

Vascular Ultrasound Vocabulary Reference

Part 1: Introduction to the Vascular System | Chapters 1–3

Kupinski, *Diagnostic Medical Sonography: The Vascular System*, 3rd Ed.

An In-Depth Review by Dr. Alice Matthews

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Chapter 1: Vascular Anatomy

Term	Definition	Analogy / Example
Abdominal Aorta	The continuation of the descending thoracic aorta below the diaphragm. It supplies blood to the abdominal organs and lower extremities before bifurcating at L4.	Like the main supply line running through the basement of a building, with branches going to each floor and room.
Anterior Tibial Artery	A terminal branch of the popliteal artery that passes through the interosseous membrane to the anterior compartment of the leg. It continues as the dorsalis pedis artery in the foot.	Like the highway that breaks off to run along the front (shin) of the leg, eventually reaching the top of the foot.
Aortic Arch	The curved portion of the aorta as it leaves the heart, giving rise to the brachiocephalic, left common carotid, and left subclavian arteries.	Like the curved handle of an umbrella--with three main "spokes" branching off to supply the head, neck, and arms.
Arteriole	Small branches of arteries that lead to capillaries. They have muscular walls and act as resistance vessels, controlling blood flow into capillary beds.	Like the adjustable nozzles on a sprinkler system--they control how much water (blood) gets through to the garden (tissues).
Axillary Artery	The continuation of the subclavian artery beyond the outer border of the first rib, supplying the axilla (armpit) region and arm.	Like a highway that changes names when crossing a state line--same road, different designation based on location.
Basilar Artery	Formed by the union of the right and left vertebral arteries. It supplies the brainstem and cerebellum before dividing into the posterior cerebral arteries.	Like two streams merging into a single river--the vertebral arteries join to form the basilar artery.
Basilic Vein	A superficial vein of the upper extremity that runs along the ulnar (pinky) side of the forearm and arm, joining the brachial vein to form the axillary vein.	Like another surface drainage channel on the opposite (medial) side of the property.
Brachial Artery	The continuation of the axillary artery from the axilla to just below the elbow, where it divides into the radial and ulnar arteries. This is the artery commonly used for blood pressure measurement.	Like the main highway through a city--it's the primary route that eventually splits into two major local roads at the outskirts.
Brachiocephalic Artery (Innominate Artery)	The first and largest branch of the aortic arch. It divides into the right common carotid and right subclavian arteries.	Like the first major junction from a highway that splits to serve two different regions (right side of head and right arm).
Capillary	The smallest blood vessels in the body (~8 μm diameter), with walls composed of a single layer of endothelial cells. They are the primary site of nutrient and gas exchange between blood and tissues.	Like tiny garden soaker hoses that allow water to seep through their walls to water plants--capillaries allow oxygen and nutrients to "seep" into tissues.
Carotid Bifurcation	The point where the common carotid artery divides into the internal and external carotid arteries, typically at the upper border of the thyroid cartilage.	Like a Y-intersection where a single road splits into two separate highways going to different destinations.

Term	Definition	Analogy / Example
Carotid Bulb (Carotid Sinus)	A slight dilation at the origin of the internal carotid artery containing baroreceptors (pressure sensors) that help regulate blood pressure.	Like an expansion tank in a plumbing system--a widened area that helps sense and regulate pressure.
Celiac Artery (Celiac Trunk/Axis)	The first major anterior branch of the abdominal aorta. It is a short vessel (1-2 cm) that divides into the hepatic, splenic, and left gastric arteries, supplying the liver, spleen, stomach, and pancreas.	Like the main junction box that splits into three major circuits supplying the kitchen appliances (liver, spleen, stomach).
Cephalic Vein	A superficial vein of the upper extremity that runs along the radial (thumb) side of the forearm and arm, emptying into the axillary vein near the shoulder.	Like a surface drainage ditch that runs along the outside edge of a property--visible and accessible.
Circle of Willis	A ring-like arrangement of arteries at the base of the brain formed by the internal carotid and vertebral arteries. It provides collateral circulation to maintain brain blood flow if one vessel is blocked.	Like a traffic roundabout connecting multiple highways--if one road is blocked, traffic (blood) can still reach all destinations via alternate routes.
Common Carotid Artery (CCA)	A major artery on each side of the neck that supplies blood to the brain, face, and neck. The left CCA arises from the aortic arch; the right CCA arises from the brachiocephalic artery.	Like the main supply pipe that branches to feed two different sprinkler zones--one pipe coming from the source that will split.
Common Femoral Artery (CFA)	The continuation of the external iliac artery below the inguinal ligament. It divides into the superficial femoral and profunda femoris arteries.	Like the main entrance to the leg--this is where the external iliac artery officially becomes the femoral artery.
Common Femoral Vein (CFV)	Formed by the union of the femoral and profunda femoris veins. It lies medial to the common femoral artery and becomes the external iliac vein at the inguinal ligament.	Like the main collection point for venous blood from the leg before it heads back toward the heart.
Common Iliac Arteries	The terminal branches of the abdominal aorta at the level of L4. Each divides into the internal and external iliac arteries.	Like a T-junction where the main highway splits into two major routes serving different regions (pelvis and legs).
Dorsalis Pedis Artery	The continuation of the anterior tibial artery on the dorsum (top) of the foot. It's palpable between the first and second metatarsals.	Like the visible supply line on the top of the foot--often checked for pulse in vascular exams.
Endothelium	A single layer of squamous epithelial cells that lines the entire vascular system (arteries, veins, capillaries) and heart. It provides a smooth surface and produces substances that regulate blood flow and clotting.	Like the inner lining of a garden hose--smooth and seamless, allowing water to flow without resistance or turbulence.
External Carotid Artery (ECA)	A branch of the common carotid that supplies blood to the face, scalp, and neck. It has eight branches including the superior thyroid, lingual, and facial arteries.	Like a local delivery route with many stops--it branches extensively to supply the face and neck structures.
External Iliac Artery	A branch of the common iliac artery that continues distally to supply the lower extremity. It becomes the common femoral artery at the inguinal ligament.	Like the through-lane that continues past the city (pelvis) to reach the outlying regions (legs).
Femoral Vein	The continuation of the popliteal vein above the knee, accompanying the superficial femoral artery. It joins the profunda femoris vein to form the common femoral vein.	Like the main return pipe from the leg, running alongside the arterial supply line.
Great Saphenous Vein (GSV)	The longest vein in the body, beginning at the dorsal venous arch of the foot and ascending medially along the leg and thigh to terminate at the saphenofemoral junction.	Like a major surface drainage channel running along the inside of the leg from ankle to groin.

Term	Definition	Analogy / Example
Hepatic Veins	Three veins (right, middle, left) that drain the liver into the inferior vena cava. The middle and left hepatic veins often join into a common trunk before entering the IVC.	Like the exit pipes from the liver's processing facility, carrying filtered blood back to the main return line (IVC).
Inferior Mesenteric Artery (IMA)	An anterior branch of the abdominal aorta arising about 3-4 cm above the aortic bifurcation. It mainly supplies the large intestine (colon).	Like a branch line supplying the final section of the digestive tract--the downstream portion of the colon.
Inferior Vena Cava (IVC)	A large vein formed by the union of the common iliac veins at L5. It ascends along the right side of the aorta and returns blood from the lower body to the right atrium.	Like the main return pipe in a building's basement, collecting all the used water from downstairs and sending it back to the pump.
Internal Carotid Artery (ICA)	A branch of the common carotid that supplies blood to the brain and eyes. It has no extracranial (outside the skull) branches.	Like a dedicated express lane that goes directly to a major destination (the brain) without any stops along the way.
Internal Iliac Artery (Hypogastric Artery)	A branch of the common iliac artery that supplies the pelvic organs (bladder, rectum, reproductive organs) and pelvic walls.	Like the local service road that delivers supplies to all the buildings within the pelvic complex.
Median Cubital Vein	A superficial vein that connects the cephalic and basilic veins at the antecubital fossa (elbow crease). This is a common site for blood draws and IV placement.	Like a connecting road between two parallel highways--provides an alternate route and access point.
Palmar Arches	Two arterial networks in the hand: the superficial palmar arch (from the ulnar artery) and deep palmar arch (from the radial artery). They supply the fingers via digital arteries.	Like two interconnected traffic circles in a city--one superficial, one deep--ensuring all neighborhoods (fingers) receive blood even if one route is blocked.
Perforating Veins	Veins that connect the superficial and deep venous systems, penetrating (perforating) the deep fascia. They contain valves that direct flow from superficial to deep systems.	Like transfer stations that move cargo from surface roads (superficial veins) to the highway (deep veins).
Peroneal (Fibular) Artery	A branch of the tibial-peroneal trunk that descends along the medial aspect of the fibula in the deep posterior compartment.	Like a parallel service road running alongside the fibula bone, with connections to both the front and back routes.
Plantar Arches	Arterial networks in the sole of the foot formed by the medial and lateral plantar arteries. They give rise to the digital arteries supplying the toes.	Like the intricate network of irrigation channels in a garden, ensuring every plant (toe) gets water (blood).
Popliteal Artery	The continuation of the superficial femoral artery as it passes through the adductor canal and behind the knee in the popliteal fossa. It bifurcates into the anterior tibial and tibial-peroneal trunk.	Like the underpass beneath a bridge--the artery passes behind the knee joint before branching.
Portal Vein	Formed by the junction of the splenic and superior mesenteric veins posterior to the pancreas. It carries nutrient-rich blood from the digestive organs to the liver (70% of liver blood flow).	Like a special delivery route that takes nutrients from the digestive system directly to the processing plant (liver) before returning to general circulation.
Posterior Tibial Artery	A branch of the tibial-peroneal trunk that runs in the posterior compartment of the leg behind the medial malleolus. It terminates as the medial and lateral plantar arteries.	Like the route that stays behind, running along the back of the leg and behind the inner ankle bone.
Profunda Femoris Artery (Deep Femoral Artery)	A terminal branch of the common femoral artery that lies posterior and lateral to the SFA. It supplies the deep muscles of the thigh via perforating branches.	Like a service road running parallel to the main highway, supplying the local neighborhoods (thigh muscles).

Term	Definition	Analogy / Example
Radial Artery	A terminal branch of the brachial artery that runs along the radial (thumb) side of the forearm. It forms the deep palmar arch in the hand.	Like the express lane on the thumb side of the forearm--commonly felt at the wrist to check pulse.
Renal Arteries	Paired branches arising from the lateral aspect of the aorta just below the SMA. They supply the kidneys. The right renal artery is longer and passes posterior to the IVC.	Like dedicated supply lines to the filtration plant (kidneys)--each kidney gets its own arterial supply.
Saphenofemoral Junction (SFJ)	The point where the great saphenous vein empties into the common femoral vein, just below the inguinal ligament.	Like where a tributary stream flows into a major river--the confluence point.
Saphenopopliteal Junction (SPJ)	The point where the small saphenous vein typically empties into the popliteal vein, in the upper calf.	Like where a smaller creek joins a larger river behind the knee.
Small Saphenous Vein (SSV)	A superficial vein beginning at the lateral aspect of the dorsal venous arch, ascending the posterior calf to terminate in the popliteal vein in about 70% of people.	Like a drainage channel running up the back of the calf--shorter and more posterior than the GSV.
Subclavian Artery	Paired arteries that supply blood to the arms, chest wall, and brain (via the vertebral arteries). The left arises directly from the aortic arch; the right from the brachiocephalic artery.	Like the main supply lines that feed both the upper floors (brain via vertebral) and the wings (arms) of a building.
Superficial Femoral Artery (SFA)	A terminal branch of the common femoral artery that courses distally through the thigh in the adductor canal. It becomes the popliteal artery at the adductor hiatus.	Like the main highway through the thigh--despite its name, it runs deep in the thigh and is the primary route to the lower leg.
Superior Mesenteric Artery (SMA)	An anterior branch of the abdominal aorta just below the celiac artery. It supplies most of the small intestine and part of the large intestine.	Like the supply line feeding the long conveyor belt of the intestines--it keeps the digestive process moving.
Superior Vena Cava (SVC)	A large vein formed by the junction of the left and right brachiocephalic veins. It returns deoxygenated blood from the head, neck, arms, and upper chest to the right atrium of the heart.	Like the main return pipe collecting water from all upstairs rooms and delivering it back to the pump (heart).
Tunica Adventitia	The outermost layer of a blood vessel wall, composed of connective tissue that provides structural support and anchors the vessel to surrounding tissues.	Like the outer casing of an electrical cable that protects and anchors the wires inside to their surroundings.
Tunica Intima	The innermost layer of a blood vessel wall, composed of a single layer of endothelial cells resting on a thin layer of connective tissue. It provides a smooth, friction-reducing surface for blood flow.	Like the non-stick coating inside a pan--the smooth surface prevents things from sticking and allows easy flow.
Tunica Media	The middle layer of a blood vessel wall, composed primarily of smooth muscle cells and elastic fibers. It controls vessel diameter and regulates blood pressure.	Like the muscular walls of a water balloon that you can squeeze to control flow--the muscle layer allows the vessel to constrict or dilate.
Ulnar Artery	A terminal branch of the brachial artery that runs along the ulnar (little finger) side of the forearm. It forms the superficial palmar arch in the hand.	Like the local lane on the pinky side of the forearm--it's usually the larger of the two terminal branches.
Valve Sinus	A slightly enlarged space between the vein wall and the valve leaflet that fills with blood when the valve closes.	Like the small pocket that forms when you close a zipper--the extra space where material bunches up.

Term	Definition	Analogy / Example
Venae Comitantes	Paired deep veins that accompany arteries in the limbs. They are wrapped in a common connective tissue sheath with the artery.	Like train tracks running parallel to a highway--the veins (tracks) run alongside the artery (highway) in pairs.
Venous Valve	Bicuspid (two-leaflet) structures in veins formed by inward projections of the tunica intima. They ensure unidirectional blood flow toward the heart, especially in the legs where blood must fight gravity.	Like one-way swing doors at a store entrance--people can push through one way, but the doors swing closed to prevent backward movement.
Venule	Small vessels that collect blood from capillaries and merge to form veins. They have thin walls with little smooth muscle.	Like the small streams that collect runoff water from a field and merge to form a larger creek.
Vertebral Artery	A branch of the subclavian artery that ascends through the cervical vertebrae and enters the skull to supply the brainstem, cerebellum, and posterior brain.	Like a secret passage that winds through the vertebrae (spine bones) to reach the back of the brain.

Chapter 2: Arterial Physiology

Term	Definition	Analogy / Example
Arterial Compliance (Capacitance)	The ability of arteries to expand and contract with pressure changes. Compliance = $\Delta\text{Volume} \div \Delta\text{Pressure}$. It decreases with age as vessels stiffen.	Like a balloon's stretchiness--a new balloon stretches easily (compliant); an old, stiff balloon doesn't. This is why systolic pressure increases with age.
Autoregulation	The ability of tissues to maintain constant blood flow over a wide range of perfusion pressures. Resistance vessels dilate when pressure is high and constrict when pressure is low.	Like a thermostat maintaining room temperature--it automatically adjusts to keep conditions stable regardless of outside changes.
Bernoulli Principle	States that when fluid flows without velocity change between two points, total energy remains constant (minus frictional losses). In blood vessels, if velocity increases, pressure must decrease.	Like water flowing through a garden hose nozzle--as the water speeds up through the narrow opening, its pressure drops. This is why you can estimate pressure drop across a narrowed heart valve by measuring velocity.
Collateral Arteries	Preexisting pathways that enlarge when a main artery becomes stenotic or occluded. They consist of stem arteries, midzone collaterals, and reentry arteries.	Like detour routes around road construction--side streets that normally carry little traffic become major routes when the main road is blocked.
Critical Stenosis	The degree of narrowing (typically 75% cross-sectional area reduction or 50% diameter reduction) at which pressure and flow begin to be significantly affected. The threshold varies with distal bed resistance.	Like when a highway lane closure finally causes traffic jams--before a certain point, traffic flows fine; after that point, everything backs up.
High-Resistance Flow	A flow pattern with both antegrade and retrograde (reversed) flow components. Occurs when distal arterioles are constricted, as in resting peripheral arteries and the ECA.	Like trying to push water through a partly closed valve--some water bounces back because of the resistance.
Hydraulic Filter	The arterial system's function of converting the heart's intermittent (pulsatile) output into steady capillary flow. This is achieved through arterial elasticity and capacitance.	Like a shock absorber that smooths out bumpy road into a steady ride--the elastic arteries absorb the pulse and release it gradually.

Term	Definition	Analogy / Example
Hydrostatic Pressure	Pressure within blood vessels due to the weight of a column of blood, measured relative to a reference point (usually the right atrium). It increases in dependent parts of the body.	Like the pressure at the bottom of a swimming pool--the deeper you go, the more pressure from the weight of water above you. Standing, your ankles feel about 100 mmHg more pressure than when lying down.
Inertia	The tendency of a body at rest to stay at rest, or a body in motion to stay in motion, unless acted upon by an outside force. In blood vessels, energy is lost when blood changes direction or velocity.	Like passengers in a car when brakes are applied--they lurch forward because their bodies want to keep moving. Blood similarly resists changes in direction or speed.
Kinetic Energy	The energy of motion or work in the vascular system. Blood velocity represents the kinetic energy component--the faster blood moves, the more kinetic energy it has.	Like water rushing through a fire hose--the faster it moves, the more energy it carries.
Laminar Flow	Flow that moves in smooth, parallel layers. The layer at the vessel wall is slowest (due to friction); the center layer moves fastest ($2 \times$ the mean velocity).	Like lanes of traffic on a highway--all moving in the same direction, with the fast lane in the center and slower traffic near the edges.
Low-Resistance Flow	A flow pattern with antegrade (forward) flow throughout the cardiac cycle. Occurs when the distal arteriolar bed is dilated, as in the ICA, renal, and celiac arteries.	Like a wide-open faucet--water flows forward continuously because there's little resistance downstream.
Parabolic Flow Profile	The velocity profile of fully developed laminar flow, where velocities form a parabola shape--fastest at the center, slowest at the walls.	Like the cross-section of a hill--the peak is in the middle, sloping down to the edges.
Poiseuille's Law	Describes the relationship between flow, pressure, and resistance: $Q = \pi(P_1 - P_2)r^4 \div 8\eta L$. Flow is directly proportional to pressure and radius ⁴ , and inversely proportional to viscosity and vessel length.	Like a garden hose: the bigger the hose radius, the more water flows. But radius matters A LOT--if you double the radius, flow increases 16 times ($2^4 = 16$)! This is why small changes in artery diameter have huge effects on blood flow.
Potential Energy	Stored or resting energy in the vascular system, represented primarily by intravascular pressure. It's supplied by cardiac contraction and distends the vessels.	Like water stored in an elevated tank--the pressure is there even when water isn't moving, ready to push water when needed.
Resistance	The opposition to blood flow. In the vascular system, $R = \Delta P \div Q$ (pressure drop divided by flow). Resistance is primarily determined by vessel radius.	Like the friction in a pipe that reduces water flow. Narrow pipes (small radius) have high resistance; wide pipes have low resistance.
Resistances in Parallel	When vessels are arranged side-by-side, total resistance decreases: $1/R_{\text{total}} = 1/R_1 + 1/R_2 + 1/R_3$. Adding collateral pathways lowers overall resistance.	Like adding more checkout lanes at a store--each additional lane reduces the overall wait time for customers.
Resistances in Series	When vessels are arranged one after another, total resistance equals the sum of individual resistances: $R_{\text{total}} = R_1 + R_2 + R_3$. Multiple stenoses in the same vessel add up.	Like traffic delays--each construction zone you pass adds more delay to your total trip time.

Term	Definition	Analogy / Example
Reynolds Number	A dimensionless number that predicts whether flow will be laminar or turbulent. $Re < 2,000$ = laminar; $Re > 2,000$ = turbulent. It's proportional to velocity, density, and radius; inversely proportional to viscosity.	Like a "turbulence threshold" meter--once the number gets high enough (due to high velocity or large vessel), the flow "breaks up" into turbulence.
Turbulent Flow	Irregular, chaotic flow with rapid mixing between layers. Occurs when the Reynolds number exceeds 2,000, typically at stenoses where velocity increases.	Like rapids in a river--instead of smooth flow, the water churns and swirls unpredictably.
Vasomotor Tone	The constant partial contraction of arteriolar smooth muscle, maintained by sympathetic nervous system activity. It provides baseline resistance that can be adjusted up or down.	Like keeping a garden hose nozzle partially closed--you have a baseline setting that you can adjust to increase or decrease flow.
Velocity	The rate of movement (displacement) with respect to time. Measured in distance per unit time (e.g., cm/s). It's how fast blood cells are moving.	Like the speedometer reading in a car--it tells you how fast you're going, not how many cars are on the road.
Viscosity	The property of a fluid that resists flow. It represents friction between layers of fluid. Blood viscosity increases with hematocrit (red blood cell concentration).	Like the difference between honey and water--honey is more viscous and flows slowly; water is less viscous and flows easily. Blood with more red cells is "thicker" and harder to pump.
Volume Flow (Blood Flow)	The volume of blood moved per unit of time. Measured in mL/s, mL/min, or L/min. It's related to velocity by the equation: $Velocity = Flow \div Area$.	Like the gallons per minute flowing through a pipe--it tells you the total amount of water, not just how fast individual molecules are moving.

Chapter 3: Venous Physiology

Term	Definition	Analogy / Example
Calf Muscle Pump	The mechanism by which contraction of calf muscles (gastrocnemius and soleus) compresses veins, propelling blood toward the heart. It can generate pressures >200 mmHg.	Like squeezing a tube of toothpaste--when the calf muscles contract, they squeeze the veins, pushing blood upward. The valves prevent backflow.
Compression Stockings	Elastic garments that apply external pressure to the legs, increasing tissue pressure and reducing transmural pressure. They help reduce edema and improve venous return.	Like putting an ace bandage on a swollen ankle--the external pressure helps squeeze fluid out of the tissues and prevent it from pooling.
Continuous Venous Flow	Abnormal venous flow that lacks respiratory variation. This suggests proximal obstruction or elevated venous pressure that overrides normal respiratory effects.	Like a faucet that won't stop running--instead of varying with respiration, the flow is constant, indicating something is wrong upstream.
Edema	Excessive accumulation of fluid in tissues. In venous disease, it results from increased venous pressure that forces fluid out of capillaries into the interstitial space.	Like a waterlogged sponge--when too much pressure pushes fluid into tissues, they become swollen and puffy.
Fibrin Cuff	A theory of ulcer formation where fibrin accumulates around capillaries in venous disease, forming a barrier that limits oxygen transfer to tissues.	Like wrapping plastic wrap around a plant's roots--it blocks nutrients from reaching where they're needed, causing the plant to suffer.

Term	Definition	Analogy / Example
Osmotic Pressure	Pressure exerted by fluid due to differences in solute concentrations across a semipermeable membrane. Plasma proteins (especially albumin) create osmotic pressure that pulls fluid into capillaries.	Like a magnet attracting iron filings--the proteins in blood "pull" water back into the vessels, preventing it from leaking out.
Phasic Venous Flow	Normal venous flow pattern that varies with respiration. Inspiration increases abdominal pressure (impeding leg vein flow); expiration decreases it (increasing leg vein flow).	Like breathing affecting a trumpet player--the flow of air (blood) varies rhythmically with the breathing cycle.
Primary Varicose Veins	Varicose veins that develop without deep vein thrombosis. They result from congenital or acquired valvular incompetence in superficial veins, allowing blood to pool.	Like a door that won't close properly--the valves don't seal, so blood falls back down instead of moving forward.
Respiratory Phasicity	The normal variation in venous flow velocity that occurs with breathing. Flow decreases during inspiration (due to increased abdominal pressure) and increases during expiration.	Like waves on a beach influenced by the tide--venous flow has a rhythm tied to breathing, not the heartbeat.
Secondary Varicose Veins	Varicose veins resulting from deep vein thrombosis. The DVT damages valves and may leave residual obstruction, causing increased pressure in superficial veins.	Like traffic being diverted to side streets because the main road is blocked--the superficial veins become overloaded when the deep system is damaged.
Starling Equilibrium	Describes the balance of forces governing fluid movement across capillary walls. Fluid moves out due to intracapillary pressure and interstitial osmotic pressure; fluid moves in due to interstitial pressure and capillary osmotic pressure.	Like a tug-of-war at the capillary wall--forces pulling fluid out balance forces pulling fluid in. When this balance tips (like in venous disease), fluid accumulates.
Transmural Pressure	The pressure difference across a vessel wall (intravascular pressure minus tissue pressure). It determines vein shape: low pressure = dumbbell/elliptical; high pressure = circular.	Like the pressure difference between inside and outside a balloon--this determines how round or collapsed the balloon becomes.
Venous Capacitance	The ability of veins to hold large volumes of blood. Veins contain approximately two-thirds of the body's total blood volume and serve as a reservoir.	Like a storage tank in a water system--veins hold the reserve supply. When you need more blood elsewhere (like during hemorrhage), veins can release their stored volume.
Venous Insufficiency	Abnormal retrograde (backward) flow in veins due to incompetent valves. It leads to venous hypertension, edema, skin changes, and potentially ulceration.	Like a one-way valve that's broken--instead of blood flowing only toward the heart, it sloshes backward, causing pooling and pressure buildup.
Venous Stasis Ulcer	A wound, typically near the medial ankle, caused by chronic venous insufficiency. Increased venous pressure leads to tissue ischemia and breakdown.	Like soil erosion from constant water pressure--chronic venous pressure damages the tissues until they break down and ulcerate.

Quick Reference: Vessel Layers

Layer	Arteries	Veins
Tunica Intima	Endothelium + internal elastic membrane	Endothelium (forms valves)
Tunica Media	Thick (smooth muscle + elastic fibers)	Thin (less muscle, less elastic)

Layer	Arteries	Veins
Tunica Adventitia	Connective tissue + vasa vasorum	Connective tissue (thickest layer in veins)

Quick Reference: High vs. Low Resistance Flow Patterns

Feature	Low-Resistance	High-Resistance
Diastolic Flow	Continuous antegrade	May reverse in early diastole
Arterioles	Dilated	Constricted
Examples	ICA, vertebral, renal, celiac	ECA, resting extremity arteries, fasting SMA
Physiology	Organs need constant flow	Tissues don't need continuous perfusion

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