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Name	Name of Ineligible companies with which relevant financial relationships	Nature of Relationship
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Dr. Toby Fugate	Gilead Sciences	Speaker
Dr. Richard Pierce	Sensus Healthcare	Employee, Medical Director, Stockholder

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ROPER ST. FRANCIS HEALTHCARE

The Complete Blood Count and other Heme Consults

2025 ROPER PRIMARY CARE SYMPOSIUM

Brian Greenwell, MD
Charleston Oncology

02/08/2025

CME Disclosure Statement: F. Strait Fairey, MD – Primary Care Symposium 2025

Dr. Brian Greenwell speaker has no financial relationships with ineligible companies whose primary business is producing, marketing, selling re-selling, or distributing healthcare products used by or on patients

Approach to the CBC

Put abnormalities in context:

1. **Other cell lines normal/abnormal?**
2. **Changes over time? Chronicity**
3. **Why was the CBC done? Annual labs? New symptoms?**
4. **Age and history of the patient?**

CELL COUNT AND DI...	2024 12/11/24 11:06	12/5/24 11:00	2023 11/28/23 12:16	2022 2/4/22 07:52	2020 12/3/20 07:20	7/31/20 08:00	6/11/20 09:07	6/9/20 10:44	2019 9/13/19 11:30
WBC	13.6 ↑	15.4 ↑	15.5 ↑	11.3 ↑	11.8 ↑		11.7 ↑	10.9 ↑	12.1 ↑
RBC	4.30	4.67	4.60	4.06	4.28		4.20	4.05	4.57
Hemoglobin Quant	12.8	14.1	14.3	12.6	13.0		13.2	12.6	14.0
Hematocrit	39.1	43.7	44.0	37.4	39.2		39.2	38.1	41.9
MCV	90.9	93.6	95.7	92.1	91.6		93.3	94.1	91.6
MCH	29.8	30.2	31.1	31.0	30.4		31.4	31.1	30.6
MCHC	32.7	32.3	32.5	33.7	33.2		33.7	33.1	33.4
MPV	10.2	11.0	10.7	11.5	11.2		11.1	11.1	9.4
RDW	14.6	15.1	14.8	13.6	13.0		13.1	12.7	13.2
Platelet Count	277	302	300	225	229		243	244	229
Neutrophils %	65.5	70.6	68.3	55.9	58.5				57.3
Monocytes %	6.6	6.8	5.9	5.9	6.3				5.7
Eosinophils %	3.1	3.1	3.2	3.6	4.2				3.0
Basophils %	0.9	0.8	1.2	1.2	1.1				0.8
Neutrophils Absolute	8.9 ↑	10.8 ↑	10.6 ↑	6.3	6.9				6.9
Lymphocytes Absolute	3.2	2.8	3.3 ↑	3.7 ↑	3.5 ↑				4.0 ↑
Monocytes Absolute	0.9	1.1 ↑	0.9	0.7	0.7				0.7
Eosinophils Absolute	0.4	0.5	0.5	0.4	0.5				0.4

Caution with an automated differential

CELL COUNT AND DI...	
WBC	26.0 ↑
RBC	4.90
Hemoglobin Quant	15.1
Hematocrit	45.1
MCV	92.0
MCH	30.8
MCHC	33.5
MPV	9.0
RDW	14.1
Platelet Count	37 ↓
Platelet Estimate	
Neutrophils %	14.4 ↓
Monocytes %	50.9 ↑
Eosinophils %	1.5
Basophils %	1.1
Neutrophils Absolute	3.7
Lymphocytes Absolute	7.3 ↑
Monocytes Absolute	13.3 ↑
Eosinophils Absolute	0.4
Basophils Absolute	0.3 ↑

Metamyelocytes Relative		3
Myelocytes Absolute		0.2
Myelocyte Percent		1
Blasts Relative		37 ↑
Blasts Absolute		8.5
Nucleated Red Blood Cells		3 ↑
RBC Morphology		Abnormal !
Polychromasia		Few !
Tear Drop Cells		Few !
Metamyelocytes Absolute		0.7
NRBC Absolute	0.930 ↑	0.720 ↑
NRBC Automated	3.6 ↑	3.1 ↑
Immature Platelet, Absolute	1.3	
Immature Platelet, Percent	3.4	
Neutrophils %. Manual count		18 ↓

ROPER ST. FRANCIS HEALTHCARE

WBC cases

Case 1: 66yo with leukocytosis

Leukocytosis seen on annual labs. Asymptomatic.

+Tobacco use

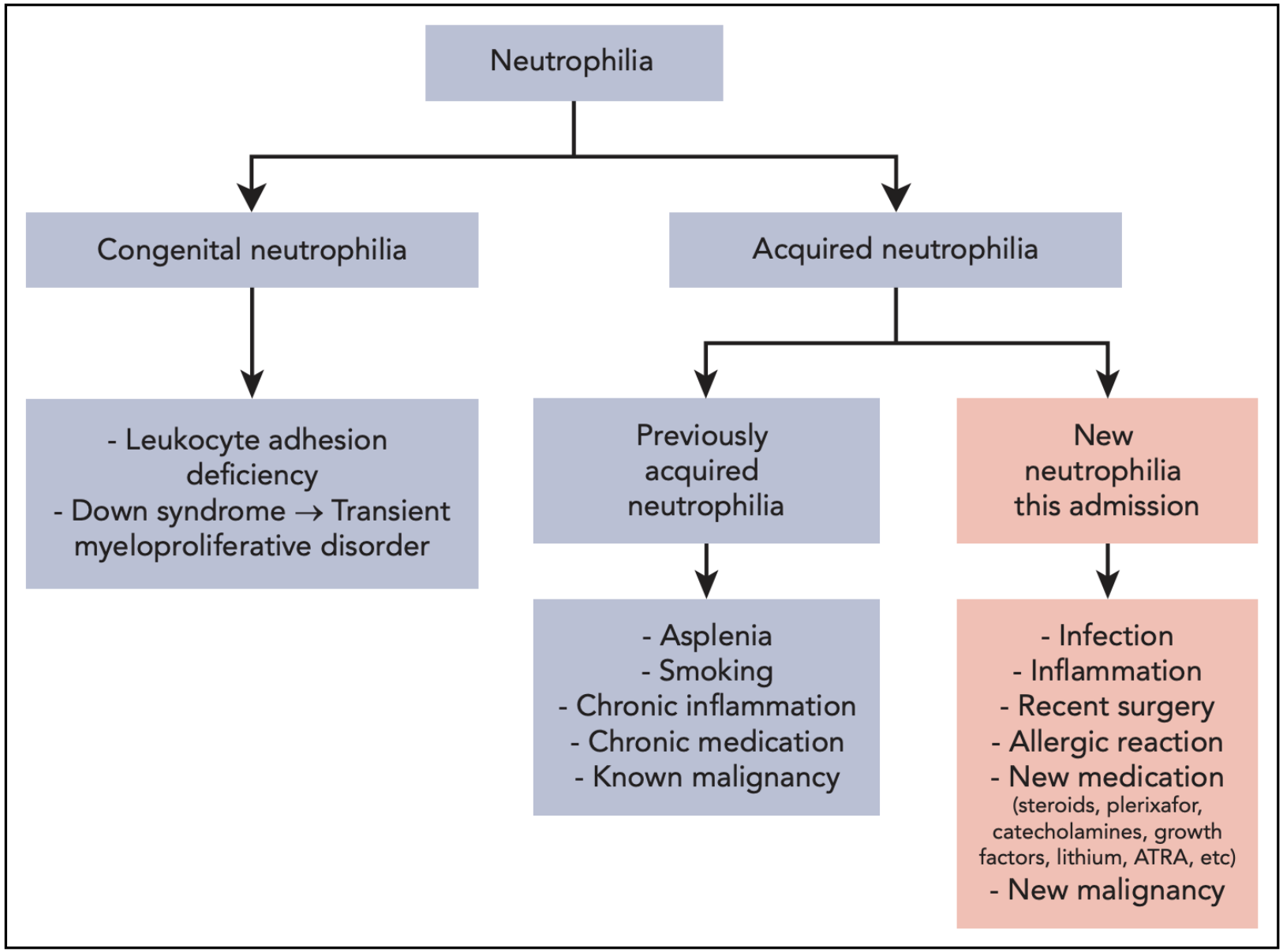
BMI=37, +diabetes

All Rows

Time Mark

CELL COUNT AND DI...	2024 12/11/24 11:06	12/5/24 11:00	2023 11/28/23 12:16	2022 2/4/22 07:52	2020 12/3/20 07:20	7/31/20 08:00	6/11/20 09:07	6/9/20 10:44	2019 9/13/19 11:30
WBC	13.6 ↑	15.4 ↑	15.5 ↑	11.3 ↑	11.8 ↑		11.7 ↑	10.9 ↑	12.1 ↑
RBC	4.30	4.67	4.60	4.06	4.28		4.20	4.05	4.57
Hemoglobin Quant	12.8	14.1	14.3	12.6	13.0		13.2	12.6	14.0
Hematocrit	39.1	43.7	44.0	37.4	39.2		39.2	38.1	41.9
MCV	90.9	93.6	95.7	92.1	91.6		93.3	94.1	91.6
MCH	29.8	30.2	31.1	31.0	30.4		31.4	31.1	30.6
MCHC	32.7	32.3	32.5	33.7	33.2		33.7	33.1	33.4
MPV	10.2	11.0	10.7	11.5	11.2		11.1	11.1	9.4
RDW	14.6	15.1	14.8	13.6	13.0		13.1	12.7	13.2
Platelet Count	277	302	300	225	229		243	244	229
Neutrophils %	65.5	70.6	68.3	55.9	58.5				57.3
Monocytes %	6.6	6.8	5.9	5.9	6.3				5.7
Eosinophils %	3.1	3.1	3.2	3.6	4.2				3.0
Basophils %	0.9	0.8	1.2	1.2	1.1				0.8
Neutrophils Absolute	8.9 ↑	10.8 ↑	10.6 ↑	6.3	6.9				6.9
Lymphocytes Absolute	3.2	2.8	3.3 ↑	3.7 ↑	3.5 ↑				4.0 ↑
Monocytes Absolute	0.9	1.1 ↑	0.9	0.7	0.7				0.7
Eosinophils Absolute	0.4	0.5	0.5	0.4	0.5				0.4

Approach to Neutrophilia



Zon and Berliner, Blood 2023

Case 1: 66yo with leukocytosis

FLOW CYTOMETRY [a] REPORT

Interpretation
A minute CD5, CD10 and CD103 negative monoclonal B cell population detected, non-specific phenotype, <1% of leukocytes, <5,000/uL, see comment.

Assessment of Leukocytes
A minute CD5-/CD10-/CD103- monoclonal B cell population is detected with lambda light chain restriction, non-specific phenotype, representing 6% of B-cells and <1% of leukocytes.

There is no loss of, or aberrant expression of, the pan T cell antigens to suggest a neoplastic T cell process.
CD4:CD8 ratio 2.5

No circulating blasts are detected.

	2019 9/13/19 11:30							
CELL COUNT AND DI...								
WBC	13.6 ↑	15.4 ↑	15.5 ↑	11.3 ↑	11.8 ↑	11.7 ↑	10.9 ↑	12.1 ↑
Hemoglobin Quant	12.8	14.1	14.3	12.6	13.0	13.2	12.6	14.0
MCV	90.9	93.6	95.7	92.1	91.6	93.3	94.1	91.6
Platelet Count	277	302	300	225	229	243	244	229
Neutrophils Absolute	8.9 ↑	10.8 ↑	10.6 ↑	6.3	6.9			6.9
OTHER HEMATOLOG...								
Sed Rate, Automated	45 ↑							

Case 2: 83yo with leukocytosis

Leukocytosis seen on annual labs. Asymptomatic.

Time Mark	12/23/24 14:49	12/11/24 07:11	12/2/24 16:17	11/6/24 13:34	2/12/24 07:34	12/9/23 16:05	2/2/23 07:49	2/2/22 07:10	1/27/21 08:36	1/23/20 07:20
CELL COUNT AND DI...										
WBC	11.8 ▲	12.1 ▲	11.6 ▲	10.0	8.2		5.9	6.0	4.8	5.9
RBC	4.78	4.60	4.46	4.67	4.54		4.93	4.93	4.85	5.06
Hemoglobin Quant	14.4	13.9	13.7	14.1	14.0		14.9	15.4	14.9	15.0
Hematocrit	44.4	42.4	41.1	42.8	42.0		44.6	45.7	43.9	46.2
MCV	92.9	92.2	92.2	91.6	92.5		90.5	92.7	90.5	91.3
MCH	30.1	30.2	30.7	30.2	30.8		30.2	31.2	30.7	29.6
MCHC	32.4	32.8	33.3	32.9	33.3		33.4	33.7	33.9	32.5
MPV	9.9	10.2	10.8	10.5	10.3		10.8	11.1	11.4	10.9
RDW	14.8	14.8	14.9	14.4	14.2		14.6	14.0	14.1	13.5
Platelet Count	230	222	230	330	245		225	232	238	290

Time Mark	12/23/24 14:49	12/11/24 07:11	12/2/24 16:17	11/6/24 13:34	2/12/24 07:34	2/2/23 07:49	2/2/22 07:10	1/27/21 08:36	1/23/20 07:20
CELL COUNT AND DI...									
WBC	11.8 ▲	12.1 ▲	11.6 ▲	10.0	8.2	5.9	6.0	4.8	5.9
Neutrophils Absolute	3.5	1.9	2.4	3.7			2.2	2.2	3.2
Lymphocytes Absolute	7.7 ▲	2.7	7.1 ▲	5.9 ▲			3.1	2.0	1.9
Monocytes Absolute	0.4	0.4	0.3	0.4			0.5	0.5	0.6
Eosinophils Absolute	0.1		0.2	0.0			0.1	0.1	0.2
Basophils Absolute	0			0.0			0.1	0.1	0.0

Case 2: 83yo with leukocytosis

Leukocytosis seen on annual labs. Asymptomatic.

Time Mark	12/23/24 14:49	12/11/24 07:11	12/2/24 16:17	11/6/24 13:34	2/12/24 07:34	12/9/23 16:05	2/2/23 07:49	2/2/22 07:10	1/27/21 08:36	1/23/20 07:20
CELL COUNT AND DI...										
WBC	11.8 ▲	12.1 ▲	11.6 ▲	10.0	8.2		5.9	6.0	4.8	5.9
RBC	4.78	4.60	4.46	4.67	4.54		4.93	4.93	4.85	5.06
Hemoglobin Quant	14.4	13.9	13.7	14.1	14.0		14.9	15.4	14.9	15.0
Hematocrit	44.4	42.4	41.1	42.8	42.0		44.6	45.7	43.9	46.2
MCV	92.9	92.2	92.2	91.6	92.5		90.5	92.7	90.5	91.3
MCH	30.1	30.2	30.7	30.2	30.8		30.2	31.2	30.7	29.6
MCHC								33.7	33.9	32.5
MPV								11.1	11.4	10.9
RDW								14.0	14.1	13.5
Platelet Count								232	238	290

FLOW CYTOMETRY [a] REPORT

Interpretation

The phenotype is most consistent with a diagnosis of chronic lymphocytic leukemia/small lymphocytic lymphoma (CLL/SLL), CD20+, CD22+, CD38-

Time Mark								1/27/21 08:36	1/23/20 07:20
CELL COUNT AND DI...									
WBC	11.8 ▲	12.1 ▲	11.6 ▲	10.0	8.2	5.9	6.0	4.8	5.9
Neutrophils Absolute	3.5	1.9	2.4	3.7			2.2	2.2	3.2
Lymphocytes Absolute	7.7 ▲	2.7	7.1 ▲	5.9 ▲			3.1	2.0	1.9
Monocytes Absolute	0.4	0.4	0.3	0.4			0.5	0.5	0.6
Eosinophils Absolute	0.1		0.2	0.0			0.1	0.1	0.2
Basophils Absolute	0			0.0			0.1	0.1	0.0

Case 3: 34yo with leukopenia

Neutropenia seen on routine labs.

Patient reports generalized fatigue in the context of 2 children and a full-time job as an attorney.

5/5/2023
WBC 2.9, hemoglobin 13.3, platelets 249, MCV 83, granulocytes 1.0

10/4/2024
WBC 3.4, hemoglobin 13.7, platelets 225, MCV 87, granulocytes 1.7

10/28/2024
WBC 2.9, hemoglobin 13.8, platelets 235, MCV 89, granulocytes 1.3

Time Mark

CELL COUNT AND DI...	2024 12/13/24 13:12
WBC	3.3 ↓
RBC	4.38
Hemoglobin Quant	13.0
Hematocrit	36.9
MCV	84.2
MCH	29.7
MCHC	35.2
MPV	9.6
RDW	11.9
Platelet Count	199
Neutrophils %	57.8
Monocytes %	6.9
Eosinophils %	0.9
Basophils %	0.6
Neutrophils Absolute	1.9
Lymphocytes Absolute	1.1
Monocytes Absolute	0.2 ↓
Eosinophils Absolute	0.0
Basophils Absolute	0
Lymphocytes	33.8

Neutropenia

Cause	Mutations or laboratory recommendations	Treatment
Severe congenital neutropenia	*ELANE*, *HAX1*, other less-frequent mutations (*G6PC3*, *CSF3R*, *GFI1*, etc)	Lifelong G-CSF Surveillance for MDS/AML
Immunodeficiencies (Shwachman-Diamond syndrome, Chediak-Higashi syndrome, G6PD deficiency, cartilage-hair hypoplasia, GATA2 deficiency, primary humoral deficiencies)	*SBDS* *CHS1 (LYST)* *G6PD* *RMRP* *GATA2* Many mutations	G-CSF if needed Surveillance for myeloid malignancy
Cyclic neutropenia	ELANE gene mutation	G-CSF if symptoms
Duffy-null associated neutrophil count (DANC)	Duffy antigen blood typing	No treatment required
Short telomere syndrome	Obtain telomere length	Surveillance for aplastic anemia, myeloid malignancy Counseling regarding pregnancy
Rheumatologic/autoimmune conditions (primary or secondary autoimmune, Felty syndrome [rheumatoid arthritis], Sjogren syndrome, inflammatory bowel disease, granulomatosis with polyangiitis) Autoimmune lymphoproliferative syndrome	ESR, CRP, antibodies as indicated by symptoms *FAS*, *FASLG*, *CASP10*	Treat underlying cause
Medications/toxins (antibiotics such as sulfa drugs, phenothiazine, chemotherapy, rituximab, tyrosine kinase inhibitors, benzene, insecticides, azathioprine, mycophenolate mofetil)	Medication review, can check some drug levels; toxicology blood and urine testing	Drug discontinuation if severe
Infection	Hepatitis A, B, and C; HIV, EBV, bacteria, parasites, *Rickettsia*, tuberculosis	Treat underlying cause G-CSF for fever and neutropenia
Malignancy (aplastic anemia, leukemia, MDS, large granular lymphocytic leukemia, hairy cell; can present as pancytopenia)	Flow cytometry; bone marrow	Diagnosis-directed therapy G-CSF for fever and neutropenia
Nutritional (ask about diet [vegan] and alcohol consumption; can present as pancytopenia)	Vitamin B12, MMA, homocysteine, folate, copper	Replete nutritional deficiency
Chronic idiopathic neutropenia	Diagnosis of exclusion	No treatment required if no symptoms G-CSF for treatment of aphthous ulcers, frequent infections

Zon and Berliner, Blood 2023

Case 3: 34yo with leukopenia

Neutropenia seen on routine labs.

Patient reports generalized fatigue in the context of 2 children and a full-time job as an attorney.

5/5/2023
WBC 2.9, hemoglobin 13.3, platelets 249, MCV 83, granulocytes 1.0

10/4/2024
WBC 3.4, hemoglobin 13.7, platelets 225, MCV 87, granulocytes 1.7

10/28/2024
WBC 2.9, hemoglobin 13.8, platelets 235, MCV 89, granulocytes 1.3

Exam unremarkable

Nutritional and Viral workup negative

Peripheral blood flow cytometry deferred

Time Mark

CELL COUNT AND DI...	2024 12/13/24 13:12
WBC	3.3 ↓
RBC	4.38
Hemoglobin Quant	13.0
Hematocrit	36.9
MCV	84.2
MCH	29.7
MCHC	35.2
MPV	9.6
RDW	11.9
Platelet Count	199
Neutrophils %	57.8
Monocytes %	6.9
Eosinophils %	0.9
Basophils %	0.6
Neutrophils Absolute	1.9
Lymphocytes Absolute	1.1
Monocytes Absolute	0.2 ↓
Eosinophils Absolute	0.0
Basophils Absolute	0
Lymphocytes	33.8

Case 4: 71yo with leukopenia

Malnutrition in the setting of Alaskan hunting trip

Presented to the ED with fatigue and anemia

CELL COUNT AND DI...	10/9/24 12:07	10/8/24 13:20	10/7/24 07:20	4/15/24 07:17	3/25/24 07:26
WBC					
RBC	1.4	1.4	1.4		2.1
	2.10	2.31	2.15		3.84
Hemoglobin Quant					
Hematocrit	7.0	7.6	7.0	11.6	11.7
MCV	21.5	24.4	22.4	34.7	35.4
MCH	102.4	105.6	104.2		92.2
MCHC	33.3	32.9	32.6		30.5
MPV	32.6	31.1	31.3		33.1
RDW	11.8	11.5	12.2		11.2
Platelet Count	18.0	17.4	17.9		15.0
Platelet Estimate	127	134	146		143
Neutrophils %	Not Indicated	Decreased !	Not Indicated		
Monocytes %		24.9	21.3		50.3
	6	8.5	9.9		7.1
Eosinophils %					
Basophils %	1	0.0	0.0		1.4
Neutrophils Absolute		1.4	0.7		0.9
	0.3	0.4	0.3		1.1
Lymphocytes Absolute					
	1.0	0.9	1.0		0.8
Monocytes Absolute					
	0.1	0.1	0.1		0.2
Eosinophils Absolute					
Basophils Absolute		0.0	0.0		0.0
Lymphocytes		0.0	0.0		0.0
	72	64.5	67.4		39.8

Neutropenia

Cause	Mutations or laboratory recommendations	Treatment
Severe congenital neutropenia	*ELANE*, *HAX1*, other less-frequent mutations (*G6PC3*, *CSF3R*, *GFI1*, etc)	Lifelong G-CSF Surveillance for MDS/AML
Immunodeficiencies (Shwachman-Diamond syndrome, Chediak-Higashi syndrome, G6PD deficiency, cartilage-hair hypoplasia, GATA2 deficiency, primary humoral deficiencies)	*SBDS* *CHS1 (LYST)* *G6PD* *RMRP* *GATA2* Many mutations	G-CSF if needed Surveillance for myeloid malignancy
Cyclic neutropenia	ELANE gene mutation	G-CSF if symptoms
Duffy-null associated neutrophil count (DANC)	Duffy antigen blood typing	No treatment required
Short telomere syndrome	Obtain telomere length	Surveillance for aplastic anemia, myeloid malignancy Counseling regarding pregnancy
Rheumatologic/autoimmune conditions (primary or secondary autoimmune, Felty syndrome [rheumatoid arthritis], Sjogren syndrome, inflammatory bowel disease, granulomatosis with polyangiitis) Autoimmune lymphoproliferative syndrome	ESR, CRP, antibodies as indicated by symptoms *FAS*, *FASLG*, *CASP10*	Treat underlying cause
Medications/toxins (antibiotics such as sulfa drugs, phenothiazine, chemotherapy, rituximab, tyrosine kinase inhibitors, benzene, insecticides, azathioprine, mycophenolate mofetil)	Medication review, can check some drug levels; toxicology blood and urine testing	Drug discontinuation if severe
Infection	Hepatitis A, B, and C; HIV, EBV, bacteria, parasites, *Rickettsia*, tuberculosis	Treat underlying cause G-CSF for fever and neutropenia
Malignancy (aplastic anemia, leukemia, MDS, large granular lymphocytic leukemia, hairy cell; can present as pancytopenia)	Flow cytometry; bone marrow	Diagnosis-directed therapy G-CSF for fever and neutropenia
Nutritional (ask about diet [vegan] and alcohol consumption; can present as pancytopenia)	Vitamin B12, MMA, homocysteine, folate, copper	Replete nutritional deficiency
Chronic idiopathic neutropenia	Diagnosis of exclusion	No treatment required if no symptoms G-CSF for treatment of aphthous ulcers, frequent infections

Zon and Berliner, Blood 2023

Case 4: 71yo with leukopenia

Time Mark	10/15/24 12:02	10/8/24 13:20
IRON/ANEMIA PROFIL...		
Ferritin		838.9 ↑
Iron		98
UIBC		146.6
TIBC		245 ↓
Folate		>20.00
Vitamin B-12	643	631
Iron % Saturation		40

CELL COUNT AND DI...	10/9/24 12:07	10/8/24 13:20	10/7/24 07:20	4/15/24 07:17	3/25/24 07:26
WBC					
RBC	1.4 ↓↓	1.4 ↓↓	1.4 ↓↓		2.1 ↓
	2.10 ↓	2.31 ↓	2.15 ↓		3.84 ↓
Hemoglobin Quant					
Hematocrit	7.0 ↓↓	7.6 ↓	7.0 ↓↓	11.6 ↓	11.7 ↓
MCV	21.5 ↓	24.4 ↓	22.4 ↓	34.7 ↓	35.4 ↓
MCH	102.4 ↑	105.6 ↑	104.2 ↑		92.2
MCHC	33.3	32.9	32.6		30.5
MPV	32.6	31.1	31.3		33.1
RDW	11.8	11.5	12.2		11.2
Platelet Count	18.0 ↑	17.4 ↑	17.9 ↑		15.0
Platelet Estimate	127 ↓	134 ↓	146		143
Neutrophils %	Not Indicated	Decreased !	Not Indicated		
Monocytes %		24.9 ↓	21.3 ↓		50.3
	6	8.5	9.9		7.1
					1.4
					0.9
					1.1 ↓
					0.8 ↓
					0.2 ↓
					0.0
Lymphocytes		0.0	0.0		0.0
	72 ↑	64.5 ↑	67.4 ↑		39.8

BONE MARROW:

NORMOCELLULAR MARROW EXHIBITING TRILINEAGE HEMATOPOIESIS WITH TRILINEAGE MATURATION WITHOUT DIAGNOSTIC DYSPOIETIC MORPHOLOGY.
15%-20% MYELOBLASTS, SEE COMMENT.
MILD T LYMPHOCYTOSIS, FAVOR REACTIVE.
MINIMAL INCREASED RETICULIN.
2+ STAINABLE IRON WITHOUT RING SIDEROBLASTS.
IDH2 MUTATION DETECTED.
NGS: MUTATIONS IN SRSF2, IDH2, ASXL1, PBRM1, RUNX1, AND NF1 GENES.

Teaching points

Context for the WBC abnormality:

1. Other cell lines normal/abnormal?
2. Changes over time? Chronicity
3. Why was the CBC done? Annual labs? New symptoms?
4. Age and history of the patient?

Occasionally the best diagnostic test is “time”.

Always feel free to refer for a quick confirmation of “okay to observe”

ROPER ST. FRANCIS HEALTHCARE

Platelet cases

Case 1: 23yo with thrombocytosis

Moved from Charlotte

Heavy Menses

No hx VTE

CELL COUNT AND DI...		
WBC	7.0	7.9
RBC	4.31	4.62
Hemoglobin Quant	11.7	12.9
Hematocrit	35.5	38.0
MCV	82.4	82.3
MCH	27.1	27.9
MCHC	33.0	33.9
MPV	9.8	10.0
RDW	12.7	12.6
Platelet Count	510 ↑	441 ↑
Neutrophils %	54.3	52.2
Monocytes %	6.3	6.9
Eosinophils %	1.3	1.8
Basophils %	0.7	0.9
Neutrophils Absolute	3.8	4.1
Lymphocytes Absolute	2.6	3.0
Monocytes Absolute	0.4	0.5
Eosinophils Absolute	0.1	0.1
Basophils Absolute	0.1	0.1
Lymphocytes	36.8	37.7

1m ago All Rows

Time Mark

IRON/ANEMIA PROFIL...	2024 10/4/24 12:48
Ferritin	9.2 ↓
Iron	62
UIBC	421.3 ↑
TIBC	484 ↑
Iron % Saturation	13 ↓

Case 1: 23yo with thrombocytosis

Moved from Charlotte

Heavy Menses

No hx VTE

CELL COUNT AND DI...					
WBC	11.6 ↑	11.8 ↑	7.6	7.0	7.9
RBC	4.92	5.49 ↑	4.71	4.31	4.62
	4.86		4.79		
Hemoglobin Quant	14.3	15.1	12.4	11.7	12.9
Hematocrit	40.8	45.1	38.7	35.5	38.0
MCV	84.0	82.1	80.8 ↓	82.4	82.3
MCH	29.4	27.5	25.9 ↓	27.1	27.9
MCHC	35.0	33.5	32.0	33.0	33.9
MPV	9.7	9.4	9.6	9.8	10.0
RDW	14.2	17.1 ↑	12.5	12.7	12.6
Platelet Count	363	370	432	510 ↑	441 ↑
Neutrophils %	53.2	67.4	50.4	54.3	52.2
Monocytes %	8.2	6.9	6.8	6.3	6.9
Eosinophils %	1.4	0.3	1.6	1.3	1.8
Basophils %	0.2	0.5	0.7	0.7	0.9
Neutrophils Absolute	6.2	8.0 ↑	3.8	3.8	4.1
Lymphocytes Absolute	4.3 ↑	2.9	3.1	2.6	3.0
Monocytes Absolute	1.0	0.8	0.5	0.4	0.5
Eosinophils Absolute	0.2	0.0	0.1	0.1	0.1
Basophils Absolute	0	0.1	0	0.1	0.1
Lymphocytes	36.9	24.6	40.4	36.8	37.7

Iron Deficiency

Reactive Thrombocytosis

Improved with IV iron

1m ago

All Rows

Time Mark

IRON/ANEMIA PROFIL...	2025 1/10/25 13:17	2024 10/4/24 12:48
Ferritin	118.0	9.2 ↓
Iron	107	62
UIBC	233.0	421.3 ↑
TIBC	340	484 ↑
Iron % Saturation	31	13 ↓

Case 2: 84yo with thrombocytosis

Annual labs

Asymptomatic

Time Mark

CELL COUNT AND DI...

	2024 10/30/24 13:14	10/15/24 08:11	10/9/24 10:44	9/18/24 13:11	7/3/24 14:08	5/16/24 08:10	2023 11/20/23 12:10	1/30/23 09:07	2022 9/2/22 10:12	2021 12/1/21 18:42
WBC	10.2	10.2	9.4	9.3	9.1	8.4	7.7	6.2	8.2	7.6
RBC	5.04	5.00	5.19	4.89	4.90	5.19	4.71	4.96	5.12	4.84
		5.00		4.89						
Hemoglobin Quant	15.1	15.1	15.7	14.8	15.1	15.6	14.6	15.0	15.4	14.6
Hematocrit	44.8	45.4	**47.5** ↑	44.1	44.0	**47.9** ↑	42.8	44.1	45.2	42.3
MCV	88.9	90.8	91.5	90.2	89.8	92.3	90.9	88.9	88.3	87.4
MCH	30.0	30.2	30.3	30.3	30.8	30.1	31.0	30.2	30.1	30.2
MCHC	33.7	33.3	33.1	33.6	34.3	32.6	34.1	34.0	34.1	34.5
MPV	10.3	10.2	11.3	10.9	11.5	11.2	11.7	11.8	11.7	12.4
RDW	14.3	14.5	14.9	14.6	15.2	15.1	14.6	14.1	13.4	13.9
Platelet Count	**706** ↑	**454** ↑	**583** ↑	**627** ↑	**595** ↑	**583** ↑	**496** ↑	372	301	314
Platelet Estimate		**Increased !**								
Neutrophils %	69.1		73.7	65.8	64.5				**80.1** ↑	65.9
Monocytes %	9.2	**1** ↓	7.6	9.2	9.9				10.4	9.6
Eosinophils %	2.9	2	4.8	5.8	3.3				0.6	3.2
Basophils %	1.0	1	0.9	1	0.9				0.5	0.8
Neutrophils Absolute	7.1	**8.2** ↑	6.9	6.1	5.9				6.6	5.0
Lymphocytes Absolute	1.8	1.1	1.2	1.7	1.9				**0.7** ↓	1.5
Monocytes Absolute	0.9	**0.1** ↓	0.7	0.8	0.9				0.9	0.7
Eosinophils Absolute	0.3	0.2	0.5	0.5	0.3				0.1	0.2
Basophils Absolute	0	0.1	0.1	0	0.1				0.0	0.1

Case 2: 84yo with thrombocytosis

Annual labs

Asymptomatic

JAK2 V617F rfx CALR/MPL/E12-15

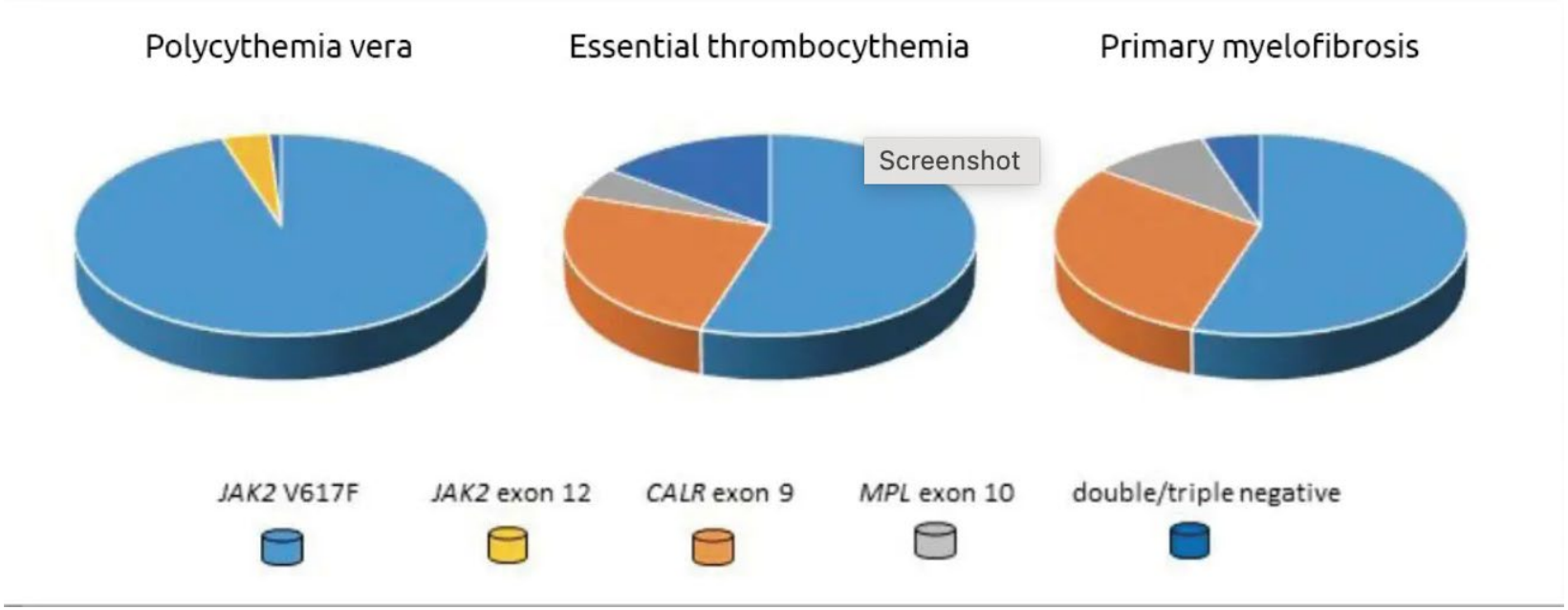
Status: **Final result** Visible to patient: **No (not released)** Next appt: **03/10/2025 at**

0 Result Notes

Component	9/18/24 1311
Ref Range & Units	
JAK2 V617F Result	Comment
Comment: POSITIVE	

Mutations in MPNs

Subhead here if needed



Langabeer, Clinical Laboratory Int.

Essential Throbocythemia

TABLE 2 International Consensus Classification diagnostic criteria for essential thrombocythemia and post-essential thrombocythemia (ET) myelofibrosis (see text for references).

Essential thrombocythemia (diagnosis requires meeting all four major criteria or the first three major and one minor criteria)	Post-essential thrombocythemia myelofibrosis (diagnosis requires meeting both major criteria and at least 2 minor criteria)
Major criteria: 1. Platelet count ≥450 × 10^9/L 2. BM megakaryocyte proliferation with mature cytology, hyperlobulated nuclei, and in loose clusters, BM fibrosis absent or ≤grade 1 3. Not meeting ICC criteria for other myeloid neoplasms, including PV, prefibrotic MF, and CML 4. *JAK2*-, *CALR*-, or *MPL*-mutated	Major criteria: 1. Prior documentation of ICC-defined ET 2. BM fibrosis grade ≥2
Minor criteria: 1. Other clonal marker present 2. No evidence of reactive thrombocytosis	Minor criteria: 1. Anemia combined with a ≥2 g/dL decrease in hemoglobin from baseline 2. A leukoerythroblastic blood smear 3. Increase in palpable splenomegaly of >5 cm from baseline or new palpable splenomegaly 4. Increased serum lactate dehydrogenase 5. Development of constitutional symptoms[a]

Abbreviations: BM, bone marrow; CML, chronic myeloid leukemia; ICC, International Consensus Classification; MF, myelofibrosis; PV, polycythemia vera.
[a]Any two of the following three: >10% weight loss in 6 months, drenching night sweats, unexplained fever of >37.5 degrees centigrade.

Tefferi et al., AJH 2024

Essential Throbocythemia

Traditionally low risk

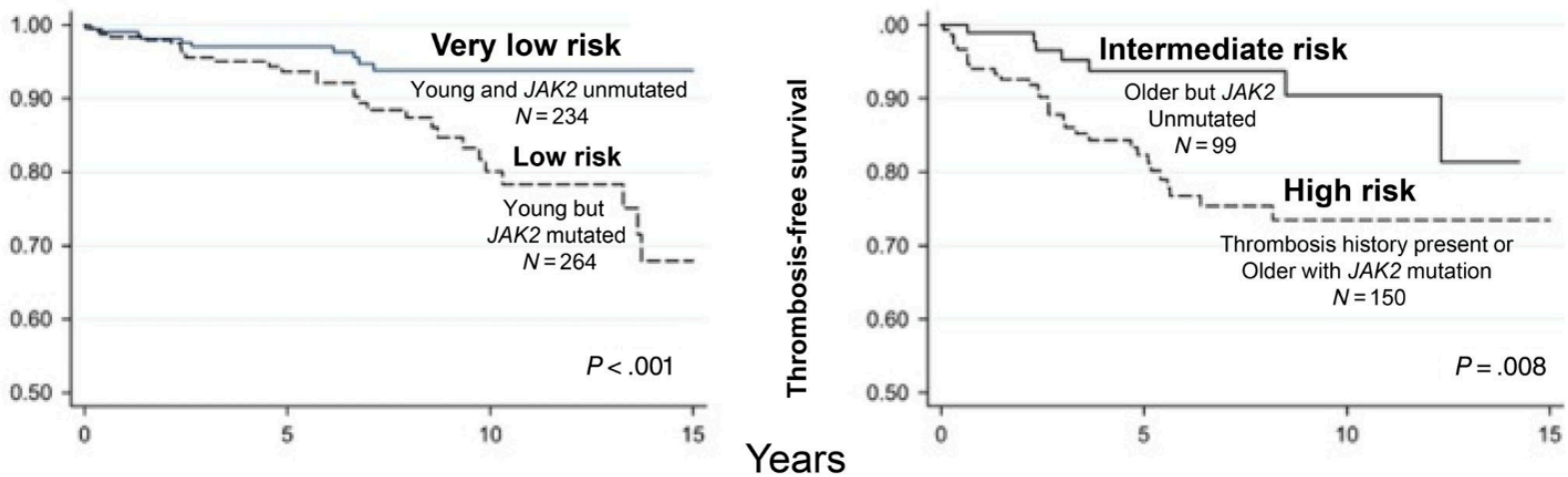
- *Age ≤60 years and*
- *No thrombosis history*

Traditionally high risk

- *Age >60 years or*
- *Presence of thrombosis history*

Revised international prognostic score ET (IPSET)-thrombosis

4-tiered



Tefferi et al., AJH 2024

ROPER ST. FRANCIS HEALTHCARE

RBC cases

Case 1: 63yo with Erythrocytosis

Subhead here if needed

Order Date Result Date	12/12/2024 12/12/2024	08/28/2024 08/28/2024	05/16/2024 05/16/2024	02/13/2024 02/13/2024	11/07/2023 11/07/2023	08/03/2023 08/03/2023
Ordering Physician	Sutterlin, John	Sutterlin, John	Sutterlin, John	Sutterlin, John	Sutterlin, John	Sutterlin, John
WBC	8.1 3.4-10.8 K/uL	8.3 3.4-10.8 K/uL	7.4 3.4-10.8 K/uL	5.8 3.4-10.8 K/uL	7.7 3.4-10.8 K/uL	9.5 3.4-10.8 K/uL
RBC	6.30H 4.14-5.80 M/uL	5.94H 4.14-5.80 M/uL	5.60 4.14-5.80 M/uL	5.72 4.14-5.80 M/uL	5.88H 4.14-5.80 M/uL	5.71 4.14-5.80 M/uL
HGB	19.5H 13.0-17.7 g/dL	18.1H 13.0-17.7 g/dL	16.9 13.0-17.7 g/dL	17.6 13.0-17.7 g/dL	18.2H 13.0-17.7 g/dL	17.9H 13.0-17.7 g/dL
HCT	56.50H 38.00-61.00 %	52.70H 38.00-61.00 %	49.60 38.00-61.00 %	49.80 38.00-61.00 %	51.30H 38.00-61.00 %	49.50 38.00-61.00 %
MCV	90 79-97 fL	89 79-97 fL	89 79-97 fL	87 79-97 fL	87 79-97 fL	87 79-97 fL

Case 1: 63yo with Erythrocytosis

CELL COUNT AND DI...	
WBC	9.0
RBC	5.86 ▲
Hemoglobin Quant	17.8 ▲
Hematocrit	50.1
MCV	85.5
MCH	30.4
MCHC	35.5
MPV	9.7
RDW	12.2
Platelet Count	189
Neutrophils %	80.9 ▲
Monocytes %	6.1
Eosinophils %	0.1
Basophils %	0.2
Neutrophils Absolute	7.2
Lymphocytes Absolute	1.1
Monocytes Absolute	0.6
Eosinophils Absolute	0.0

Unsigned – Prescriptions / Follow-Up Orders

Order Panel

BCR-ABL1 Gene Rearrangement, Quantitative, PCR
Expected: 1/25/2025, Expires: 1/25/2026, Routine, Lab Collect, Resulting Agency - ROPER HOSPITAL LABORATORY

MISCELLANEOUS SENDOUT
Expected: 1/25/2025, Expires: 1/25/2026, Routine, Lab Collect, Resulting Agency - ROPER HOSPITAL LABORATORY

Urinalysis W/ Rflx Microscopic
Expected: 1/25/2025, Expires: 1/25/2026, Routine, Lab Collect, Resulting Agency - ROPER HOSPITAL LABORATORY

Erythropoietin
Expected: 1/25/2025, Expires: 1/25/2026, Routine, Lab Collect, Resulting Agency - ROPER HOSPITAL LABORATORY

JAK2 V617F Mutation Analysis, Quant rflx CALR/Exon 12-15/MPL
Expected: 1/25/2025, Expires: 1/25/2026, Routine, Lab Collect, Resulting Agency - ROPER HOSPITAL LABORATORY

CBC with Auto Differential
Expected: 1/25/2025 Approximate, Expires: 1/25/2026, Routine, Lab Collect, Resulting Agency - ROPER HOSPITAL LABORATORY

Comprehensive Metabolic Panel
Expected: 1/25/2025 Approximate, Expires: 1/25/2026, Routine, Lab Collect, Resulting Agency - ROPER HOSPITAL LABORATORY

Lactate Dehydrogenase
Expected: 1/25/2025, Expires: 1/25/2026, Routine, Lab Collect, Resulting Agency - ROPER HOSPITAL LABORATORY

Erythrocytosis

Subhead here if needed

- Hgb/Hct > 16.5 g/dl/49% or > 16 g/dl/48%
- Peripheral blood *JAK2* exon 12-15 mutation negative

SERUM ERYTHROPOIETIN (Epo) MEASUREMENT

Long-standing duration
Family history

Epo | Epo

Acquired or unknown duration

Epo | Epo

subnormal

CONSIDER
Epo receptor (EPOR) mutation

No HOAV but P50 <24 mmHg

CONSIDER:
2,3-bisphosphoglycerate deficiency
BPGM (2,3-bisphosphoglycerate mutase) mutations

PIEZO1 mutations
- Iron overload, splenomegaly, hemolysis

Methemoglobinemia

normal or increased

Start with tests for high-oxygen affinity hemoglobin variants (HOAV)
- Venous P50 determination
- Capillary electrophoresis
- HPLC
- Mass spectrometry
- *HBB, HBA1, HBA2* sequencing

No HOAV and P50 >24 mmHg

CONSIDER:
Germline oxygen sensing pathway mutations
- *VHL (von Hippel-Lindau); a.k.a Chuvash polycythemia; Epo↑*
- *HIF2A (hypoxia-inducible factor-2 alpha subunit); Epo↑*
- *PHD2 (prolyl hydroxylase domain-2); Epo often normal*

EPO mutations*; Epo↑*

Other considerations:

HFE mutations; ↑ferritin
SLC30A10 mutations;
- hypermanganesemia, parkinsonism, cirrhosis

"compensated normal" or increased

Cardiopulmonary disease
Obstructive Sleep apnea
High altitude habitat
CO poisoning
Smoking
Cushing's disease
Drug-induced
- Anabolic steroids
- Blood/Epo doping
- Sodium-glucose co-transporter-2 (SGLT2) inhibitors (gliflozins)

Contracted volume
- Dehydration
- Diuretics
- Gaisböck's syndrome

increased

Epo-producing tumors
- Carcinomas (renal cell, hepatocellular)
- Cerebellar hemangioblastoma
- Meningioma
- Pheochromocytoma
- Uterine leiomyoma
- Parathyroid adenoma or carcinoma

Renal artery stenosis
Renal cysts (polycystic kidney disease)
Post renal transplant erythrocytosis

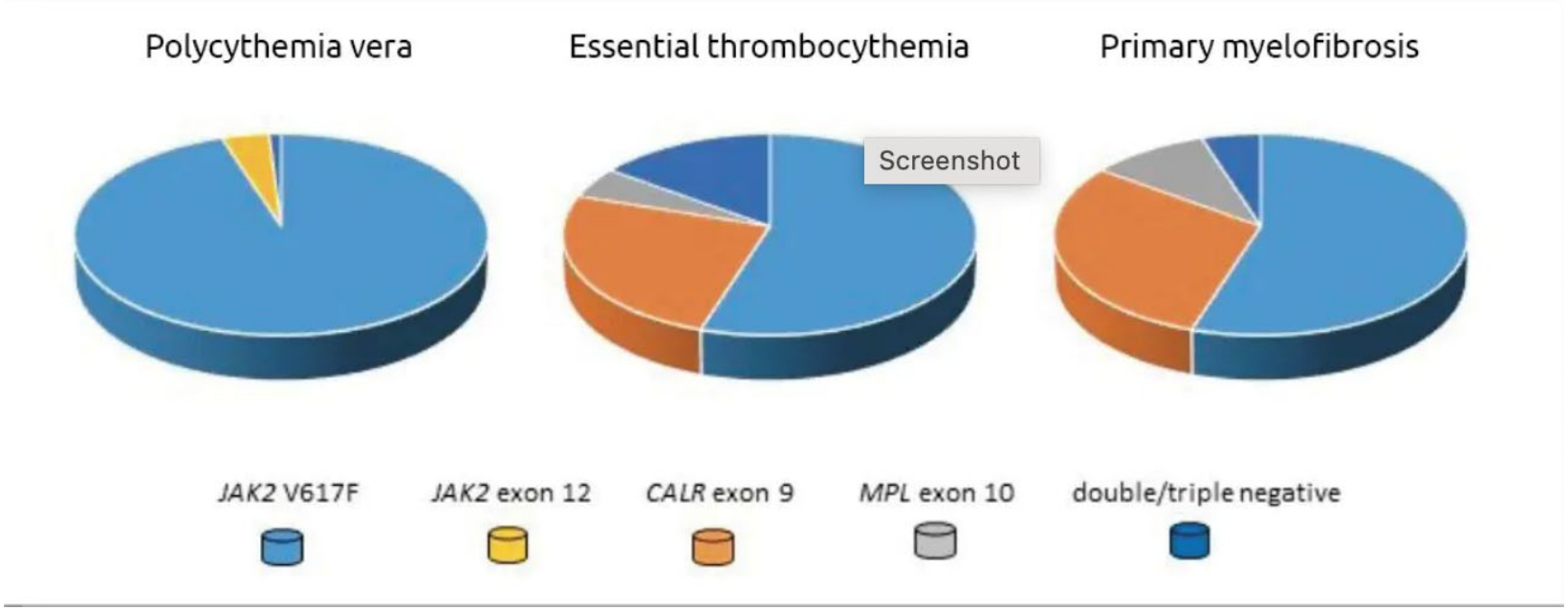
Other considerations:

LNK (SH2B3) mutations; Epo↓
TEMPI; Epo ↑
- telangiectasias, erythrocytosis with ↑Epo, monoclonal gammopathy (IgGκ), perinephric-fluid collections, intrapulmonary shunting

Gangat et al., AJH 2023

Mutations in MPNs

Subhead here if needed



Langabeer, Clinical Laboratory Int.

Erythrocytosis

Subhead here if needed

Erythrocytosis		Thrombocytosis	
Congenital causes	Mutations in genes of the oxygen-sensing pathway e.g. *VHL*, *EGLN1*, *EGLN2*, *EPAS1*	**Congenital causes**	Other hematological malignancies e.g. CML, MDS/MPN
EPO gene mutations	Methemoglobinemia Biphosphoglycerate mutase deficiency		
Acquired causes		**Reactive causes**	Acute blood loss Recovery from thrombocytopenia Infection (acute and chronic) Inflammation (acute and chronic) Extreme physical exertion Iron deficiency Hemolytic anemia Asplenium (splenectomy or infarction) Rare drug reactions
Central hypoxia	Chronic lung disease Right-to-left cardiopulmonary shunts Living at high altitudes Obstructive sleep apnea		
Renal hypoxia	Renal artery stenosis Hydronephrosis Renal cysts		
Erythropoietin-producing tumors	Cerebellar hemangioblastoma Renal cell carcinoma Uterine leiomyoma Pheochromocytoma		
Drugs	Erythropoiesis-stimulating agents Androgen preparations Testosterone Diuretics Anti-diabetic agents (SGLT2 inhibitors)		
Others	Alcohol excess After renal transplant Hemochromatosis TEMPI syndrome		

Table 1. Congenital or acquired clinical scenarios that can mimic either polycythemia vera (erythrocytosis) or essential thrombocythemia and primary myelofibrosis (thrombocytosis)

Langabeer, Clinical Laboratory Int.

Secondary Erythrocytosis: Role of Phlebotomy?

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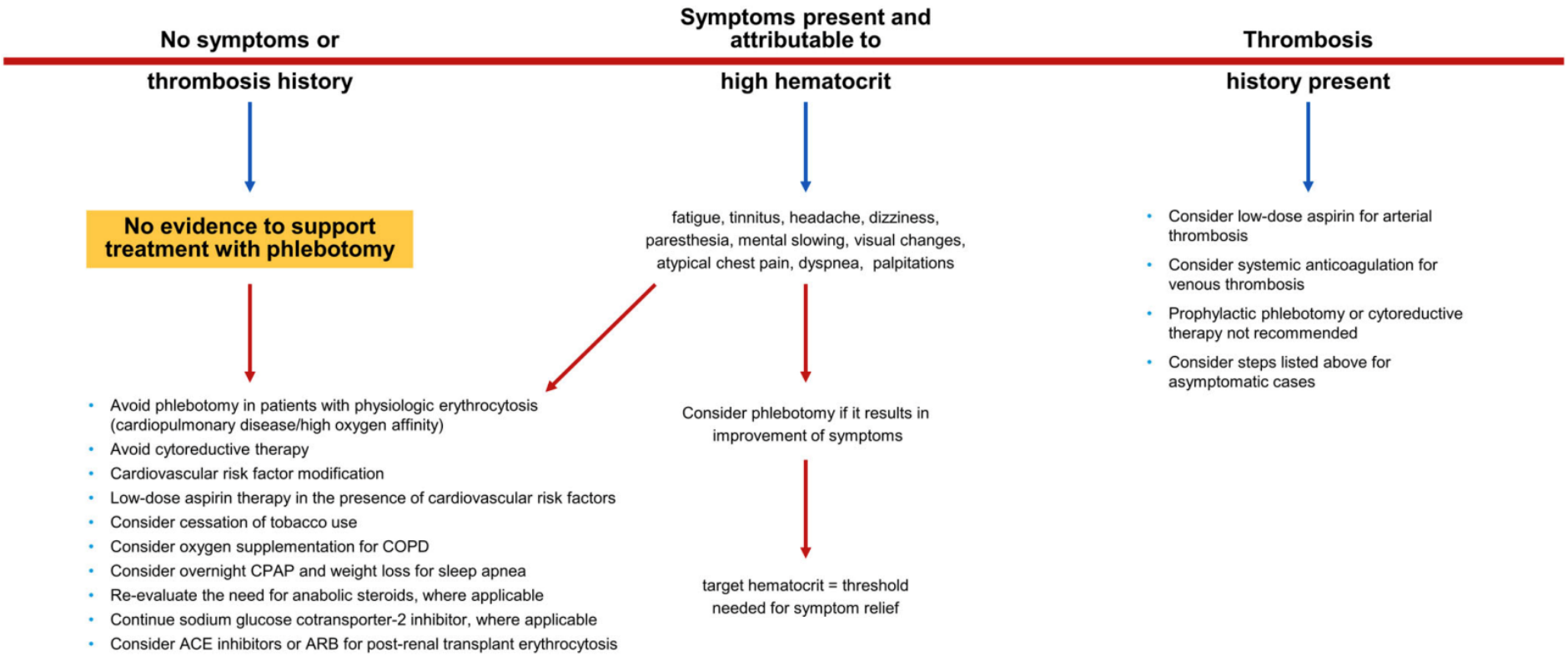
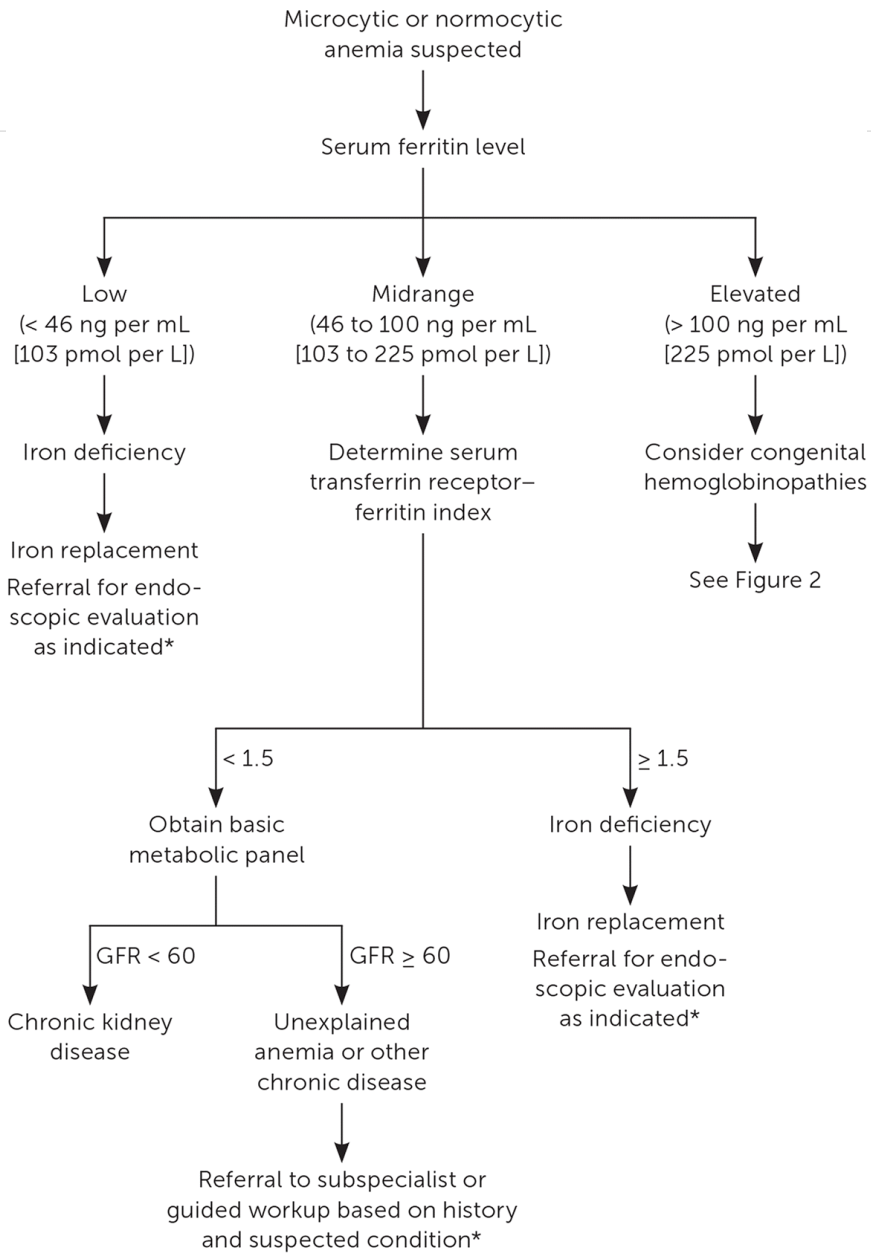


FIGURE 2 Treatment algorithm for *JAK2* unmutated erythrocytosis. ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; COPD, chronic obstructive pulmonary disease; CPAP, continuous positive airway pressure.

Gangat et al., AJH 2023

Anemia workup

Subhead here if needed

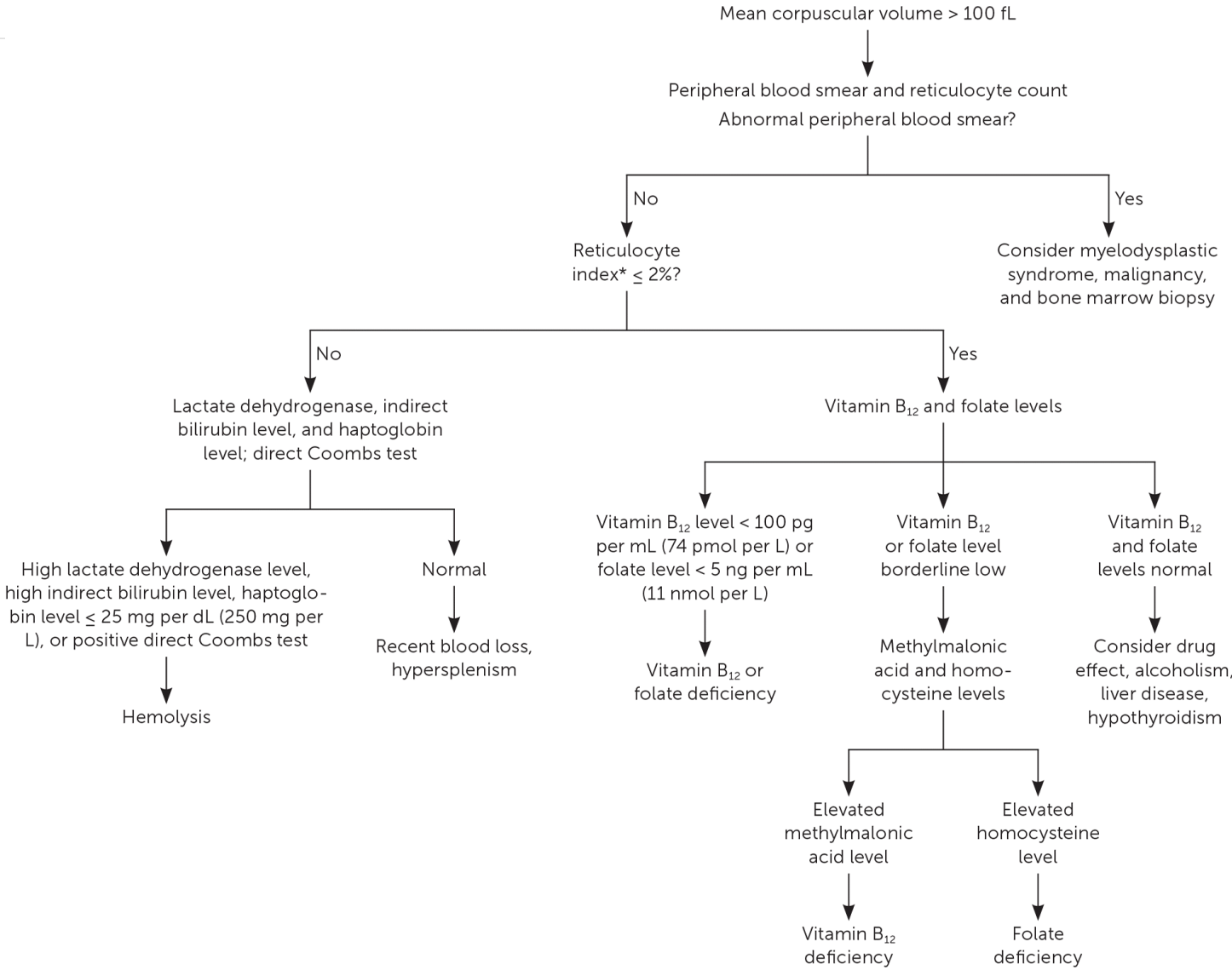


*—Workup and further evaluation must balance benefits and harms with patient's desires and long-term care plan.

Am Fam Physician. 2018;98(7):437-442

Anemia workup

Subhead here if needed



*–Consider subspecialist consultation if reticulocyte count is low and vitamin B_{12} and folate levels are normal.

Am Fam Physician. 2018;98(7):437-442

ROPER ST. FRANCIS HEALTHCARE

Clonal Hematopoesis:

CHIP

Clonal Hematopoesis of Indeterminate Potential

CCUS

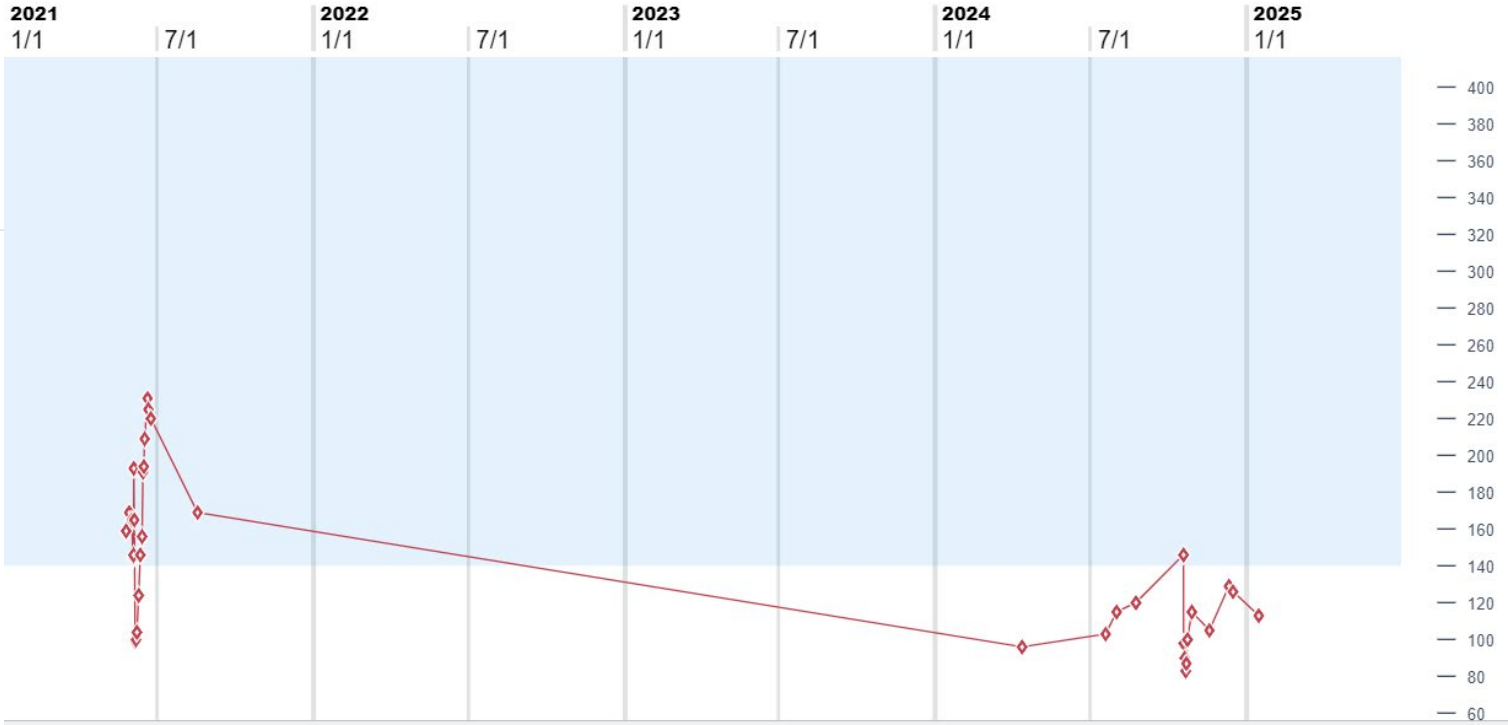
Clonal Cytopenias of Undetermined Significance

78yo with cirrhosis and thrombocytopenia

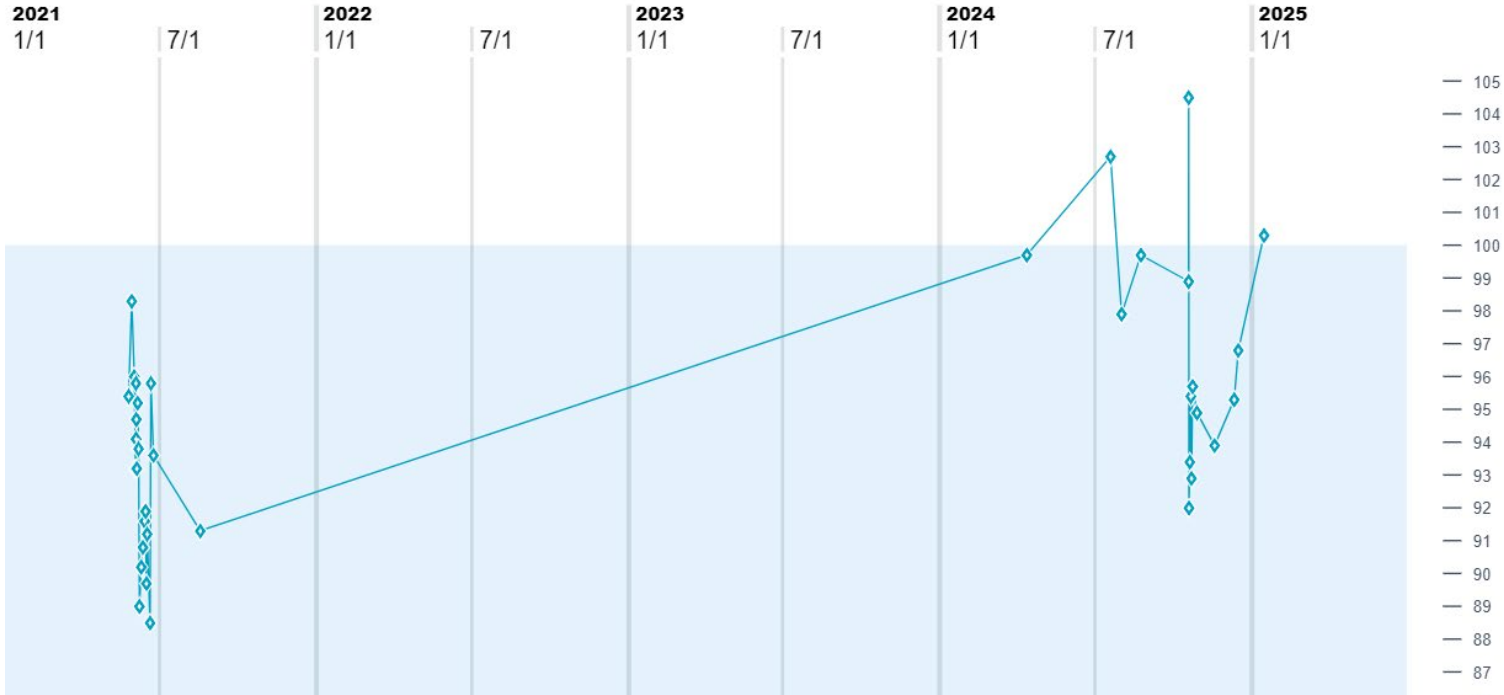
<1m ago | All Rows | Time Mark

CELL COUNT AND DI...	2025 1/15/25 10:31	2024 12/16/24 09:55	12/11/24 13:15	11/18/24 10:06	10/28/24 12:54	10/23/24 09:26	10/22/24 04:34	10/21/24 05:58
WBC	4.9	4.8	5.1	5.4	6.4	6.5	6.4	6.7
RBC	3.18 ↓	3.14 ↓	3.22 ↓	3.42 ↓	3.69 ↓	3.52 ↓	3.24 ↓	3.28 ↓
Hemoglobin Quant	10.9 ↓	10.4 ↓	10.3 ↓	11.1 ↓	11.7 ↓	11.3 ↓	10.4 ↓	10.6 ↓
Hematocrit	31.9 ↓	30.4 ↓	30.7 ↓	32.1 ↓	35.0 ↓	33.7 ↓	30.1 ↓	31.3 ↓
MCV	100.3 ↑	96.8	95.3	93.9	94.9	95.7	92.9	95.4
MCH	34.3	33.1	32.0	32.5	31.7	32.1	32.1	32.3
MCHC	34.2	34.2	33.6	34.6	33.4	33.5	34.6	33.9
MPV	11.0	12.0	12.1	12.7 ↑	12.6 ↑	12.0	11.5	11.6
RDW	15.2	18.4 ↑	18.4 ↑	18.2 ↑	16.6	17.6 ↑	17.5 ↑	17.9 ↑
Platelet Count	113 ↓	126 ↓	129 ↓	105 ↓	115 ↓	100 ↓	87 ↓	83 ↓
Platelet Estimate					Decreased !			
Neutrophils %	61.4	51.5	54.1	54.5	56.0		63.8	60.8
Monocytes %	11.8	13.8 ↑	16.3 ↑	15.9 ↑	13.4 ↑		13.1 ↑	14.9 ↑
Eosinophils %	2.6	2.7	3.7	2.4	2.0		2.0	1.9
Basophils %	1.2	1.7	1.2	0.9	1.3		0.9	1.0
Neutrophils Absolute	3.0	2.5	2.8	2.9	3.6		4.1	4.1
Lymphocytes Absolute	1.1	1.4	1.3	1.4	1.7		1.3	1.4
Monocytes Absolute	0.6	0.7	0.8	0.9	0.9		0.8	1.0
Eosinophils Absolute	0.1	0.1	0.2	0.1	0.1		0.1	0.1
Basophils Absolute	0	0.1	0.1	0.1	0.1		0.1	0.1
Lymphocytes	22.8	29.9	24.3	26.1	27.0		19.6	20.8

Platelets



MCV



78yo with cirrhosis and thrombocytopenia

Progressive thrombocytopenia

Progressive macrocytisis

DIAGNOSIS

PERIPHERAL BLOOD:

MILD ANEMIA.
MILD THROMBOCYTOPENIA.

BONE MARROW:

MODERATELY HYPOCELLULAR MARROW EXHIBITING TRILINEAGE HYPOPLASIA WITH TRILINEAGE MATURATION.
SUBTLE DYSERYTHROPOIETIC MORPHOLOGY.
LESS THAN 1% BLASTS.
TRACE AMOUNT OF STAINABLE IRON WITHOUT RING SIDEROBLASTS.
NGS: LOW-LEVEL MUTATION IN MSH6 GENE.

Detailed Results

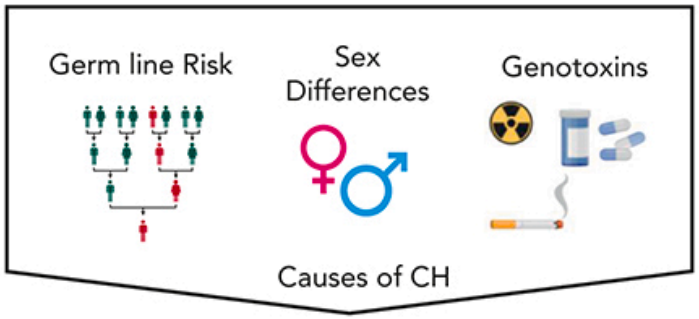
Single Nucleotide Variant (SNV) and Insertions-Deletions (INDELS)

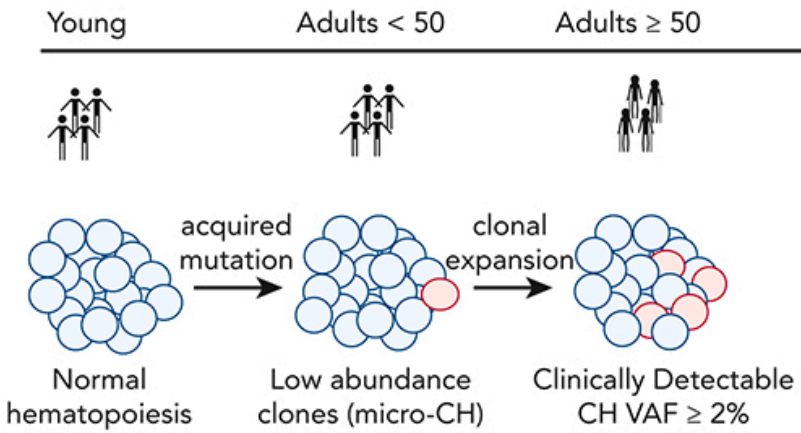
Gene name	Hgvsp	Hgvsc	Amino acids	Codons	Consequence	Allele frequency	Read depth	Predicted effect on protein
MSH6	NP_000170.1:p.Arg248Gly	NM_000179.2:c.742C>G	R/G	Cga/Gga	missense_variant	1.84	1249	deleterious (0)

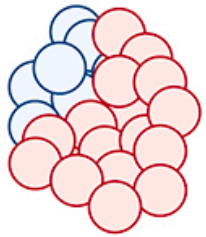
Subhead here if needed

Genes Tested for Abnormalities in Coding Sequence												
ABL1	B2M	CCNE1	CUX1	ETNK1	GALNT12	IL7R	MCL1	NFE2L2	PIM1	RB1	SMO	TRAF3
ABRAXAS1	BAP1	CD274	CXCR4	ETV6	GATA1	INHBA	MDM2	NFKBIA	PLCG1	RET	SOCS1	TSC1
ACVR1B	BARD1	CD79A	CYLD	EXO1	GATA2	IRF4	MDM4	NKX2-1	PMS1	RHEB	SOX2	TSC2
AKT1	BCL2	CD79B	DAXX	EZH2	GATA3	JAK1	MED12	NOTCH1	PMS2	RHOA	SOX9	TSHR
AKT2	BCL2L1	CDC73	DDR2	FANCA	GEN1	JAK2	MEF2B	NOTCH2	POLD1	RIT1	SPOP	U2AF1
AKT3	BCL6	CDH1	DDX41	FANCC	GNA11	JAK3	MEN1	NOTCH3	POLE	RNF43	SRC	U2AF2
ALK	BCOR	CDK12	DICER1	FANCD2	GNAQ	KAT6A	MET	NPM1	POT1	ROS1	SRSF2	UBA1
AMER1	BCORL1	CDK4	DNM2	FANCE	GNAS	KDM5C	MITF	NRAS	PPM1D	RUNX1	STAG2	VHL
ANKRD26	BCR	CDK6	DNMT3A	FANCF	GNB1	KDM6A	MLH1	NSD1	PPP2R1A	SAMD9	STAT3	WT1
APC	BIRC3	CDKN1B	DOT1L	FANCG	GREM1	KDR	MPL	NSD2 (WHSC1)	PRDM1	SAMD9L	STAT5B	XPO1
AR	BLM	CDKN2A	EED	FAS	GRIN2A	KEAP1	MRE11	NTHL1	PRKAR1A	SDHA	STK11	XRCC2
ARAF	BMPR1A	CDKN2B	EGFR	FBXW7	H3-3A (H3F3A)	KIT	MSH2	NTRK1	PRKDC	SDHAF2	SUFU	XRCC3
ARID1A	BRAF	CDKN2C	EGLN1	FGF4	H3C2 (HIST1H3B)	KMT2A	MSH3	NTRK2	PRPF8	SDHB	SUZ12	ZNF217
ARID1B	BRCA1	CEBPA	ELANE	FGF6	HGF	KMT2B	MSH6	NTRK3	PRSS1	SDHC	TAL1	ZRSR2
ARID2	BRCA2	CHEK1	EP300	FGFR1	HNF1A	KMT2C	MTOR	PAK3	PTCH1	SDHD	TCF3	-
ASXL1	BRIP1	CHEK2	EPAS1	FGFR2	HOXB13	KMT2D	MUTYH	PALB2	PTEN	SETBP1	TENT5C (FAM46C)	-
ATM	BTK	CIC	EPCAM	FGFR3	HRAS	KRAS	MYC	PAX5	PTPN11	SETD2	TERC	-
ATR	CALR	CREBBP	EPHA3	FGFR4	HSP90AA1	LRP1B	MYCL	PBRM1	RAC1	SF3B1	TERT	-
ATRX	CARD11	CRLF2	EPHA5	FH	ID3	MAP2K1	MYCN	PDGFRA	RAD21	SMAD2	TET2	-
AURKA	CBL	CSF1R	ERBB2	FLCN	IDH1	MAP2K2	MYD88	PDGFRB	RAD50	SMAD4	TGFBR2	-
AURKB	CBLB	CSF3R	ERBB3	FLT3	IDH2	MAP2K4	NBN	PHF6	RAD51	SMARCA4	TMEM127	-
AURKC	CBLC	CTCF	ERBB4	FLT4	IGF1R	MAP3K1	NF1	PIK3CA	RAD51C	SMARCB1	TNFAIP3	-
AXIN1	CCND1	CTNNA1	ERG	FOXL2	IKZF1	MAP3K14	NF2	PIK3R1	RAD51D	SMC1A	TNFRSF14	-
AXIN2	CCND3	CTNNB1	ESR1	FUBP1	IKZF3	MAPK1	NFE2	PIK3R2	RAF1	SMC3	TP53	-

Causes and Consequences of Clonal Hematopoiesis (CH)





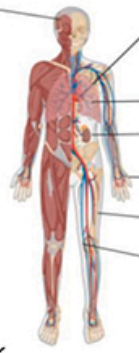


Malignant Outcomes

Myeloid CH CHIP/CCUS, M-mCA → MDS, CMML, AML, ET, PV, MF, Ph- CML

Lymphoid CH L-CHIP, L-mCA → CLL, SLL, Lymphomas

Nonmalignant Outcomes



- Alzheimer's Dementia
- Cardiovascular Disease
  - Coronary artery disease
  - Heart Attacks
  - Ischemic heart failure
  - Stroke
- COPD
- Chronic Kidney Disease
- Rheumatoid Arthritis
- Osteoporosis
- Thrombosis

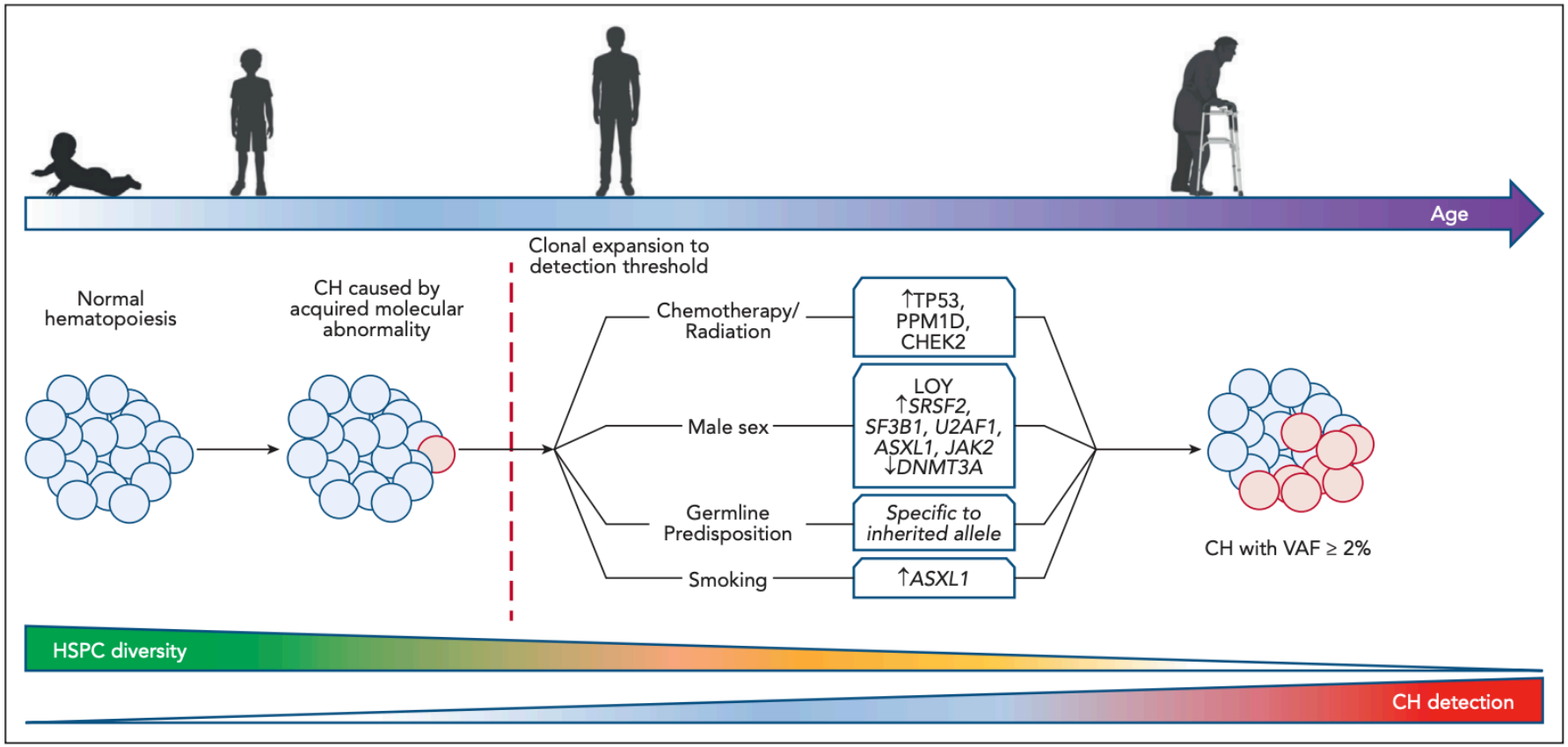
Decreased risk — Increased risk

Conclusion: Age, germ line predisposition, sex differences, and exposure to genotoxic stress influence the risk of clonal hematopoiesis and associated malignant and nonmalignant clinical outcomes.

*Weeks and Ebert. DOI: 10.1182/**blood**.2023022222*

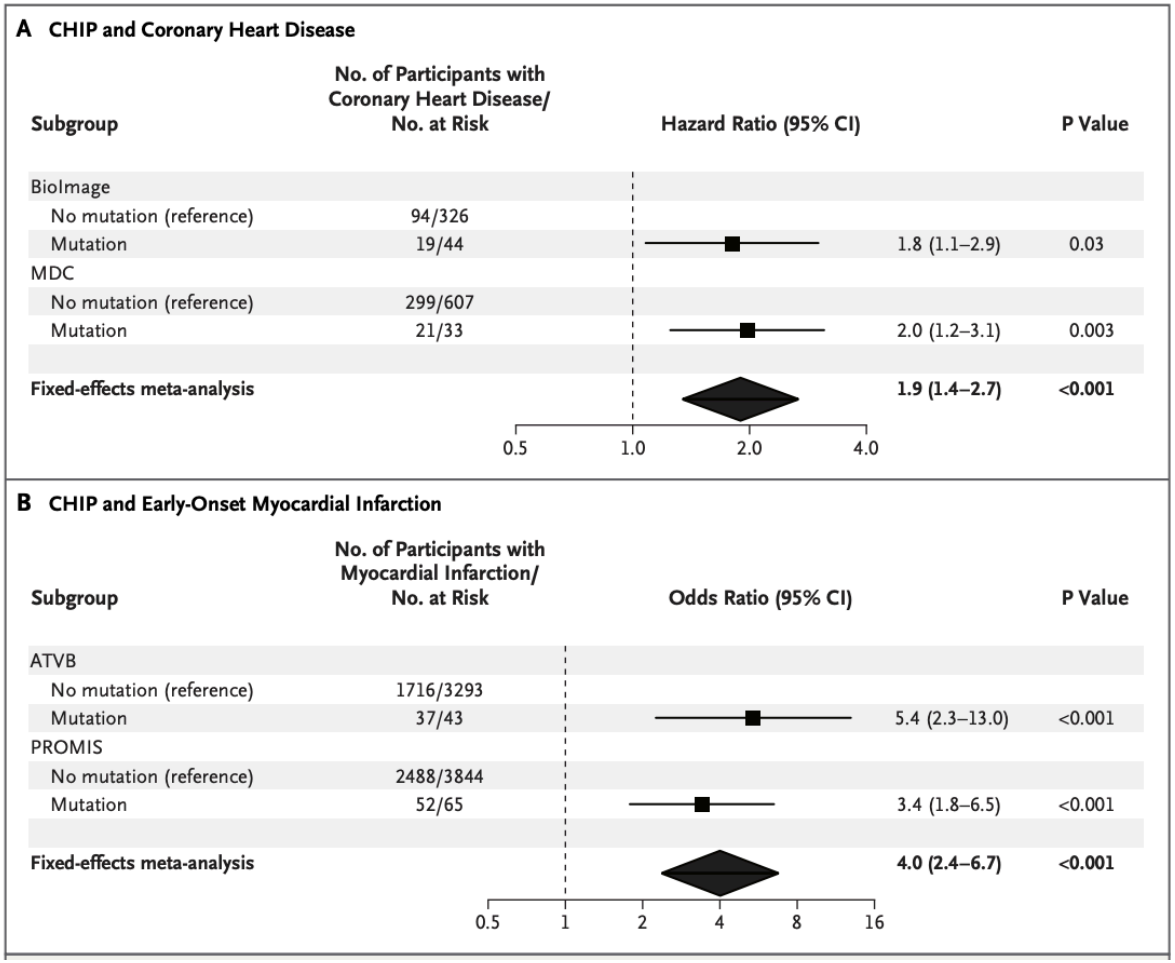
Blood Visual Abstract

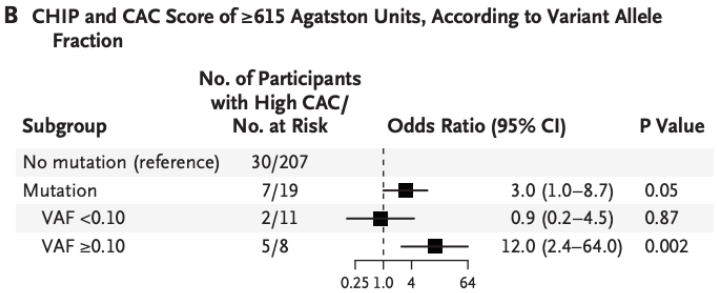
CHIP and CCUS



Weeks and Ebert, Blood 2023

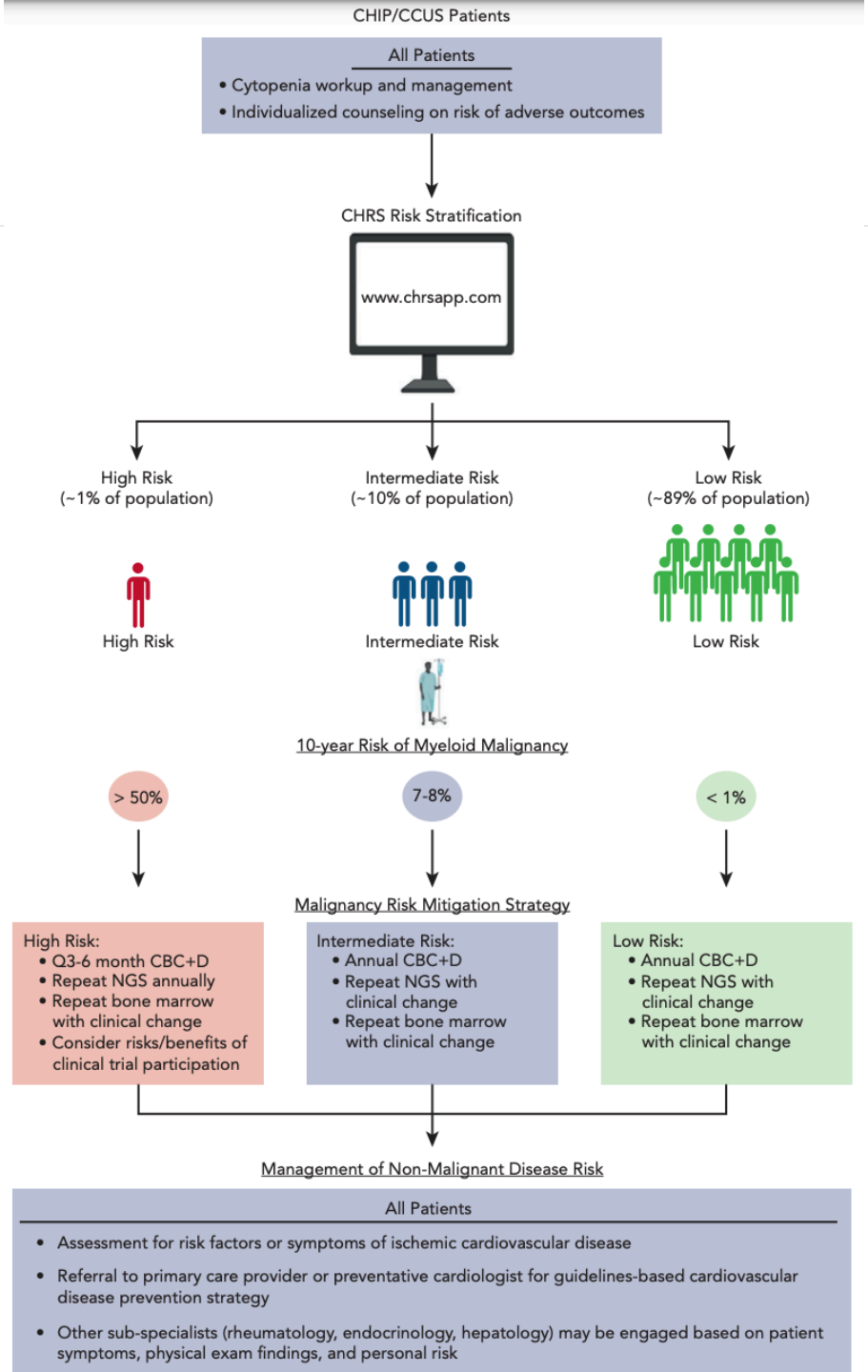
CHIP and CCUS





Jaiswal et al, NEJM 2017

CHIP and CCUS



Weeks and Ebert, Blood 2023

ROPER ST. FRANCIS HEALTHCARE

Elevated Ferritin and Hemachromatosis

47yo F with elevated ferritin

Established with new PCP

Was chronically on iron supplementation ant Vitamin C for UTIs

New PCP sent iron panel

Time Mark	2025 1/24/25 14:17	2024 12/13/24 14:09	11/27/24 11:04	11/15/24 13:40	10/25/24 12:34	10/9/24 15:02	9/20/24 14:55	7/10/24 07:29	4/1/24 07:24
IRON/ANEMIA PROFIL...									
Ferritin	540.0 ↑	621.0 ↑	520.8 ↑	678.9 ↑	784.5 ↑	1,014.0 ↑	1,077.0 ↑	922.0 ↑	1,046.0 ↑
Iron						81	108	135	151 ↑
UIBC						192.0	174.9	108.0 ↓	83.5 ↓
TIBC						273	283	243 ↓	234 ↓
Iron % Saturation						30	38	56 ↑	65 ↑

Component	7/29/24 1117
Hemochromatosis Gene Analysis	Comment

Comment: Result:
c.845G>A (p.Cys282Tyr) - Not Detected
c.187C>G (p.His63Asp) - Not Detected
c.193A>T (p.Ser65Cys) - Not Detected
Not associated with increased risk to develop clinical symptoms of Hereditary Hemochromatosis. In symptomatic individuals, other causes of iron overload should be evaluated. See Additional Information and Comments.

47yo F with elevated ferritin

Liver MRI with iron quantification:

08/28/2024 08/28/2024 08/28/2024

Impression

IMPRESSION:

Findings consistent with iron deposition throughout the liver, measuring approximately 6.3 mg/g of liver tissue.

Dictated by: Philip Kyles, DO. 8/28/2024 4:36 PM

I, Taylor Gunnell, MD, have reviewed the study and agree with the findings in this report. 8/28/2024 4:46 PM

Narrative

EXAMINATION: MRI ABDOMEN WO IV CONTRAST (MRI Liver Iron Quantification) 8/28/2024 1:36 PM

ACCESSION NUMBER: 22838871

INDICATION: ELEVATED FERRITIN. ELEVATED FERRITIN.

COMPARISON: None.

TECHNIQUE: Limited MRI of the abdomen was performed without contrast to evaluate liver iron content.

47yo F with elevated ferritin

Time Mark	2025 1/24/25 14:17	2024 12/13/24 14:09	11/27/24 11:04	11/15/24 13:40	10/25/24 12:34	10/9/24 15:02	9/20/24 14:55	7/10/24 07:29	4/1/24 07:24
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TIBC						273	283	243 ↓	234 ↓
Iron % Saturation						30	38	56 ↑	65 ↑

11/18/2024 10:34 11/18/2024 H&P

Update

Clinical Impression: Ms. Conrad presents with evidence of iron overload with an elevated ferritin and MRI suggesting hemosiderosis. She does not have HFE mutations, and she does have a clinical picture that could be consistent with secondary overload from vitamin-C and oral iron for a decade. I would recommend continued induction phlebotomy to get ferritin 250, and then monitor every 3-4 months for the next several years to be sure she does not load iron again. If she resumes loading iron we would need to perform non HFE genetic testing via our genetics team.

Plan:

1. Serum labs EKG echo ultrasound
2. Continued induction phlebotomy every 2-3 weeks locally with ferritin goal of 50, as tolerated
3. Once ferritin of 50 goal is achieved, monitor ferritin every 3-4 months for the next 2-3 years to confirm it does not increase back over 200. If she resumes iron loading she needs non-HFE genetic testing.
4. Hold vitamin-C supplements and iron supplements indefinitely
5. Follow up via portal

Hemochromatosis Guidelines

Clinical Practice Guidelines

JOURNAL OF HEPATOLOGY

EASL Clinical Practice Guidelines on haemochromatosis☆

European Association for the Study of the Liver*

ACG Clinical Guideline: Hereditary Hemochromatosis

Kris V. Kowdley, MD, FACG[1], Kyle E. Brown, MD, MSc[2,3,4], Joseph Ahn, MD, MS, MBA, FACG (GRADE Methodologist)[5] and Vinay Sundaram, MD, MSc[6]

EASL Clinical Practice Guidelines on haemochromatosis Journal of Hepatology 2010 vol. 53 j 3–22

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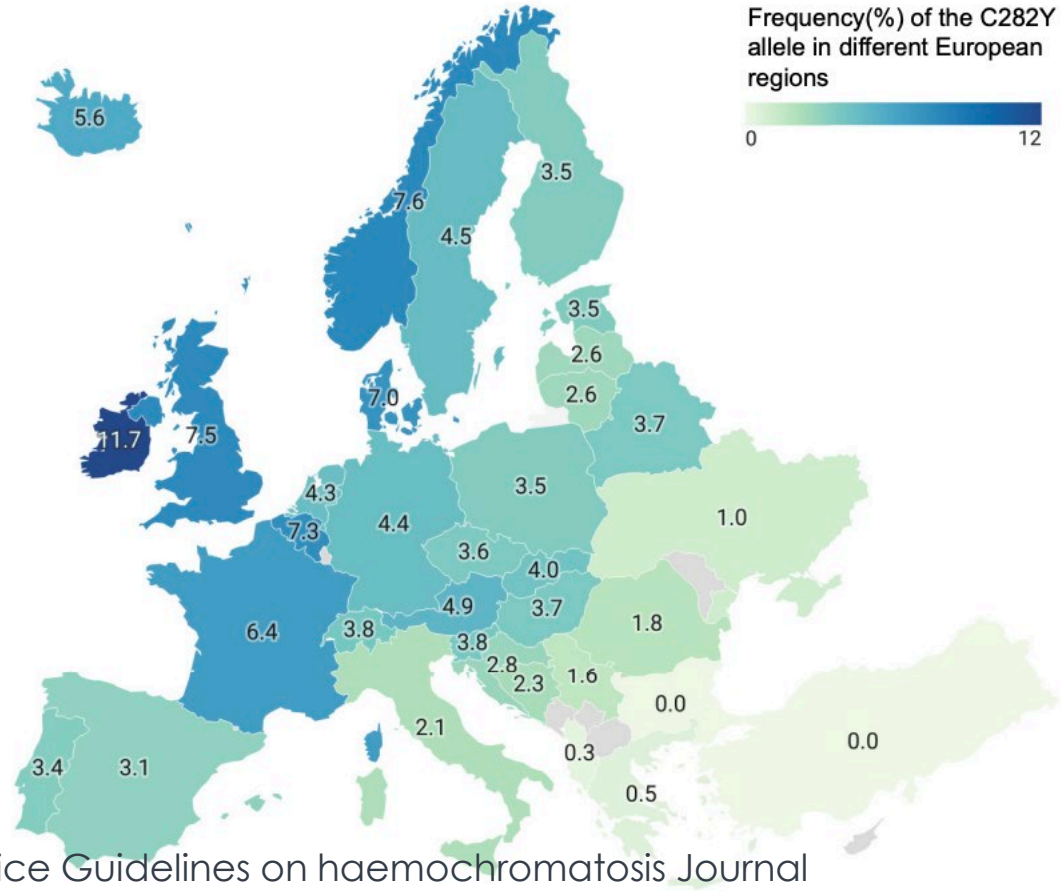
EASL Clinical Practice Guidelines on haemochromatosis☆

European Association for the Study of the Liver*



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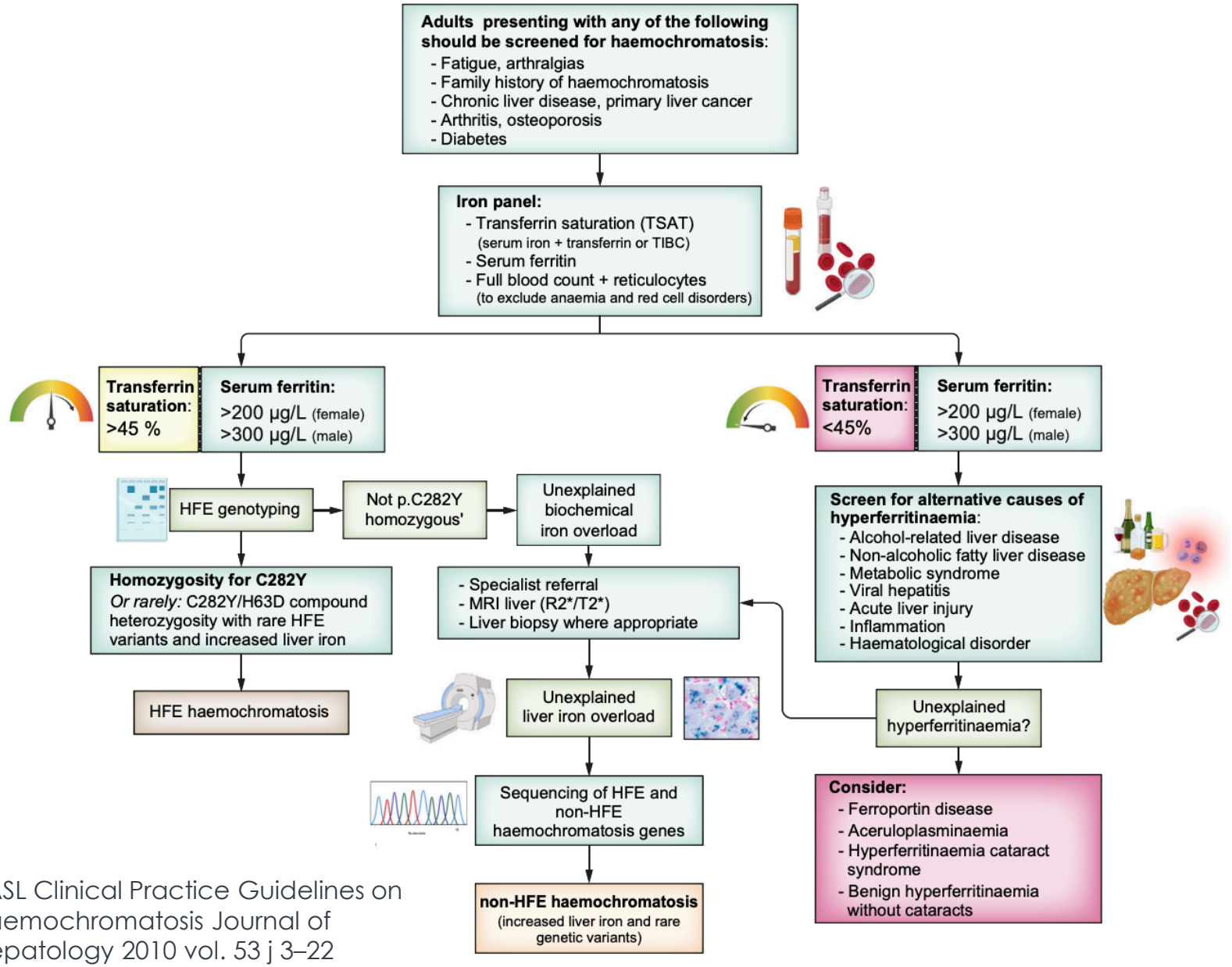
EASL Clinical Practice Guidelines on haemochromatosis☆



EASL Clinical Practice Guidelines on haemochromatosis Journal of Hepatology 2010 vol. 53 j 3–22

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JAK2 unmutated erythrocytosis: 2023 Update on diagnosis and management Naseema Gangat, Natasha Szuber, Ayalew Tefferi
First published: 26 March 2023
https://doi.org/10.1002/ajh.26920

American Family Physician. 2018:98(7):437-442

Weeks and Ebert. DOI: 10.1182/blood.2023022222

Clonal Hematopoiesis and Risk of Atherosclerotic Cardiovascular Disease
Authors: Siddhartha Jaiswal, M.D., Ph.D., Pradeep Natarajan, M.D., Alexander J. Silver, B.A., Christopher J. Gibson, M.D., Alexander G. Bick, M.D., Ph.D., Eugenia Shvartz, B.S., Marie McConkey, Ph.D., **+14**, and Benjamin L. Ebert, M.D., Ph.D.Author Info & Affiliations **Published July 13, 2017**
N Engl J Med 2017;377:111-121 DOI: 10.1056/NEJMoa1701719

EASL Clinical Practice Guidelines on haemochromatosis Journal of Hepatology 2010 vol. 53 j 3–22

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Questions?