

MYELOYDYSPLASTIC SYNDROME (MDS)

FAB CLASSIFICATION	% MARROW BLASTS	% PERIPHERAL BLOOD BLASTS	RINGED SIDEROBLASTS > 15% OF BM	MONOCYTES > 1000/ μ L
Refractory anemia	< 5	\leq 1	-	-
Refractory anemia with ringed sideroblasts	< 5	\leq 1	+	-
Refractory anemia with excess blasts	5-20	< 5	-/+	-
Refractory anemia with excess blasts in transition	Recently omitted			
Chronic myelomonocytic anemia	\leq 20	< 5	-/+	+

Reference: [Bennett JM, et al. Br J Haematol 1982;51:189 - 99.](#)

WHO CLASSIFICATION SYSTEM FOR MDS

DISEASE	BLOOD FINDINGS	BONE MARROW FINDINGS
Refractory anemia (RA)	Anemia No or rare blasts	Erythroid dysplasia only < 5% blasts; < 15% ringed sideroblasts
Refractory anemia with ringed sideroblasts (RARS)	Anemia No blasts	Erythroid dysplasia only \geq 15% ringed sideroblasts; < 5% blasts
Refractory cytopenia with multilineage dysplasia (RCMD)	Cytopenias (bicytopenia or pancytopenia) No or rare blasts No Auer rods < 1 x 10 ⁹ /L monocytes	Dysplasia in \geq 10% of cells in 2 or more myeloid cell lines < 5% blasts in marrow; No Auer rods < 15% ringed sideroblasts
Refractory cytopenia with multilineage dysplasia and ringed sideroblasts (RCMD-RS)	Cytopenias (bicytopenia or pancytopenia) No or rare blasts No Auer rods < 1 x 10 ⁹ /L monocytes	Dysplasia in \geq 10% of cells in 2 or more myeloid cell lines < 5% blasts in marrow No Auer rods \geq 15% ringed sideroblasts
Refractory anemia with excess blasts-1 (RAEB-1)	Cytopenias < 5% blasts No Auer rods < 1 x 10 ⁹ /L monocytes	Unilineage or multilineage dysplasia 5% to 9% blasts No Auer rods
Refractory anemia with excess blasts-2 (RAEB-2)	Cytopenias 5% to 19% blasts Auer rods \pm < 1 x 10 ⁹ /L monocytes	Unilineage or multilineage dysplasia 10% to 19% blasts Auer rods \pm
Myelodysplastic syndrome, unclassified (MDS-U)	Cytopenias No or rare blasts No Auer rods	Unilineage dysplasia in granulocytes or megakaryocytes < 5% blasts No Auer rods
MDS associated with isolated del(5q)	Anemia < 5% blasts Platelets normal or increased	Normal to increased megakaryocytes with hypolobated nuclei < 5% blasts No Auer rods Isolated del(5q)

Reference: WHO classification Tumors of Haematopoietic and Lymphoid Tissue. Lyon, France: IARC Press 2001.

INTERNATIONAL PROGNOSTIC SCORING SYSTEM FOR MDS

PARAMETER	CRITERIA	SCORE*
Marrow blasts	<5%	0
	5-10%	0.5
	11-20%	1.5
	21-30%	2.0
Karyotype	Normal 46 XY, -Y, 5-q, 20-q	0
	Other	0.5
	At least 3 abnormalities, Chromosome 7 abnormalities	1.0
Cytopenias (hemoglobin less than 10 g/dL, platelet count less than $100 \times 10^9/L$, neutrophil count less than $1.5 \times 10^9/L$)	None or one	0
	Two or three	0.5

*Total score 0= low risk group; 0.5-1 = intermediate-risk group; 1.5-2.0 = intermediate-2 risk group; >2 = high risk group.

Reference: [Greenberg P, et al. *Blood* 1997;89:2079 - 88; Erratum in *Blood* 1998;91:1100.](#)

TOTAL SCORE	CATEGORY	25% AML	MEDIAN SURVIVAL (YEARS)	5-YEAR SURVIVAL	PROGRESSION TO AML (%)
0	Low	9.4 years	5.7 years	55	15
0.5 - 1	Int-1	3.3 years	3.5 years	35	30
1.5 - 2	Int-2	1.1 years	1.2 years	7	65
≥ 2.5	High	0.4 years	0.4 years	0	100

Reference: [Greenberg P, et al. *Blood* 1997;89:2079 - 88; Erratum in *Blood* 1998;91:1100.](#)