MEDICAL TERMINOLOGY · STUDY GUIDE

Exam 4 Study Guide

This guide covers chapters 7 and 8. The heart chapter gives you the roots for layers, chambers, valves and vessels, then the words for blocked flow, pump failure, rhythm problems, tests, operations and drug classes. The blood chapter names every formed element, the anemias and clotting words, the lymphatic structures and the language of immunity. Work one chapter at a time. Read the "what to know" paragraphs, copy the tables out by hand, then try each worked case with the steps covered. Finish each chapter with its ten self-test items. The cram sheet at the end puts the roots, look-alikes and abbreviations in one place.

WHAT THIS GUIDE COVERS

- Chapter 7 · cardi/o vs coron/o; heart layers, chambers, septa and valves; stenosis vs regurgitation; vessel roots; arteri/o, ather/o, arthr/o; ischemia, infarction, thrombus, embolus; heart failure and rhythm words; ECG and echo; procedures; drug endings; chart abbreviations.
- Chapter 8 · hem/o, hemat/o and -emia; plasma vs serum; -poiesis and -blast; red cell descriptors and the anemias; white cell types and -phil; clotting and bleeding words; lymph, lymph vessel and node; spleen, thymus, tonsils; antigen and antibody; four kinds of immunity; lab abbreviations.

CHAPTER 7

The Cardiovascular System

Read it in full: **Chapter 7 in the textbook**. Practice it in the lab: **The Heart Wall Forge** and **The Vessel Root Untangler**.

What to know

Cardi/o (Greek) means heart and does most clinical work: cardiomegaly (enlarged heart), cardiomyopathy (heart muscle disease), tachycardia and bradycardia. The adjective is cardiac, with -ac. **Coron/o** means crown and names the arteries that circle and feed the heart. Coronary

artery disease (CAD) is about the plumbing; cardiomyopathy and heart failure are about the pump. A patient can have one without the other.

The wall has three layers named by prefixes: **endocardium** (within, the lining the blood touches), **myocardium** (muscle, from the combining form my/o) and **epicardium** (upon, the outer surface). The **pericardium** is the sac around the heart, holding about 15 to 50 mL of fluid. Endocarditis is often bacteria on a damaged valve; myocarditis is often viral; pericarditis gives sharp chest pain that eases when leaning forward. Fluid that squeezes the heart is cardiac tamponade, drained by pericardiocentesis.

Two atria receive and two ventricles pump. Atrium becomes atria. Septa divide them, and a hole is an ASD or VSD. Four valves keep flow one way: tricuspid (right atrium to right ventricle), **mitral or bicuspid** (left atrium to left ventricle), and the two semilunar valves, pulmonary and aortic. A valve that will not open fully is **stenotic** (aortic stenosis). One that will not close fully leaks backward: **regurgitation** or insufficiency. Cusps that balloon back are a prolapse (MVP). Turbulent flow is a murmur, systolic or diastolic. The SA node is the pacemaker; the AV node delays the signal. Ventricul/o also names brain ventricles, so context matters.

Vessel roots: **angi/o** (any vessel, Greek) and **vas/o**, **vascul/o** (Latin). Vas/o can also mean duct (vasectomy). Arteries (arteri/o) carry blood **away from** the heart and veins carry it **toward** it, whatever the oxygen level: the pulmonary artery carries oxygen-poor blood. Veins have ven/o (Latin, anatomy: venipuncture, intravenous) and phleb/o (Greek, pathology: phlebitis, phlebotomy). The smallest vessels take -ole and -ule: arterioles and venules. The aorta is aort/o.

PTCA decodes as percutaneous (through the skin) transluminal (across the lumen) coronary angioplasty (vessel reshaping). A hemangioma is a benign vessel growth. Thrombophlebitis is an inflamed vein with a clot. An anastomosis is a connection between vessels. A varix is one enlarged twisted vein; varices is the plural, varicose the adjective, and a varicocele is dilated scrotal veins. **Arteri/o** is artery, **ather/o** is fatty plaque and **arthr/o** is joint: arteriosclerosis is hardening of artery walls from any cause; atherosclerosis is the plaque disease behind most heart attacks and strokes.

Systole is contraction and diastole is relaxation; BP 128/76 is systolic over diastolic. A **sphygmomanometer** is sphygm/o (pulse) + man/o (pressure) + -meter. -tension is pressure. Orthostatic hypotension is a drop on standing. Claudication is cramping leg pain on walking from arterial insufficiency. Cyanosis, pallor, edema and slow capillary refill are signs of poor perfusion.

Ischemia (isch/o, hold back, + -emia) is blood held back from tissue and can be reversed. **Infarction** is tissue death after long enough ischemia; an MI is death of heart muscle. A **thrombus** forms and stays; an **embolus** travels and lodges (a clot, but also fat, air or amniotic fluid). A DVT becomes a PE when a piece breaks off and reaches the lung. Plurals: thrombi, emboli. An aneurysm is a bulge in a weak artery wall (AAA, "triple A"); a dissection is a tear between layers. **Angina** comes from Latin angere, to choke, and is not built on angi/o.

Heart failure (HF, formerly CHF): left-sided failure backs blood into the lungs (pulmonary edema, dyspnea, orthopnea, PND); right-sided failure backs it into the body (peripheral edema, JVD, hepatomegaly, ascites). Cor pulmonale is right-sided failure from lung disease. Ejection fraction (EF) is the share of blood pushed out each beat: HFrEF is reduced, HFpEF is preserved. Arrhythmia literally means "no rhythm," so dysrhythmia (abnormal rhythm) is more accurate. Atrial fibrillation is a stroke risk; ventricular fibrillation is an arrest rhythm; flutter is fast but organized; asystole is no contraction.

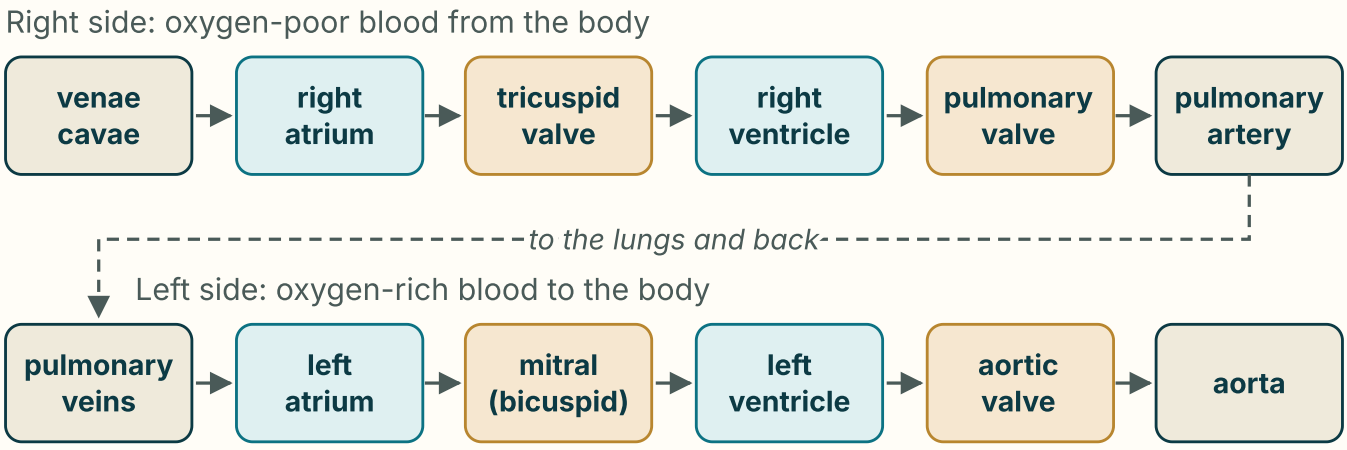
Congenital defects are named by anatomy: ASD, VSD, PDA (patent, meaning open, ductus arteriosus), coarctation (narrowing) of the aorta and tetralogy of Fallot (four defects). PAD is atherosclerosis of limb arteries. Assessment: auscultation is listening, palpation is feeling; S1 and S2 are the normal sounds; S3 and S4 are a gallop; a murmur you can feel is a thrill; a **bruit** is turbulent flow over an artery. The apical pulse is at about the fifth intercostal space, midclavicular line.

Tests: the **electrocardiogram** (ECG or EKG) is the record, the electrocardiograph the machine and electrocardiography the process. P wave is atrial depolarization, QRS ventricular depolarization, T wave ventricular repolarization; ST elevation defines a STEMI. Telemetry is remote monitoring; a Holter monitor records for 24 hours. Echocardiography uses sound: TTE through the chest wall, TEE through the esophagus. Troponin confirms heart muscle injury, BNP

rises with ventricular stretch, D-dimer helps rule out clots, INR monitors warfarin, ABI grades peripheral artery disease.

Procedures: angioplasty (often with a stent), valvuloplasty, **endarterectomy** (removing plaque from the artery lining), atherectomy, thrombectomy, embolectomy, thrombolysis (dissolving a clot with a drug). CABG ("cabbage") routes blood around a block with a graft. TAVR replaces the aortic valve by catheter. A pacemaker treats slow rates; an ICD treats lethal rhythms. Cardioversion is a timed shock; defibrillation is untimed. Drug endings: **-olol** beta blocker, **-pril** ACE inhibitor, **-sartan** angiotensin receptor blocker, **-dipine** calcium channel blocker, **-statin** lowers LDL, **-parin** heparin-family anticoagulant. Anticoagulants block the clotting cascade, antiplatelets stop platelet clumping and thrombolytics dissolve a formed clot. PVD, MS and MI can each mean two things, so write them out.

One-way flow: chambers (boxes) and the valves that guard them (gold)



The pulmonary artery carries oxygen-poor blood: arteries are named for direction (away from the heart), not for oxygen. A valve that will not open is stenotic; one that will not close regurgitates.

Follow the blood, and the valve names fall into place. Tri- has three cusps and the mitral (bi-) has two; the two semilunar valves guard the exits.

LOCK THESE IN

- Cardi/o is the heart; coron/o is the crown of arteries that feed it.
- Endocardium inside, myocardium muscle, epicardium on the surface, pericardium the sac.
- Stenosis will not open; regurgitation will not close. Mitral is bicuspid.
- Arteries go away from the heart, veins toward it, regardless of oxygen.
- Arteri/o artery, ather/o plaque, arthr/o joint. Angina is not angi/o.
- Ischemia is reversible; infarction is death. A thrombus stays; an embolus travels.
- -graph machine, -graphy process, -gram record.
- -olol, -pril, -sartan, -dipine, -statin, -parin.

Word parts for the heart and vessels

Word part	Meaning	Example term	What it means
cardi/o; -cardia	heart; heart condition	cardiomegaly; bradycardia	enlarged heart; slow rate
coron/o	crown; heart's own arteries	coronary	of the arteries that feed the heart muscle
atri/o, ventricul/o	upper, lower chamber	atrial, ventriculography	of an atrium; ventricle imaging
sept/o, valv/o, valvul/o	wall, valve	septal defect, valvuloplasty	hole in a wall; valve repair
apic/o	apex	apical pulse	pulse at the heart tip
endo-, epi-, peri-	within, upon, around	endocardium, epicardium, pericardium	the layers and sac
angi/o; vas/o, vascul/o	vessel	angioplasty; vasculitis	vessel reshaping; vessel inflammation
arteri/o, arteriol/o	artery, small artery	arteriography, arteriolar	artery imaging; of arterioles
ven/o, phleb/o, venul/o	vein, small vein	venipuncture, phlebitis	puncturing a vein; inflamed vein
aort/o, lumin/o	aorta, lumen	aortic, transluminal	of the aorta; across the lumen
sphygm/o, man/o, -tension	pulse, pressure	sphygmomanometer, hypertension	BP cuff; high pressure

Word part	Meaning	Example term	What it means
isch/o	hold back	ischemia	reduced blood supply
ather/o	fatty plaque	atheroma, atherectomy	plaque; plaque removal
thromb/o, embol/o	clot, plug	thrombosis, embolism	clot forming; blockage by a traveling plug
varic/o	twisted vein	varicocele	dilated scrotal veins
-stenosis, -sclerosis, -ectasis, -rrhexis	narrow, harden, dilate, rupture	angiostenosis, angiectasis, angiorrhexis	vessel conditions
electr/o, echo-, son/o, tele-	electricity, reflected sound, sound, distant	electrocardiogram, echocardiogram, telemetry	heart tests
steth/o, ox/i	chest, oxygen	stethoscope, hypoxia	listening tool; low tissue oxygen

Cardiac abbreviations and drug endings

Item	Meaning	Note
MI, ACS, CAD	myocardial infarction, acute coronary syndrome, coronary artery disease	MI once also meant mitral insufficiency
STEMI, NSTEMI	ST-elevation or non-ST-elevation MI	read from the ECG
HF (CHF), EF	heart failure, ejection fraction	HFrEF vs HFpEF
AF, VF, VT, SVT	atrial and ventricular fibrillation, ventricular and supraventricular tachycardia	rhythm problems
PVC, PAC	premature ventricular or atrial contraction	early extra beats
DVT, PE, AAA	deep vein thrombosis, pulmonary embolism, abdominal aortic aneurysm	clot and bulge
PAD (PVD), JVD	peripheral artery disease, jugular venous distention	PVD can mean an eye condition too
ASD, VSD, PDA, MVP	septal defects, patent ductus arteriosus, mitral valve prolapse	structural
PCI, PTCA, CABG, TAVR	catheter and surgical treatments	CABG said "cabbage"
ICD, AED, CPR, LVAD	implanted and external defibrillators, resuscitation, assist device	rescue devices
TTE, TEE, ABI, BNP	echo through chest, through esophagus; ankle-brachial index; natriuretic peptide	tests
-olol; -pril; -sartan	beta blocker; ACE inhibitor; angiotensin receptor blocker	metoprolol; lisinopril; losartan
-dipine; -statin; -parin	calcium channel blocker; LDL lowering; heparin family	amlodipine; atorvastatin; enoxaparin

Worked cases

WORKED CASE 1 · DECODING A LONG PROCEDURE NAME

Mr. Bello's chart says PTCA. Write out and decode each part.

STEP 1 · EXPAND IT

Percutaneous transluminal coronary angioplasty.

STEP 2 · SPLIT THE FIRST WORD

per- (through) + cutane/o (skin) + -ous: through the skin.

STEP 3 · THE SECOND AND THIRD

trans- (across) + lumin/o (lumen): along the inside of the vessel. Coronary: the heart's own arteries.

STEP 4 · THE LAST WORD

angi/o (vessel) + -plasty (repair or reshaping).

ANSWER

Reopening a coronary artery from inside, through the skin, usually with a balloon and stent.

WORKED CASE 2 · THROMBUS OR EMBOLUS

A clot forms in Ms. Laine's calf vein. Days later she is short of breath and a clot is found in her lung. Name both.

STEP 1 · THE FIRST CLOT

It formed and stayed in a deep leg vein: a thrombus, so deep vein thrombosis (DVT).

STEP 2 · THE SECOND EVENT

A piece traveled and lodged in the lung: an embolus, so pulmonary embolism (PE).

ANSWER

Same clot, two words: **DVT, then PE**. The difference is whether it moved.

WORKED CASE 3 · READING A MEDICATION LIST BY CLASS

A list reads metoprolol, lisinopril, atorvastatin, enoxaparin. Name each class.

STEP 1 · FIND THE ENDINGS

-olol, -pril, -statin, -parin.

STEP 2 · MATCH EACH

Beta blocker; ACE inhibitor; LDL-lowering statin; heparin-family anticoagulant.

CHECK

None of these "thins" blood. Enoxaparin is an anticoagulant; it does not dissolve a clot the way a thrombolytic does.

WORKED CASE 4 · LEFT OR RIGHT HEART FAILURE

A note lists JVD, ankle edema, hepatomegaly and ascites. Which side is failing?

STEP 1 · FOLLOW THE BACKUP

Each sign is fluid backing up into the body's veins, not the lungs.

STEP 2 · MATCH THE SIDE

Left-sided failure backs into the lungs; right-sided failure backs into the body.

ANSWER

Right-sided heart failure. Lung crackles, orthopnea and PND would point to the left side.

TRAPS PEOPLE FALL INTO

- **Reading coronary as "of the heart."** It means the arteries that feed the heart. CAD is plumbing; HF is the pump.
- **Defining arteries by oxygen.** The pulmonary artery carries oxygen-poor blood. Direction defines an artery.
- **Treating atherosclerosis and arteriosclerosis as synonyms.** Plaque disease vs hardening of the wall from any cause.
- **Building angina from angi/o.** Angina means choking or strangling, not vessel.
- **Swapping stenosis and regurgitation.** Will not open vs will not close.
- **Mixing -graph, -graphy and -gram.** If the question asks for the record, the answer ends in -gram.
- **Calling every anticoagulant a clot dissolver.** Anticoagulants and antiplatelets prevent; thrombolytics dissolve.
- **Writing atriums or thrombuses.** Atria, thrombi, emboli, apices, varices, venae cavae.

Chapter 7 self-test · ten items

1. Which layer of the heart wall is the thick muscle that contracts?

A. Endocardium
B. Epicardium
C. Myocardium
D. Pericardium

C. Myocardium My/o is muscle. The endocardium lines the chambers, the epicardium is the surface and the pericardium is the sac.

2. A valve that cannot close fully and leaks backward shows:

A. Regurgitation
B. Stenosis
C. Coarctation
D. Ischemia

A. Regurgitation Regurgitation, or insufficiency, is backward leak. Stenosis is a valve that will not open fully.

3. Which valve sits between the left atrium and left ventricle?

A. Mitral (bicuspid)
B. Tricuspid
C. Aortic semilunar
D. Pulmonary semilunar

A. Mitral (bicuspid) The mitral valve has two cusps. The tricuspid sits on the right side, and the semilunar valves guard the exits.

4. Which statement about the pulmonary artery is true?

A. It carries oxygen-rich blood back to the heart
B. It carries oxygen-rich blood to the body
C. It returns blood from the body to the heart
D. It carries oxygen-poor blood away from the heart

D. It carries oxygen-poor blood away from the heart Arteries are defined by direction. The pulmonary artery carries oxygen-poor blood from the right ventricle to the lungs.

5. Which root means fatty plaque?

A. arteri/o
B. ather/o
C. arthr/o
D. angi/o

B. ather/o Ather/o, from the Greek for gruel, is plaque. Arteri/o is artery, arthr/o is joint and angi/o is vessel.

6. Blood held back from a tissue, still reversible, is called:

A. Infarction
B. Ischemia
C. Necrosis
D. Embolism

B. Ischemia Isch/o means to hold back. Infarction and necrosis mean the tissue has died.

7. Which test result defines a STEMI?

A. A raised BNP in the blood
B. ST elevation on the ECG
C. A low ejection fraction
D. A positive D-dimer result

B. ST elevation on the ECG STEMI is ST-elevation myocardial infarction, read from the ECG tracing.

8. A drug named valsartan belongs to which class?

A. ACE inhibitor
B. Beta blocker
C. Calcium channel blocker
D. Angiotensin receptor blocker

D. Angiotensin receptor blocker -sartan marks an angiotensin receptor blocker. ACE inhibitors end in -pril and beta blockers in -olol.

9. Which procedure strips plaque from the inner lining of an artery?

A. Embolectomy
B. Thrombolysis
C. Endarterectomy
D. Valvuloplasty

C. Endarterectomy End- (within) + arter + -ectomy (removal). Embolectomy removes a traveling clot.

10. What is the plural of varix?

A. Varices
B. Varixes
C. Varici
D. Varixae

A. Varices -ix becomes -ices: varix to varices, said VAR-ih-seez.

CHAPTER 8

Blood, the Lymphatic System and Immunity

Read it in full: **Chapter 8 in the textbook**. Practice it in the lab: **The Blood Term Forge** and **Fluid, Vessel or Node?**.

What to know

Blood has two equal roots, **hem/o** and **hemat/o**, which sit at the front of a term (hemoglobin, hematoma). The suffix **-emia** sits at the end and means a substance in the blood: hyperkalemia, bacteremia, uremia, anemia. Watch which end the blood idea sits on: hematuria is blood in the urine; uremia is urea in the blood. A hematoma is clotted blood, not a tumor. Hemolysis is red cell destruction. **Hemostasis** (-stasis, stopping) is the body stopping bleeding; hemorrhage is the opposite.

Spun blood separates. About 55% is **plasma**, the liquid with clotting factors still in it. About 45% is packed red cells: that share is the **hematocrit** (hemat/o + -crit, to separate). The buffy coat of white cells and platelets is under 1%. **Serum** is what is left after blood clots: plasma minus fibrinogen and other used clotting factors. Fresh frozen plasma replaces clotting factors; antibody tests run on serum (serology).

-poiesis is formation: hematopoiesis, erythropoiesis, leukopoiesis, thrombopoiesis. **Erythropoietin** (EPO) is made by the kidney and drives red cell production, which is why chronic kidney disease causes anemia. All blood cells start in red marrow, **myel/o**. -blast is an immature

cell; blasts on a smear suggest acute leukemia. A megakaryocyte (large nucleus cell) sheds platelets. My/o is muscle, myel/o is marrow or spinal cord, and myelin is the nerve sheath.

The red cell is the **erythrocyte**, a bag of hemoglobin. Size: microcytic, macrocytic, normocytic. Color (hemoglobin content): hypochromic, normochromic. **Anisocytosis** is unequal size; **poikilocytosis** is irregular shape; spherocytes are round; a drepanocyte is a sickle cell. Sider/o and ferr/o mean iron (ferritin stores it). A reticulocyte is a young red cell, and a rising count means the marrow is responding.

Anemia is a deficiency of red cells or hemoglobin, a finding rather than a diagnosis. Iron deficiency anemia is microcytic and hypochromic. Pernicious anemia is macrocytic, from B12 deficiency due to loss of intrinsic factor. Aplastic anemia is marrow failure, so all three lines fall. Hemolytic anemia destroys red cells and raises bilirubin, often with jaundice. Sickle cell disease is a hemoglobinopathy. **Polycythemia** is too many red cells; secondary polycythemia can follow chronic hypoxia, as in COPD. Hemochromatosis is iron overload. -penia is always too few; -osis on a cell root means too many.

White cells are **leukocytes**. Granulocytes are named by the dye they take, with **-phil** (attraction): **neutrophils** (neutral; first responders to bacteria; also segs, polys, PMNs; immature ones are bands, and more bands is a left shift), **eosinophils** (rosy dye; allergy and parasites) and **basophils** (basic dye; histamine). Agranulocytes are lymphocytes and **monocytes** (one nucleus), which become **macrophages** (large eaters) in tissue. Neutropenia after chemotherapy calls for an ANC and neutropenic precautions. Agranulocytosis is near-total loss of granulocytes, an emergency despite the -osis ending.

Leukemia is a malignancy of blood-forming tissue. Two axes name the four main types: acute (immature blasts, fast) or chronic (more mature cells, slow), and lymphocytic or myelogenous (myel/o + -genous, marrow-produced). That gives ALL, AML, CLL and CML.

A platelet is a **thrombocyte**: thrombocytopenia causes bleeding and thrombocytosis can cause clotting. Hemostasis is vessel spasm, platelet plug, then a fibrin mesh from the coagulation cascade (coagul/o). A **thrombus** stays; an **embolus** travels. Thrombosis is the condition of forming a clot, where -osis does not mean "more cells." Bleeding into skin: petechiae (pinpoint),

purpura (purple patches), ecchymosis (bruise), hematoma (a pocket with volume). Hemophilia is an inherited clotting factor deficiency. Fibrinolysis breaks down fibrin.

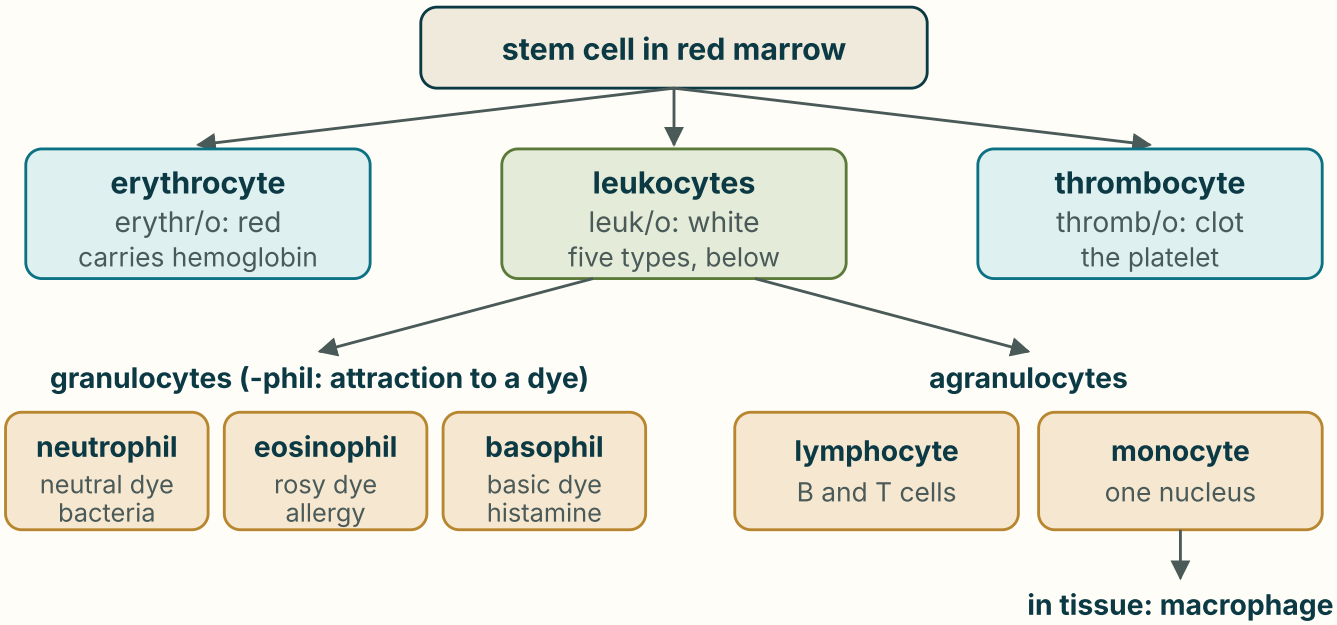
About three liters a day of fluid that leaks from capillaries does not go straight back into the veins; the lymphatic system collects it. In a lymphatic vessel it is **lymph** (lymph/o). Vessels are **lymphangi/o**; nodes are **lymphaden/o**; aden/o alone is any gland. Lymph returns to the blood through the thoracic duct and right lymphatic duct. There is no pump, so muscle action, breathing and valves move it. Lacteals absorb fat as milky chyle; chylothorax is chyle in the pleural space. The spleen (splen/o) filters blood; the thymus (thym/o) is where T cells mature; tonsil has one l but tonsillectomy has two.

Lymphadenopathy is enlarged nodes, a sign that needs a cause. Lymphadenitis is an inflamed node. **Lymphangitis** is an inflamed vessel, the red streak up a limb. Lymphedema is swelling from blocked drainage, as after axillary node removal, so that arm is protected from blood draws, BP cuffs and injections. Lymphoma is a malignancy of lymphocytes in lymphoid tissue: Hodgkin lymphoma (with Reed-Sternberg cells) and non-Hodgkin lymphoma. Splenomegaly occurs in mononucleosis; after splenectomy the patient needs vaccines against encapsulated bacteria.

Immun/o means protection. Innate immunity is nonspecific (skin, acid, fever, phagocytes). Adaptive immunity uses B cells (made in marrow; make antibodies) and T cells (mature in the thymus). An **antigen** provokes a response; an **antibody** (immunoglobulin) answers it. IgE drives allergy, IgM comes first in a new infection, and IgG is long-term and crosses the placenta. Active immunity is your own antibodies; passive is ready-made. Natural active is having the infection; artificial active is a vaccine; natural passive is maternal antibodies; artificial passive is an immune globulin shot.

Anaphylaxis is a severe whole-body IgE reaction treated with epinephrine. Autoimmune disease attacks self (lupus, RA, type 1 diabetes, myasthenia gravis). HIV destroys CD4 T cells; a CD4 count below 200 or an opportunistic infection means AIDS. Autologous tissue is the patient's own; allogeneic is from another person; graft-versus-host disease is donor cells attacking the recipient. O negative is the universal donor and AB positive the universal recipient. Tests: CBC, H&H, indices (MCV), diff, ANC, PT/INR (warfarin), aPTT (heparin), ESR, CRP, D-dimer, Coombs. Apheresis removes one component and returns the rest.

Every formed element starts in red marrow (myel/o)



Counts: -penia means too few (leukopenia); -osis on a cell root means too many (leukocytosis).

Name the cell, then add the count suffix. Each formed element has a color or job root, and -cyte, -blast, -poiesis, -penia and -osis attach to all of them.

LOCK THESE IN

- Hem/o and hemat/o at the front; -emia at the end. Hematuria vs uremia.
- Plasma keeps clotting factors; serum is what is left after clotting. Hematocrit is the red cell share.
- Microcytic hypochromic is iron deficiency; macrocytic is B12 (pernicious); aplastic is marrow failure.
- -penia too few; -osis on a cell root too many; agranulocytosis is a dangerous loss.
- Neutrophil, eosinophil, basophil (-phil, attraction); lymphocyte, monocyte to macrophage.
- Acute or chronic plus lymphocytic or myelogenous: ALL, AML, CLL, CML.
- Lymph/o fluid, lymphangi/o vessel, lymphaden/o node.
- Antigen provokes, antibody answers. IgE allergy, IgM first, IgG crosses the placenta.

Word parts for blood, lymph and immunity

Word part	Meaning	Example term	What it means
hem/o, hemat/o; -emia	blood; blood condition	hematology; bacteremia	study of blood; bacteria in blood
plasm/o, ser/o	plasma, serum	plasmapheresis, serology	plasma removal; serum antibody study
-poiesis, -poietin	formation, forming substance	hematopoiesis, erythropoietin	blood cell making; red cell hormone
-blast, -crit, -globin	immature cell, separate, protein	myeloblast, hematocrit, hemoglobin	young marrow cell; red cell share; oxygen protein
erythr/o, leuk/o, thromb/o	red, white, clot	erythrocyte, leukocyte, thrombocyte	the three formed elements
micr/o, macr/o, chrom/o	small, large, color	microcytic, hypochromic	small cells; pale cells
anis/o, poikil/o	unequal, irregular	anisocytosis, poikilocytosis	varied size; varied shape
spher/o, drepan/o	round, sickle	spherocyte, drepanocyte	round cell; sickle cell
sider/o, ferr/o, reticul/o	iron, iron, net	hemosiderin, ferritin, reticulocyte	iron pigment; iron store; young red cell
neutr/o, eosin/o, bas/o; -phil	neutral, rosy, basic; attraction	neutropenia, eosinophilia	too few neutrophils; too many eosinophils

Word part	Meaning	Example term	What it means
mon/o, phag/o, morph/o	one, eat, shape	monocyte, macrophage, polymorphonuclear	one nucleus; large eater; many-shaped nucleus
granul/o	granule	agranulocytosis	severe loss of granulocytes
coagul/o, fibrin/o, -stasis	clotting, fibrin, stopping	anticoagulant, fibrinolysis, hemostasis	against clotting; fibrin breakdown; bleeding stopped
purpur/o, -philia	purple, tendency	purpura, hemophilia	purple bleeding; clotting factor disorder
lymph/o, lymphangi/o, lymphaden/o	lymph, lymph vessel, lymph node	lymphedema, lymphangitis, lymphadenopathy	swelling; inflamed vessel; enlarged nodes
splen/o, thym/o, tonsill/o, chyl/o	spleen, thymus, tonsil, chyle	splenomegaly, thymectomy, tonsillitis, chylothorax	organ terms
immun/o, -gen, tox/o, -phylaxis	protection, producing, poison, protection	immunosuppression, pathogen, antitoxin, anaphylaxis	immune terms
auto-, allo-	self, other	autoimmune, allogeneic	attack on self; from another person

Hematology and immunology abbreviations

Abbreviation	Meaning
CBC, H&H	complete blood count; hemoglobin and hematocrit
WBC, RBC, PLT, diff	white cells, red cells, platelets; differential
MCV, MCH, MCHC, RDW	red cell indices; size variation
ANC	absolute neutrophil count
PT/INR, aPTT	clotting times that follow warfarin and heparin
ESR, CRP	sedimentation rate, C-reactive protein (inflammation)
T&C, PRBC, FFP	type and crossmatch; packed red cells; fresh frozen plasma
DIC, ITP, SCD	disseminated intravascular coagulation; immune thrombocytopenic purpura; sickle cell disease
ALL, AML, CLL, CML	acute or chronic lymphocytic or myelogenous leukemia
HL, NHL	Hodgkin and non-Hodgkin lymphoma
HSCT, BMT	hematopoietic stem cell transplant; bone marrow transplant
Ig, CD4, HIV, AIDS, SLE	immunoglobulin; T cell subset; virus and syndrome; lupus

Worked cases

WORKED CASE 1 · DECODING A CBC PHRASE

A note on Mr. Ruiz reads "pancytopenia with hepatosplenomegaly." Decode it.

STEP 1 · FIRST TERM

pan- (all) + cyt/o (cell) + -penia (too few): all three cell lines are low.

STEP 2 · SECOND TERM

hepat/o (liver) + splen/o (spleen) + -megaly (enlargement).

ANSWER

Low red cells, white cells and platelets, with an enlarged liver and spleen.

WORKED CASE 2 · NAMING AN ANEMIA FROM THE SMEAR

A smear shows small, pale red cells. Name the pattern and the classic cause.

STEP 1 · SIZE

Small is micr/o + -cytic: microcytic.

STEP 2 · COLOR

Pale means less hemoglobin: hypo- + chrom/o + -ic, hypochromic.

ANSWER

Microcytic hypochromic anemia, the classic picture of iron deficiency. Large cells would point to B12 deficiency.

WORKED CASE 3 · DECODING A LEUKEMIA ABBREVIATION

Spell out and explain CML.

STEP 1 · FIRST LETTER

C is chronic: more mature cells and a slower course.

STEP 2 · SECOND LETTER

M is myelogenous: myel/o (marrow) + -genous (produced by), the granulocyte line.

ANSWER

Chronic myelogenous leukemia, a slow cancer of the granulocyte line.

WORKED CASE 4 · WHICH KIND OF IMMUNITY

A newborn has antibodies from her mother; a week later her brother gets a tetanus immune globulin shot; their father gets a vaccine. Name each.

STEP 1 · WHO MADE THE ANTIBODIES?

Baby and brother received ready-made antibodies (passive). The father's body will make its own (active).

STEP 2 · NATURAL OR ARRANGED BY MEDICINE?

Maternal antibodies are natural. The shot and the vaccine are artificial.

ANSWER

Baby: **natural passive**. Brother: **artificial passive**. Father: **artificial active**.

TRAPS PEOPLE FALL INTO

- **Mixing hematuria and uremia.** Blood in urine vs urea in blood. Check which end the blood idea sits on.

- **Treating plasma and serum as the same.** Serum has lost its clotting factors.
- **Reading every -osis as "more cells."** Thrombosis is clot formation; thrombocytosis is too many platelets.
- **Reading agranulocytosis as mild.** It is a near-total loss of granulocytes, an emergency.
- **Mixing lymphadenitis and lymphangitis.** Node vs vessel. The vessel gives the red streak.
- **Swapping antigen and antibody.** The antigen provokes; the antibody answers.
- **Spelling tonsilectomy.** The root is tonsill/o, so tonsillectomy has two l's.
- **Writing "several petechia."** Petechia is singular; petechiae is plural.

Chapter 8 self-test · ten items

1. Which term means urea in the blood?

A. Hematuria
B. Uremia
C. Uricemia
D. Bacteremia

B. Uremia The substance before -emia is what is in the blood. Hematuria is blood in the urine.

2. What is serum?

A. Plasma with all clotting factors intact
B. The packed red cells at the tube bottom
C. The buffy coat of white cells and platelets
D. Plasma after clotting factors are used up

D. Plasma after clotting factors are used up Serum is what remains after blood clots. Plasma keeps its clotting factors.

3. Why do patients with chronic kidney disease often become anemic?

A. The kidney destroys red blood cells
B. The kidney loses iron into the urine
C. The kidney makes less erythropoietin
D. The kidney blocks vitamin B12 uptake

C. The kidney makes less erythropoietin Erythropoietin from the kidney drives red cell formation; a failing kidney makes less of it.

4. Red cells that vary in shape show:

A. Anisocytosis
B. Spherocytosis
C. Poikilocytosis
D. Polycythemia

C. Poikilocytosis Poikil/o means varied or irregular. Anisocytosis is variation in size.

5. Which white cell rises in allergy and parasitic infection?

A. Neutrophil
B. Basophil
C. Monocyte
D. Eosinophil

D. Eosinophil Eosinophils take up the rosy dye eosin and rise in allergy and parasites. Neutrophils lead against bacteria.

6. A monocyte that moves into tissue becomes a:

A. Megakaryocyte
B. Macrophage
C. Lymphocyte
D. Reticulocyte

B. Macrophage Macr/o (large) + -phage (eater). A megakaryocyte sheds platelets.

7. Pinpoint hemorrhages in the skin are called:

A. Petechiae
B. Ecchymoses
C. Hematomas
D. Purpura

A. Petechiae Petechiae are pinpoint. Purpura are larger purple patches, an ecchymosis is a bruise and a hematoma has volume.

8. A red streak runs up the arm from an infected cut. Which term fits?

A. Lymphadenitis
B. Lymphedema
C. Lymphadenopathy
D. Lymphangitis

D. Lymphangitis Lymphangi/o is a lymph vessel. Lymphadenitis is an inflamed node.

9. Which antibody class is the only one that crosses the placenta?

A. IgM
B. IgE
C. IgG
D. IgA

C. IgG IgG is the long-term antibody and crosses the placenta. IgM comes first in an infection and IgE drives allergy.

10. Which test is used to monitor warfarin?

A. PT/INR
B. aPTT
C. ESR
D. ANC

A. PT/INR PT/INR follows warfarin. The aPTT follows heparin.

ONE PAGE

Cram sheet

Everything from chapters 7 and 8 in one place. Cover the right column and see if you can rebuild each row.

Word parts to know

Group	Parts and meanings
Heart	cardi/o heart; coron/o crown arteries; atri/o; ventricul/o; sept/o; valv/o, valvul/o; apic/o; -cardia
Vessels	angi/o, vas/o, vascul/o vessel; arteri/o; arteriol/o; ven/o, phleb/o; venul/o; aort/o; lumin/o; varic/o
Disease	isch/o hold back; ather/o plaque; thromb/o clot; embol/o plug; necr/o death; -stenosis; -sclerosis; -ectasis; -rrhexis
Tests	electr/o; echo-; son/o; tele-; sphygm/o pulse; man/o pressure; steth/o chest; ox/i oxygen
Blood	hem/o, hemat/o; -emia; plasm/o; ser/o; -poiesis; -poietin; -blast; -crit; -globin; myel/o marrow
Red cells	erythr/o; micr/o; macr/o; chrom/o; anis/o unequal; poikil/o irregular; spher/o round; drepan/o sickle; sider/o, ferr/o iron
White cells and clotting	leuk/o; neutr/o; eosin/o; bas/o; -phil; mon/o; phag/o; granul/o; coagul/o; fibrin/o; -stasis
Lymph and immunity	lymph/o; lymphangi/o; lymphaden/o; splen/o; thym/o; tonsill/o; chyl/o; immun/o; -gen; tox/o; -phylaxis; auto-; allo-

Key terms and comparisons

Pair or set	The difference
cardi/o vs coron/o	the heart vs the arteries that feed it
stenosis vs regurgitation	will not open vs will not close
arteri/o vs ather/o vs arthr/o	artery vs plaque vs joint
ischemia vs infarction	reversible supply loss vs tissue death
thrombus vs embolus	stays vs travels
left vs right HF	lungs (dyspnea, orthopnea) vs body (JVD, edema, ascites)
-graph, -graphy, -gram	machine, process, record
anticoagulant, antiplatelet, thrombolytic	blocks cascade, stops clumping, dissolves a clot
plasma vs serum	with vs without clotting factors
-penia vs -osis (cell root)	too few vs too many
lymphadenitis vs lymphangitis	node vs vessel
antigen vs antibody	provokes vs answers
active vs passive immunity	your own antibodies vs ready-made ones

Abbreviations and drug endings

Item	Meaning
MI, CAD, HF, EF, STEMI	heart attack; coronary disease; failure; ejection fraction; ST-elevation MI
AF, VF, DVT, PE, AAA	fibrillations; clot and its travel; aortic aneurysm
PCI, PTCA, CABG, TAVR, ICD	catheter and surgical treatments; implanted defibrillator
ECG/EKG, TTE, TEE, BNP, ABI	heart tests
-olol, -pril, -sartan, -dipine, -statin, -parin	beta blocker, ACE inhibitor, ARB, calcium channel blocker, statin, heparin family
CBC, H&H, MCV, ANC, diff	blood counts
PT/INR, aPTT, ESR, CRP, DIC	clotting and inflammation
ALL, AML, CLL, CML, HL, NHL	leukemias and lymphomas
CD4, HIV, AIDS, HSCT	HIV staging; transplant

Dr. Garg Learning · CC BY-SA 4.0