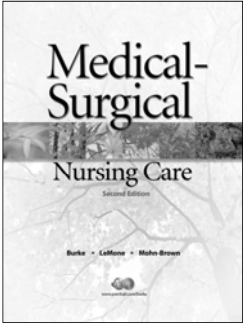


**Medical-Surgical
Nursing Care**
Second Edition

Karen Burke
Priscilla LeMone
Elaine Mohn-Brown

Chapter 29
***The Hematologic and
Lymphatic Systems and
Assessment***



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Blood and Blood Cells

- Transport oxygen
- Remove wastes
- Blood components
 - Plasma
 - RBC
 - WBC
 - Platelets

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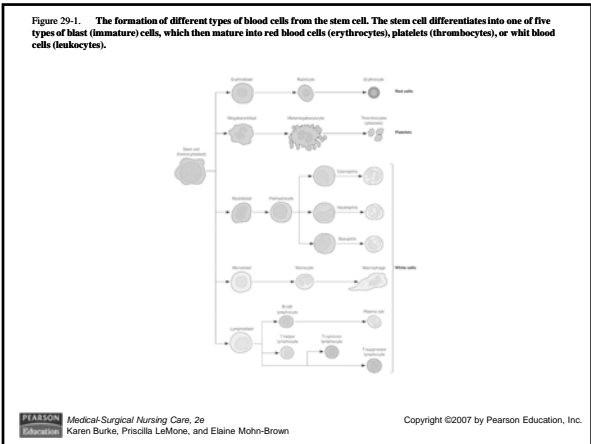
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Blood and Blood Cells

- Formation of blood
 - Liver
 - Bone marrow
 - Stem cells

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Red Blood Cells

- Carry oxygen and carbon dioxide
- Biconcave disks

Top view

Side view

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Red Blood Cells

- Formed in bone marrow via erythropoiesis
- Tissue hypoxia stimulates the kidneys to release erythropoietin to stimulate RBC production in bone marrow

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Red Blood Cells

- Contain hemoglobin
- Life span 120 days
- Old RBCs
 - Destroyed by phagocytes in the spleen, liver, bone marrow, lymph nodes; hemolysis
- Amino acids and iron saved and reused by body, circulates as transferrin; stored as ferritin; heme converted to bilirubin
- Normal lab values differ by gender

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TABLE 29-1 Laboratory Values Related to Red Blood Cells.

LABORATORY TEST	NORMAL VALUE	MEASURES
Red Blood Cell (RBC) count ■ Men ■ Women	4.2–5.4 million/mm ³ 3.6–5.0 million/mm ³	Number of circulating RBCs in one cubic millimeter (mm ³) of blood
Reticulocyte count	1–1.5% of total RBC	Number of immature RBCs in 1 mm ³ of blood
Hemoglobin (Hgb) ■ Men ■ Women	14–16.5 g/dL 12–15 g/dL	Amount of hemoglobin in 100 mL (1 dL) of blood
Hematocrit (Hct) ■ Men ■ Women	40–50% 37–47%	Packed volume of RBCs in 100 mL of blood; reported as a percentage
Mean corpuscular volume (MCV)	85–100 μm ³ /cell	Average volume of individual RBCs
Mean corpuscular hemoglobin (MCH)	31–35 g/dL	Weight of the hemoglobin in an average RBC
Mean corpuscular hemoglobin concentration (MCHC)	33.4–35.5%	Average concentration (percent) of hemoglobin within RBC

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Red Blood Cells

- Terms used
 - Normocytic
 - Microcytic
 - Macrocytic
 - Normochromic
 - Hypochromic

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White Blood Cells

- Leukocytes
- 5000 to 10,000; make up 1% of total blood volume
- Leukocytosis: high WBC count
- Leukopenia: low WBC count
- Originate from stem cells in bone marrow

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White Blood Cells

- Move to where they are needed
- Three types
 - Granulocytes
 - Monocytes
 - Lymphocytes

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White Blood Cells

- Granulocytes
 - Neutrophils
 - Eosinophils
 - Basophils
- Monocytes
 - Largest WBC

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White Blood Cells

- Lymphocytes
 - Regulate immune response

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TABLE 29-2 Normal White Blood Cell Count and Differential.

TABLE 29-2 Normal White Blood Cell Count and Differential	
LABORATORY TEST	NORMAL VALUES
WBC count	5,000–10,000/mm ³
Differential WBC count	
Neutrophils	60–70% (3,000–7,000/mm ³)
Eosinophils	1–3% (50–400/mm ³)
Basophils	0.3–0.5% (25–200/mm ³)
Lymphocytes	20–30% (1,000–4,000/mm ³)
Monocytes	3–8% (100–600/mm ³)

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Platelets

- Part of the clotting mechanism
- Fragments of cytoplasm without nuclei
- Most stored in the spleen
- 250,000 to 400,000 in each mL of blood
- Excess termed thrombocytosis
- Live approximately 10 days

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Hemostasis

- Blood clotting to stop bleeding
- Vessel spasm
- Formation of platelet plug
- Clot formation
 - Intrinsic pathway
 - Extrinsic pathway

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Figure 29-3. Both the slower intrinsic pathway (on the left) and the more rapid extrinsic pathway (on the right) are necessary to form a stable blood clot.



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Hemostasis

- Clot retraction
- Clot dissolution

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Assessment

- Changes in energy level
- Usual activities
- Pain, burning, tingling
- Changes in skin color or temperature
- Edema
- Bruising, dizziness, fatigue
- Diet
- Medications
- Tobacco, alcohol, recreational drugs
- Medical history
- Family history

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Physical Examination

- Inspection
 - Petechiae
 - Purpura
 - Documentation

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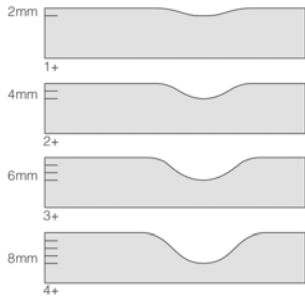
Figure 5-3. Assessing edema. (A) Palpating for edema over the tibia. (B) Four-point scale for grading edema.



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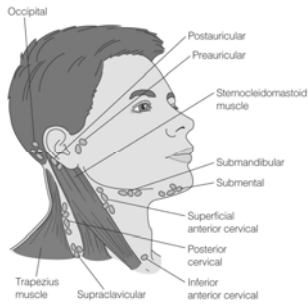
Figure 5-3. (continued) Assessing edema. (A) Palpating for edema over the tibia. (B) Four-point scale for grading edema.



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Figure 5-6. Lymph nodes of the head and neck.



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Diagnostic Tests

- Laboratory
 - CBC
 - Clotting studies or coagulation profile
 - Coombs' test
 - Hemoglobin electrophoresis
 - Iron stores
 - Schilling's test

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Bone Marrow Aspiration

- Nursing care
 - Preprocedure: consent, purpose, vital signs
 - Postprocedure: pressure, vital signs, dressing
 - Teaching: 20 minutes, anesthetic, still, ache

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Other Diagnostic Tests

- Biopsy
- Imaging studies
 - Lymphangiogram

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