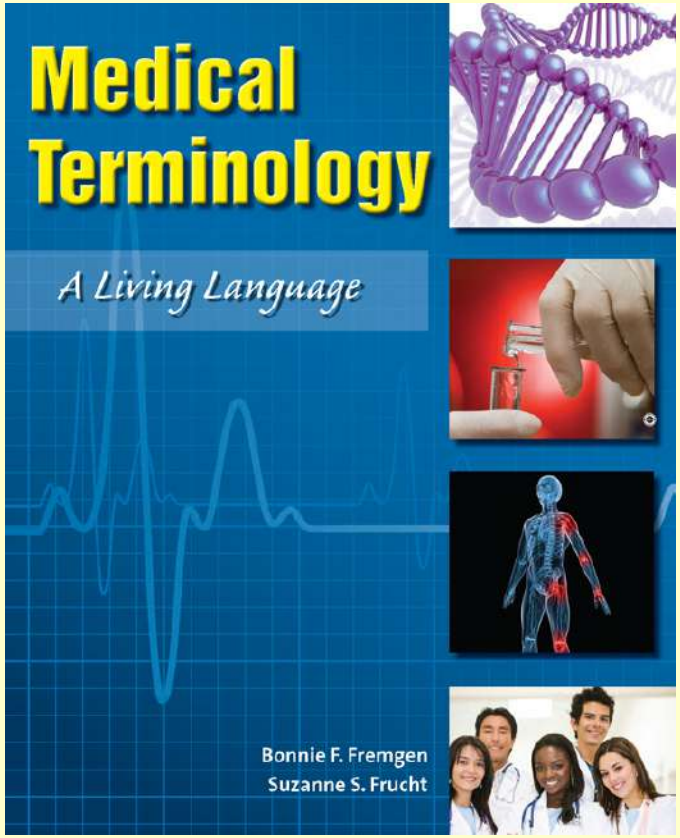
Medical Terminology
A Living Language



Chapter 6

Blood and the Lymphatic and Immune Systems

PEARSON Education
Medical Terminology: A Living Language, Fourth Edition
Bonnie F. Fremgen and Suzanne S. Frucht

Multimedia Directory

Slide 27Blood Type Exercise
Slide 44Sickle Cell Anemia Animation
Slide 46Leukemia Video
Slide 51Lab Technicians Video
Slide 54Phlebotomy Video
Slide 69Lymphatic System Animation
Slide 89Lymphatic System Exercise
Slide 110Inflammation Video
Slide 112Anaphylaxis Animation
Slide 117AIDS Video

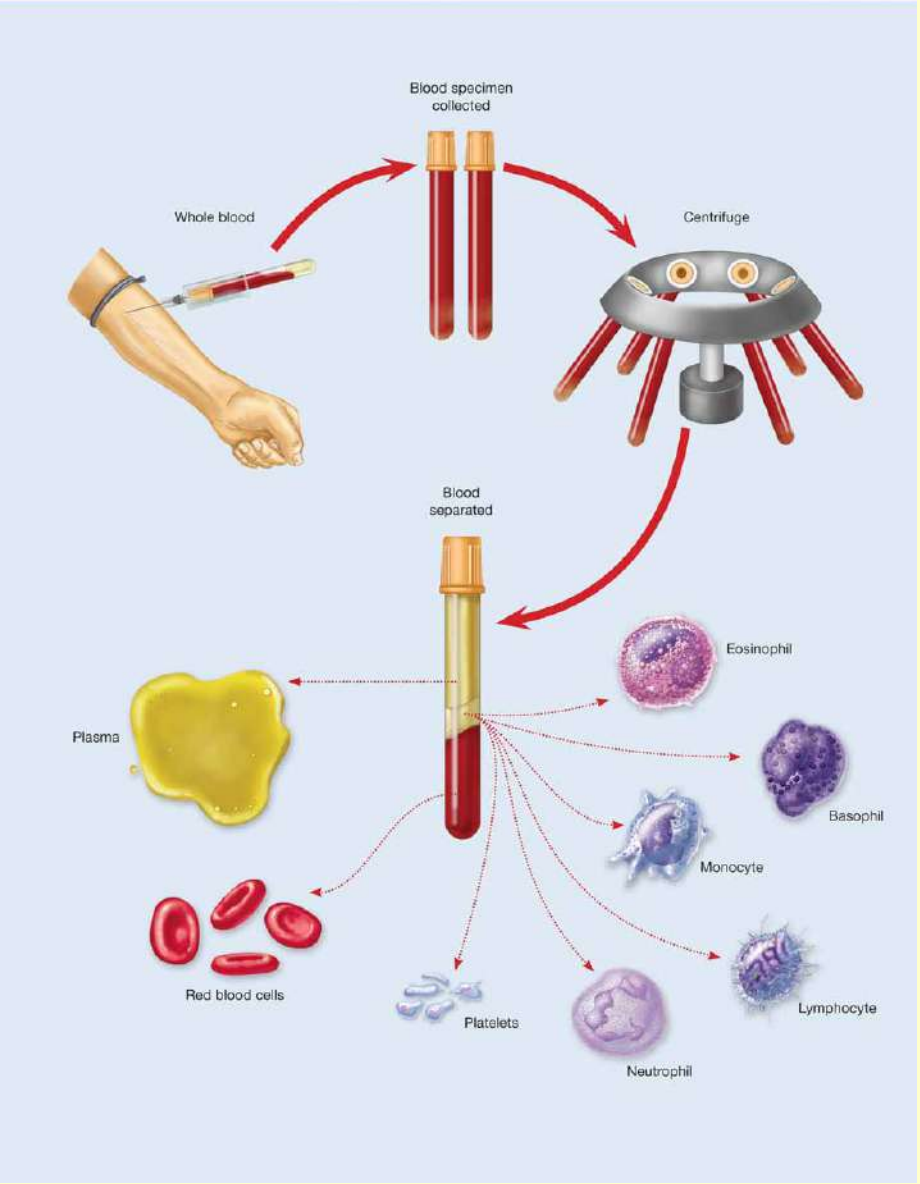
Blood at a Glance: Functions

- Transports substances throughout body
  - Substances are attached to **red blood cells** or dissolved in **plasma**
- **White blood cells** fight infection and disease
- **Platelets** initiate blood clotting process

Blood at a Glance: Components

- Blood cells (formed elements)
  - Erythrocytes
  - Platelets
  - Leukocytes
- Plasma

Blood Illustrated



Blood Combining Forms

- agglutin/oclumping
- bas/obase
- chrom/ocolor
- coagul/oclotting
- eosin/orosy red
- erythr/ored
- fibrin/ofibers, fibrous
- granul/ogranules

Blood Combining Forms

- hem/oblood
- hemat/oblood
- leuk/owhite
- morph/oshape
- neutr/oneutral
- phag/oeat, swallow
- sanguin/oblood
- thromb/oclot

Blood Suffixes

- -apheresisremoval
- -cytosismore than normal number of cells
- -emiablood condition
- -globinprotein
- -peniaabnormal decrease
- -philattraction for
- -poiesisformation
- -stasisstanding still

Anatomy and Physiology

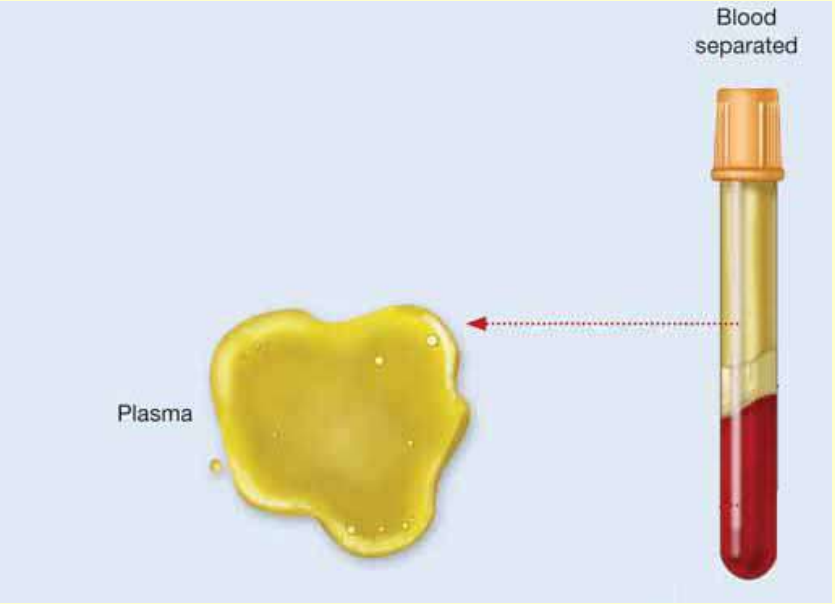
- Average adult has about five liters of blood
- Circulates through body within blood vessels
- Blood cells are produced in red bone marrow
  - Process called **hematopoiesis**

Anatomy and Physiology

- Is a mixture of cells floating in a fluid
- Fluid is plasma
- Cells are called formed elements
  - Erythrocytes
  - Leukocytes
  - Platelets

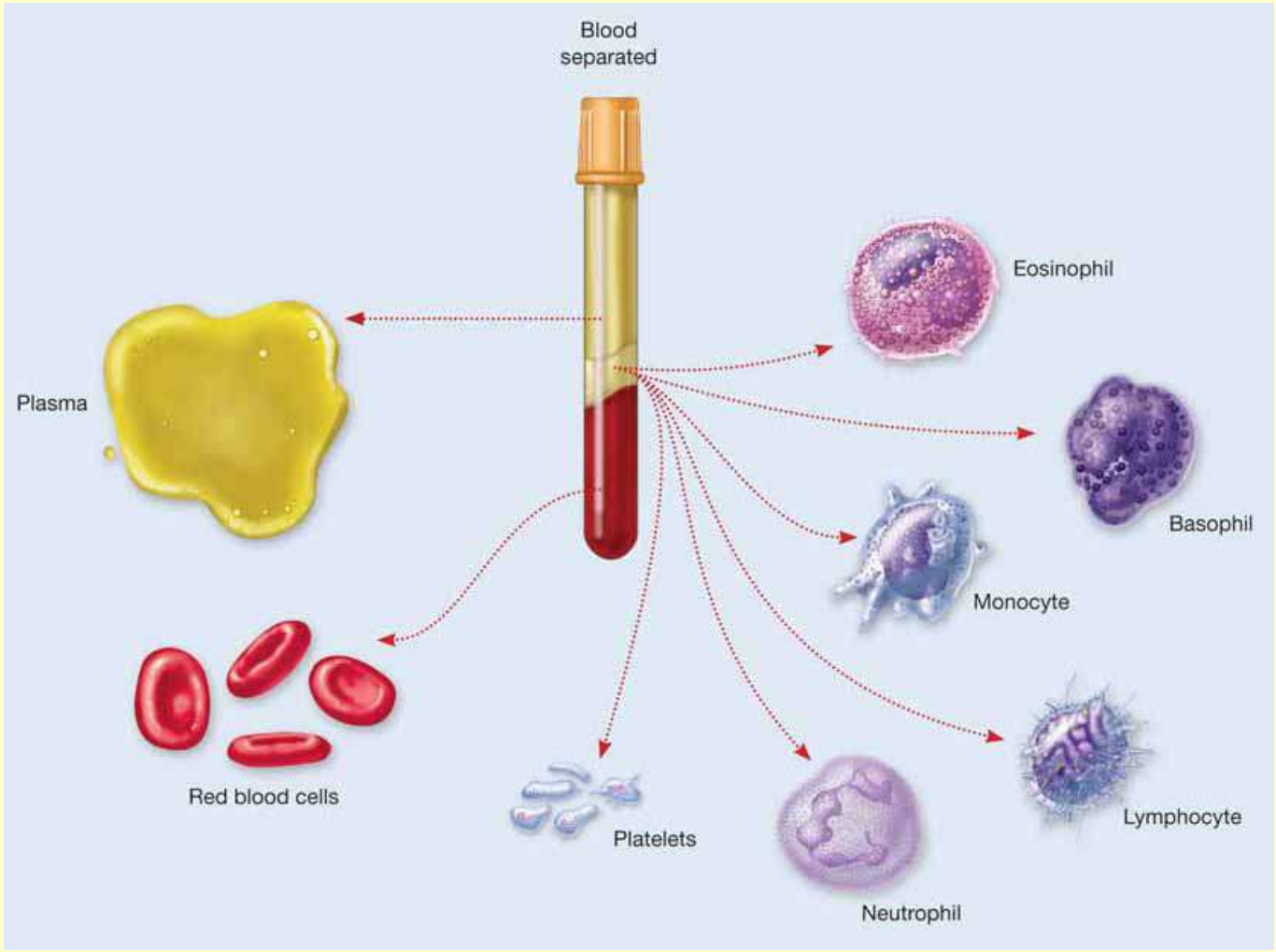
Plasma

- About 55% of whole blood
- Plasma is 90–92% water
- Remaining 8–10% is dissolved substances



Dissolved Substances in Plasma

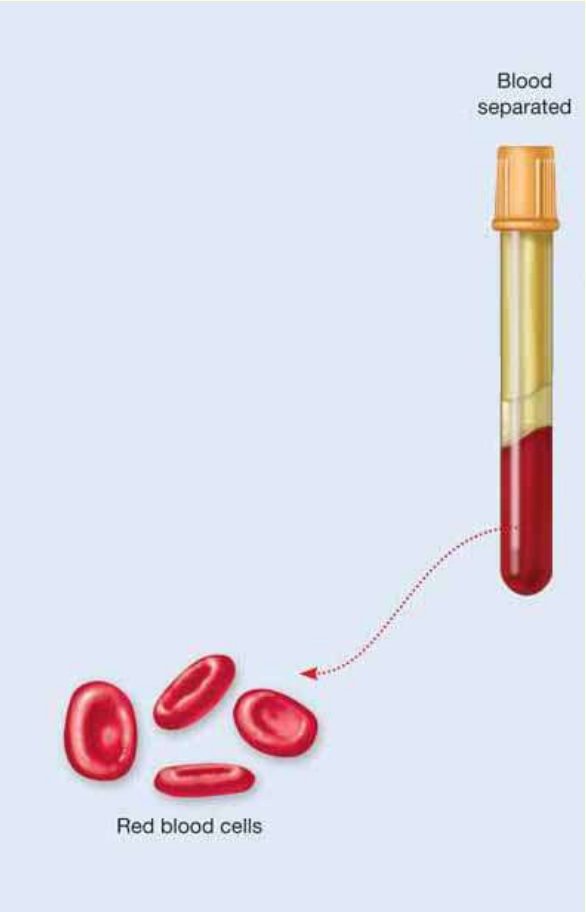
- Plasma proteins
  - **Albumin** – helps transport fatty substances
  - **Globulin** – **gamma globulins** are antibodies
  - **Fibrinogen** – blood clotting protein
- Additional important substances
  - Calcium, potassium, sodium, glucose, amino acids, fats, urea, creatinine



Components of blood.

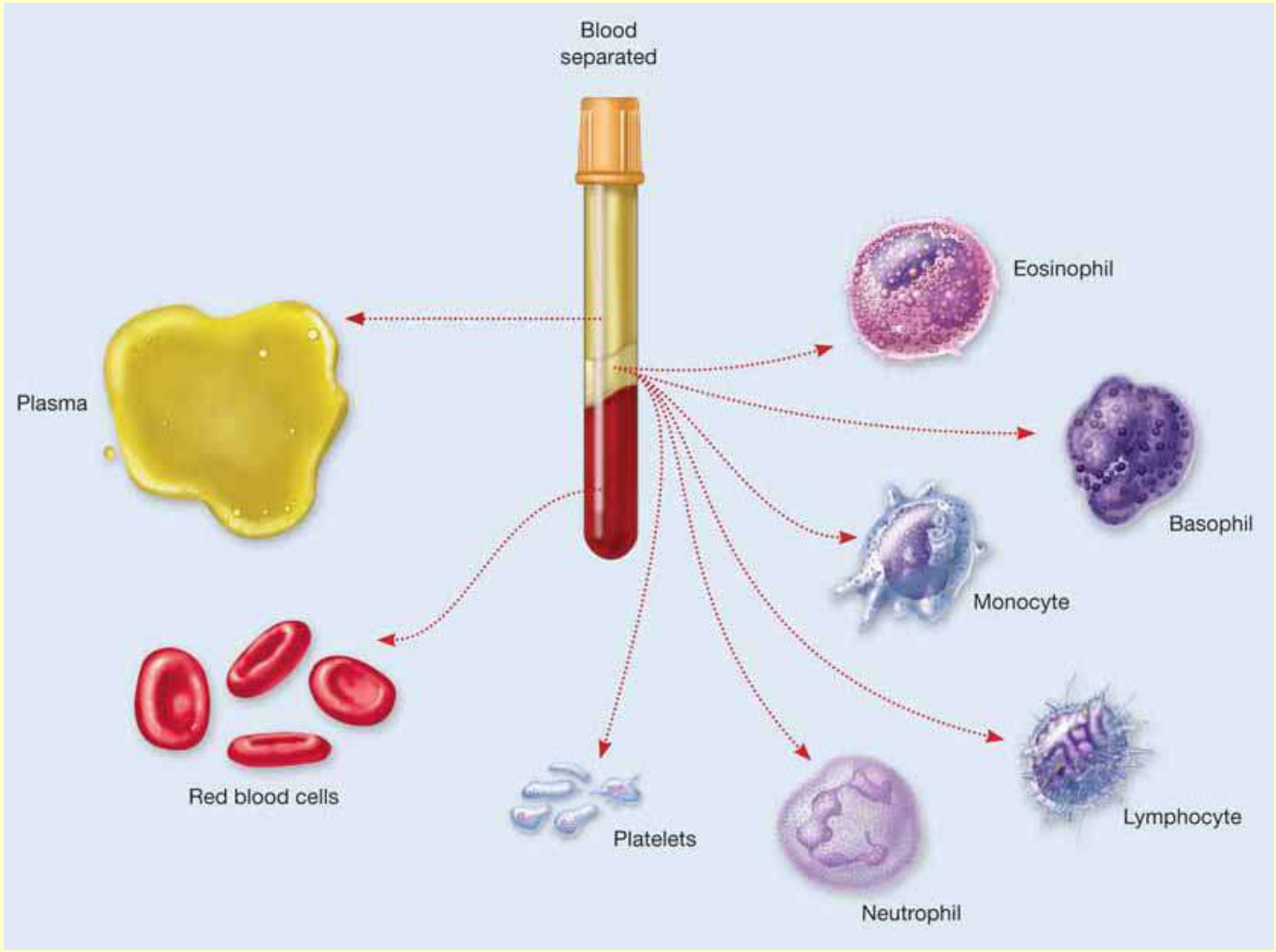
Red Blood Cells (RBC)

- Called **erythrocytes**
- Enucleated
  - No nucleus
- Biconcave disk
- 5 million per cubic millimeter of blood
- Adult has 35 trillion; more in males



Erythrocytes

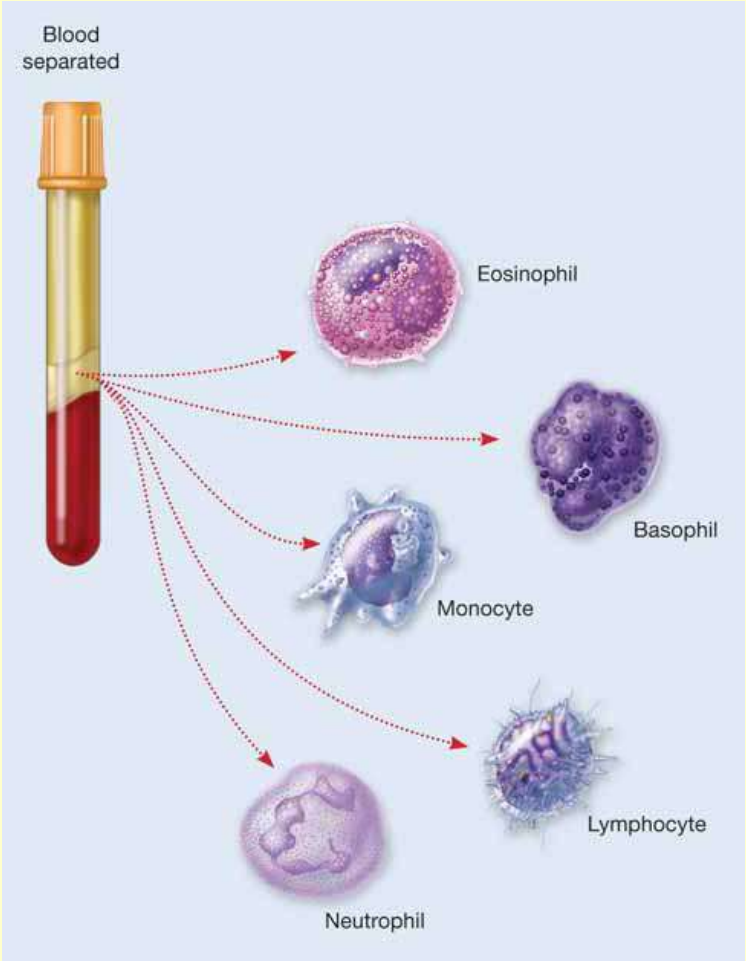
- **Hemoglobin** (Hgb, Hb) gives red color
  - Pigment containing iron
  - Responsible for oxygen transport
- Life span of 120 days
  - Spleen removes worn out ones
  - Iron can be reused
  - Bilirubin is waste product disposed of by liver



Components of blood.

White Blood Cells (WBC)

- Also called **leukocytes**
- Spherical shape with large nucleus
- 8,000 per cubic millimeter of blood

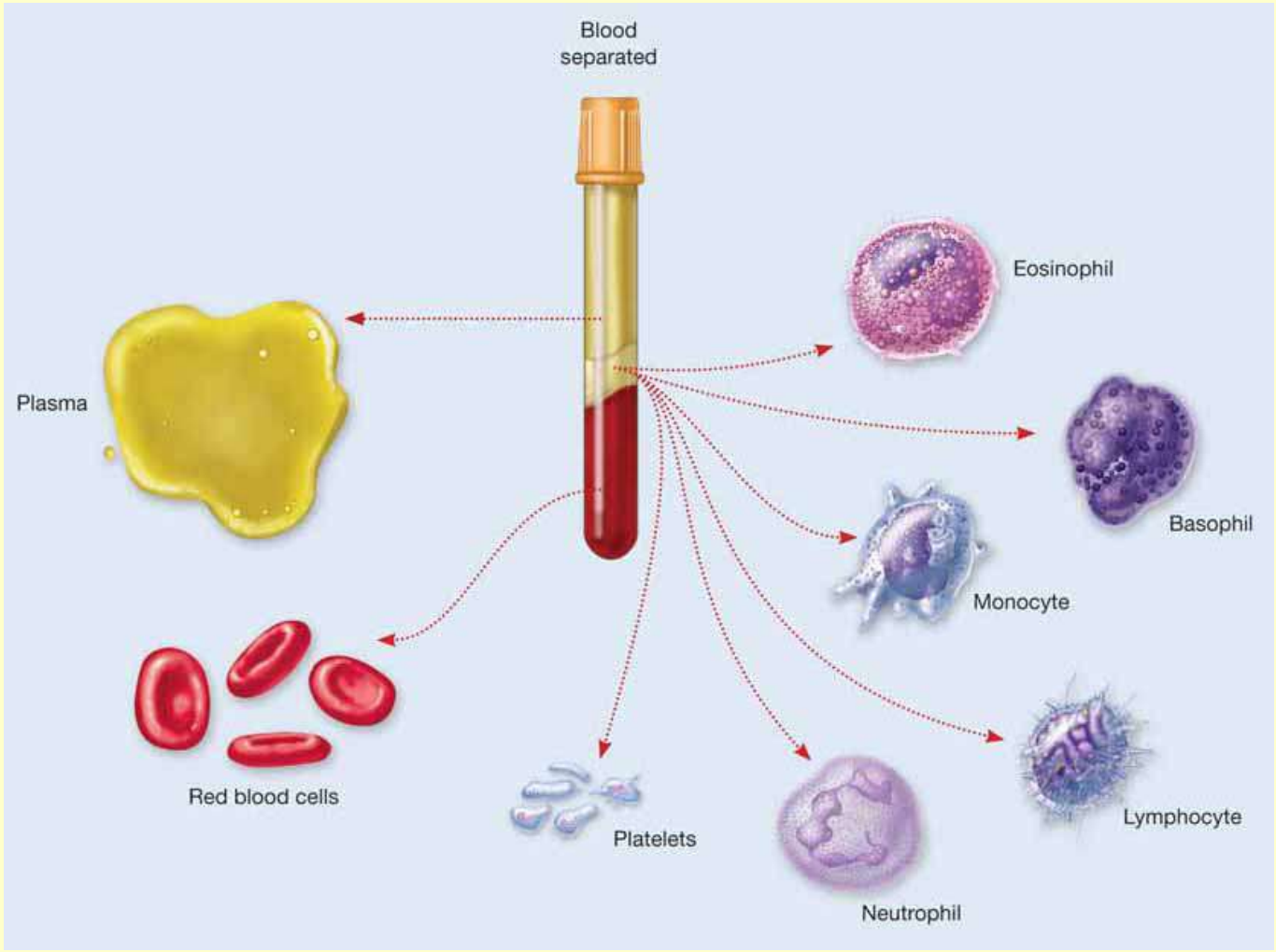


Leukocytes

- Provide protection against **pathogens**
  - Bacteria
  - Viruses
  - Foreign material
- Subdivided into two categories
  - **Granulocytes** – have granules in cytoplasm
  - **Agranulocytes** – no granules in cytoplasm

Leukocyte Classification

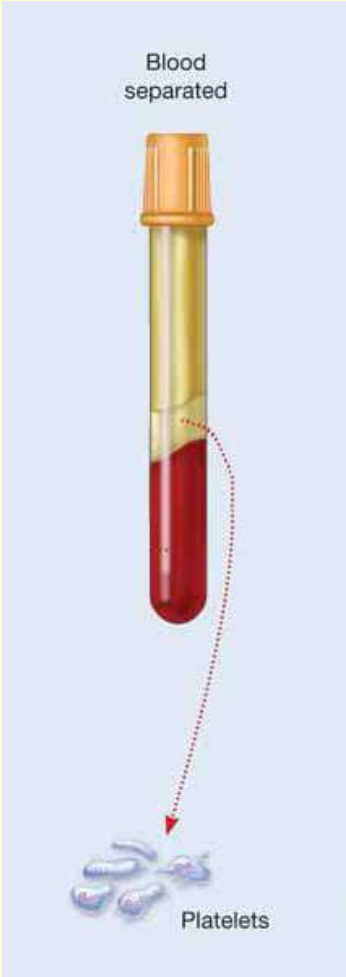
- Granulocytes
  - **Basophils** Release histamine and heparin to damaged tissue
  - **Eosinophils** Destroy parasites and increase during allergic reaction
  - **Neutrophils** Important for phagocytosis
- Agranulocytes
  - **Monocytes** Important for phagocytosis
  - **Lymphocytes** Provide protection through immunity



Components of blood.

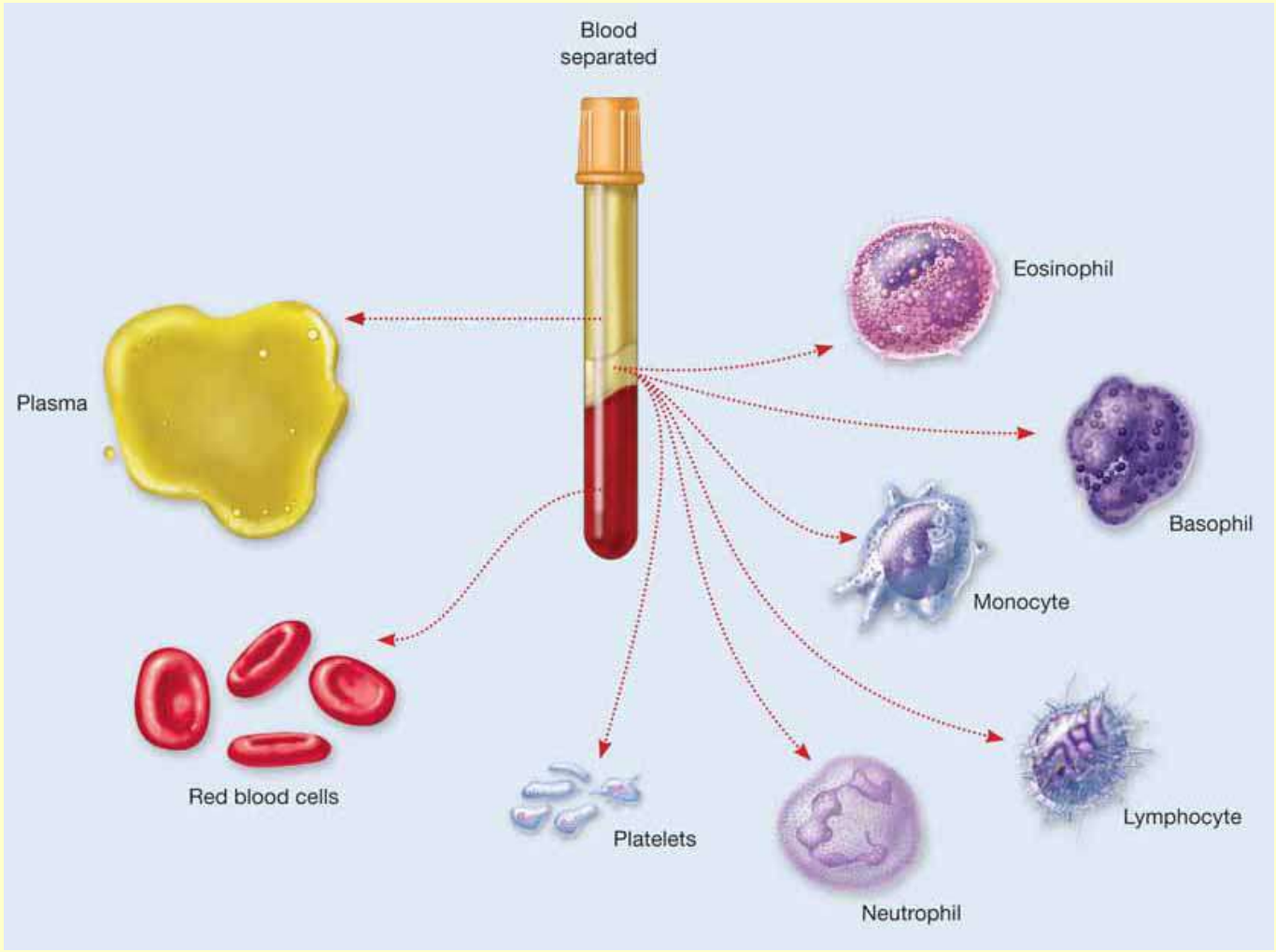
Platelets

- Older term is **thrombocyte**
- Smallest of all blood elements
- Plate-like fragments of larger cell
- 200,000-300,000 per cubic millimeter



Platelets

- Critical in blood clotting
  - **Hemostasis**
- **Agglutinate** into small clusters when blood vessel is damaged
- Leads to formation of **thrombin**
  - Which converts **fibrinogen** to **fibrin**
  - Results in formation of mesh-like blood clot



Components of blood.

Blood Typing

- Each person's blood is different from others'
  - Due to presence of marker proteins on surface of erythrocytes
- Must do blood typing before blood transfusion
  - Test to determine if donated blood is compatible with recipient's blood
- There are many different blood markers
  - Two most important ones for transfusions are ABO system and Rh factor

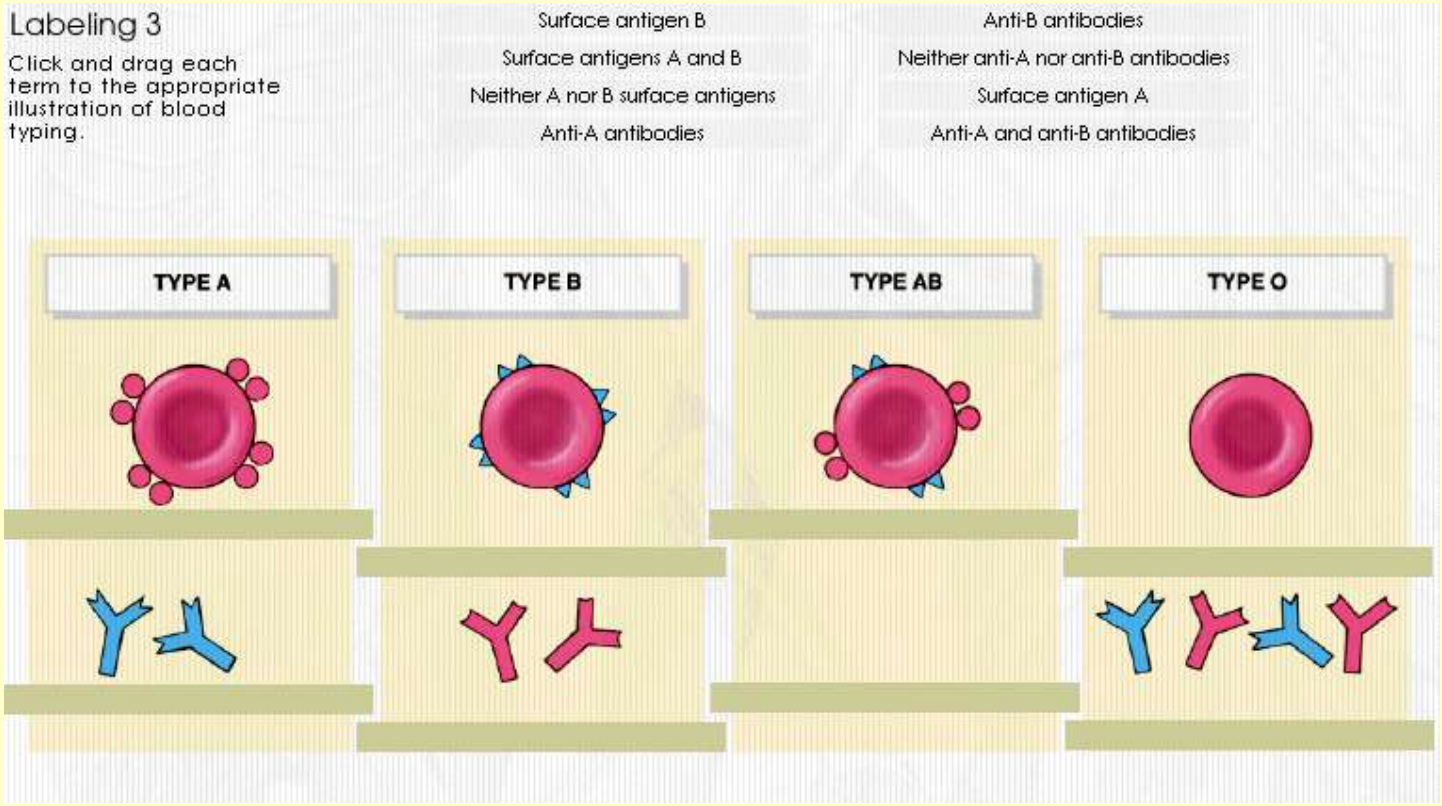
ABO System

- There are two possible RBC markers, A and B
- Person with A marker has **type A** blood
  - Type A blood produces anti-B antibodies
  - Anti-B antibodies attack type B and type AB blood
- Person with B marker has **type B** blood
  - Type B blood produces anti-A antibodies
  - Anti-A antibodies attack type A and type AB blood

ABO System

- Person with no marker has **type O** blood
  - Type O blood produces anti-A & anti-B antibodies
  - These antibodies will attack type A, type B, and type AB blood
- Person with both markers has **type AB** blood
  - Type AB blood produces no antibodies
  - Therefore it will not attack any other blood types

Blood Type Exercise



Click here to review antigens and antibodies in a labeling activity.

Universal Donor

- Because type O blood does not have either marker A or B, it will not react with anti-A or anti-B antibodies found in other blood types
- For this reason a person with type O blood is referred to as a **universal donor**
- In an extreme emergency, type O blood may be given to a person with any other blood type

Universal Recipient

- Because a person with type AB blood has no antibodies against other blood types, it will not react with other blood
- For this reason, type AB blood is the **universal recipient**
- In an extreme emergency, a person with type AB blood may receive any type of blood

Rh Factor

- Person with Rh factor on red blood cells is Rh-positive (Rh+)
  - Will not make anti-Rh antibodies
- Person without Rh factor is Rh-negative (Rh-)
  - Will produce anti-Rh antibodies
- Rh+ person may receive either Rh+ or Rh- transfusion, but Rh- person can receive only Rh- blood

Word Building with fibrin/o and hem/o

–gen	fibrinogen	fiber producing
–lysis	fibrinolysis	fiber destruction
–ous	fibrinous	pertaining to fibers

–globin	hemoglobin	blood protein
–lysis	hemolysis	blood destruction
–lytic	hemolytic	blood destruction
–rrhage	hemorrhage	rapid flow of blood

Word Building with hemat/o and sanguin/o

–ologist	hematologist	blood specialist
–ic	hematic	pertaining to blood

–ous	sanguinous	pertaining to blood

Word Building with –cyte

erythr/o	erythrocyte	red cell
leuk/o	leukocyte	white cell
thromb/o	thrombocyte	clotting cell
granul/o	granulocyte	granular cell
a– granul/o	agranulocyte	not a granular cell

Word Building with –cytosis & –penia

erythr/o	erythrocytosis	too many red cells
leuk/o	leukocytosis	too many white cells
thromb/o	thrombocytosis	too many clotting cells

erythr/o	erythropenia	too few red (cells)
leuk/o	leukopenia	too few white (cells)
thromb/o	thrombopenia	too few clotting (cells)
pan– cyt/o	pancytopenia	too few all cells

Word Building with –poiesis

erythr/o	erythropoiesis	red (cell) producing
leuk/o	leukopoiesis	white (cell) producing
thromb/o	thrombopoiesis	clotting (cell) producing
hemat/o	hematopoiesis	blood producing

Blood Vocabulary

blood clot	hard collection of fibrin, blood cells, and tissue debris; end result of hemostasis
coagulate	to convert a liquid to a solid; as in blood clotting
dyscrasia	general term for disease affecting blood
hematology	branch of medicine specializing in blood conditions; physician is a hematologist

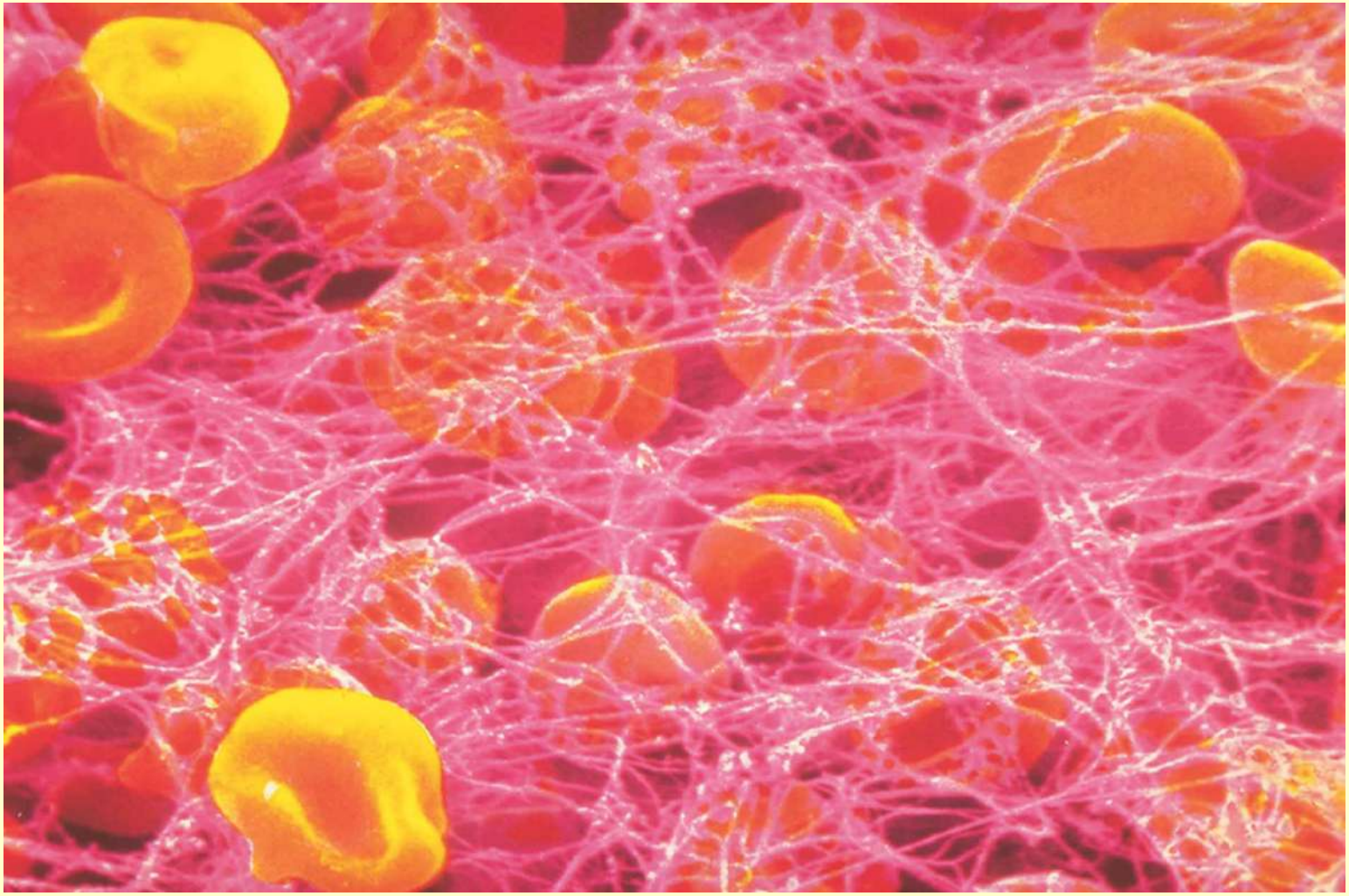


Figure 6.4 – Electronmicrograph showing a blood clot, composed of fibrin, red blood cells, and tissue debris.

Blood Vocabulary

hematoma	collection of blood under skin as a result of blood escaping into tissue from damaged blood vessels
hemostasis	to stop bleeding or stagnation of blood flow through tissues
packed cells	transfusion of only blood cells without plasma
whole blood	mixture of both plasma and formed elements

Blood Pathology

hemophilia	genetic disorder; blood fails to clot due to lack of one clotting factor
hyperlipidemia	excessive level of lipids in the blood stream; risk factor for atherosclerosis
septicemia	having bacteria or their toxins in the bloodstream; also called blood poisoning

Erythrocyte Pathology

anemia	group of conditions characterized by a reduction in number of RBCs or the amount of hemoglobin; results in less oxygen reaching tissues
aplastic anemia	severe anemia in which red bone marrow stops making sufficient blood cells; may require bone marrow transplant
hemolytic anemia	results from excessive loss of RBCs

Erythrocyte Pathology

hemolytic reaction	destruction of RBCs when patient receives mismatched blood transfusion
hypochromic anemia	results from insufficient amount of hemoglobin in RBCs; unable to transport sufficient oxygen
iron-deficiency anemia	results from insufficient amount of iron to make hemoglobin for RBCs

Erythrocyte Pathology

pernicious anemia (PA)	insufficient absorption of vitamin B_{12}; unable to make enough RBCs
polycythemia vera	condition of having too many RBCs; blood is too thick and flows sluggishly
sickle cell anemia	genetic disorder where RBCs take on abnormal sickle shape; become more fragile leading to hemolytic anemia
thalassemia	genetic disorder where unable to produce functioning hemoglobin

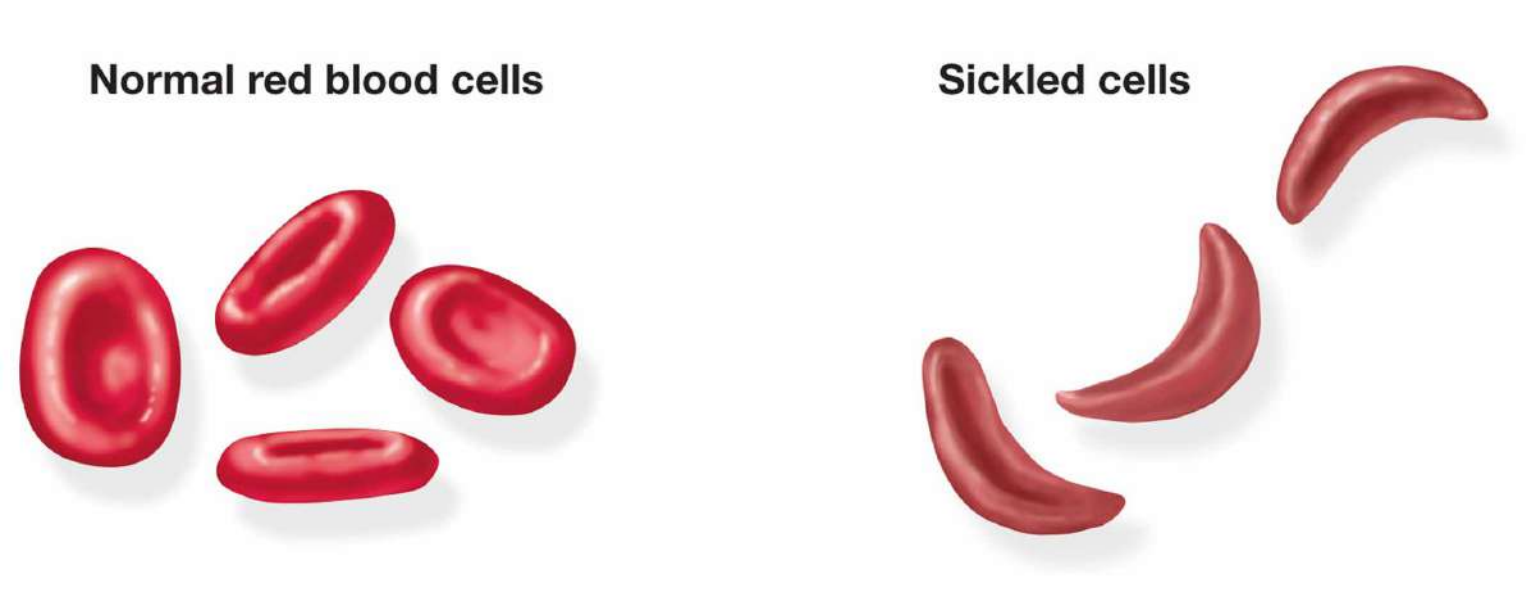


Figure 6.5 – Comparison of normal-shaped erythrocytes and the abnormal sickle shape noted in patients with sickle cell anemia.

Sickle Cell Anemia Animation

Click here to view animation on sickle cell anemia.

Leukocyte Pathology

leukemia	cancer of white blood cell-forming portion of red bone marrow; results in large number of abnormal and immature WBCs circulating in blood stream

Leukemia Video

Click here to view a video on leukemia.

Clinical Laboratory Tests

blood culture & sensitivity (C&S)	blood is incubated to identify infecting bacteria and then test determines best antibiotic to use
complete blood count (CBC)	set of blood tests: RBC count, WBC count, hemoglobin, hematocrit, white blood cell differential, and platelet count
erythrocyte sedimentation rate (ESR)	determines rate at which RBCs settle in a test tube; indicates presence of inflammation in body

Clinical Laboratory Tests

hematocrit (HCT, Hct, crit)	measures volume of RBCs
hemoglobin (Hgb, hb)	measures amount of hemoglobin present
platelet count	determines number of platelets
prothrombin time (Pro time, PT)	measures how long needed for blood to coagulate and form a clot

Clinical Laboratory Tests

red blood cell count (RBC)	measures number of RBCs
red blood cell morphology	examines RBCs for abnormalities in shape
sequential multiple analyzer computer (SMAC)	machine for doing multiple blood chemistry tests automatically

Clinical Laboratory Tests

white blood cell count (WBC)	measures number of leukocytes
white blood cell differential (diff)	determines the number of each type of WBC

Lab Technicians Video

Click here to view a video about clinical lab technicians.

Medical Procedures

bone marrow aspiration	sample of bone marrow removed by aspiration and examined for diseases such as leukemia and aplastic anemia
phlebotomy	incision into vein in order to withdraw blood for testing; also called venipuncture

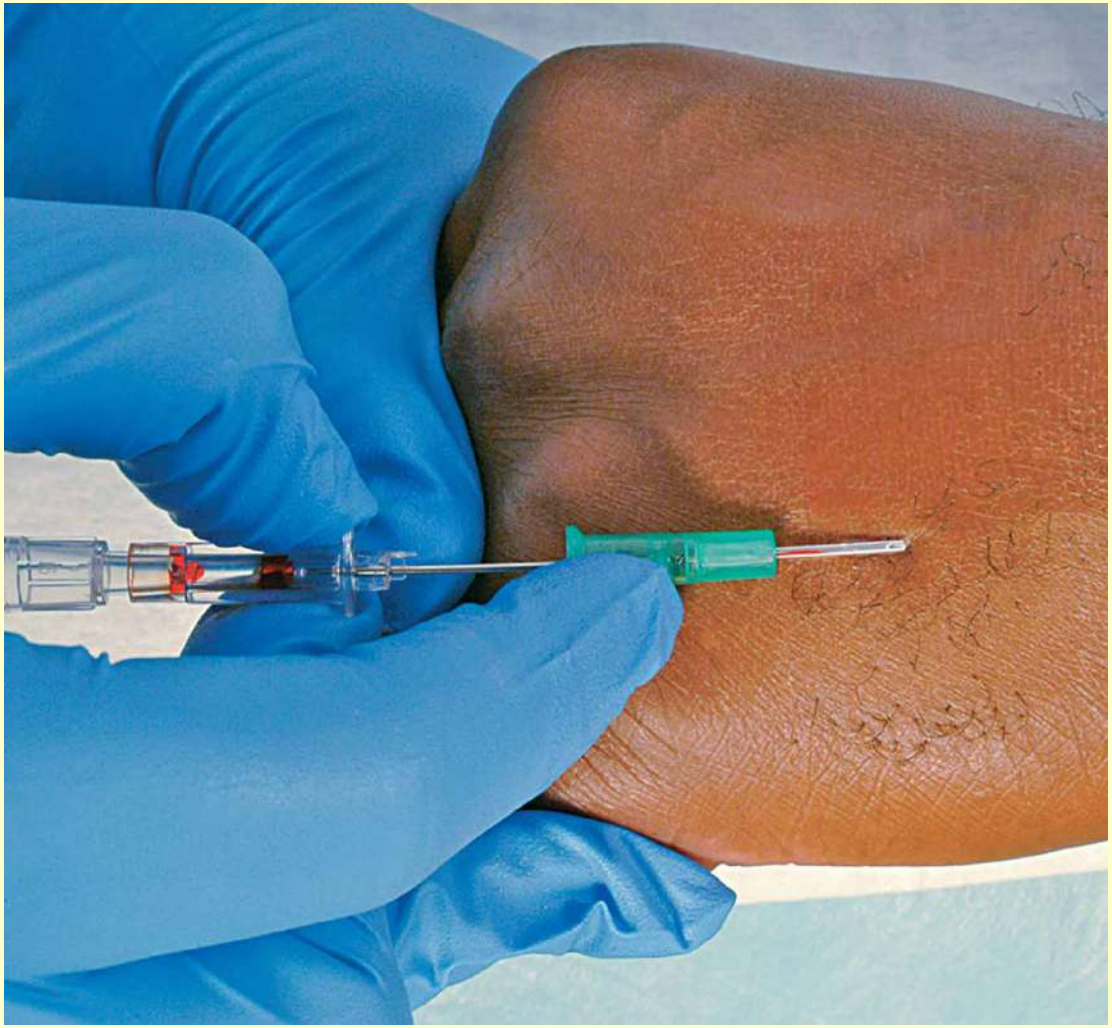


Figure 6.6 – Phlebotomist using a needle to withdraw blood.

Phlebotomy Video

Click here to view a video on phlebotomy.

Medical Procedures

autologous transfusion	collection and storage of patient's own blood prior to actual need
blood transfusion	artificial transfer of blood into the bloodstream
bone marrow transplant (BMT)	patient receives red bone marrow from donor after patient's own bone marrow has been destroyed

Medical Procedures

homologous transfusion	replacement blood with blood from another person
plasmapheresis	removal of whole blood, separation of plasma from formed elements; formed elements returned to patient with donor plasma transfusion

Blood Pharmacology

anticoagulant	prevents blood clot formation	warfarin, Coumadin
antihemorrhagic	prevents bleeding	Amicar, Vitamin K
antiplatelet agent	interferes with action of platelets	Plavix, Ticlid
hematinic	increases number of RBCs and hemoglobin	Procrit, Aranesp
thrombolytic	dissolves existing clots	Activase, Streptase

Blood Abbreviations

ALL	acute lymphocytic leukemia
AML	acute myelogenous leukemia
basos	basophils
BMT	bone marrow transplant
CBC	complete blood count
CLL	chronic lymphocytic leukemia
CML	chronic myelogenous leukemia

Blood Abbreviations

diff	differential
eosins, eos	eosinophils
ESR, SR, sed rate	erythrocyte sedimentation rate
HCT, Hct, crit	hematocrit
Hbg, Hb, HGB	hemoglobin
lymphs	lymphocytes
monos	monocytes

Blood Abbreviations

PA	pernicious anemia
PCV	packed cell volume
PMN, polys	polymorphonuclear neutrophil
PT, pro-time	prothrombin time
RBC	red blood cell
Rh+	Rh positive

Blood Abbreviations

Rh-	Rh negative
segs	segmented neutrophil
SMAC	sequential multiple analyzer computer
WBC	white blood cell

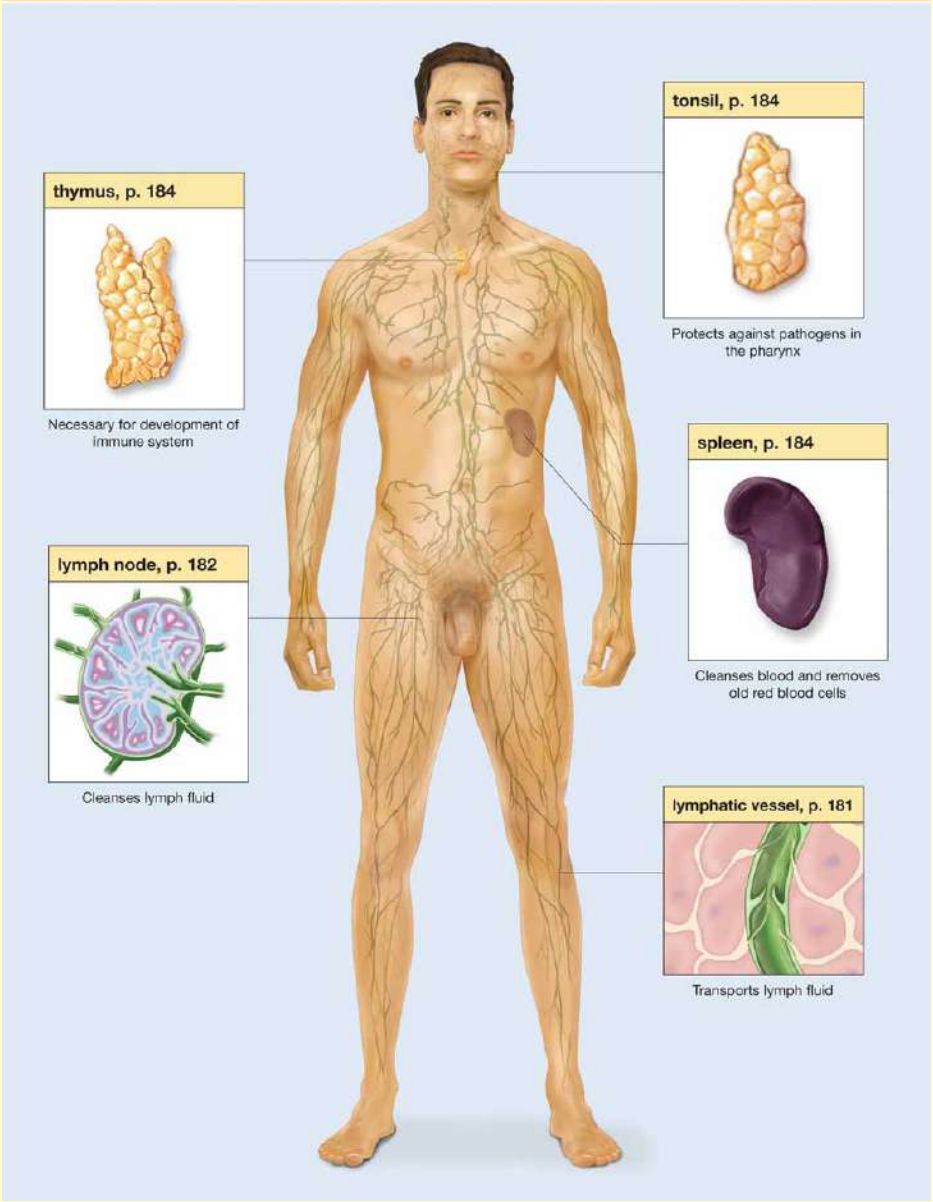
The Lymphatic and Immune Systems at a Glance

- Functions of the Lymphatic System
  - Network of vessels that picks up excess tissue fluid, cleanses it, and returns it to circulatory system
  - Picks up fats absorbed by digestive system
- Functions of Immune System
  - Fights disease and infections

The Lymphatic and Immune Systems at a Glance

- Organs of the Lymphatic System
  - Lymph nodes
  - Lymphatic vessels
  - Thymus gland
  - Spleen
  - Tonsils

Lymphatic System Illustrated



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Lymphatic & Immune Combining Forms

- adenoid/oadenoids
- immun/oprotection
- lymph/olymph
- lymphaden/olymph node
- lymphangi/olymph vessel

Lymphatic & Immune Combining Forms

- path/odisease
- splen/ospleen
- thym/othymus
- tonsill/otonsils
- tox/opoison

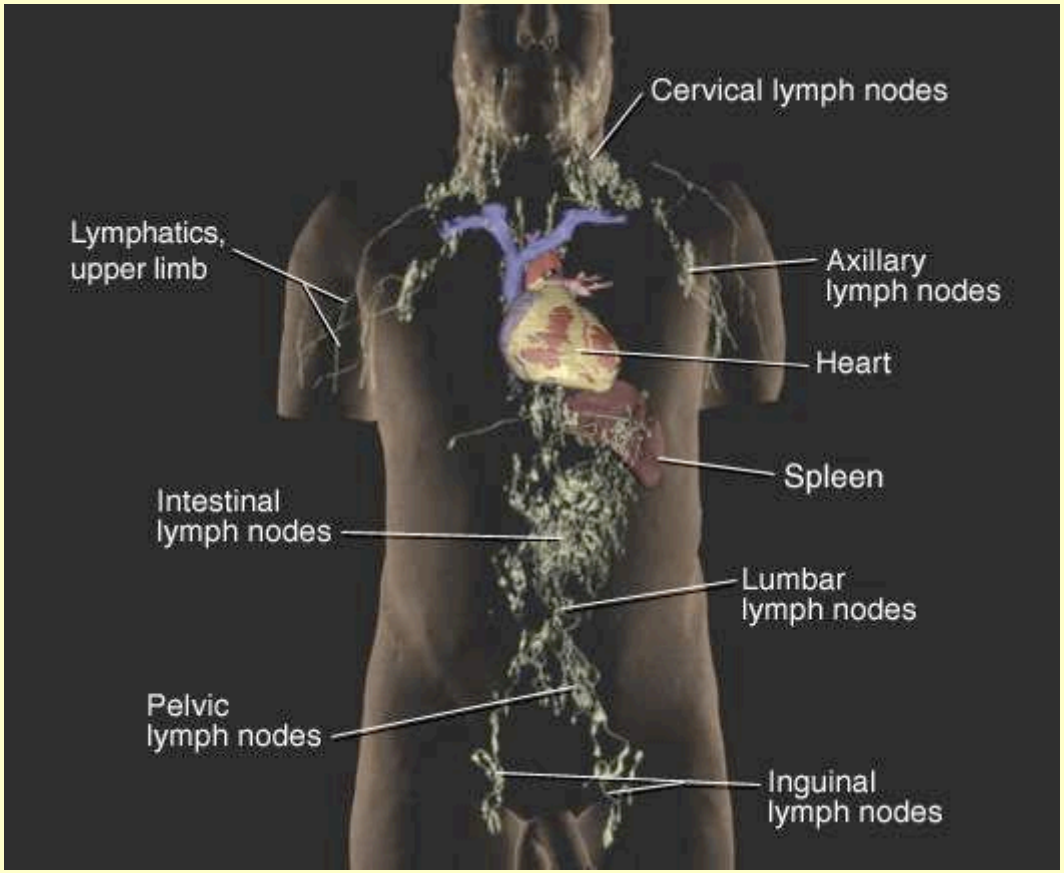
Lymphatic and Immune Suffix

- –globulinprotein

Anatomy and Physiology

- Network of:
  - **Lymphatic vessels**
  - **Lymph nodes**
  - **Spleen**
  - **Thymus gland**
  - **Tonsils**
- Perform diverse functions

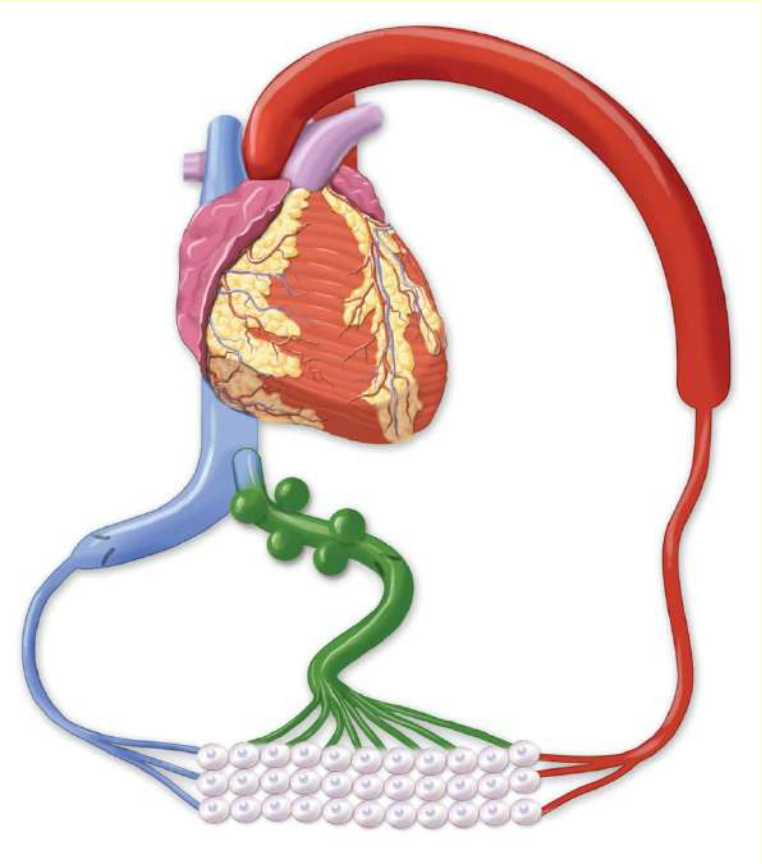
Lymphatic System Animation



Click here to view an animation illustrating the lymphatic system.

Anatomy and Physiology

- First, removes excess tissue fluid
  - Collects excess tissue fluid throughout body
  - Purifies it as it passes through system
  - Returns it to circulatory system
  - **Lymph** = fluid within lymphatic vessels



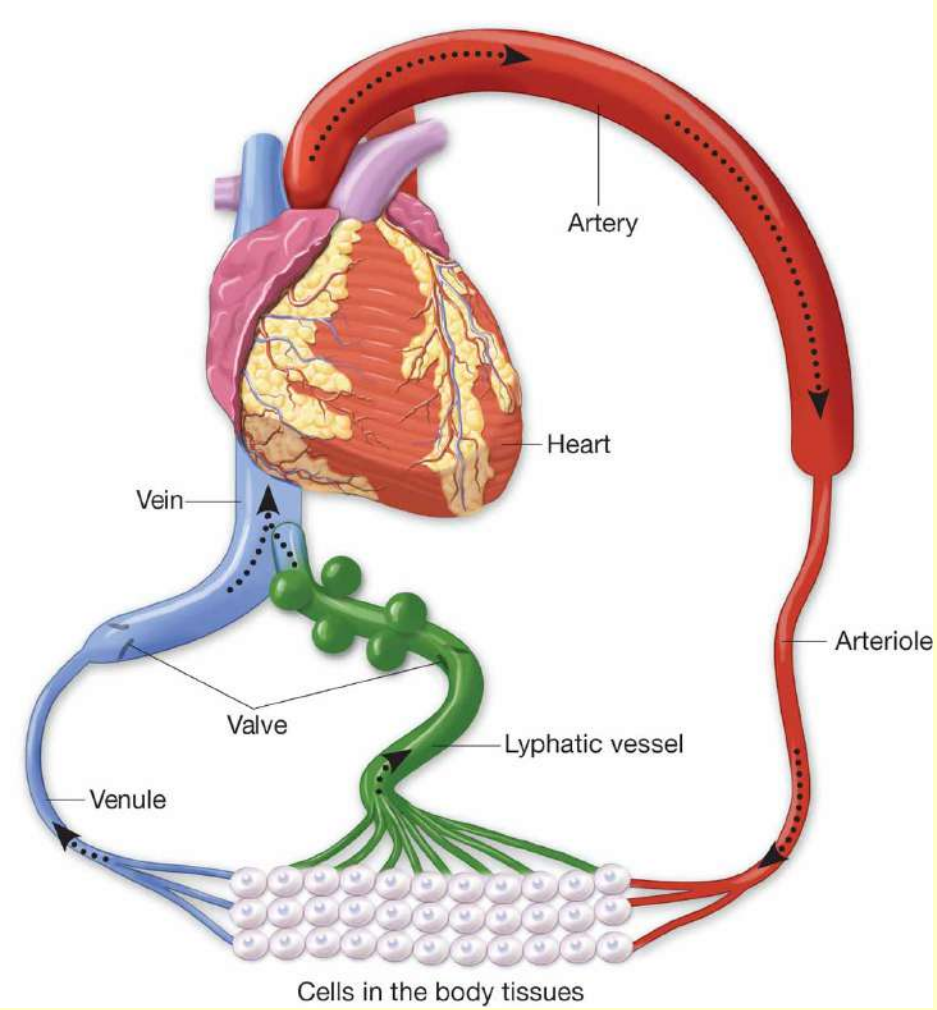


Figure 6.7 – Lymphatic vessels (green) pick up excess tissue fluid, purify it in lymph nodes, and return it to the circulatory system.

Anatomy and Physiology

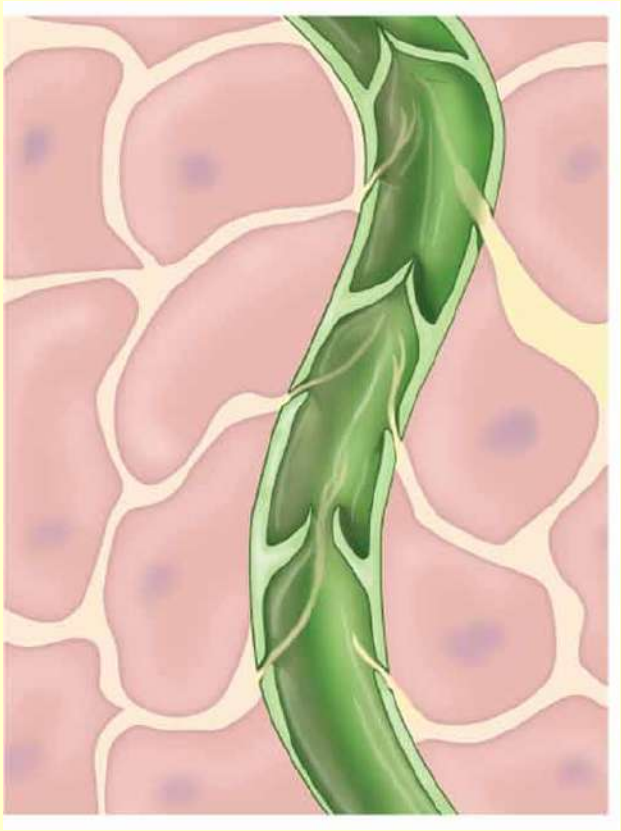
- Second, lymph vessels around the small intestine assist with fat absorption
  - Picks up absorbed fats
  - Delivers to circulatory system
  - These lymph vessels are called **lacteals**

Anatomy and Physiology

- Third, lymphatic and immune systems work together
  - Form a group of cells, tissues, organs, & molecules
  - Body's primary defense against pathogens
    - Including foreign invaders and own cells that have become diseased

Lymphatic Vessels

- Network of vessels throughout body
- One-way pipes conducting lymph from tissues toward thoracic cavity
- Low pressure system
  - Uses **valves** to prevent backflow



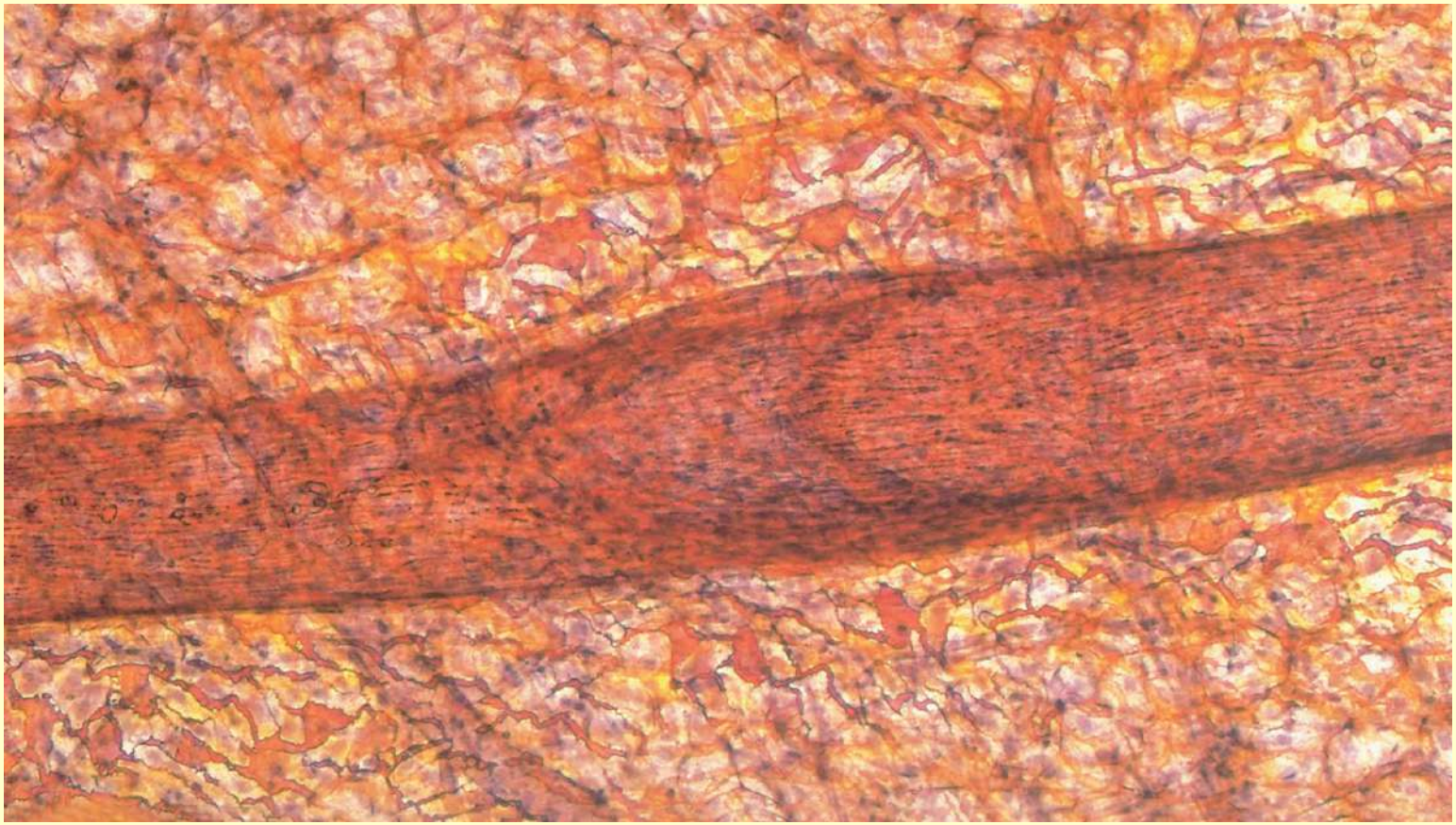
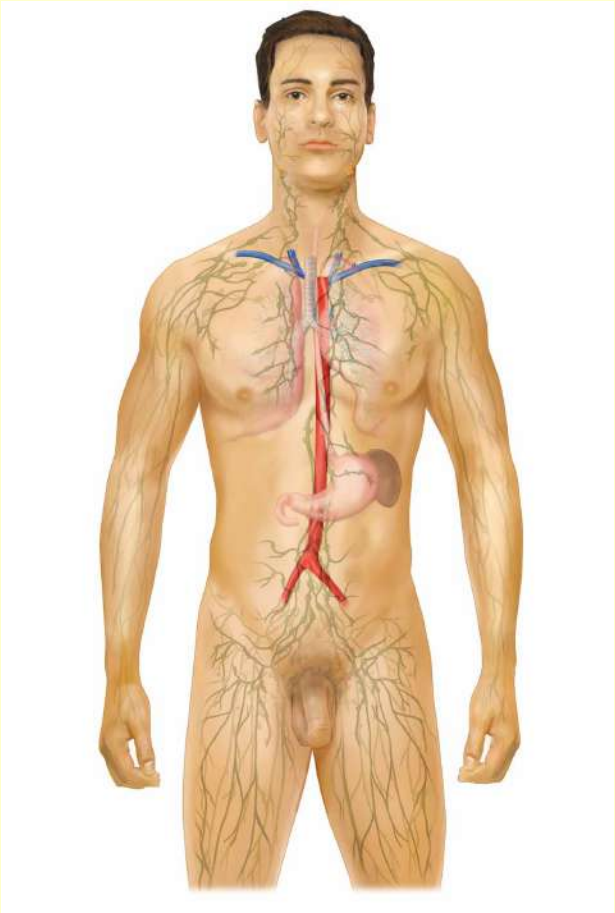


Figure 6.8b – Photomicrograph of lymphatic vessel with valve clearly visible. *(Michael Abbey/Photo Researchers, Inc.)*

Lymphatic Vessels

- Begin as very small **lymph capillaries** in tissues
- Capillaries merge into larger **lymph vessels**
- Finally drain into one of two large **lymphatic ducts** in thoracic cavity



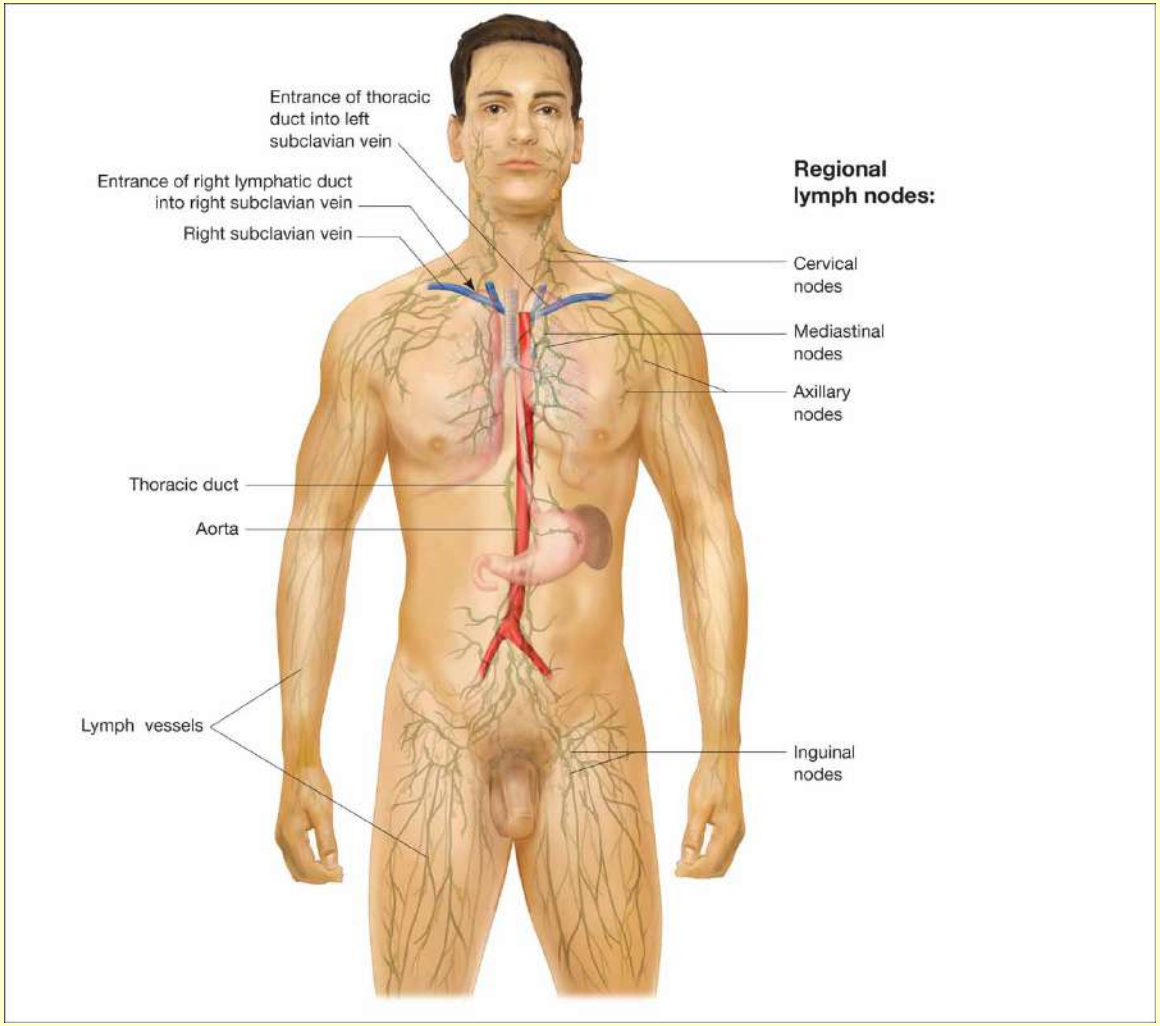
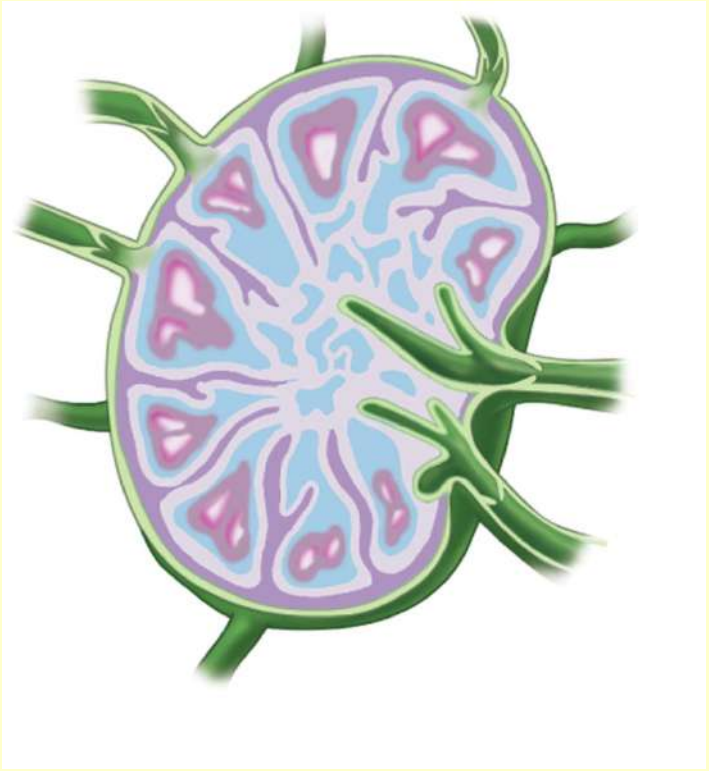


Figure 6.9 – Location of lymph vessels, lymphatic ducts, and areas of lymph node concentrations.

Lymph Nodes

- Also called **lymph glands**
  - But not real glands
  - Composed of lymphatic tissue
  - Located along route of lymphatic vessels



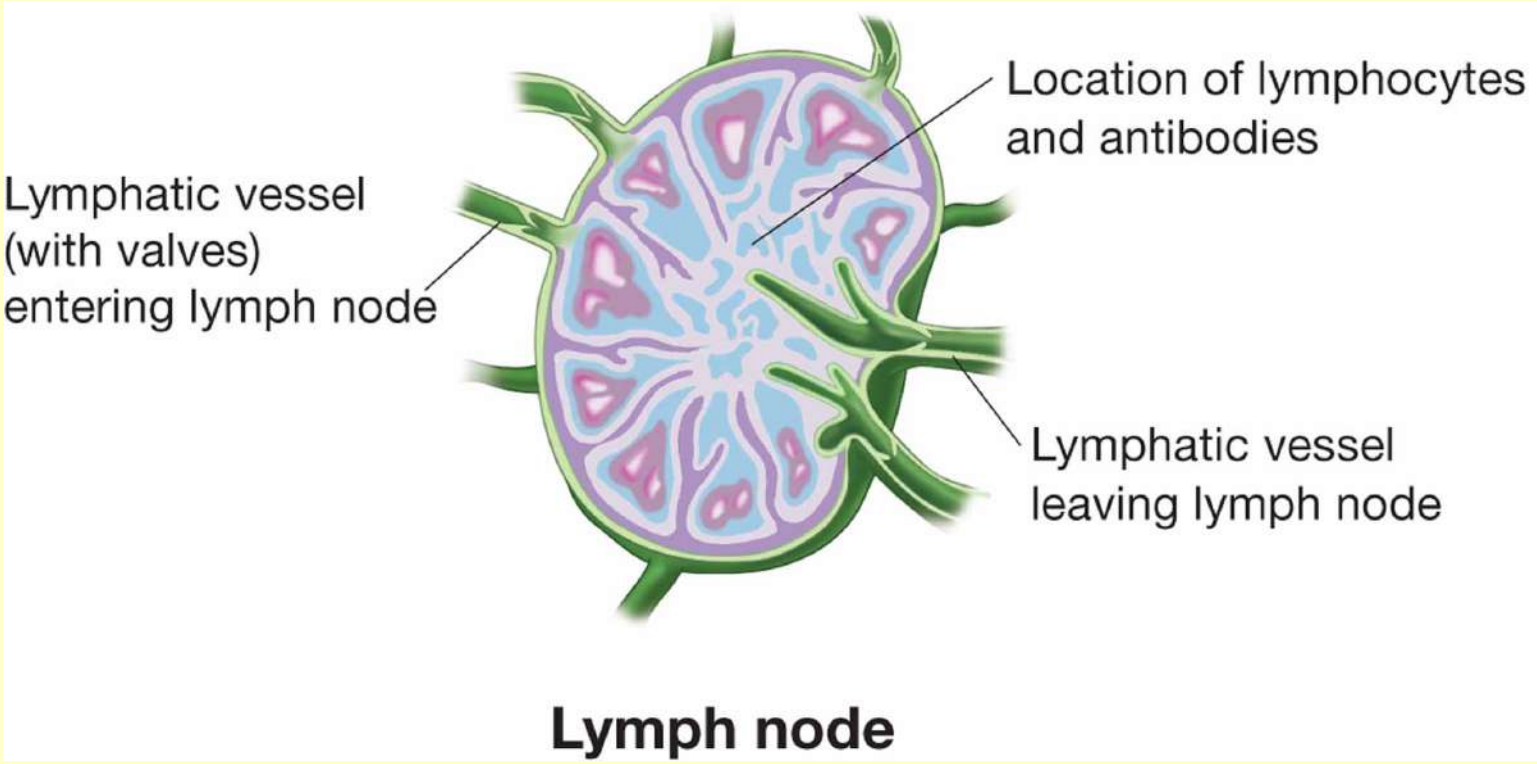


Figure 6.10 – Structure of a lymph node.

Lymph Nodes

- House lymphocytes and antibodies
  - Remove pathogens and cell debris from lymph as it passes through
  - Trap and destroy cells from cancerous tumors

Sites for Lymph Nodes

NameLocationDrains fluid from:

Axillary ArmpitsArms

Cervical NeckHead and neck

Inguinal GroinLegs and pelvis

Mediastinal ChestWithin chest cavity

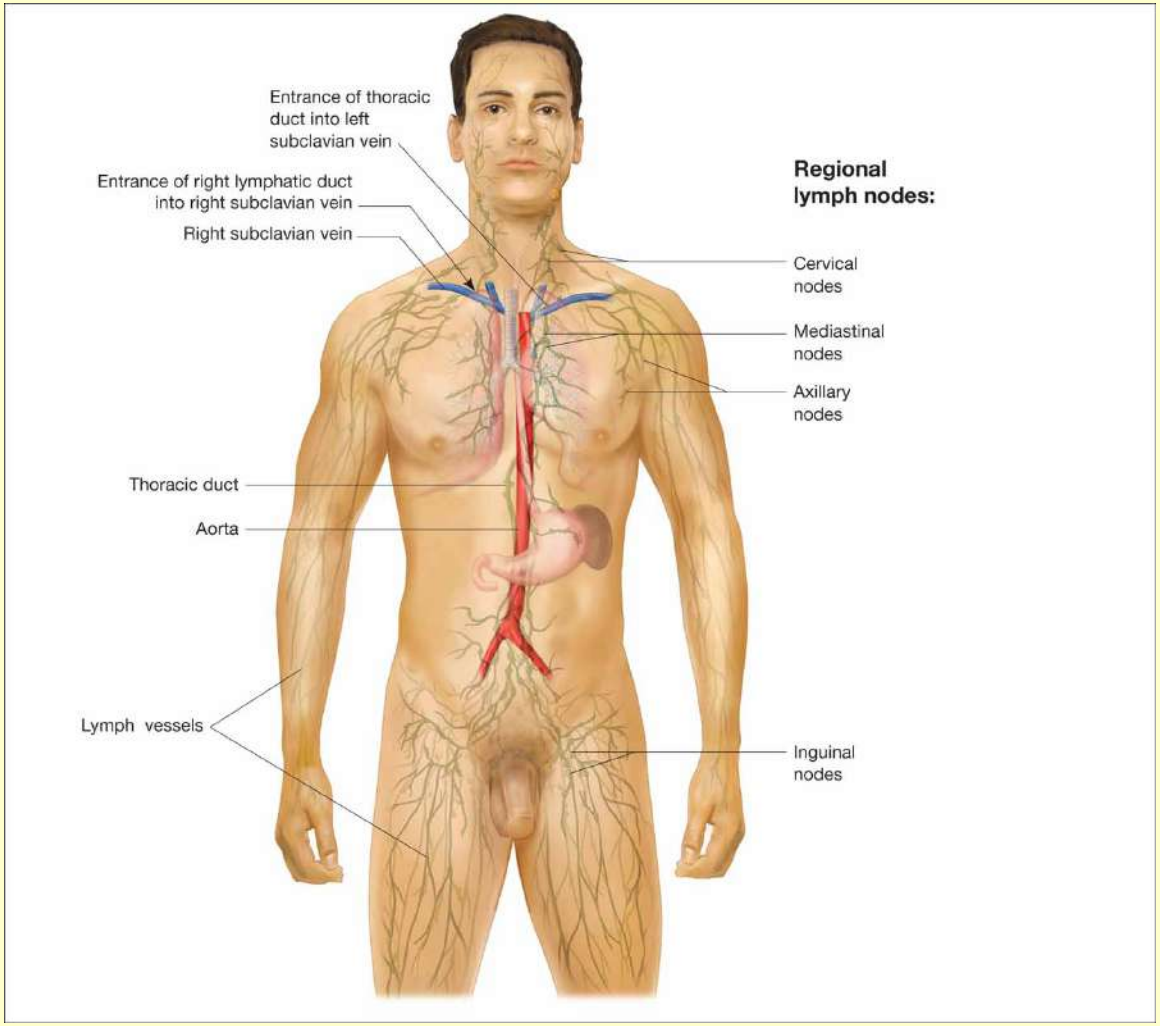


Figure 6.9 – Location of lymph vessels, lymphatic ducts, and areas of lymph node concentrations.

Tonsils

- Collections of lymphatic tissue located on each side of throat
- There are three sets of tonsils
  - Palatine tonsils
  - Pharyngeal tonsils (adenoids)
  - Lingual tonsils

Tonsils

- All contain a large number of leukocytes
  - Act as filters
  - Prevent invasion of pathogens through digestive or respiratory systems
- Not required for life and can safely be removed if they become a continuous site of infection

Spleen

- Located in LUQ of abdomen
- Consists of lymphatic tissue that is highly infiltrated with blood vessels
  - Vessels spread out into slow moving blood sinuses

Spleen

- Phagocytic macrophages line blood sinuses to remove pathogens
- Because blood is moving through slowly, macrophages have time to identify pathogens and worn out RBCs
- Filters out and destroys old red blood cells, recycling the iron
- Not an essential organ for life and may be removed due to injury or disease

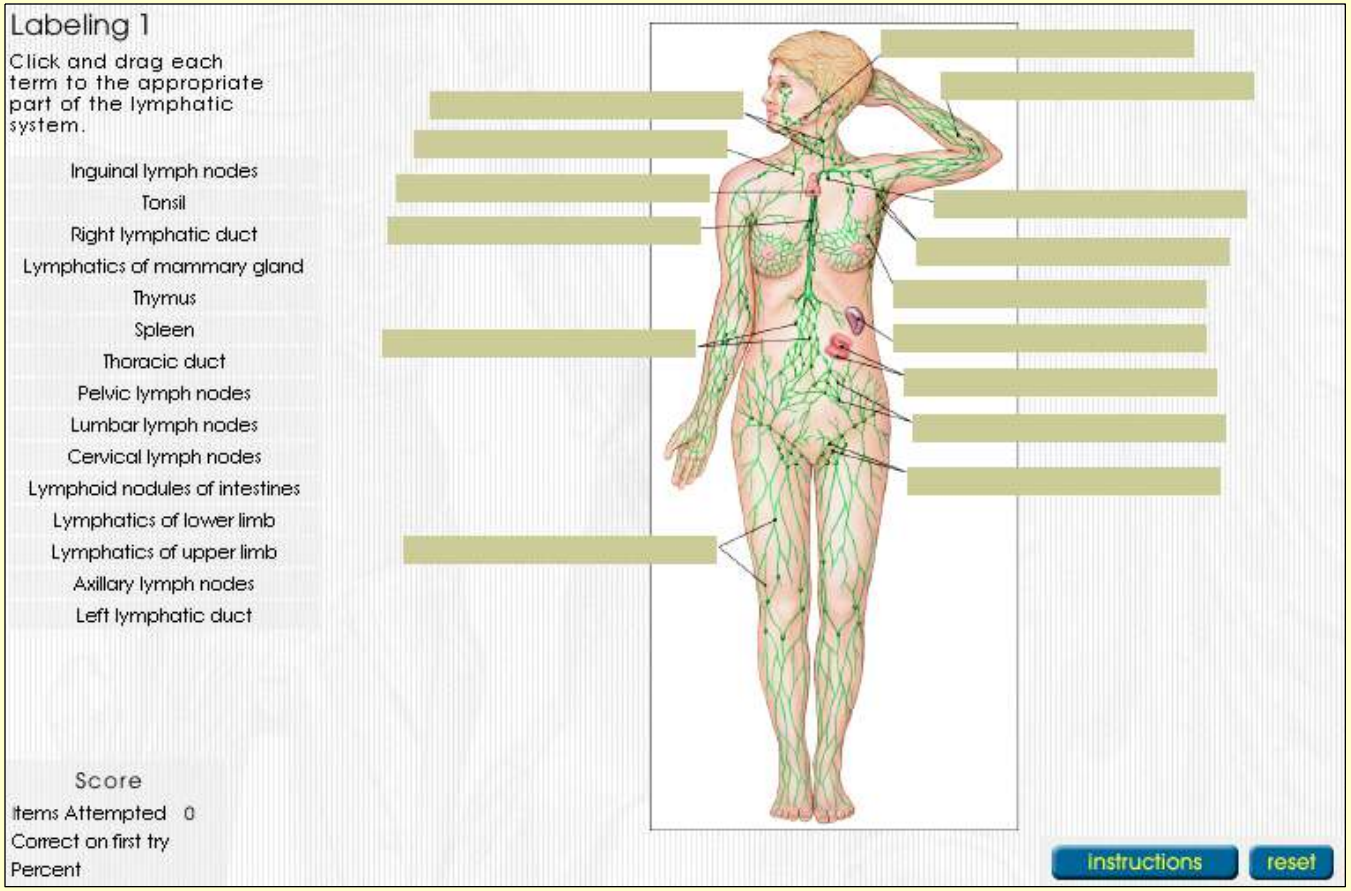
Thymus Gland

- Located in upper portion of mediastinum
- Secretes hormone, **thymosin**
  - Changes lymphocytes to **T lymphocytes** (simply called T cells)
- Active in unborn child and throughout childhood until adolescence, when it begins to shrink in size

Thymus Gland

- Essential for proper development of immune system
- Assists body with immune function and development of antibodies
- Important role in the immune response

Lymphatic System Exercise



Click here to review the lymphatic system in a labeling activity.

Immunity

- Body's ability to defend itself against pathogens
  - Bacteria, viruses, fungi, protozoans, toxins, cancerous tumors
- Two forms
  - **Natural immunity**
  - **Acquired immunity**

Natural Immunity

- Also called **innate immunity**
- Not specific to a particular disease
- Doesn't require prior exposure to pathogen
- Example:
  - **Macrophage**
  - WBCs that ingest any pathogen encountered

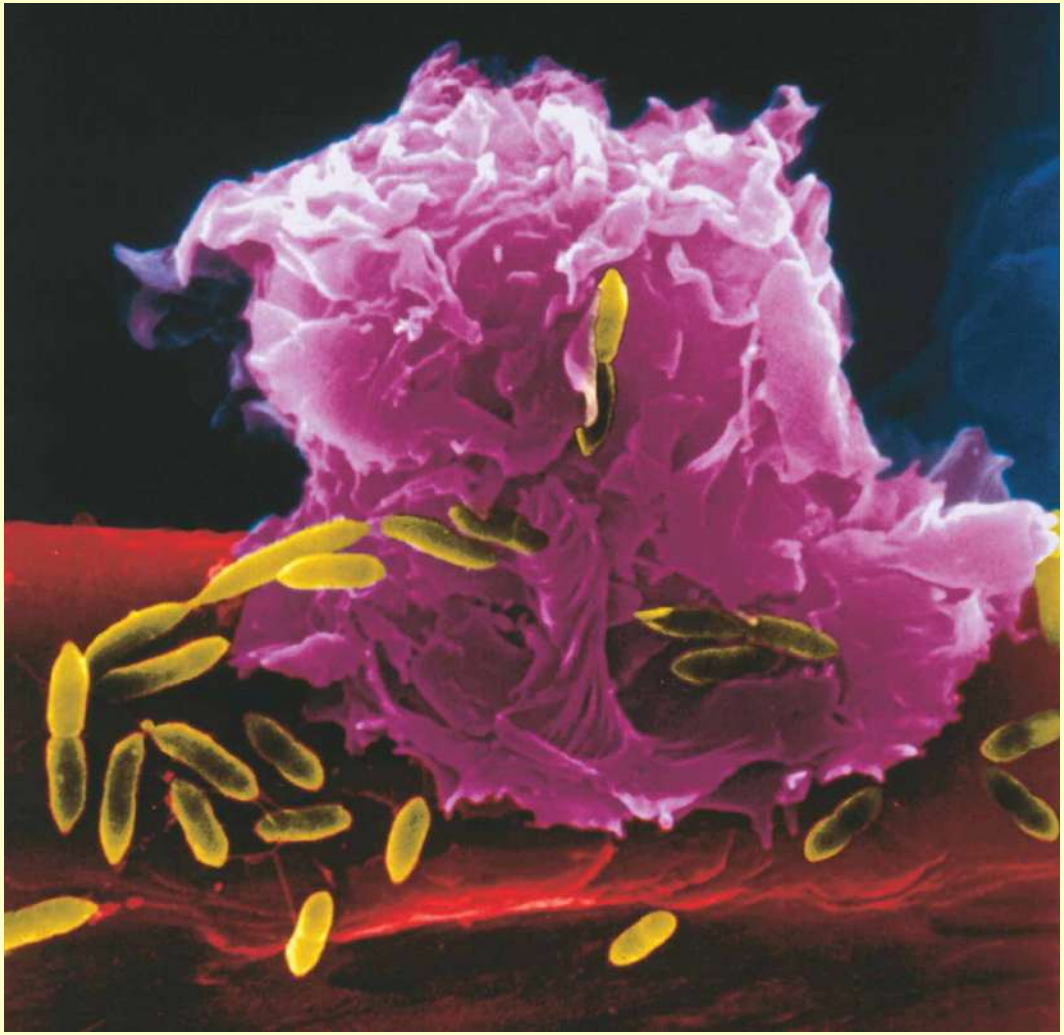


Figure 6.14 – Enhanced photomicrograph showing a macrophage (purple) attacking bacillus *Escherichia coli* (yellow).

Acquired Immunity

- Body's response to a specific pathogen
- May be either:
  - **Passive acquired immunity**
  - **Active acquired immunity**

Acquired Immunity

- Passive acquired immunity
  - Results when a person receives protective substances produced by another human or animal
  - Examples: maternal antibodies, antitoxin
- Active acquired immunity
  - Develops following direct exposure to pathogen
  - Stimulates immune response – series of mechanisms designed to neutralize pathogen
  - **Immunizations** or **vaccinations** are special types of active acquired immunity

Immune Response

- Disease-causing agents called **antigens** stimulate immune response
- Two distinct and different processes
  - **Humoral immunity** (also called antibody-mediated immunity)
  - **Cellular immunity** (also called cell-mediated immunity)

Humoral Immunity

- Involves production of **B lymphocytes**
  - Also called B cells
  - Respond to antigens by producing a protective protein, an **antibody**
  - Antibodies combine with antigen to form **antigen-antibody complex**
  - Targets pathogen for **phagocytosis**
  - Prevents infectious agent from damaging healthy cells

Cellular Immunity

- Involves production of T cells and **natural killer cells** (NK)
- These defense cells are **cytotoxic**
  - Physically attack and destroy pathogenic cells

Standard Precautions

- There are a large number of pathogens in a hospital setting
  - **Nosocomial infection** – acquired in the hospital
  - **Cross infection** – pathogen acquired from another person
  - **Reinfection** – becomes infected again with same pathogen
  - **Self-inoculation** – pathogen from one part of patient's body spreads to another part of body

Summary of Standard Precaution Guidelines

1. Wash hands before putting on and after removing gloves and before and after working with patient or equipment.
2. Wear gloves when in contact with any body fluid, mucous membrane, or non-intact skin or if you have chapped hands, a rash, or open sores.
3. Wear nonpermeable gown or apron during procedures that are likely to expose you to any body fluid, mucous membrane, or non-intact skin.

Summary of Standard Precaution Guidelines

4. Wear mask and protective eyewear or a face shield when patients are coughing or if body fluid droplets or splashes are likely.
5. Wear face mask and eyewear that seal close to the face during procedures that cause body tissues to be vaporized.
6. Remove for proper cleaning any shared equipment that has come into contact with body fluids, mucous membrane, or non-intact skin.

Word Building with adenoid/o & immun/o

–ectomy	adenoidectomy	surgical removal of adenoids
–itis	adenoiditis	inflammation of adenoids

–logist	immunologist	immunity specialist

Word Building with lymph/o

aden/o –ectomy	lymphadenectomy	surgical removal of lymph gland
aden/o –pathy	lymphadenopathy	lymph gland disease
angi/o –gram	lymphangiogram	record of lymph vessel
angi/o –oma	lymphangioma	lymph vessel tumor
–oma	lymphoma	lymphatic tumor
–tic	lymphatic	pertaining to lymph

Word Building with path/o & splen/o

–genic	pathogenic	disease producing
–logy	pathology	study of disease

–ectomy	splenectomy	surgical removal of spleen
–megaly	splenomegaly	enlarged spleen

Word Building with thym/o & tonsill/o

–ectomy	thymectomy	surgical removal of thymus
–oma	thymoma	thymus tumor

–ar	tonsillar	pertaining to tonsils
–ectomy	tonsillectomy	surgical removal of tonsils
–itis	tonsillitis	inflammation of tonsils

Lymphatic & Immune Vocabulary

allergen	antigen causing an allergic reaction
allergist	physician who specializes in testing for and treating allergies
allergy	hypersensitivity to a common substance
autoimmune disease	disease resulting from immune system attacking its own body is if a pathogen; examples include rheumatoid arthritis and systemic lupus erythematosus

Lymphatic & Immune Vocabulary

hives	appearance of wheals as part of allergic reaction
human immunodeficiency virus (HIV)	virus that causes AIDS; known as a retrovirus
immunocompromised	immune system that does not function properly; also called immunodeficiency disorder
immunoglobins	antibodies; assist in protecting the body

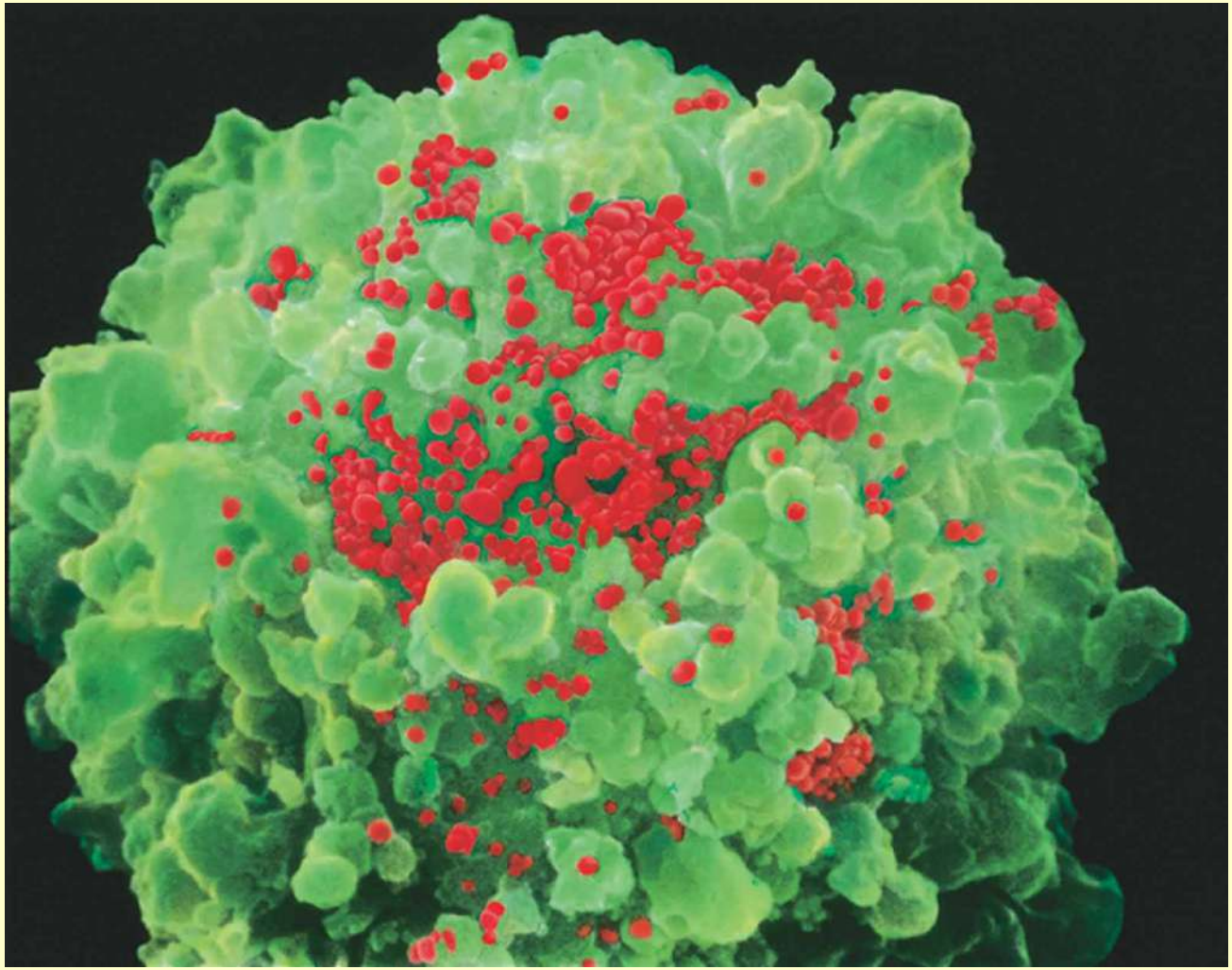


Figure 6.15 – Color enhanced scanning electron micrograph of HIV virus (red) infecting T-helper cells (green).

(NIBSC/Science Photo Library/Photo Researchers, Inc.)

Lymphatic & Immune Vocabulary

immunology	branch of medicine concerned with treating immune system disorders
inflammation	tissues' response to injury; redness, pain, swelling, and feeling hot to touch
lymphedema	excessive tissue fluid due to blocked lymphatic flow
opportunistic infection	infection appearing in immunocompromised person
urticaria	severe itching associated with hives

Figure 6.16 – Inflammation as illustrated by cellulitis of the arm. Note that the area is red and swollen. It is also painful and hot to touch.

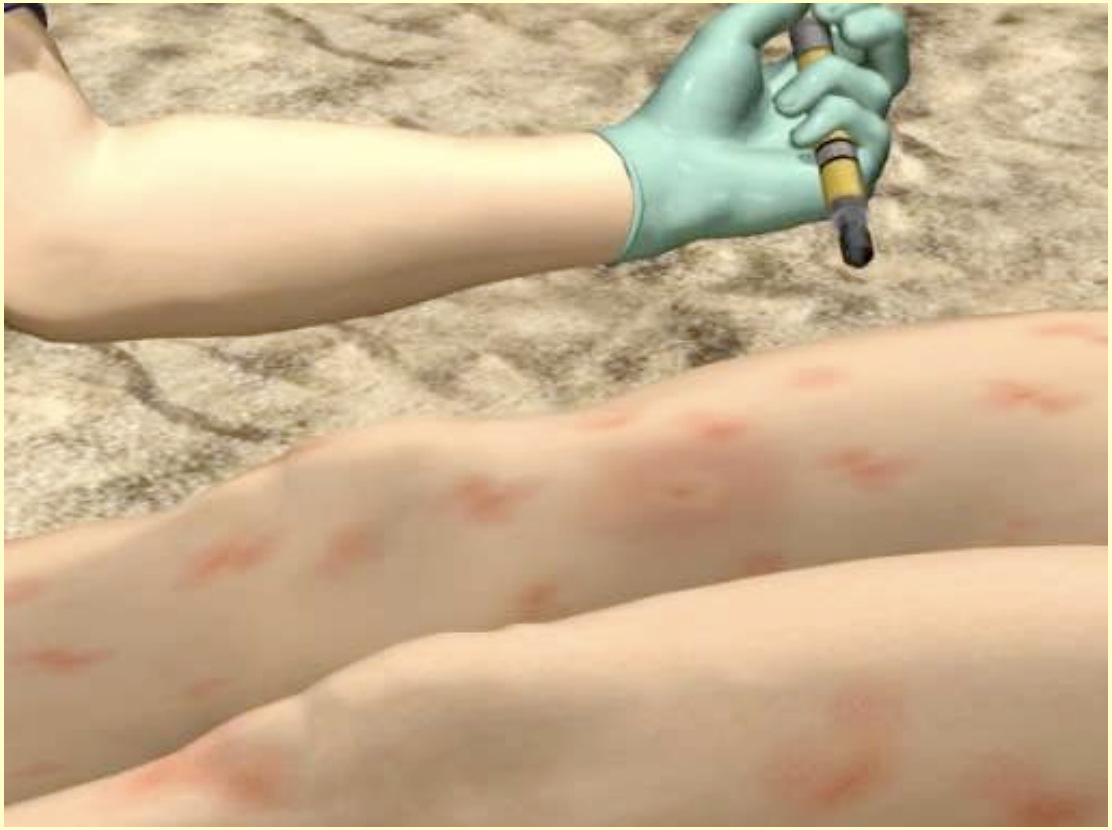
Inflammation Video

Click here to view a video on the topic of inflammation.

Allergic Reactions

anaphylactic shock	life-threatening condition from severe allergic reaction; circulatory and respiratory problems occur; also called anaphylaxis

Anaphylaxis Animation



Click here to view an animation on anaphylaxis.

Lymphatic System Pathology

elephantiasis	inflammation and obstruction of lymph vessels; results in enlarged tissues due to edema
Hodgkin's disease (HD)	cancer of the lymphatic cells found in concentration in lymph nodes
lymphadenitis	inflammation of lymph nodes; commonly called swollen glands

Figure 6.17 – Late-stage Hodgkin's disease with tumor eroding skin above cancerous lymph node.

Lymphatic System Pathology

mononucleosis (mono)	acute viral infection with large number of atypical lymphocytes
non-Hodgkin's lymphoma (NHL)	cancer of the lymphatic tissues other than Hodgkin's lymphoma

Immune System Pathology

acquired immunodeficiency syndrome (AIDS)	defect in cell-mediated immunity; result of final stages of HIV infection
AIDS-related complex (ARC)	early stage of AIDS; mild symptoms; weight loss, fatigue, anorexia
graft vs. host disease (GVHD)	complication of bone marrow transplant; immune cells from donor marrow attack recipient's body

AIDS Video

Click here to view a video on AIDS and HIV.

Immune System Pathology

Kaposi's sarcoma (KS)	skin cancer seen in AIDS patients; brownish-purple skin lesions
Pneumocystis carinii pneumonia (PCP)	common in AIDS patients; an opportunistic infection
sarcoidosis	autoimmune disease; forms fibrous lesions in multiple organs of body
severe combined immunodeficiency syndrome (SCIDS)	genetic disorder; born without a functioning immune system

Clinical Laboratory Tests

enzyme-linked immunosorbent assay (ELISA)	blood test for an antibody to AIDS virus; positive test means person has been exposed to virus
Western blot	used as a backup to ELISA test for HIV

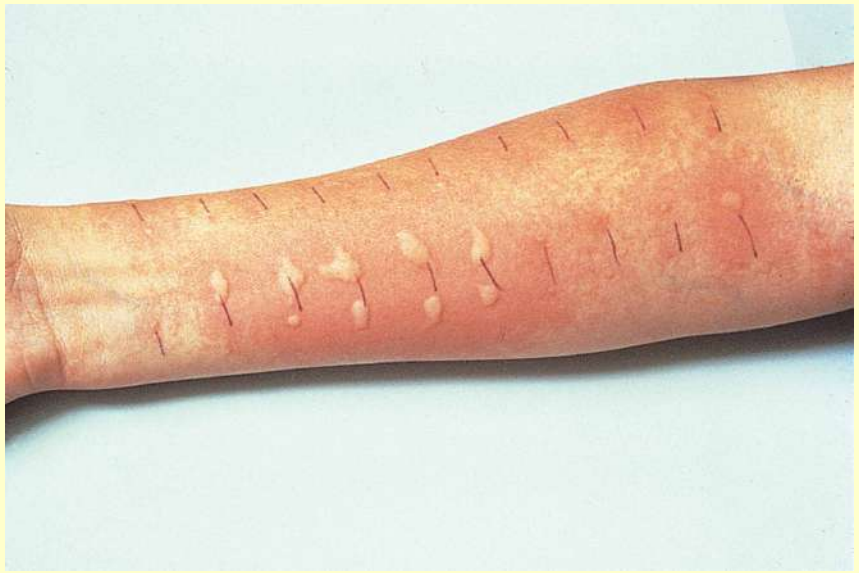
Diagnostic Imaging

lymphangiography	X-ray taken after injection of dye

Additional Diagnostic Procedures

Monospot	test for mononucleosis
scratch test	allergy testing in which body is exposed to allergens through light scratch in skin

A



B

Figure 6.18 – A) Scratch test; patient is exposed to allergens through light scratch in the skin. B) Positive scratch test results. Inflammation indicates person is allergic to that substance.

(James King-Holmes/Science Photo Library/Photo Researchers, Inc.)

Medical Procedures

immunotherapy	patient receives immunoglobulin injection or antibodies to treat a disease
vaccination	exposure to weakened pathogen to stimulate immune response; person will then be able to fight off pathogen if exposed to it in the future; also called immunization

Surgical Procedures

lymphadenectomy	surgical removal of a lymph node; done to test for malignancy or metastasis

Lymphatic and Immune Pharmacology

antihistamine	blocks histamine release during allergic reaction	Zyrtec, Benadryl
corticosteroids	anti-inflammatory; used to treat autoimmune diseases	prednisone, Solu-Medrol
immuno-suppressants	blocks immune system; prevents rejection of transplant	CellCept, Neoral

Lymphatic and Immune Pharmacology

protease inhibitor drugs	inhibits protease, enzyme needed for viruses to reproduce	Crixivan, Fortovase
reverse transcriptase inhibitor drugs	inhibits reverse transcriptase, enzyme needed for viruses to reproduce	Epivir, Retrovir

Lymphatic and Immune Abbreviations

AIDS	acquired immunodeficiency syndrome
ARC	AIDS-related complex
ELISA	enzyme-linked immunosorbent assay
GVHD	graft vs. host disease
HD	Hodgkin's disease
HIV	human immunodeficiency virus

Lymphatic & Immune Abbreviations

Ig	immunoglobulin
KS	Kaposi's sarcoma
mono	mononucleosis
NHL	non-Hodgkin's lymphoma
NK	natural killer cells
PCP	*Pneumocystis carinii* pneumonia
SCIDS	severe combined immunodeficiency syndrome