

HEMATOLOGY

NURSING STUDY NOTES

Hematology nursing bundle



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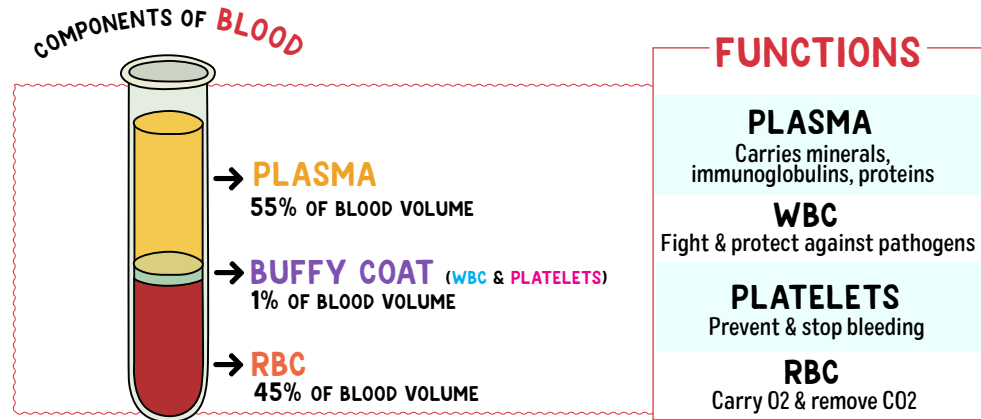
STUDY ANYWHERE

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HEMATOLOGY OVERVIEW



RED-BLOOD-CELLS (AKA ERYTHROCYTES)

TYPE	FUNCTION	NORMAL RANGE
RBC	Amount of cells in blood	MALE: 4.7-6.1 /uL FEMALE: 4.2-5.4 /uL
HEMATOCRIT	Percent of RBC in blood	MALE: 39-54 g/ dL FEMALE: 36-48 g/ dL
HEMOGLOBIN	Protein in RBC that carry O ₂ & remove CO ₂	MALE: 13-18 g/d L FEMALE: 12-16 g/dL



PLATELETS (AKA THROMBOCYTES)

TYPE	FUNCTION	NORMAL RANGE
APTT (Activated Partial Thromboplastin Time)	→ Tests how fast blood clots → Used to measure effectiveness of Heparin	NORMAL RANGE: 30-40 seconds ON HEPARIN: 47-70 seconds
PT (Prothrombin Time)	→ Tests how fast blood clots → Used to calculate INR level	10-13 seconds
INR (International Normalized Ratio)	→ Normalized ratio of PT → Used to measure effectiveness of Warfarin	NORMAL RANGE: <1 ON WARFARIN: 2-3
D-DIMER	→ Protein fragment in blood when a blood clot dissolves → Commonly used as diagnostic for clot disorders	<0.5 mcg/ mL



WHITE-BLOOD-CELLS (AKA LEUKOCYTES)

TYPE	FUNCTION	NORMAL RANGE
WBC	Amount of cells in blood	4,500-11,000 / uL
EOSINOPHILS	Fight inflammation & parasites	1-5 %
BASOPHILS	Control inflammatory & allergic response	0.1- 2%
NEUTROPHILS	First responder of WBC's	40-70%
LYMPHOCYTES	Recognize antigens & fight viral infections	20-40%
MONOCYTES	Engulf & destroy invaders	4-13%

TYPES OF ANEMIA

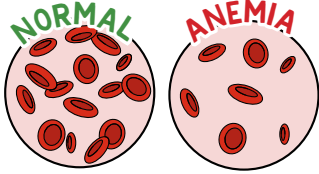
WHAT IS IT?

Deficiency in one or more of the major red blood cell measurements (RBC, HGB, HCT, MCV)

NORMAL HGB LEVELS:

MALE: 13–18 G/DL

FEMALE: 12–16 G/DL



ANEMIA has many different causes and can be classified in different ways. Depending on the type, specific symptoms may be present along with the baseline symptoms of anemia due to low blood count

GENERAL ANEMIA SYMPTOMS:

- ▶ Fatigue & easily tired
- ▶ Pallor
- ▶ Cold hands & feet
- ▶ Tachycardia
- ▶ Shortness of breath
- ▶ Weakness

IRON DEFICIENCY

Body does not have enough iron which is needed to make hemoglobin

CAUSES

- ↓ iron intake
- ↓ absorption
 - ▶ GI surgery
 - ▶ Celiac disease
 - ▶ Medications (PPI's & H2 Blockers)
- Bleeding
 - ▶ Heavy menstruation
 - ▶ GI bleed
 - ▶ Ulcers

UNIQUE SYMPTOMS

- PICA
 - ▶ Abnormal cravings for non-food items with no nutritional value (clay, ice, dirt)
- Smooth & glossy tongue

DIAGNOSTICS

- ↓ hemoglobin
- ↓ hematocrit
- ↓ iron level

TREATMENT

- Iron supplementation
 - ↳ **SIDE EFFECTS:** Black stools & constipation
- Vitamin C (↑ iron absorption)
- Blood transfusions
- Iron rich foods
 - ▶ Egg Yolks
 - ▶ Apricots
 - ▶ Leafy Greens
 - ▶ Tofu
 - ▶ Potatoes
 - ▶ Poultry

APLASTIC

Bone marrow cannot make enough new blood cells causing low blood count levels

CAUSES

- Autoimmune (cells attack bone marrow)
- Genetics
- Exposure to radiation
- Viral infections (HIV)
- Medications
 - ▶ Anticonvulsants
 - ▶ Methimazole
 - ▶ Sulfonimides

UNIQUE SYMPTOMS

- Petechiae
- Easy bruised
- Bleeding gums
- Recurrent infections

DIAGNOSTICS

- **CBC** (will show pancytopenia)
 - ▶ ANC <500
 - ▶ Platelet <20,000
 - ▶ ↓ hemoglobin ↓ hematocrit
- **Bone marrow biopsy** (will show ↓ stem cells & ↑ fat)

TREATMENT

- **Epoetin injection:** stimulates bone marrow to produce RBC
- Blood transfusions
- Bone marrow transplant

MEGALOBLASTIC

Red blood cells are big and underdeveloped

Usually due to **B12** or **FOLIC ACID DEFICIENCY**

CAUSES

- Autoimmune (Body doesn't produce intrinsic factor in stomach which helps absorb B12)
- GI disease or surgery
- ↓ B12 or folic acid intake

UNIQUE SYMPTOMS

- GI upset
- Weight loss
- Taste & smell changes
- Beefy red tongue
- Confusion



DIAGNOSTICS

- ↓ HGB ↓ HCT
- ↓ B12 or ↓ folate
- + intrinsic factor antibody

TREATMENT

- Vitamin supplementation
- B12 injections (cannot be taken PO due to ↓ intrinsic factor)
- B12 rich foods
 - ▶ Meat
 - ▶ Fish
 - ▶ Poultry
 - ▶ Eggs & dairy
- Folate rich foods
 - ▶ Dark leafy greens
 - ▶ Nuts
 - ▶ Beans
 - ▶ Meat & poultry

HEMOLYTIC

Blood cells are destroyed faster than they are made

CAUSES

- Bacterial & viral infections
- Blood transfusion reaction
- Mechanical heart valves
- Autoimmune disease
- Medications (Cephalosporins)

UNIQUE SYMPTOMS

- Enlarged spleen or liver
- Dark, blood tinged urine (from hemolysis)
- Jaundice
- Fever

DIAGNOSTICS

- ↑ reticulocyte count (immature RBC's)
- **Coomb's Test:** tests for antibodies that destroy RBC's
- ↓ haptoglobin
- ↑ LFT & bilirubin

TREATMENT

- Blood transfusion
- Plasmapheresis
- Bone marrow transplant
- Immunosuppressants
- Splenectomy
- Immunoglobulin

SICKLE CELL ANEMIA

WHAT IS IT?

Type of hemolytic anemia that causes hemoglobin to change into a "sickle" shape, that block blood vessels & die faster than normal RBC's can be produced

Due to abnormal **HEMOGLOBIN S PROTEIN** in RBC

CAUSES

GENETICS: inheritance of sickle cell gene

→ must inherit gene from both parents

★ **MOST COMMON IN AFRICAN AMERICANS**

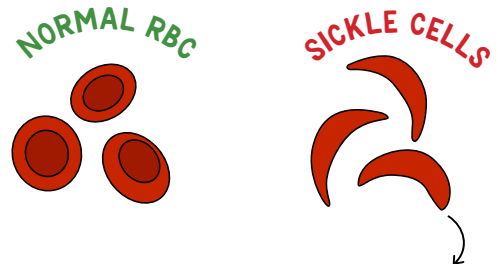
SYMPTOMS

- Severe pain
(pointy sickle cells hitting inside of blood vessels)
- Dactylitis: swelling of hands & feet
(sickle cells blocking blood flow)
- Frequent infections
(sickle cells clog vessels in spleen)
- Vision issues
(sickle cells clog vessels in eyes)
- Gall stones & jaundice
(sickle cells clog vessels in liver)
- General anemia symptoms
 - ▶ Fatigue
 - ▶ Tachycardia
 - ▶ Pallor
 - ▶ Shortness of breath
- **ACUTE CHEST SYNDROME:** Perfusion to lungs gets blocked due to sickle cells or infection
 - ▶ Chest pain
 - ▶ Hypoxia
 - ▶ Cough

TREATMENT

NO CURE: GOAL IS SYMPTOM MANAGEMENT

- Pain management: routine opioids & analgesics while in crisis
- IV fluids & encourage hydration
(stop clumping of RBC's)
- Blood transfusions
- Stem cell transplant
- Supplemental oxygen
- Antibiotics (if triggered from infection)



Causes RBC to have crescent shape & become sticky

RBC stick together & get stuck in blood vessels causing **↓ TISSUE PERFUSION**

TYPES OF SICKLE CELL CRISIS

VASO-OCCLUSIVE

RBC's stick & clump together, blocking blood flow (very painful)

CAN LEAD TO: Stroke, AKI, leg ulcers

MOST COMMON

HYPERHEMOLYTIC

Destruction of RBC's at rapid rate causes excess bilirubin

CAN LEAD TO: Gallstones, jaundice, organ failure

APLASTIC

RBC's not being made because bone marrow can't keep up

CAN LEAD TO: Severe hypoxia

SEQUESTRATION

Spleen becomes congested with RBC's & can't function properly

CAN LEAD TO: Infection

SICKLE CELL CRISIS TRIGGERS

- ▶ Surgery/trauma
- ▶ Mental or emotional stress
- ▶ Infection
- ▶ Vigorous exercise
- ▶ Dehydration
- ▶ Extreme temperatures (hot or cold)

EDUCATION

- Good hand hygiene
- Keep vaccines up to date
- Avoid extreme weather
- Avoid high altitudes
- Stress management
- Smoking cessation
- Stay hydrated
- Avoid strenuous activity and allow self adequate rest periods
- Healthy diet
- Avoid being around sick people
- Regular eye exams
- Get adequate sleep