

# THE ANEMIAS

**Inadequate Construction**

Vs

**Excessive Destruction**

# Levels Of Anemia

- Hemoglobin less than 11
- Hemoglobin less than 9: Moderate
- Hemoglobin less than 7: Severe

# Hypoxia

- Low  $PO_2$
- Oxygen Content= Hemoglobin +  $PO_2$
- Acute signs/symptoms:
- Chronic signs/symptoms:

# Cyanosis

- Five grams of hemoglobin are FULLY desaturated

# **Two ways to approach Anemia...**

**(1) Check RETICULOCYTE COUNT**

# ANEMIC

## Low RETICULOCYTE count

- Hypoproliferative
- (1) Something is MISSING from the bone marrow or...
- (2) Bone marrow is suppressed

## High RETICULOCYTE count

- Hyperproliferative
- Hemolytic Anemia
  - **Intravascular**
  - **Extravascular**

# Hemolytic Anemia

## Intravascular Hemolysis

- Vasculitis in progress
- Schistocytes
  - Burr Cells
  - Helmet Cells
- Low Haptoglobin

## Extravascular Hemolysis

- Abnormal membrane structure
- Splenomegaly



# Extravascular Hemolysis

- **Mcc: Autoimmune hemolysis: Do coombs test**

# Drugs that cause extravascular Hemolysis

- Penicillins
- Cephalosporins
- Sulpha
- Dapsone
- Alpha Methyl Dopa
- PTU
- HIPPE

# **Paroxysmal Nocturnal Hemoglobinuria**

- **First described in military recruits**
- **RBCs are sensitive to hemolysis by acidosis**
- **HAMS test**

# Hereditary Spherocytosis

- **Autosomal Dominant**
- **SPECTRIN defect**
- **Osmotic fragility test**

# Hereditary Elliptocytosis

- **Autosomal Dominant**

**Some RBCs can talk...**

**...Here is what they have to say**

# Reticulocyte



# Spherocyte

# Elliptocyte

# Schistocyte

# Tear Drop Cell

# Target Cell

# Heinz Body

# Basophilic Stippling

# Acanthocytes



# Anisocytosis

# Poikilocytosis

# The second way to approach Anemia

- **Check a CBC with differential**
- **MCV**
- **MCH**
- **MCHC**

# Microcytic Hypochromic

- **Low MCV**
- **Low MCH**
- **Impaired hemoglobin PRODUCTION**

# **Microcytic Hypochromic Anemias**

- **Iron Deficiency**
- **Chronic Disease, late**
- **Lead poisoning**
- **Thallemias**
- **Hemoglobinopathies**
- **Sideroblastic anemia**

# Microcytic Hyperchromic

- **Low MCV**
- **High MCHC ( MCH/MCV)**
- **The cells are too small**

# Microcytic Hyperchromic Anemias

- **Hereditary Spherocytosis**

# Normocytic Normochromic

- **Normal MCV**
- **Normal MCH**
- **NOTHING is wrong with the RBCs...**
- **You do not have enough of them**



# **Normocytic Normochromic Anemias**

- **Acute Hemorrhage (less Than 4 days)**
- **Chronic disease, early**
- **Renal failure**
- **Hypothyroidism, early**

# Macrocytic Anemia

- **High MCV**
- **Impaired nuclear division**

# Macrocytic Anemias

- **B12 Deficiency**
- **Folate Deficiency**
- **Hypothyroidism, severe**
- **Reticulocytosis**
- **Alcohol**
- **Chemotherapy drugs**
- **Anticonvulsants**

# Anticonvulsants

- **Phenytoin**
- **Ethosuximide**
- **Valproic Acid**
- **Carbamezapine**

**Organization is the key!**