Value
606091	mSMART Result Summary	62357-9
606092	mSMART Evaluation	57802-1
606093	Interpretation	69965-2
606094	Result Table	93356-4
606095	Result	62356-1
606096	Reason for Referral	42349-1
606097	Specimen	31208-2
606098	Source	85298-8
606099	Method	85069-3
606100	Additional Information	48767-8
606101	Disclaimer	62364-5
606102	Released By	18771-6