Focus on Anemia, Suspect MF:
A pocket guide to diagnosing MF

Symptoms of MF

Common presenting symptoms of MF are non-specific and may resemble those of other MPNs and non-malignant conditions.[1,2]

Most common symptoms of MF[3,4]

Anemia
- Fatigue/ weakness
- Shortness of breath
- Chest pains
- Palpitations
- Pale skin
- Loss of appetite

Other symptoms of MF[5]

- Bone pain
- Fever
- Pruritus
- Night sweats
- Abdominal pain (symptomatic splenomegaly)
- Weight loss >10%

Diagnosing MF

Diagnosis involves a composite evaluation of symptoms, laboratory tests, hematologic and morphologic features, and cytogenic and molecular analyses.[6,7]

Workup for diagnosing MF[6-11]

Diagnostic workflow		Diagnostic assessment
1	History and physical exam	• Clinical suspicion of anemia and/or other cytopenias • Splenomegaly • Prior MPN diagnoses
2	Peripheral blood count and peripheral blood smear	• Anemia and/or other cytopenias • Abnormal cell morphologies
3	**Tests to rule out other MPNs** • Bone marrow aspiration and biopsy (iron, reticulin, and trichrome stains) • Somatic mutation analysis • Cytogenetics (karyotyping, FISH/RT-PCR)	MF (PMF, post-ET MF, or post-PV MF)

Bristol Myers Squibb

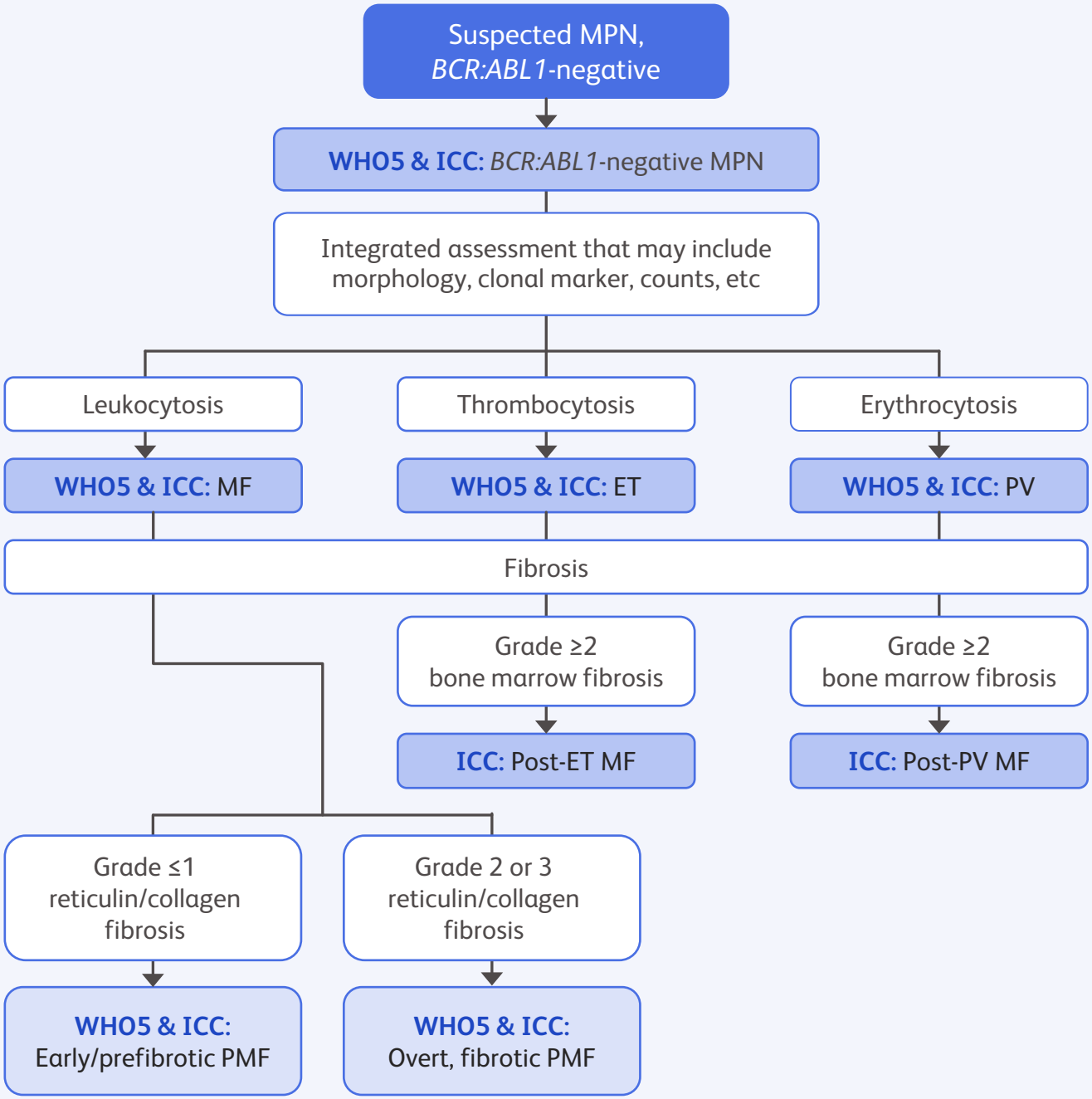
spotlight on ANEMIA

Learn more at SpotlightOnAnemia.com

Classification

Two updated classifications for ET, PV, PMF, and secondary MF (post-ET and post-PV MF) were developed in 2022: the World Health Organization 5th edition classification (WHO5) and the International Consensus Classification (ICC) of myeloid neoplasms and acute leukemia.[12,13]

Overview of WHO5 and ICC MF classification[1,11,13,14]



Classification *(continued)*

The WHO5 and ICC classifications define criteria that distinguish early/pre-fibrotic from overt, fibrotic PMF and separate primary from secondary MF.[11,13]

Combined WHO5 and ICC diagnostic criteria for overt, fibrotic stage PMF[11]

Diagnosis requires all 3 major criteria and at least 1 minor criterion confirmed in 2 consecutive assessments.

Major criteria
Megakaryocytic proliferation and atypia, accompanied by reticulin and/or collagen fibrosis grades 2 or 3
Diagnostic criteria for *BCR:ABL1*-positive CML, PV, ET, MDS, or other myeloid neoplasms are not met
JAK2, *CALR*, or *MPL* mutation, presence of another clonal marker, or absence of reactive MF

Minor criteria
Anemia not attributed to a comorbid condition
Leukocytosis ≥ 11 × 10^9/L
Splenomegaly that is clinically palpable and/or detected by imaging
LDH level above the upper limit of the institutional reference range
Leukoerythroblastosis

Adapted from *Blood Cancer J.*[11]

ICC diagnostic criteria for secondary MF[13,15]

Required criteria for post-ET and post-PV MF
Prior documentation of ICC-defined ET or PV
Bone marrow fibrosis grade ≥2[a]

Additional criteria for post-ET MF *(2 required)*	Additional criteria for post-PV MF *(2 required)*
Anemia and >2 g/dL decrease in baseline Hb level	Anemia, or sustained loss of requirement for phlebotomy or cytoreductive treatment for erythrocytosis
Leukoerythroblastosis	Leukoerythroblastosis
Newly developed, or increasing palpable splenomegaly >5 cm from baseline	Newly developed, or increasing palpable splenomegaly >5 cm from baseline
Development of constitutional symptoms[b]	Development of constitutional symptoms[b]
Increased LDH	

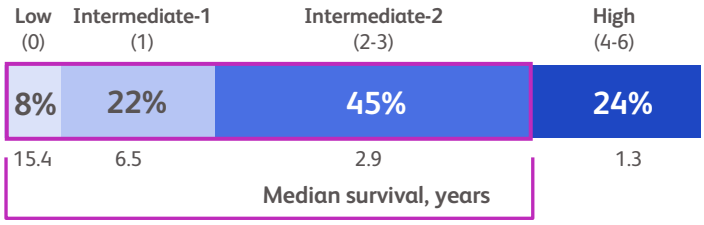
Adapted from *Am J Hematol.*[15]

[a]Diffuse often coarse fiber network with or without evidence of collagenization (trichrome stain).[15] [b]Development of any 2 (or all 3) of the following constitutional symptoms: >10% weight loss in 6 months, night sweats, unexplained fever (>37.5°C).[13]

Risk stratification

Survival by the Dynamic International Prognostic Scoring System-Plus (DIPSS-Plus)[16-18]

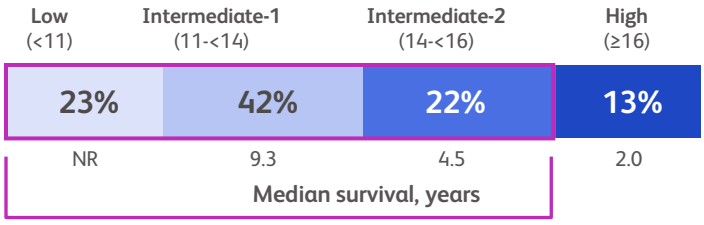
DIPSS/DIPSS-Plus are also used in MF as they can be applied at anytime during the disease course. DIPSS-Plus incorporates 3 additional independent risk factors: platelet count <100 × 10^9/L, red blood cell transfusion needs, and unfavorable karyotype.



75% of patients with PMF are low or intermediate-risk per DIPSS-Plus

Survival by the Myelofibrosis Secondary to PV ad ET Prognostic Model (MYSEC-PM)[16]

MYSEC-PM was uniquely developed for secondary MF and may better predict survival than the other prognostic models. It applies 6 independent predictors of inferior survival: age (0.15 per year of age), hemoglobin <11 g/dL, circulating blasts ≥3%, constitutional symptoms, platelet count <150 × 10^9/L and absence of *CALR* mutation.



87% of patients with secondary MF are low or intermediate-risk per MYSEC-PM

More recently, new prognostic models have been developed which consider molecular and cytogenetic findings, leading to more comprehensive risk evaluation. Prognostic variables, their individual scorings, and the resulting risk groups vary across the models, reflecting evolving approaches to risk stratification for MF.[17]

Contemporary prognostic models for MF[17]

	Age	Constitutional symptoms	Hb	WBC	Blood blast	Platelets	Transfusion dependence	Karyotype	Fibrosis grade	Driver mutation	HMR mutations
IPSS	✓	✓	✓	✓	✓						
DIPSS	✓	✓	✓	✓	✓						
DIPSS-Plus	✓	✓	✓	✓	✓	✓	✓	✓			
MIPSS70		✓	✓	✓	✓	✓			✓	✓	✓
GIPSS								✓		✓	✓
MIPSS70-Plus v2.0		✓	✓		✓			✓		✓	✓
MYSEC-PM	✓	✓	✓		✓	✓				✓	

CML, chronic myeloid leukemia; DIPSS, Dynamic International Prognostic Scoring System; ET, essential thrombocythemia; FISH, fluorescence in situ hybridization; GIPSS, Genetically Inspired International Prognostic Scoring System; Hb, hemoglobin; ICC, International Consensus Classification; IPSS, International Prognostic Scoring System; LDH, lactate dehydrogenase; MDS, myelodysplastic syndromes; MF, myelofibrosis; MIPSS, Mutation-Enhanced International Prognostic Scoring; MIPSS70, Mutation-Enhanced International Prognostic Scoring System System for transplant-age patients; MPN, myeloproliferative neoplasm; MYSEC-PM, Myelofibrosis Secondary to PV and ET-Prognostic Model; PMF, primary myelofibrosis; PV, polycythemia vera; RT-PCR, real-time polymerase chain reaction; WHO, World Health Organization 5th edition classification.

References: 1. Shao R, et al. *Cancers (Basel)*. 2025;18(1):50. **2.** Geyer H, et al. *Curr Hematol Malig Rep*. 2017;12(5):381-388. **3.** Leukemia & Lymphoma Society. *Myeloproliferative Neoplasms: In Detail.* Revised 2025. Accessed May 6, 2026. https://llsorg.widen.net/view/pdf/juiq8xkd2b/en-booklet-mpn-detail-ps81.pdf?t.download=true&u=swuzoq **4.** Passamonti F, et al. *Crit Rev Oncol Hematol.* 2022;180:103862. **5.** Mesa R, et al. *Leuk Res.* 2009;33(9):1199-203. **6.** Bose P. *Curr Hematol Malig Rep.* 2024;19(3):111-119. **7.** Thapa B et al. Myeloproliferative neoplasms. In: StatPearls [Internet]. StatPearls Publishing; 2026. Updated August 25, 2023. Accessed May 6, 2026. https://www.ncbi.nlm.nih.gov/books/NBK531464/ **8.** Mughal TI et al. *Int J Gen Med.* 2014;7:89–101. **9.** Chaparro CM et al. *Ann N Y Acad Sci*. 2019;1450(1):15-31. **10.** Geyer JT et al. *Int J Lab Hematol.* 2016;38 Suppl 1:12-9. **11.** Thiele J et al. *Blood Cancer J*. 2025;15(1):31. **12.** Khoury JD et al. *Leukemia*. 2022;36:1703-1719. **13.** Arber DA et al. *Blood*. 2022;140(11):1200-1228. **14.** Garmezy B et al. *Blood Rev*. 2021;45:100691. **15.** Tefferi A, et al. *Am J Hematol.* 2023;98(5):801-821. **16.** Passamonti F et al. *Leukemia.* 2017;31(12):2726-2731. **17.** How J, et al. *J Natl Compr Canc Netw*. 2020;18(9):1271-1278. **18.** Gangat N, et al. *J Clin Oncol.* 2011 Feb 1;29(4):392-7.

spotlight on ANEMIA

Learn more at SpotlightOnAnemia.com