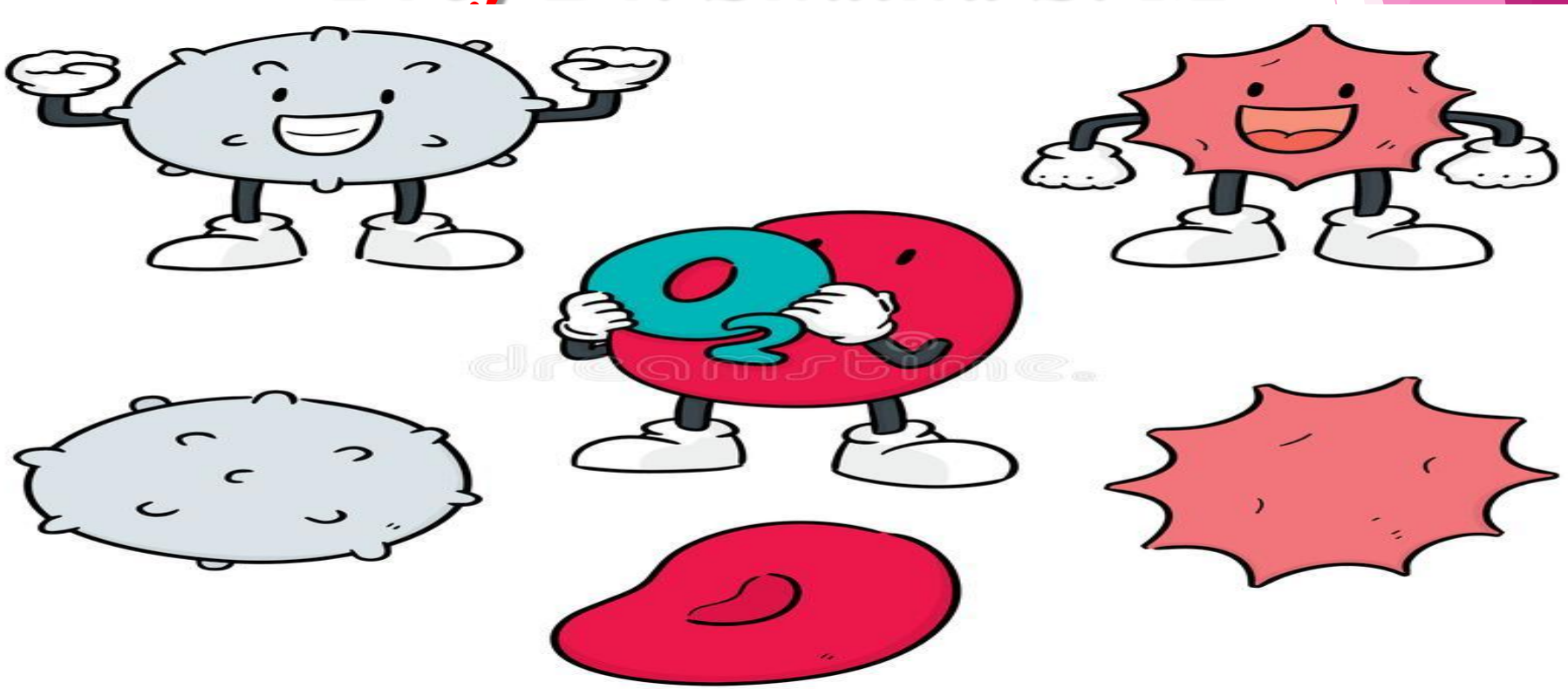
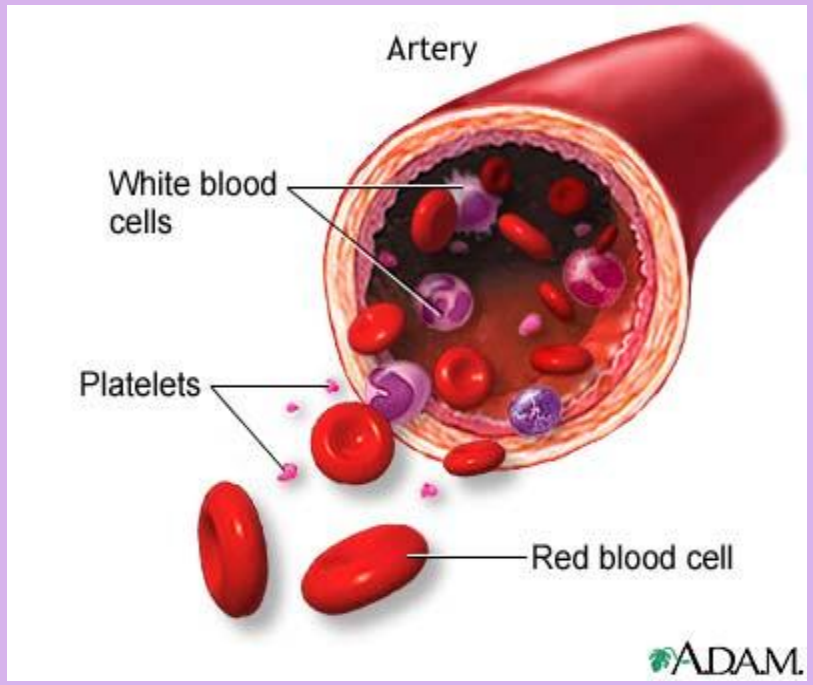
Management of Patient with Blood Disorders

Prof Dr. Shatha S. M



Hematology

- Study of blood and blood forming tissues
- Key components of hematologic system are:
  - Blood
  - Blood forming tissues
    - Bone marrow
    - Spleen
    - Lymph system

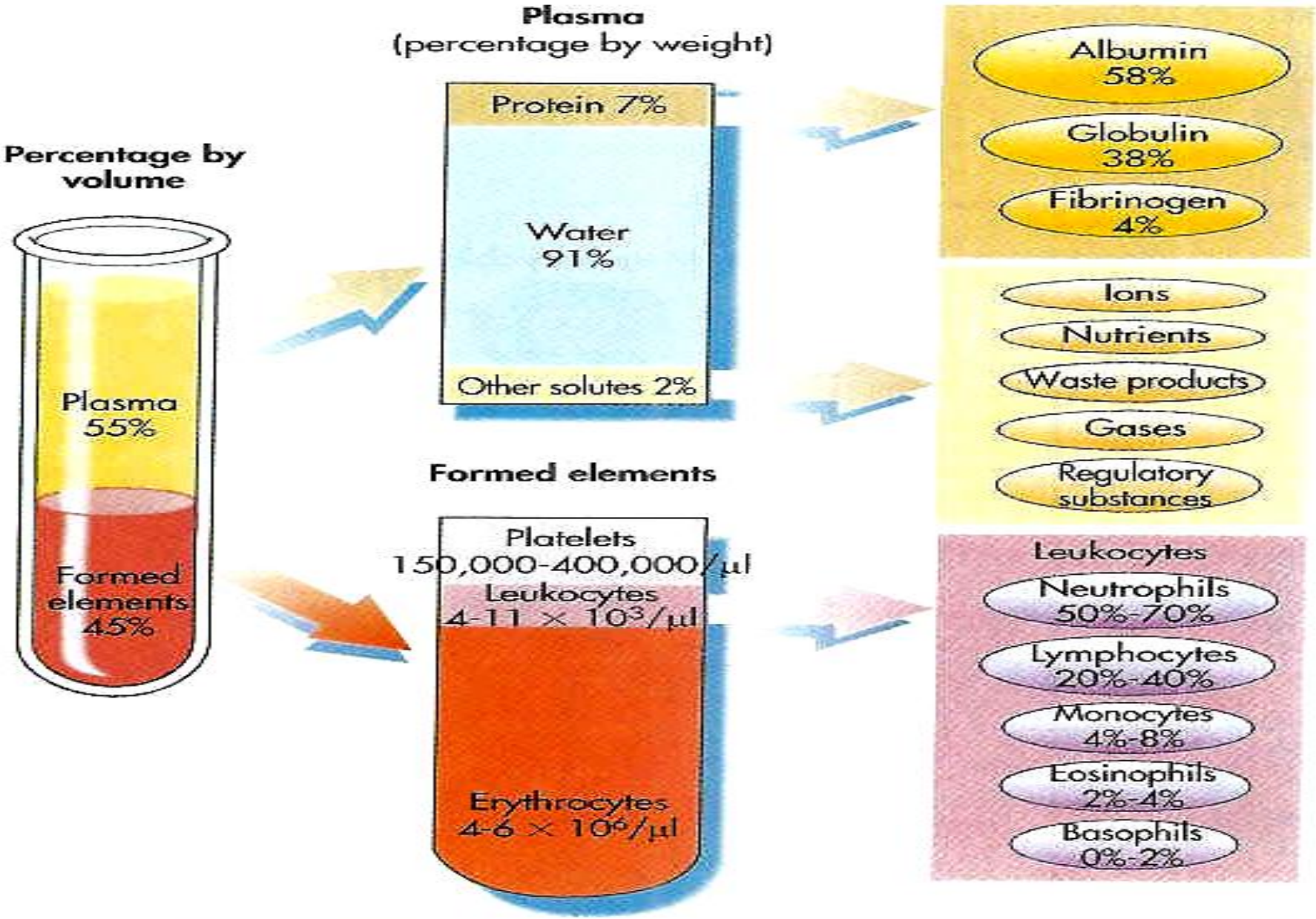


What is the Physiology of the BLOOD

- Blood consists of plasma and blood cells.
- Because blood cells have a short lifespan, **hematopoiesis** (production od blood cells in the bone marrow) is needed.
- **Functions of the blood**
- Transporting fluids such as:
  - Nutrients from digestive tract
  - O_2 from lungs
  - Waste from cells
  - Hormones
- Aids in heat distribution
- Regulates acid-base balance



Blood Composition



Composition of Blood

- Plasma.. liquid portion of blood w/out cells(Water,Nutrients, Electrolytes ,Metabolic waste product,Hormone,Vitamins and enzymes
- Erythrocytes. Red blood cells are responsible for:
  - Transport of oxygen and nutrients
  - Removal of waste and CO_2 from the cells
  - Distribution of heat
- Hemoglobin:
  - The O_2 carrying potential.
  - Has 4 subunits, each contains a hem attached to a globin chain.
  - Iron is present in the hem, hem is bind to the oxygen

Red blood cell



I deliver oxygen and take away rubbish

Platelet



I do repairs if you get a cut

White blood cell



I hunt down germs

Composition of Blood:

Leukocytes

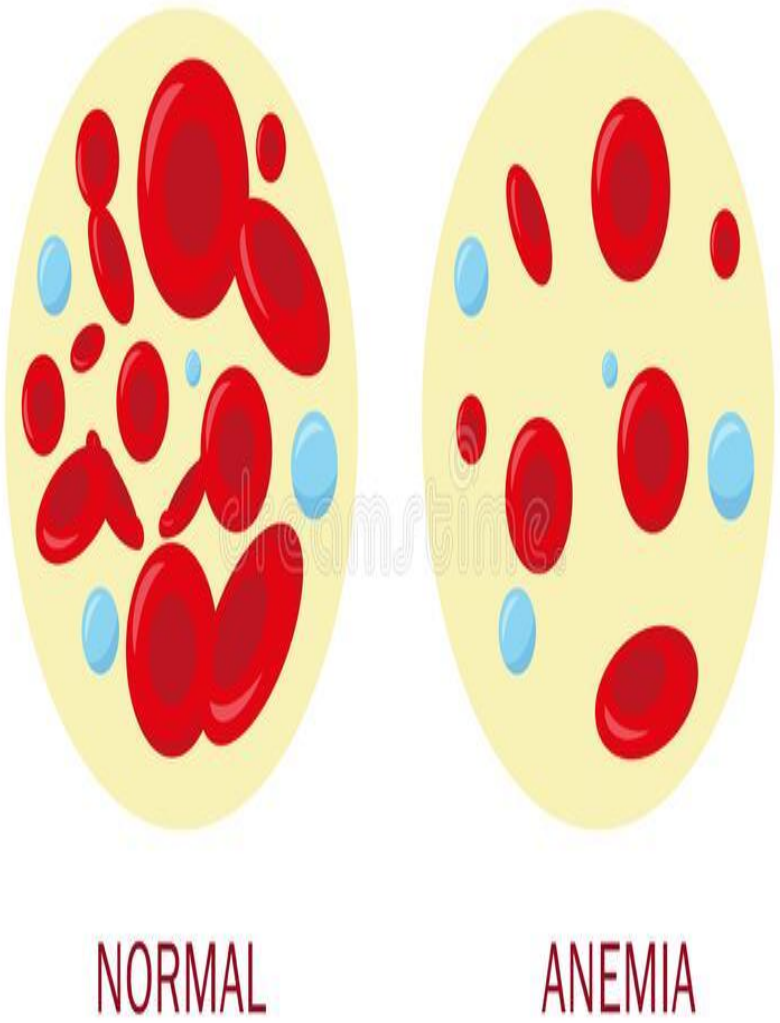
- Types of Leukocytes
  - Granulocytes
    - Neutrophils
    - Eosinophils
    - Basophils
  - Agranulocytes
    - Lymphocytes
    - Monocytes

Thrombocytes

- Platelets – the smallest of the solid components of the blood
- Responsible for the clotting process
- Coagulation: term for clotting
- Embolism: a blood clot which is moving through the body

Anemia

- Is a condition in which the hemoglobin concentration is lower than normal (low RBCs).
- As a result, the amount of oxygen delivered to the tissue is lower than normal.



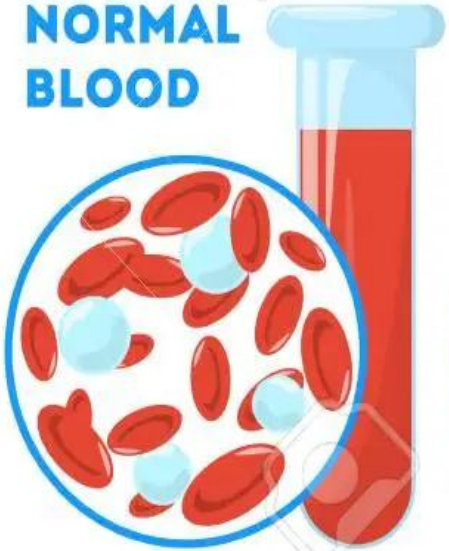
ANEMIA SYMPTOMS

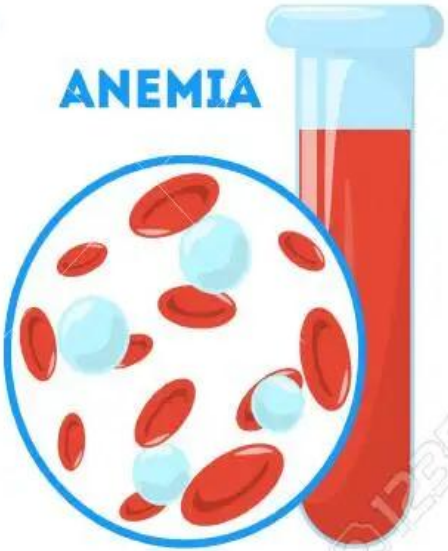


HEADACHE



INSOMNIA







SHORTNESS OF BREATH



FATIGUE



DIZZINESS



DIFFICULTY CONCENTRATING



PALE SKIN

Anemia
Clinical Manifestations

TABLE 30-3 Clinical Manifestations of Anemia

BODY SYSTEM	SEVERITY OF ANEMIA: MILD (Hb 10–14 g/dl [100–140 g/L])	MODERATE (Hb 6–10 g/dl [60–100 g/L])	SEVERE (Hb <6 g/dl [<60 g/L])
Integument	None	None	Pallor, jaundice,* pruritus*
Eyes	None	None	Icteric conjunctiva and sclera,* retinal hemorrhage, blurred vision
Mouth	None	None	Glossitis, smooth tongue
Cardiovascular	Palpitations	Increased palpitations	Tachycardia, increased pulse pressure, systolic murmurs, intermittent claudication, angina, CHF, MI
Pulmonary	Exertional dyspnea	Dyspnea	Tachypnea, orthopnea, dyspnea at rest
Neurologic	None	None	Headache, vertigo, irritability, depression, impaired thought processes
Gastrointestinal	None	None	Anorexia, hepatomegaly, splenomegaly, difficulty swallowing, sore mouth
Musculoskeletal	None	None	Bone pain
General	None	Fatigue	Sensitivity to cold, weight loss, lethargy

*Caused by hemolysis.
CHF, Congestive heart failure; *Hb,* hemoglobin; *MI,* myocardial infarction.

TABLE 30-4 Nursing Assessment: Anemia

Subjective Data

Important Health Information

Past health history: Recent blood loss or trauma; chronic liver, endocrine, or renal disease (including dialysis); GI disease (malabsorption syndrome, ulcers, gastritis, or hemorrhoids); inflammatory disorders (especially Crohn's disease); exposure to radiation or chemical toxins (arsenic, lead, benzenes, copper)

Medications: Use of vitamin and iron supplements; aspirin, anticoagulants, oral contraceptives, phenobarbital, penicillins, nonsteroidal antiinflammatory drugs, phenacetin, quinine, quinidine, phenytoin (Dilantin), methyldopa (Aldomet), sulfonamides

Surgery or other treatments: Recent surgery, small bowel resection, gastrectomy, prosthetic heart valves, chemotherapy, radiation therapy.

Functional Health Patterns

Health perception–health management: Family history of anemia; malaise

Nutritional-metabolic: Nausea, vomiting, anorexia, weight loss; dysphagia, dyspepsia, heartburn, night sweats, cold intolerance

Elimination: Hematuria, decreased urinary output; diarrhea, constipation, flatulence, tarry stools, bloody stools

Activity-exercise: Fatigue, muscle weakness and decreased strength; dyspnea, orthopnea, cough, hemoptysis; palpitations; shortness of breath with activity

Cognitive-perceptual: Headache; abdominal, chest, and bone pain; painful tongue; paresthesias of feet and hands; pruritus; disturbances in vision, taste, or hearing; vertigo; hypersensitivity to cold

Sexuality-reproductive: Menorrhagia, metrorrhagia; recent or current pregnancy; male impotence

Objective Data

General
Lethargy, apathy, general lymphadenopathy, fever

Integumentary
Pale skin and mucous membranes; blue, pale white, or icteric sclera; cheilitis; poor skin turgor; brittle, spoon-shaped fingernails; jaundice; petechiae; ecchymoses; nose or gingival bleeding; poor healing; dry, brittle, thinning hair

Respiratory
Tachypnea

Cardiovascular
Tachycardia, systolic murmur, arrhythmias; postural hypotension, widened pulse pressure, bruits (especially carotid); intermittent claudication, ankle edema

Gastrointestinal
Hepatosplenomegaly; glossitis; beefy, red tongue; stomatitis; abdominal distention; anorexic

Neurologic
Confusion, impaired judgment, irritability, ataxia, unsteady gait, paralysis

Possible Findings
↓ RBCs; ↓ Hb; ↓ Hct; ↓ serum iron, ferritin, folate, or cobalamin (vitamin B_{12}); heme (guaiac)–positive stools; ↓ serum erythropoietin level

GI, Gastrointestinal; *Hb,* hemoglobin; *Hct,* hematocrit; *RBCs,* red blood cells.

Iron-Deficiency Anemia

Etiology: Inadequate dietary intake, malabsorption, blood loss, or hemolysis

Clinical Manifestations:

- Pallor
- Glossitis – inflammation of the tongue
- Cheilitis – inflammation of the lips
- Headache, paresthesia, burning sensation of the tongue

Diagnostic Studies: Lab Studies, Endoscopy to identify GI bleed

Treatment:

- Oral Iron replacement (Iron absorbed best in duodenum)
- Ferrous sulfate – take about one hour prior to meal

Nursing Management – Diet & Medication Instruction

Megaloblastic Anemia

It characterized by morphological changes caused by impaired DNA synthesis &presence of large RBCs

Causes: Pernicious anemia, nutritional deficiency; heredity enzyme defect

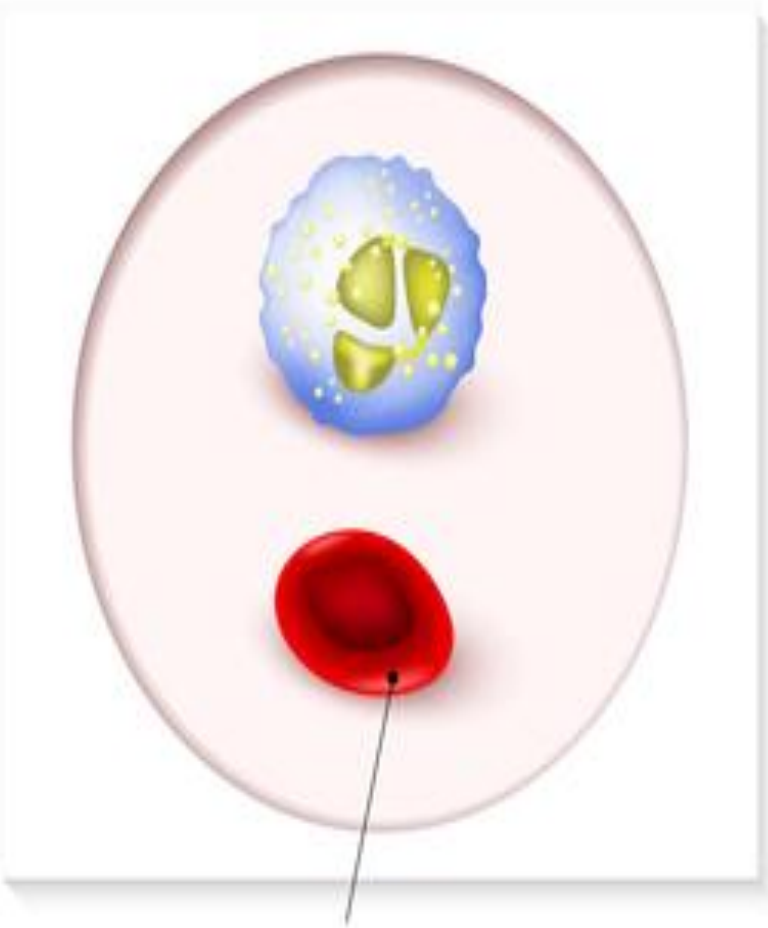
Clinical Manifestations: GI—sore tongue, anorexia, N&V, abdominal pain; muscle weakness, paresthesias of feet and hands; confusion

Diagnostic Testing: Serum cobalamin levels; gastroscopy; Schilling Test – assesses parietal cell function

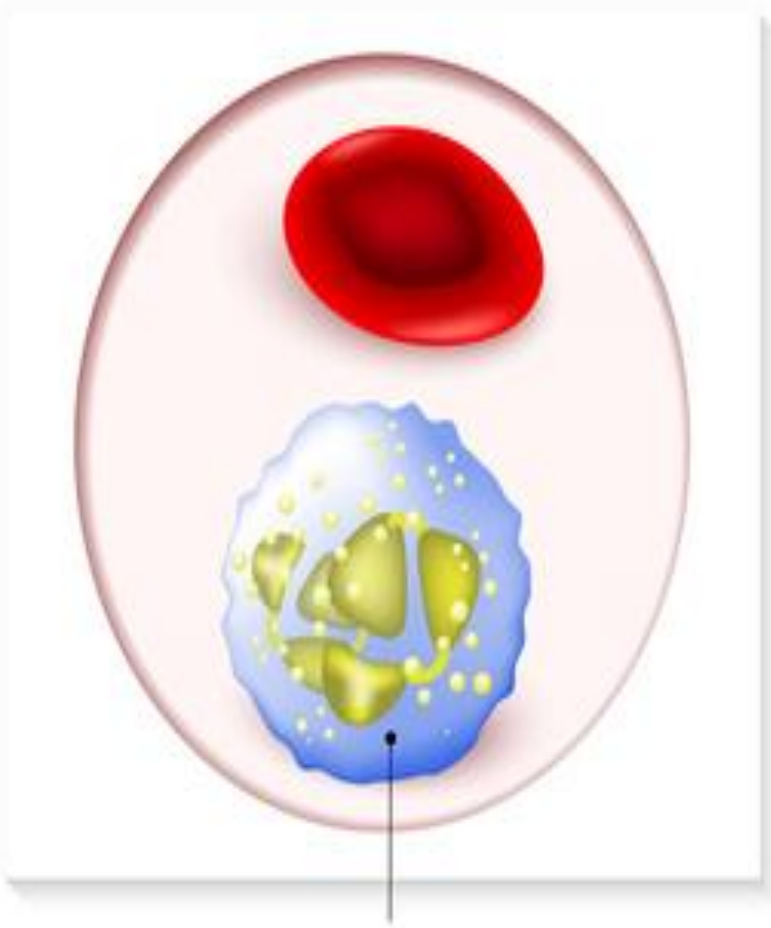
Medical Management: Parenteral administration of cobalamin – daily for 2 weeks, then weekly until >HCT, then monthly for life; intranasal form

Nursing Management: Health Promotion; protection from sensory injury—burns, trauma; pt compliance with replacement therapy

Normal



Megaloblastic anemia



The common forms of mgaloblastic anaemia:

1- Cobalamin(vitamin B12)

2-Folic acid deficiency

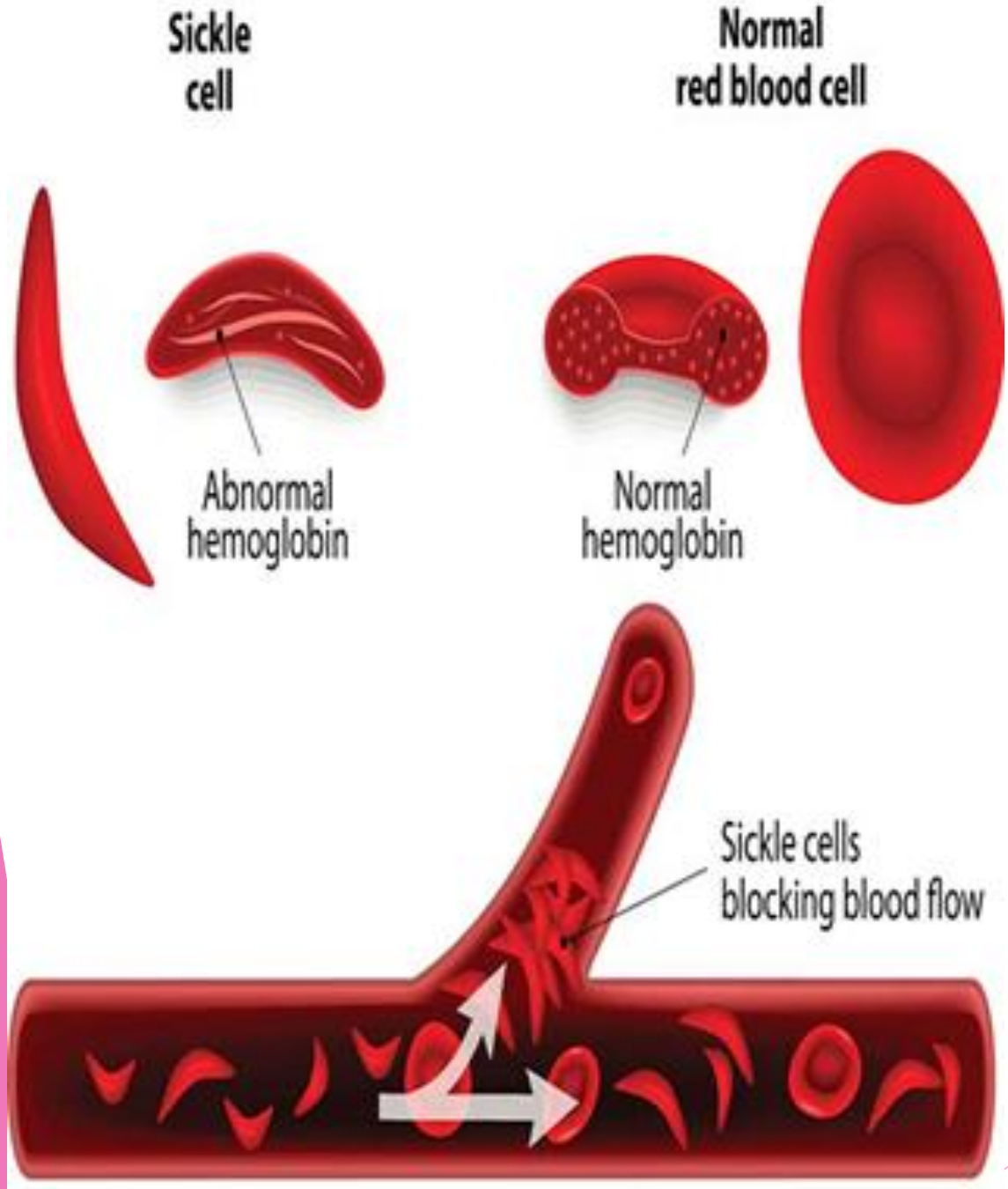


Sickle Cell anemia (Disease)

- Group of inherited autosomal recessive disorders characterized by the presence of abnormal Hgb in the erythrocyte
  - Causes the erythrocyte to stiffen & elongate
  - Sickle shape in response to lack of oxygen
- **Types:**
  - Sickle Cell Anemia: most severe – inherited homozygous for hemoglobin S (HbSS) from both parents
  - Sickle Cell Trait: mild - inherited from one parent + one normal

Sickling Episodes:

- Hypoxemia – triggered by stress, surgery, blood loss, viral or bacterial infection*(most common), dehydration, acidosis
- Hemolyzed in the spleen
- Initially reversible – then becomes irreversible due to chronic sickling


Sickle cell
Normal red blood cell
Abnormal hemoglobin
Normal hemoglobin
Sickle cells blocking blood flow



A plastic Anaemia

Related to reduced or impaired erythrocyte production (fatty bone marrow)

Aetiology

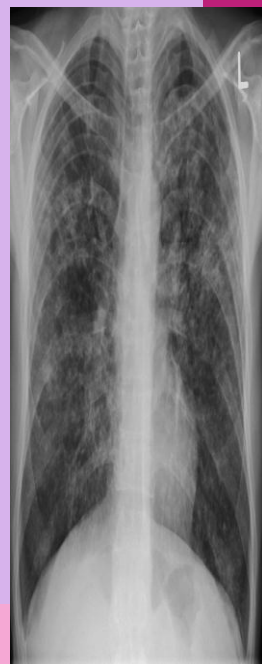
It can be divided into the major groups:

1- Congenital

Caused by chromosomal alterations.

2- Acquired as a result of exposure to:

- Ionizing radiation, chemical agents, alcohol)
- Viral and bacterial infection(hepatitis, miliary TB
- السل الدخني)



A plastic Anaemia Cont.

Clinical Manifestation

- Pallor of skin and mucous membranes.
- Cardiovascular (fatigue, and dyspnea on exertion, palpitation)
- Cerebral responses
- Infection of skin and mucous membrane.
- Haemorrhagic symptoms(bleeding tendencies into the skin and mucous membranes, nose, gums, vagina and rectum.

A plastic Anaemia Cont.

Diagnostic tests.

1. The CBC characteristically reveals a pancytopoenia (a marked decrease in the numbering of cell types)
2. The reticulocyte count is low .
3. Bone marrow examination and biopsy

Treatment

- Bone marrow transplantation from a donor with identical human leukocyte antigen for person younger than 40 years.

Haemolytic Anaemia

Definition

Premature destruction of erythrocyte occurring at such a rate that the bone marrow is unable to compensate for the loss of cells.

Haemolysis can occur either extra vascular or intravascular.

- In extra vascular, the spleen removes erythrocytes from circulation at much more rapid rate.
- In Intravascular it is secondary to the erythrocyte lysing and spilling the cell contents into the spleen. تحلل وانسكاب

Haemolytic Anaemia Cont.

Clinical Manifestation

- Ischemia occurs when red cells clump in the capillary beds, causing cyanosis, pain and paresthesia.
- Haemoglobinuria.

Management

Diagnosis

- The presence of the antibody or complement on the RBCs (direct Coomb's test) or in the serum(indirect Coomb's test)
- Decreased Hct.
- Increased reticulocyte and bilirubin

Anaemia caused by blood loss

Anaemia resulting from blood loss may be caused by either acute or chronic.

Aetiology

I. Trauma
II. Complications of surgery
III. Diseases that disrupt vascular integrity.

There are two clinical concerns in such situation

First

There is sudden reduction in the total blood volume that can lead to hypovolaemic shock.

Second

- If the acute loss is more gradual, the body maintains its blood volume by slowly increasing the plasma volume.
- Consequently, the circulating fluid volume is preserved. But the number of RBCs available to carry oxygen is significantly diminished.

Anaemia caused by blood loss Cont.

Clinical Manifestation

Clinical manifestation of acute blood loss according to varying degrees of blood volume loss as follows:

Volume loss	Clinical manifestation
10%	**None**
20%	**No detectable signs or symptoms at rest, tachycardia with exercise and slight postural hypertension.**
30%	**Normal supine blood pressure and pulse at rest , postural hypertension and tachycardia with exercise.**
40%	**Blood pressure, central venous pressure, and cardiac output below normal at rest, rapid , threading pulse and cold and clammy skin.**
50%	**Shock and potential death**

Anaemia caused by blood loss

Management

- ✓ Replacing blood volume to prevent shock.
- ✓ Identify the source of haemorrhage and stopping blood loss.
- ✓ IV fluid used in emergency includes dextran, albumin, or crystalloid electrolyte solution such as ringer lactate
- ✓ Blood transfusion (packed RBCs)
- ✓ Supplemental iron .

TABLE 30-4 Nursing Assessment: Anemia

Subjective Data

Important Health Information

Past health history: Recent blood loss or trauma; chronic liver, endocrine, or renal disease (including dialysis); GI disease (malabsorption syndrome, ulcers, gastritis, or hemorrhoids); inflammatory disorders (especially Crohn's disease); exposure to radiation or chemical toxins (arsenic, lead, benzenes, copper)

Medications: Use of vitamin and iron supplements; aspirin, anticoagulants, oral contraceptives, phenobarbital, penicillins, nonsteroidal antiinflammatory drugs, phenacetin, quinine, quinidine, phenytoin (Dilantin), methyldopa (Aldomet), sulfonamides

Surgery or other treatments: Recent surgery, small bowel resection, gastrectomy, prosthetic heart valves, chemotherapy, radiation therapy.

Functional Health Patterns

Health perception–health management: Family history of anemia; malaise

Nutritional-metabolic: Nausea, vomiting, anorexia, weight loss; dysphagia, dyspepsia, heartburn, night sweats, cold intolerance

Elimination: Hematuria, decreased urinary output; diarrhea, constipation, flatulence, tarry stools, bloody stools

Activity-exercise: Fatigue, muscle weakness and decreased strength; dyspnea, orthopnea, cough, hemoptysis; palpitations; shortness of breath with activity

Cognitive-perceptual: Headache; abdominal, chest, and bone pain; painful tongue; paresthesias of feet and hands; pruritus; disturbances in vision, taste, or hearing; vertigo; hypersensitivity to cold

Sexuality-reproductive: Menorrhagia, metrorrhagia; recent or current pregnancy; male impotence

Objective Data

General

Lethargy, apathy, general lymphadenopathy, fever

Integumentary

Pale skin and mucous membranes; blue, pale white, or icteric sclera; cheilitis; poor skin turgor; brittle, spoon-shaped fingernails; jaundice; petechiae; ecchymoses; nose or gingival bleeding; poor healing; dry, brittle, thinning hair

Respiratory

Tachypnea

Cardiovascular

Tachycardia, systolic murmur, arrhythmias; postural hypotension, widened pulse pressure, bruits (especially carotid); intermittent claudication, ankle edema

Gastrointestinal

Hepatosplenomegaly; glossitis; beefy, red tongue; stomatitis; abdominal distention; anorexic

Neurologic

Confusion, impaired judgment, irritability, ataxia, unsteady gait, paralysis

Possible Findings

↓ RBCs; ↓ Hb; ↓ Hct; ↓ serum iron, ferritin, folate, or cobalamin (vitamin B_{12}); heme (guaiac)–positive stools; ↓ serum erythropoietin level

Patient with Anemia

EXPECTED PATIENT OUTCOMES	NURSING INTERVENTIONS and *RATIONALES*
NURSING DIAGNOSIS	**Activity intolerance** *related to* weakness and malaise *as manifested by* difficulty in tolerating increased activity (e.g., increased pulse, respiration).
▪ Participation in activities of daily living (e.g., bathing, dressing, grooming, feeding) to greatest extent possible ▪ Vital signs within acceptable range	▪ Plan care to alternate periods of rest and activity *to provide activity without tiring the patient.* ▪ Strive for a 1:3 rest/activity ratio; assist patient with activities of daily living as needed. ▪ Limit visitors, phone calls, noise, and interruptions by hospital staff *to reduce demands placed on patient.* ▪ Monitor vital signs *to evaluate activity tolerance.* ▪ Monitor hematocrit and hemoglobin *as a guide to planning activities.*
NURSING DIAGNOSIS	**Imbalanced nutrition: less than body requirements** *related to* poor nutritional intake, anorexia, and treatment *as manifested by* weight loss, low serum albumin, decreased iron levels, vitamin deficiencies, below usual body weight.
▪ Maintenance of body weight, then gradual increase to within range of ideal body weight ▪ Hematocrit, hemoglobin, and serum albumin within normal ranges	▪ Teach patient about foods high in protein, iron, calories, and other nutrients *to increase intake of essential nutrients needed for hematopoiesis* (see Table 30-5). ▪ With input from patient, establish range of optimal weight outcomes and dietary plan *to involve patient and increase compliance.* ▪ Teach and monitor use of a food diary *to increase patient's awareness of actual intake and increase intake.* ▪ Suggest eating small, frequent meals with snacks throughout the day.
NURSING DIAGNOSIS	**Ineffective therapeutic regimen management** *related to* lack of knowledge about appropriate nutrition and medication regimen *as manifested by* questioning about lifestyle adjustments, diet, medication prescriptions.
▪ Knowledge about lifestyle changes, nutrition, and medication regimens	▪ Review and teach patient about nutrition and medication information *to promote compliance.* ▪ Teach about and monitor response to supplemental drugs that aid in red blood cell production *because it is often difficult to correct anemia by diet alone.* ▪ Suggest follow-up resources *to help patient maintain gains and adjustments throughout recovery.*

COLLABORATIVE PROBLEM

NURSING GOALS	NURSING INTERVENTIONS and *RATIONALES*
POTENTIAL COMPLICATION	**Hypoxemia** *related to* decreased hemoglobin.
▪ Monitor for signs of hypoxemia ▪ Report deviations from acceptable parameter ▪ Carry out appropriate medical and nursing interventions	▪ Assess for manifestations of hypoxemia such as dyspnea, decrease in O_2 saturation, increase in $PaCO_2$, cyanosis *to initiate early intervention.* ▪ Administer O_2 as ordered *to saturate all available hemoglobin.* ▪ Transfuse with blood products as ordered *to increase red blood cells.* ▪ Monitor hemoglobin *to determine severity of anemia and response to treatment.* ▪ Teach effective breathing exercises and relaxation techniques *to relieve dyspnea and to promote maximum thoracic excursion.*

Any Questions?

