Agents Used in the Treatment of Anemia

Chapter 44

Anemia

- A condition caused by an insufficient amount of hemoglobin delivering oxygen to the tissues

Causes
- Decrease in the number of RBCs
- Decrease in the amount of hemoglobin in RBCs

IRON DEFICIENCY ANEMIA

- Body doesn't have enough iron to supply its needs
- Causes of decreased iron stores:
  - Blood loss
  - Poor absorption
  - Lack of iron in diet
- Causes of increased iron demand
  - Pregnancy
Iron Supplements
Actions and Uses

- Iron preparations elevate serum iron concentration
- Best absorbed on empty stomach
- IM/IV used for GI intolerance to oral iron
- See Drug Summary Table on page 481-482

Iron Supplements
Adverse Reactions

- GI disturbance:
  - Nausea, vomiting
  - Heartburn
  - Constipation, diarrhea
  - Darker, black stools
- Staining of teeth
- Headache
- Allergic reactions

Iron Supplements
Contraindications

- Known hypersensitivity
- Hemochromatosis
- Hemolytic anemia
- Cautious use with hypersensitivity to aspirin
- ↓ absorption of antibiotics, levothyroxine
- ↓ effect of antiparkinsonism medication
- ↑ absorption with vitamin C
Iron Supplements

Patient Teaching

- Take on empty stomach
- Avoid antacids, milk, coffee, tea, tetracycline, PCN, or fluoroquinolones 2hr before or after admin
- May cause darkening of stool or constipation
- Dilute with water/juice and drink through straw to avoid staining teeth
- Increased absorption with Vitamin C

Iron Rich Foods

- Meat
- Egg yolk
- Oysters, shellfish
- Whole grain breads
- Iron fortified cereals
- Legumes
- Nuts
- Greens
- Brewer's yeast

Iron Dextran

- Given IM or IV
- Used when oral iron is contraindicated
- Hypersensitivity reactions can occur
- Fatal anaphylactic reactions have occurred

Other reactions include:
- Soreness
- Inflammation
- Sterile abscess at IM injection site
- Phlebitis with IV administration
- Exacerbation of rheumatoid arthritis and joint pain
Iron Dextran
Precautions
- Is used cautiously in patients with
  - Cardiovascular disease
  - A history of asthma or allergies
  - Rheumatoid arthritis (may exacerbate joint pain)
- A test dose of 0.5ml is given
  - Monitor for an allergic response for at least 1hr
    - Dyspnea, rash, itching, fever
    - Epinephrine is kept on standby

ANEMIA ASSOCIATED WITH CHRONIC ILLNESS
- Can occur with cancer treatment or chronic renal failure
- Cancer treatment reduces bone marrow's ability to produce RBCs
- Chronic renal failure reduces kidney's ability to produce erythropoietin (stimulates and regulates RBC production)

Epoetin Alfa
Epogen, Procrit
Uses:
- Anemia associated chronic renal failure
- Anemia secondary to AZT therapy in HIV patients
- Anemia from chemotherapy
- Reduction of need for transfusions after surgery
**Epoetin Alfa**  
 Epogen, Procrit

**Adverse reactions:**  
- Hypertension  
- Headache  
- N/V/D  
- Rashes  
- Fatigue  
- Arthralgia, skin reaction at injection site

**Contraindications:**  
- Uncontrolled HTN  
- Emergency transfusion  
- Hypersensitivity to albumin

---

**Filgrastim**  
Neupogen

- Hematopoietic growth factor that stimulates bone marrow to increase production of WBCs

**Uses:**  
- Prevention of neutropenia in patients receiving chemotherapy  
- Management of severe chronic neutropenia  
- Mobilization of progenitor cells for harvest  
- Decreased incidence of infections in neutropenic patients

---

**Filgrastim**  
**Neupogen**

**Contraindications:**  
- Hypersensitivity to E. coli derived proteins  
- Do not give within 24hrs of chemotherapy or bone marrow infusion

**Adverse reactions:**  
- N/V  
- Bone pain  
- Flu-like illness  
- Rupture of spleen
FOLIC ACID DEFICIENCY ANEMIA

- Folic acid is required for the manufacture of red blood cells in the bone marrow
- Common causes:
  - Poor nutrition
  - Malabsorption syndromes
  - Drugs that impede absorption
  - Pregnancy

FOLIC ACID DEFICIENCY ANEMIA

- Dietary sources
  - Green leafy vegetables
  - Fish
  - Meat and poultry
  - Whole grains

Leucovorin

- Is a derivative of folic acid
- Also used to diminish the hematologic effects of methotrexate
- Rescues normal cells from destruction caused by methotrexate
- This technique of administering leucovorin after a large dose of methotrexate is called folic acid rescue or leucovorin rescue
- May be ordered to be given via the IV, IM, or oral route
Folic Acid & Leucovorin

- Contraindications:
  - Tx of pernicious anemias or other anemias where Vitamin B12 is deficient

- Interactions:
  - Signs of folate deficiency can occur with sulfasalazine
  - ↑ seizure activity with hydantoins (anti-seizure drugs)

Folic Acid & Pregnancy

- ↓ risk for neural tube defects if taken before conception and during early pregnancy
- Pregnant women are more likely to develop folate acid deficiency
- Folic acid requirements are increased during pregnancy: 0.4mg/day

PERNICIOUS ANEMIA
VITAMIN B12 DEFICIENCY

- Loss of intrinsic factor produced in the stomach results in a lack of absorption of Vitamin B 12
- Failure to absorb vitamin B12 results in abnormal formation of erythrocytes
- Vitamin B12
  - Essential to growth
  - Cell reproduction
  - The manufacture of myelin (which surrounds some nerve fibers)
  - Blood cell manufacture
Pernicious Anemia
Vitamin B\textsubscript{12} Deficiency

Occurs in:
- Strict vegetarians
- Total gastrectomy or subtotal gastric resection
- Intestinal disease
- Gastric carcinoma
- Congenital ↓ in number of gastric cells that secrete intrinsic factor

Vitamin B\textsubscript{12} Adverse Reactions

- Mild diarrhea
- Itching
- Increase in red blood cell production
- Acne
- Peripheral vascular thrombosis
- Congestive heart failure
- Pulmonary edema

Vitamin B\textsubscript{12} Contraindications

- Allergy to cyanocobalamin
- Pregnancy category C when administered parenterally
- Cautious use: pregnancy, pulmonary disease
- Decreased absorption with:
  - Alcohol
  - Neomycin
  - Colchicine
Vitamin B₁₂

- Patients with pernicious anemia are treated with Vitamin B₁₂ by IM injections
- After stabilization, maintenance therapy is usually **monthly injections for life**
- For nutritional deficiency of vitamin B₁₂ eat a balanced diet including
  - Seafood
  - Eggs
  - Meats
  - Dairy products

[Image: http://oregonstate.edu/dept/foodsci/dairy/dairy_products.jpg]