Anemia Reference Handout

CBC Evaluation

1. Accurate vs. Inaccurate
2. Urgent vs. Non-urgent
3. Acute vs. Chronic
4. Anemia vs. Pancytopenia or Thrombocytosis
5. MCV & MCV Trend

Other Labs

Iron Studies	Iron, TIBC or Transferrin, Ferritin IDA: Fe ^{low} TIBC ^{high} Ferritin ^{low} Tsat <20% AOCD: Ferritin ^{high}
Hemolysis	Haptoglobin ^{low} LDH ^{high} Ibili ^{high} Reticulocyte ^{low}
B12 +/- Folate	Folate MMA ^{B12} Homocysteine $^{B12 + Folate}$
Multiple Myeloma	SPEP/UPEP, SIFE/UIFE, Free Kappa/Lambda

Anemia Eval by MCV

Microcytosis
MCV < 80 fL

2. Rule out Fe deficiency

Normocytosis
MCV 80-100 fL

Macrocytosis
MCV > 100 fL

2. Rule out B12 +/- Folate deficiency

3. Check hemolysis labs
4. Evaluate drug exposures
5. Evaluate kidney, liver, thyroid function
6. Check MM labs
7. Check CBC Diff + Smear

Hemolytic Anemia

Coombs (DAT) Positive
= Autoimmune Hemolysis

Spherocytes can be present on peripheral smear

WARM AIHA

Dx: IgG+, C3+/-

Causes: Autoimmune, infections, lymphoproliferative disorders, drugs, immunosuppression, transfusions

COLD AIHA

Dx: C3+, IgG-

Causes: Cold Agglutinin Disease, Paroxysmal Cold Hemoglobinuria

Coombs (DAT) Negative
= Non-Autoimmune Hemolysis

Microangiopathic

Schistocytes often present on peripheral smear

MAHA = Microangiopathic HA
ex: Mechanical heart valve

TMA = Thrombotic Microangiopathy
= MAHA + Thrombocytopenia
ex: DIC, TTP, HUS

Macroangiopathic

Hemoglobinopathies
ex: Sickle cell, Thalassemia
Enzymopathies
ex: G6PD Deficiency
RBC Membrane Disorders
ex: Hereditary Spherocytosis

Microcytosis
MCV < 80 fL

Acquired: Iron Deficiency Anemia (IDA)
- Often down-trending MCV
- History of bleeding (GI, menstrual). ~20% menstruating women!
- Iron studies: Low Fe, High TIBC, Low Ferritin, Tsat <20%, elevated RDW. Ferritin < 40 = IDA
- Smear: Microcytic, hypochromic RBCs
- Plts: Can have thrombocytosis
- Drugs: History of anticoagulants or anti-plts

Acquired: AOCD
- Can be more chronic
- Can be normocytic
- Often elevated ferritin (acute phase reactant)

Hereditary: Thalassemia
- Chronic anemia (congenital)
- MCV often quite low (< 65-75), out of proportion to degree of anemia
- Iron studies and RDW normal

Normocytosis
MCV 80-100 fL

AOCD
- Many causes: CKD, CHF, Infection/inflammation
- Fe studies can be confusing, ferritin often high
- Can have mixed AOCD with IDA

Microcytic Overlap
- ex: IDA

Macrocytic Overlap
- ex: Multiple Myeloma

Macrocytosis
MCV > 100 fL

Megaloblastic (DNA metabolism)
- B12/Folate Deficiency
- Drugs, ETOH (low retics iso BM suppression)

Immature Cells (Reticulocytosis)
- Hemolysis (low hapto, high LDH, high Tbili, high retics)

Primary Bone Marrow Dysfunction
- MDS, Leukemia, Myeloma
- Smear: Immature cells (ex: blasts in leukemia)

Multifactorial (ex: Lipid Metabolism)
- Liver disease (acanthocytes/spur cells present, abnormal LFTs)
- Endocrinopathies (hypothyroidism)