**EVALUATION OF ANEMIAS**

Definition: reduction of mass of RBC below normal.

- Men Hgb <13.5 g/dL or Hct <41
- Women Hgb <12 g/dL or Hct <36

Approach to Evaluation: Kinetic vs Morphologic Approach

1) Kinetic approach
   - Dec production → nutritional, bone marrow, suppression
   - Inc destruction → hemolysis
   - RBC loss → traumatic, occult, iatrogenic

2) Morphologic approach: by size → MCV (est RBC volume cell by cell); RDW (variety of size)

   **Macrocytic**: MCV >100 (Nutritional → B12, Folate, Drugs, BM)
   - B12 if decreased
     - Screen for intrinsic factor Ab (+→ pernicious; −→ malabs. i.e. celiac, IBS)
     - Schilling test
       - Stage 1 → IM B12, followed by labeled B12; 24 hour urine for radioactive labeled B12; if >7% of ingested load then it is normal b/c all binding sites occupied by unlabeled B12, and radiolabeled excreted
       - Stage 2 → only if stage 1 abnormal; give 60mg intrinsic factor, followed by B12
   - Folate (may be altered by recent dietary changes)
     - Check homocysteine → elevated 2 to impaired folate dependent conversion
   - Drugs → ETOH, hydroxyurea, MTX, TMP, 5-FU, AZT
   - Primary BM → aplastic, myelodysplastic, leukemia

   **Microcytic**: MCV <80 (Fe deficient, Thalassemia, Chronic Disease, Congenital)
   - Fe Deficient
     - Fe panel includes ferritin, transferrin, serum FE, TIBC, % sat
     - Often dec MCV, inc RDW
     - If ferritin dec makes diagnosis**
   - Thalassemia
     - Often dec MCV, inc RDW like Fe deficient
     - If has been longstanding microcytic always consider
     - Check Hgb electrophoresis to differentiate α and β
   - Anemia of Chronic Disease (RA, PMR, DM, Connective Tissue, Renal, Infectious)
     - Typically cytokine mediated which inhibits RBC production
     - Usually normocytic
     - Ferritin is normal or elevated
     - Serum FE dec, % sat dec, TIBC dec, normal RDW
   - Congenital
     - Sideroblastic → check smear; dimorphic RBC, sideroblasts

   **Normocytic**: MCV 80-100 (Blood loss, Chronic Disease, Hemolytic)
   - Check ferritin to r/o early Fe deficient; B12, Folate; renal function
   - Acute Blood Loss → trauma, melena, hematemeses, etc.
   - Anemia of Chronic Disease
   - Hemolytic
     - Check LDH → increased destruction
     - Check Indirect Bilirubin → if inc, think increased catabolism
     - Check Haptoglobin → protein that carries free Hgb, so will be dec
     - Check Retic count → >1%
       - Absolute retic count (RBC x %retic) if >100K think hemolysis
       - Corrected retic count (%retic x Hct/45 x .5) if >3 think hemolytic
     - Peripheral Smear
       - Spherocytes → hereditary spherocytosis
       - Schistocytes → microangiopathic hemolytic (TTP, HUS, DIC, heart valves)
       - Sickle → sickle cell
G6PD $\rightarrow$ Heinz body; can order level; enzyme used in prod of glutathione which protects RBC proteins; X-linked, so predominantly male

- Coombs
  - Positive $\rightarrow$ acquired; SLE, HUS, TTP
  - Negative $\rightarrow$ congenital

- Primary BM disorder (associated with decreased WBC, decreased platelets)
  - Myelodysplastic $\rightarrow$ increased RDW
  - Multiple Myeloma $\rightarrow$ rouleaux formation
  - Aplastic $\rightarrow$ decreased retic

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