

Midsternal line

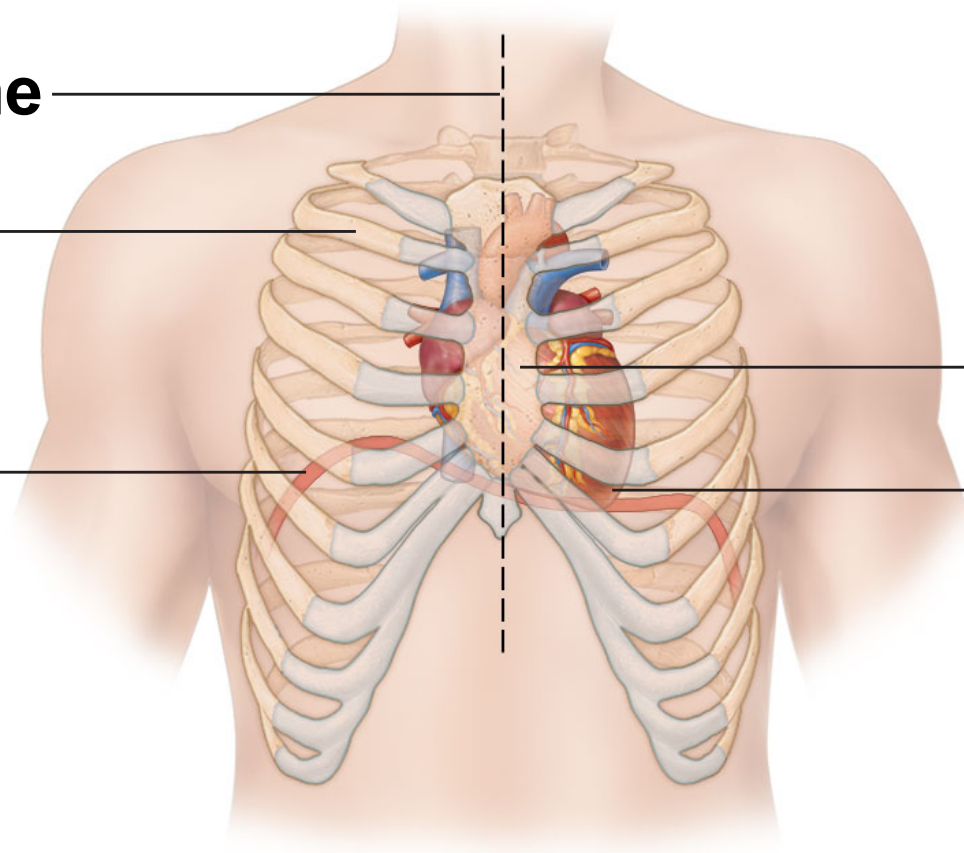
2nd rib

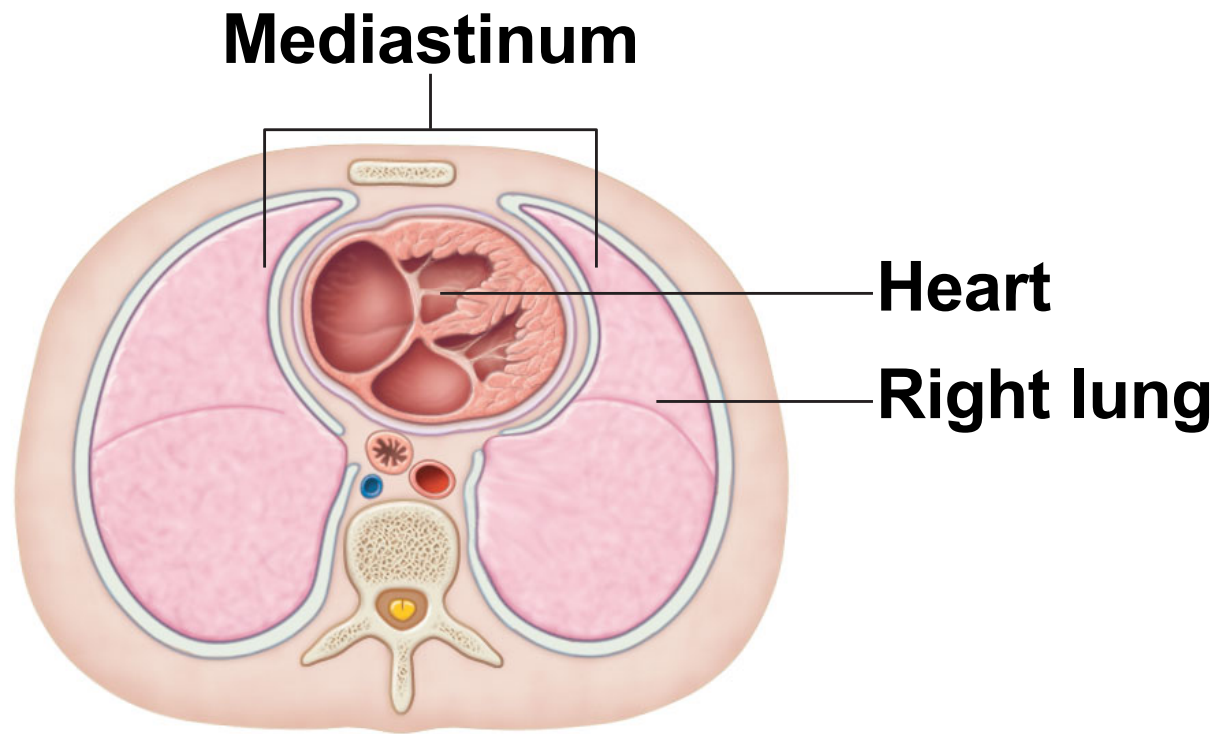
Diaphragm

Sternum

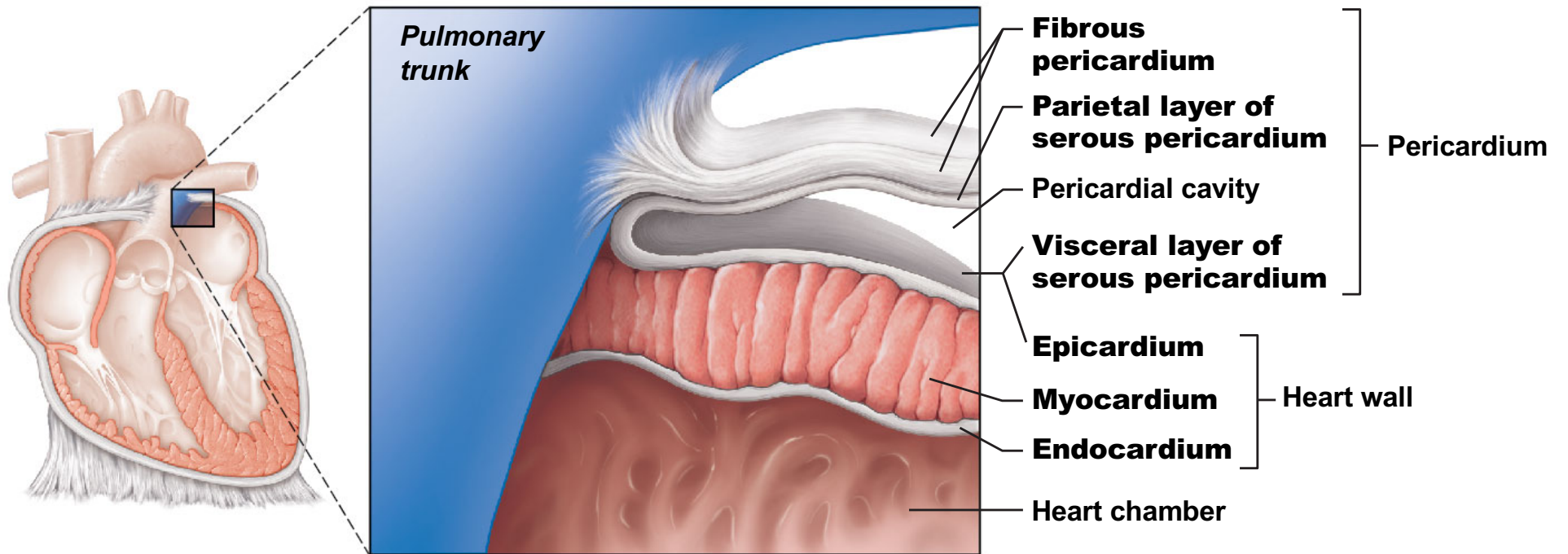
Point of maximal intensity (PMI)

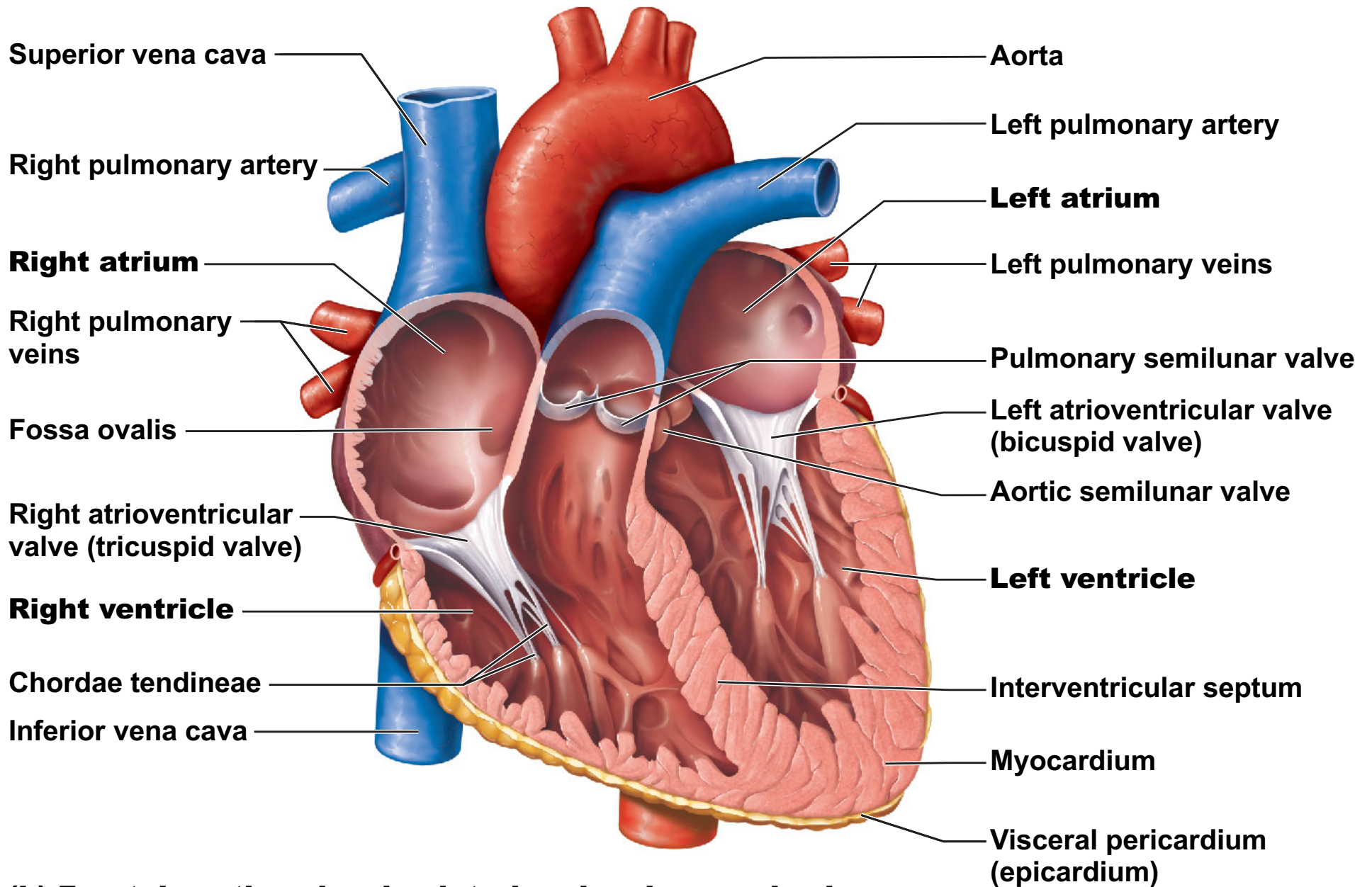
(b)



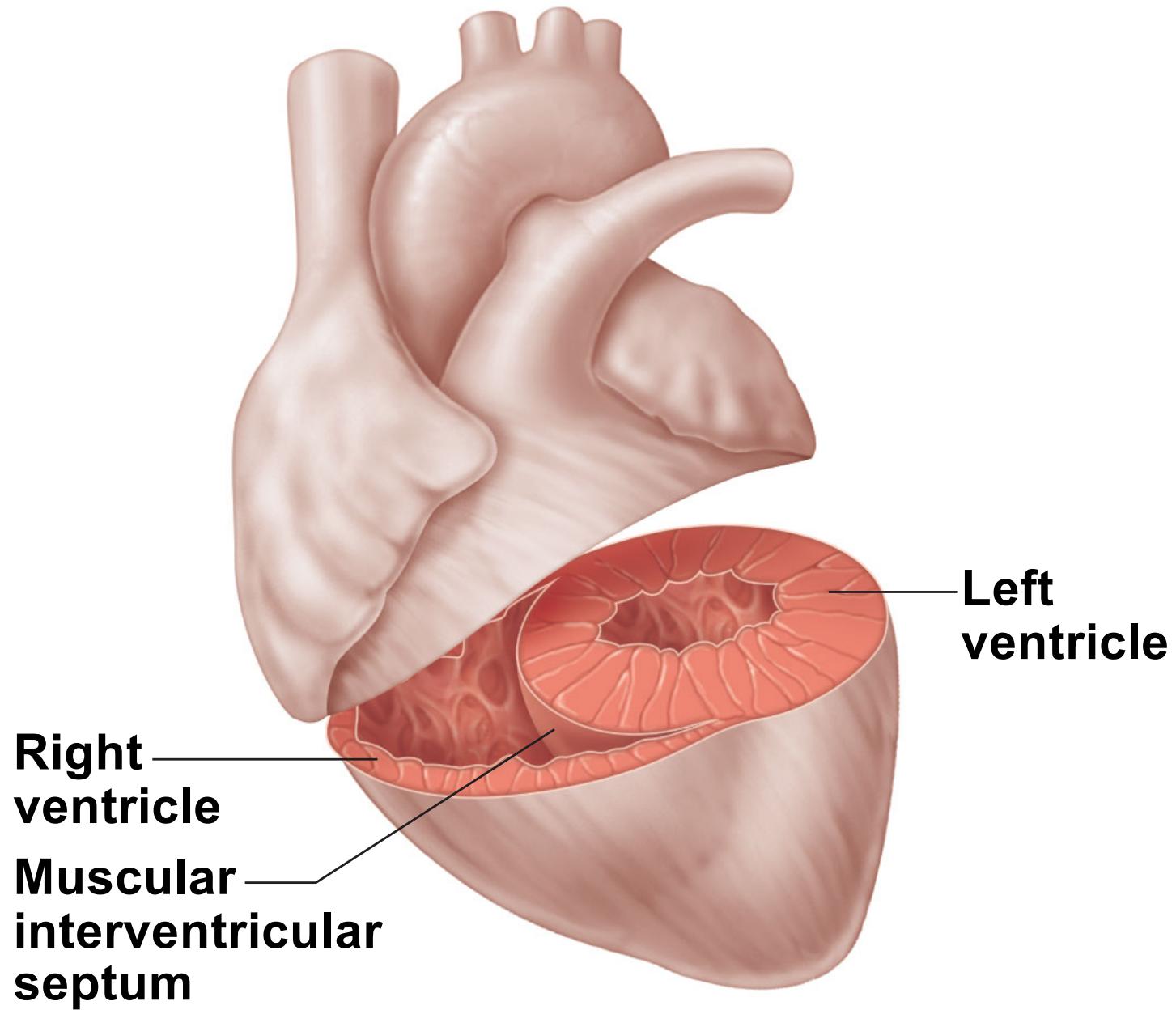


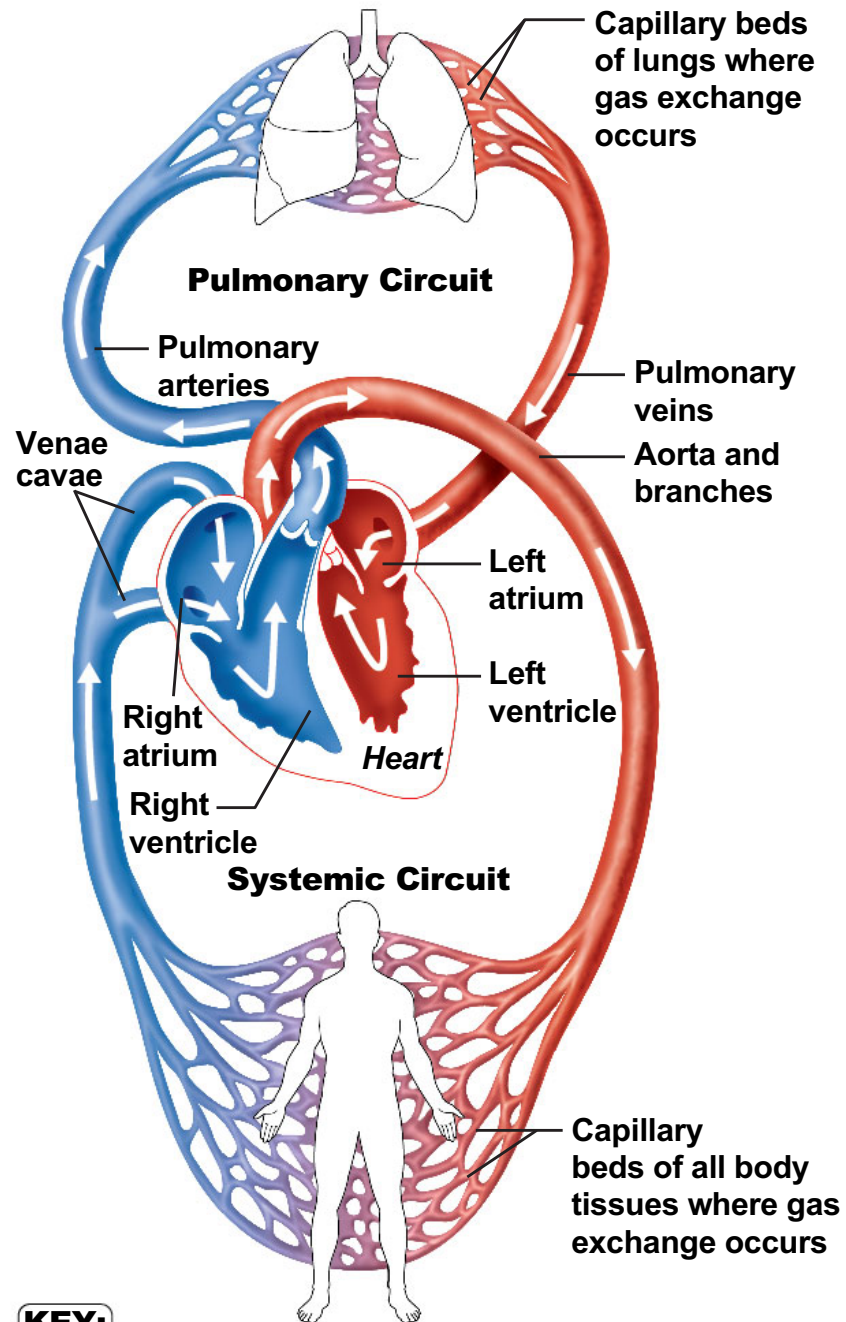
(c) *Posterior*





(b) Frontal section showing interior chambers and valves





KEY:

- Oxygen-rich, CO₂-poor blood
- Oxygen-poor, CO₂-rich blood

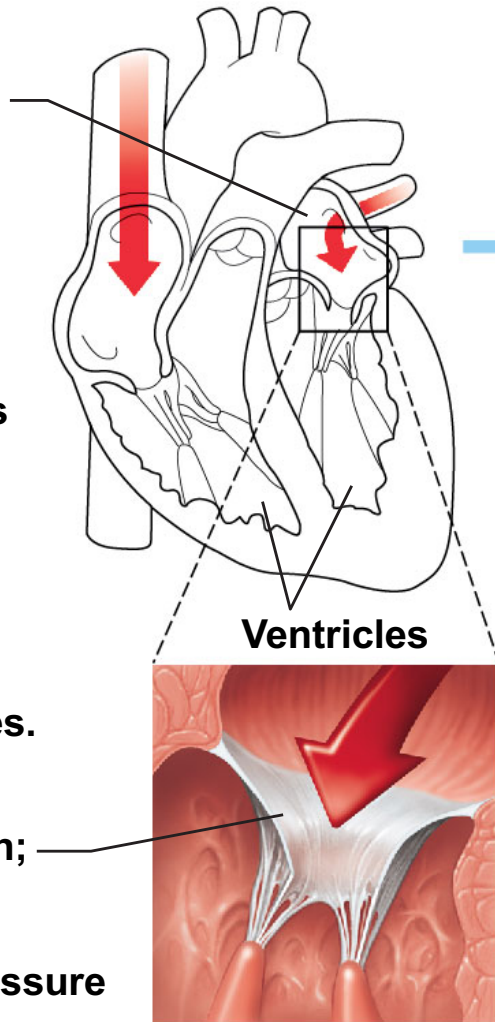
(a) Operation of the AV valves

① Blood returning to the atria puts pressure against AV valves; the AV valves are forced open.

② As the ventricles fill, AV valve cusps hang limply into ventricles.

③ Atria contract, forcing additional blood into ventricles.

AV valves open; atrial pressure greater than ventricular pressure

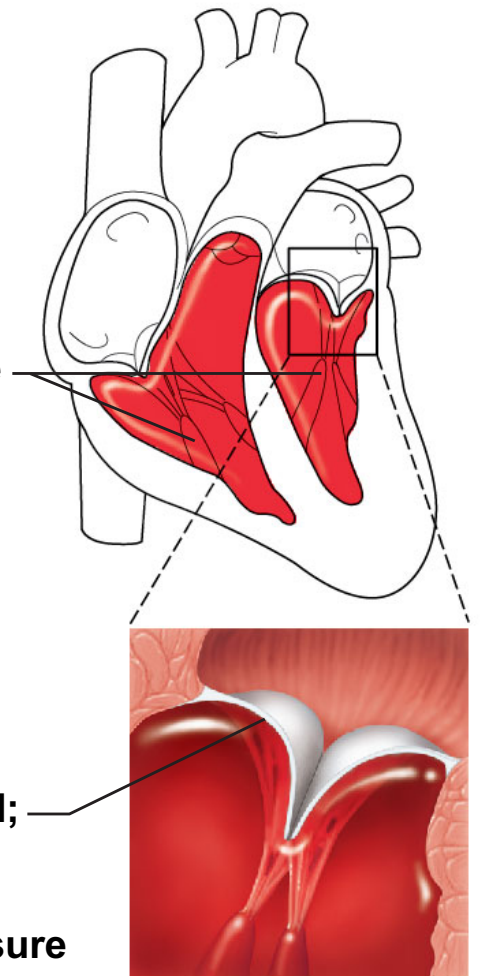


④ Ventricles contract, forcing blood against AV valve cusps.

⑤ AV valves close.

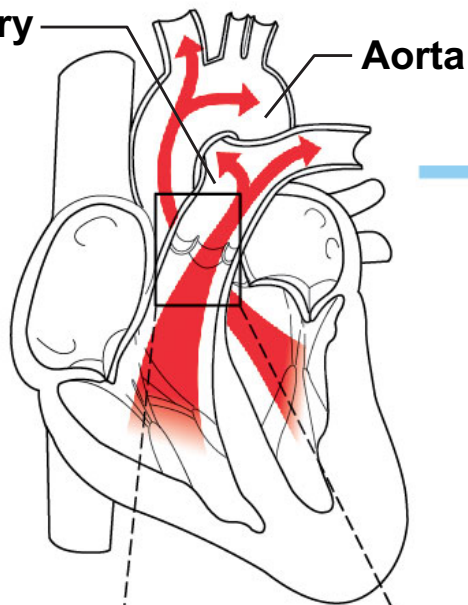
⑥ Chordae tendineae tighten, preventing valve cusps from everting into atria.

AV valves closed; atrial pressure less than ventricular pressure

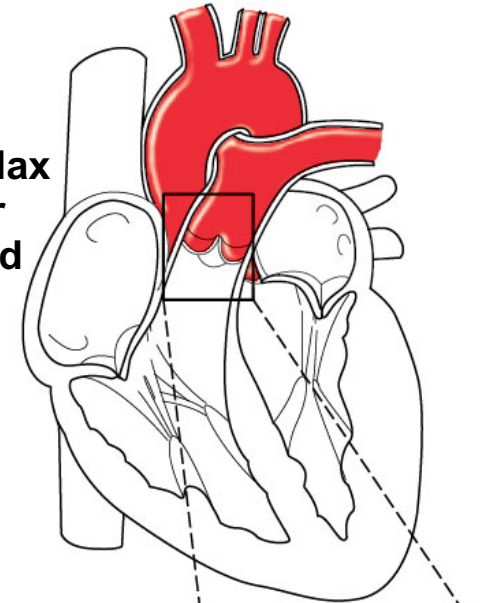


(b) Operation of the semilunar valves

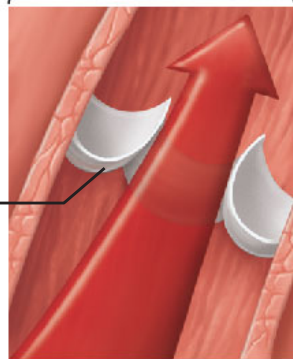
① As ventricles contract and intraventricular pressure rises, blood is pushed up against semilunar valves, forcing them open.



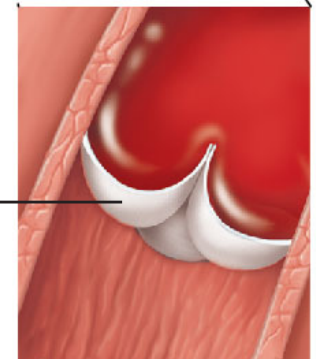
② As ventricles relax and intraventricular pressure falls, blood flows back from arteries, filling the cusps of semilunar valves and forcing them to close.

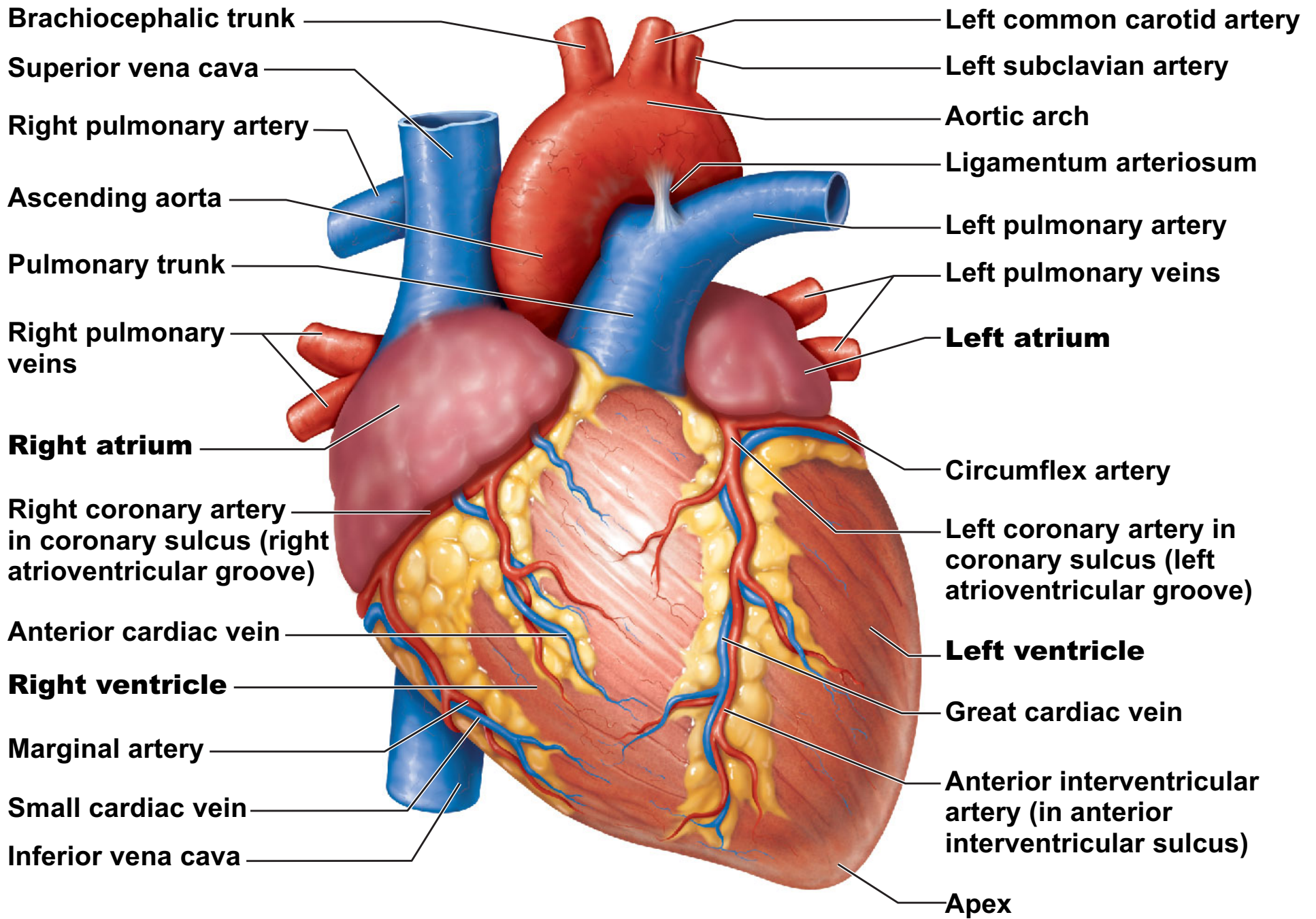


Semilunar valves open



Semilunar valves closed





(a) Anterior view of heart showing major vessels

**Superior
vena cava**

**Sinoatrial (SA)
node (pacemaker)**

**Atrioventricular
(AV) node**

Right atrium

Bundle branches

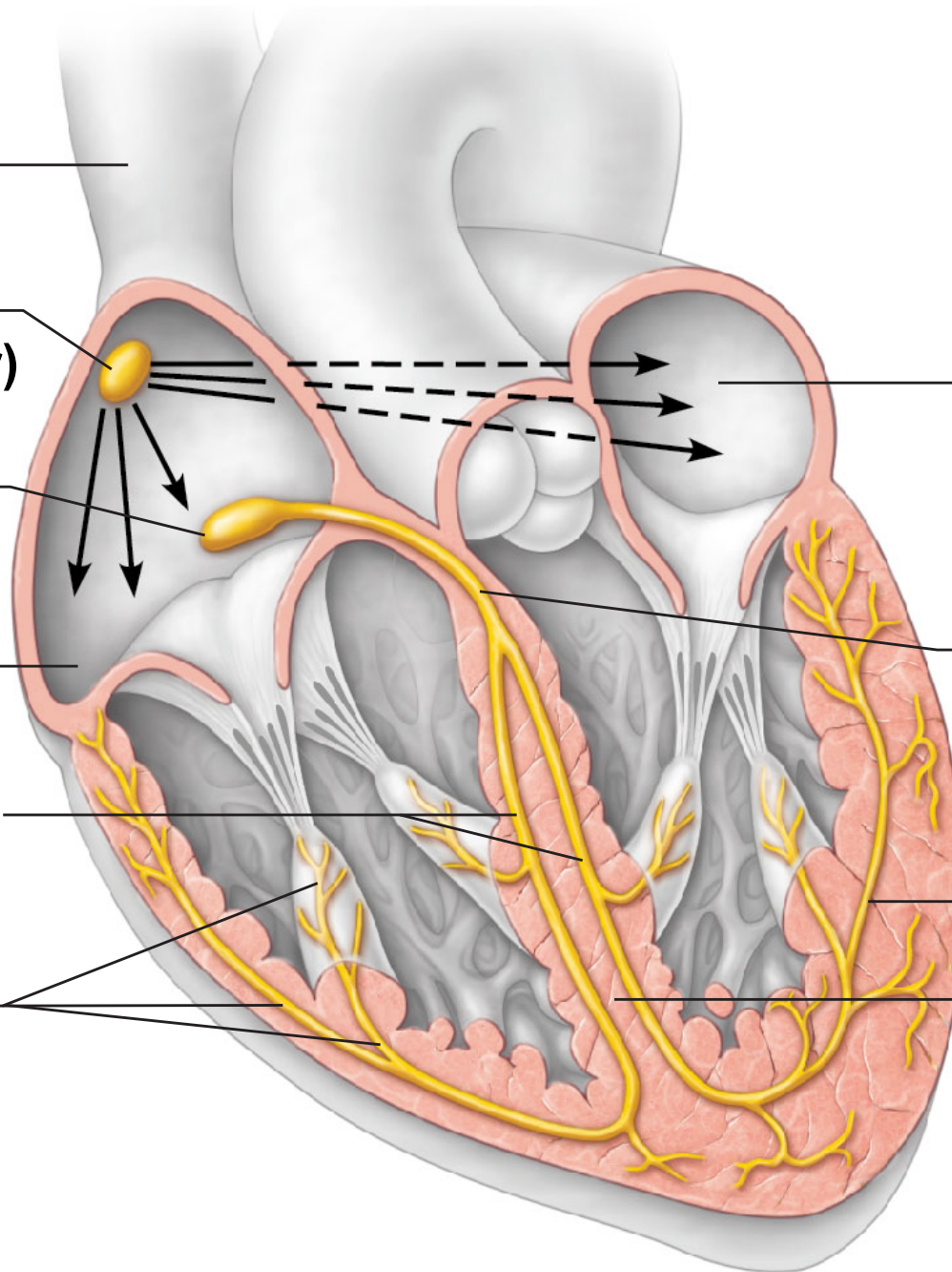
Purkinje fibers

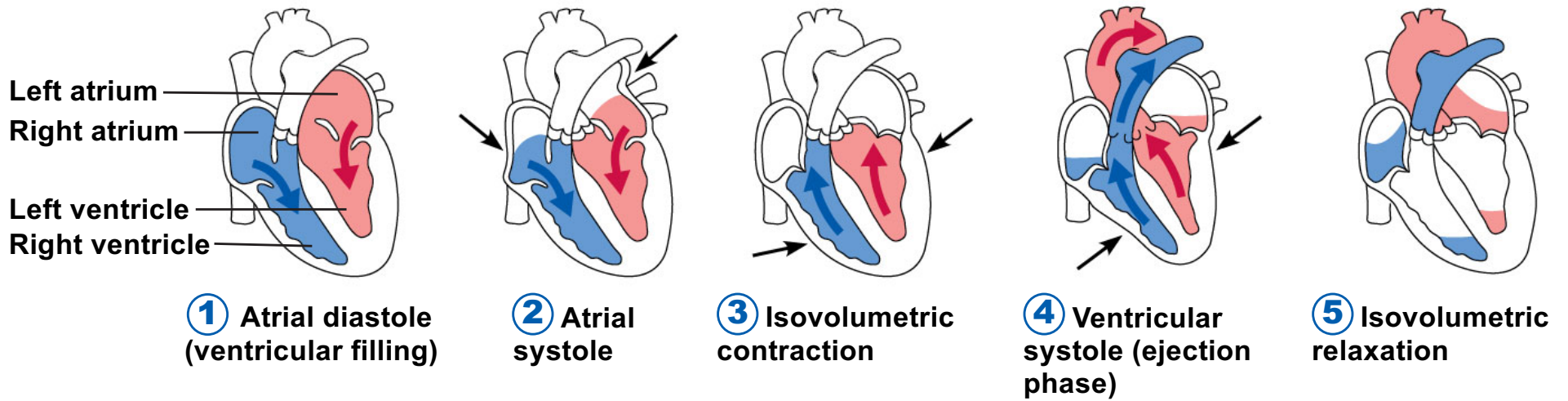
Left atrium

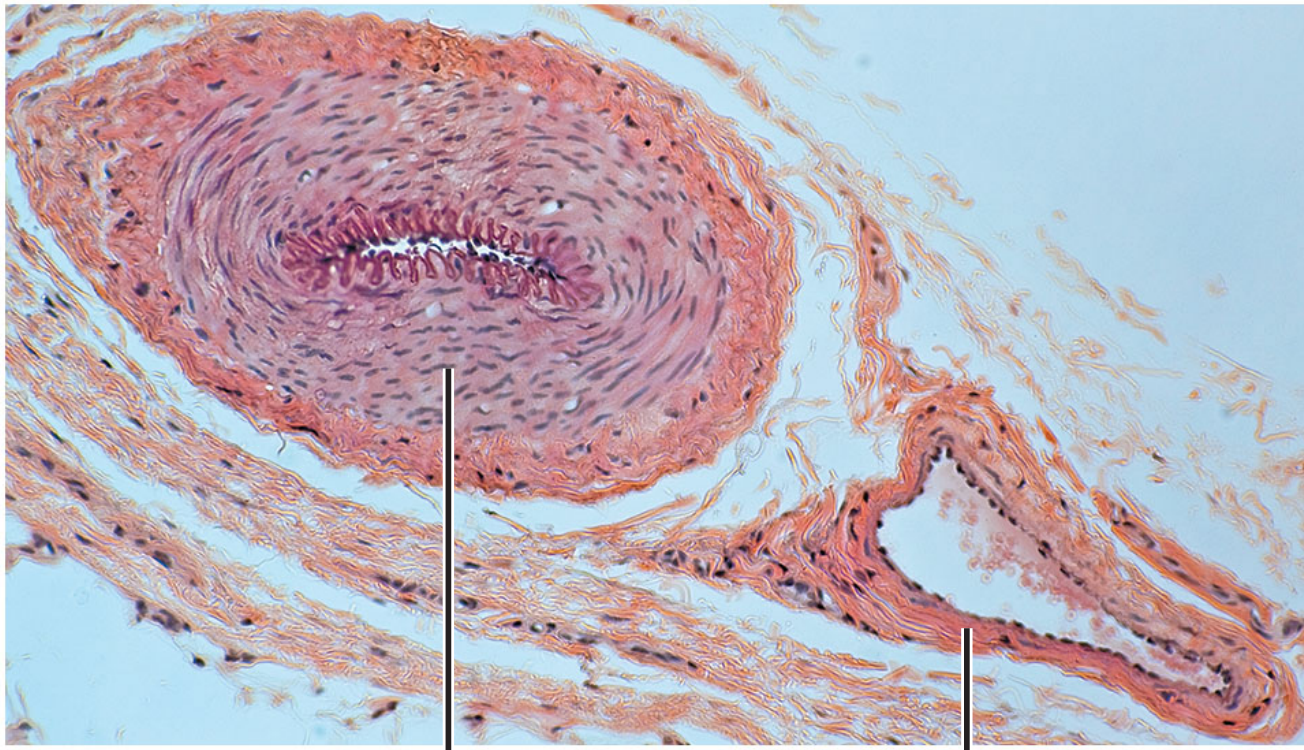
**Atrioventricular
(AV) bundle
(bundle of His)**

Purkinje fibers

**Interventricular
septum**



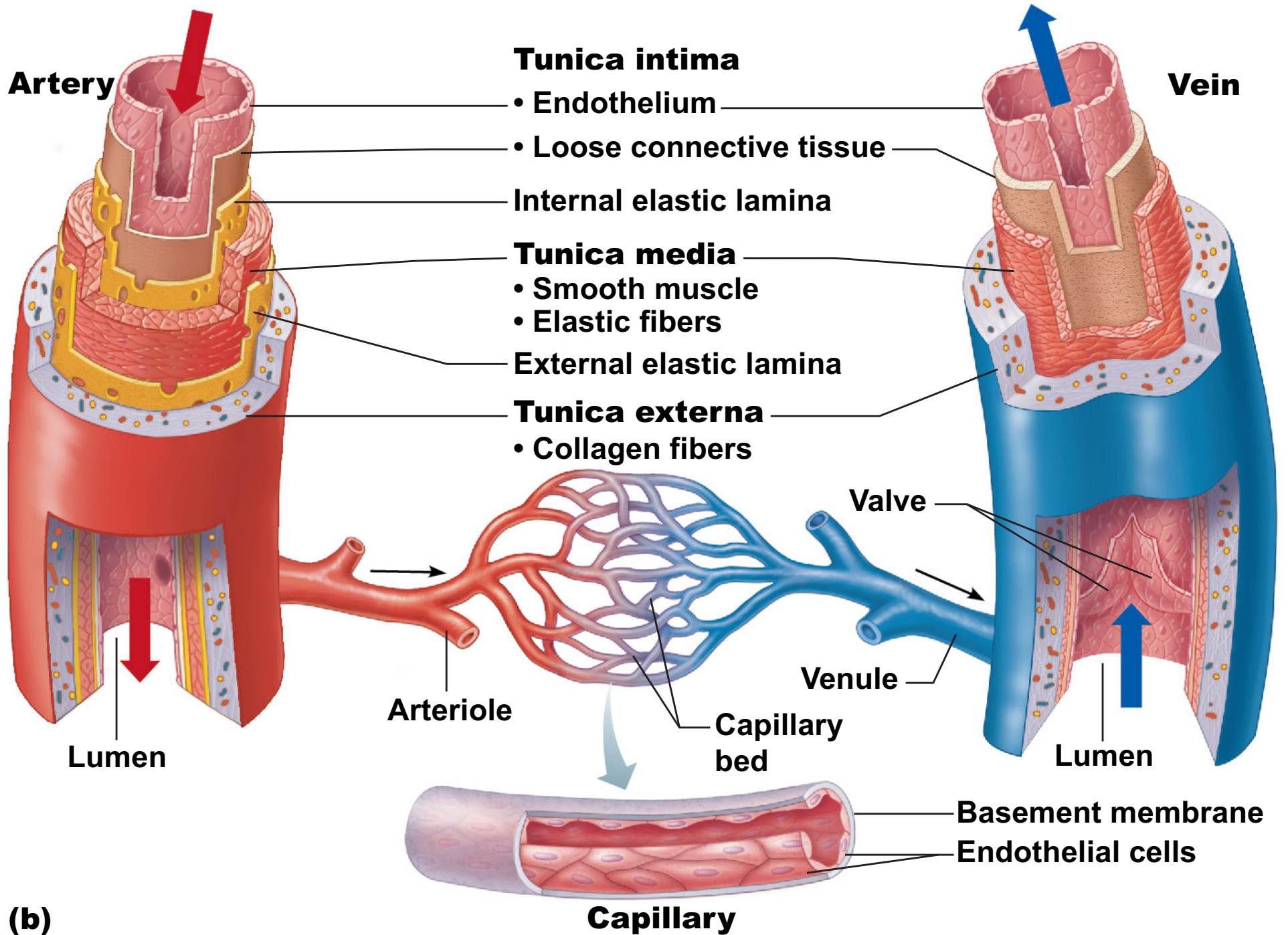




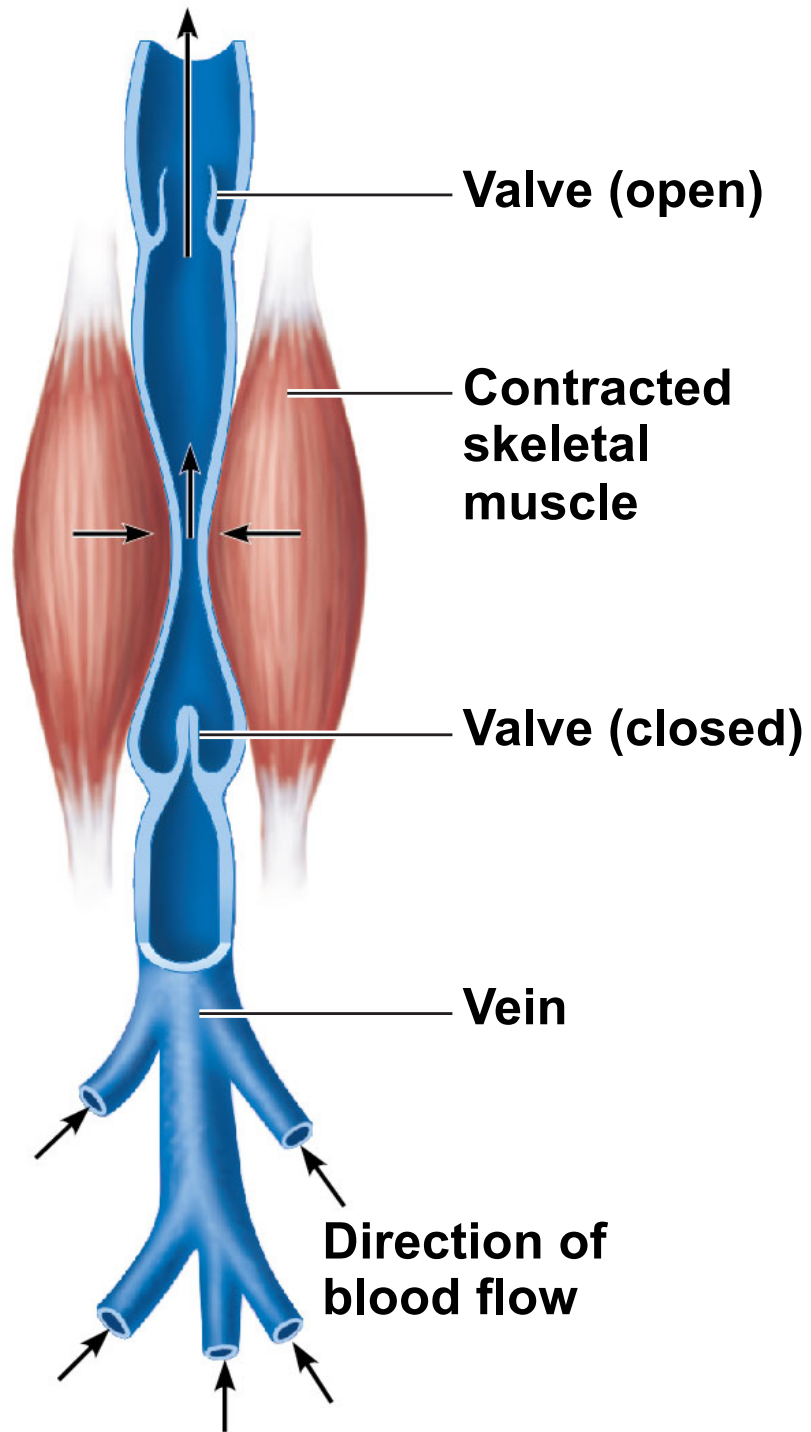
(a)

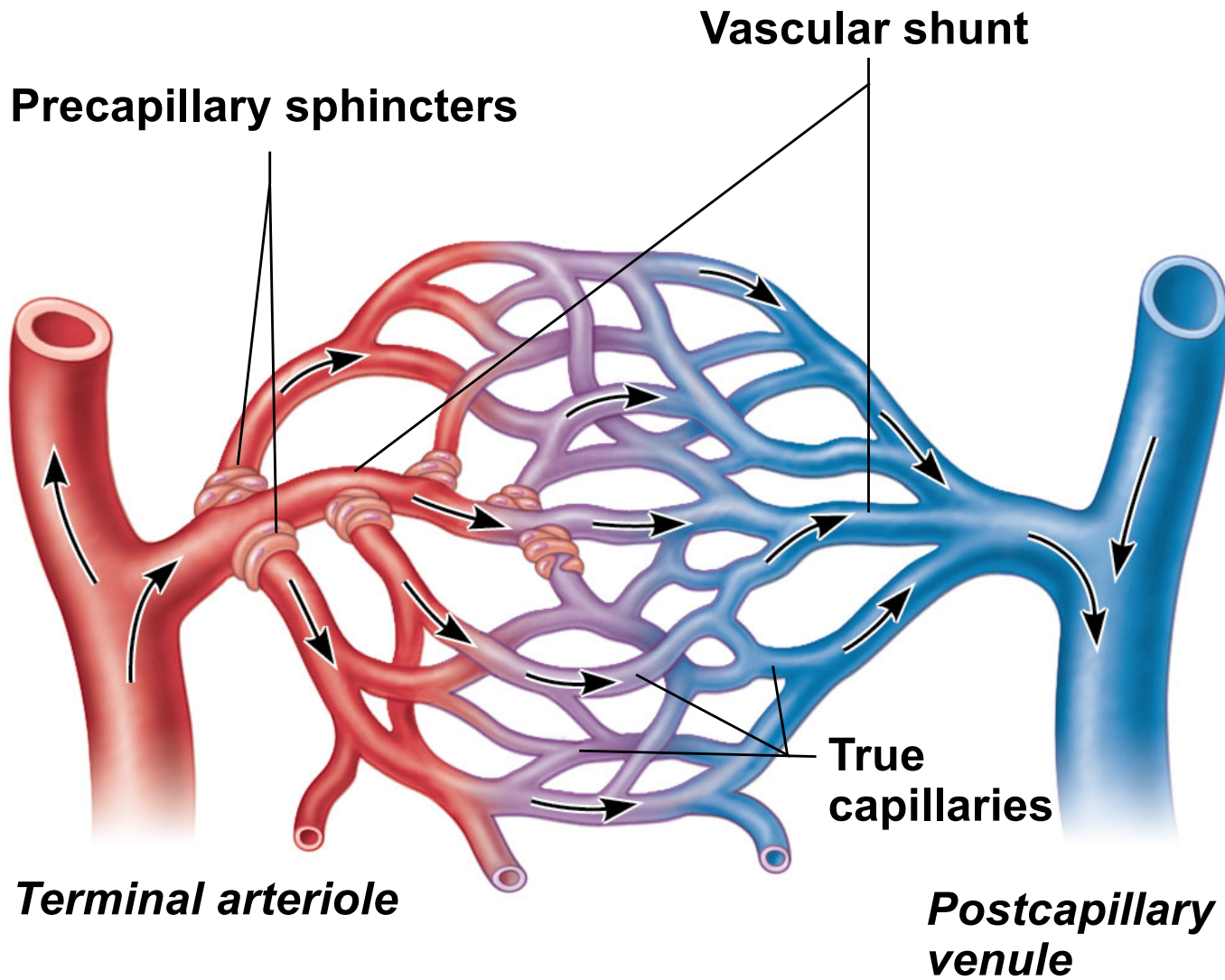
Artery

Vein

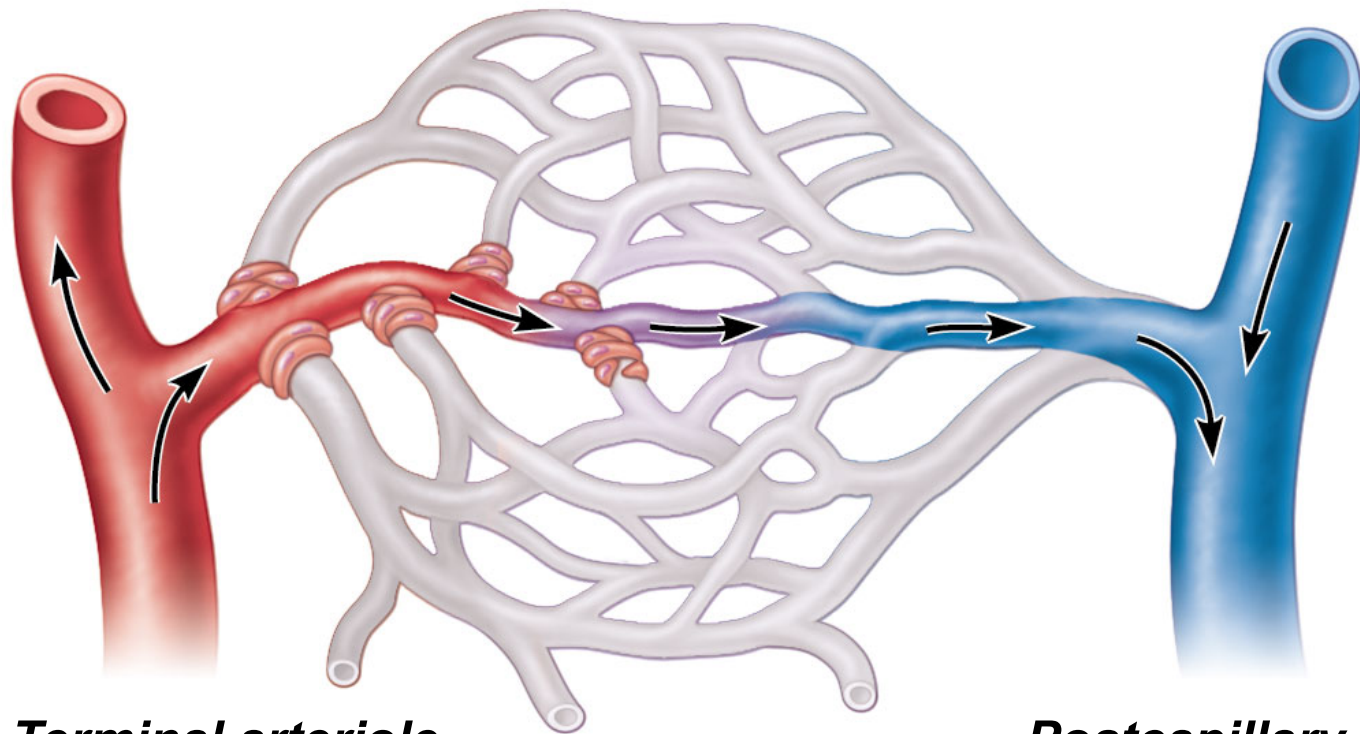


(b)





(a) Sphincters open; blood flows through true capillaries.



Terminal arteriole

*Postcapillary
venule*

**(b) Sphincters closed; blood flows through
vascular shunt.**

Anterior

**Cerebral arterial circle
(circle of Willis)**

Frontal lobe

Optic chiasma

**Middle cerebral
artery**

**Internal carotid
artery**

Mammillary body

Temporal lobe

Pons

Occipital lobe

• **Anterior communicating
artery**

• **Anterior cerebral artery**

• **Posterior communicating
artery**

• **Posterior cerebral artery**

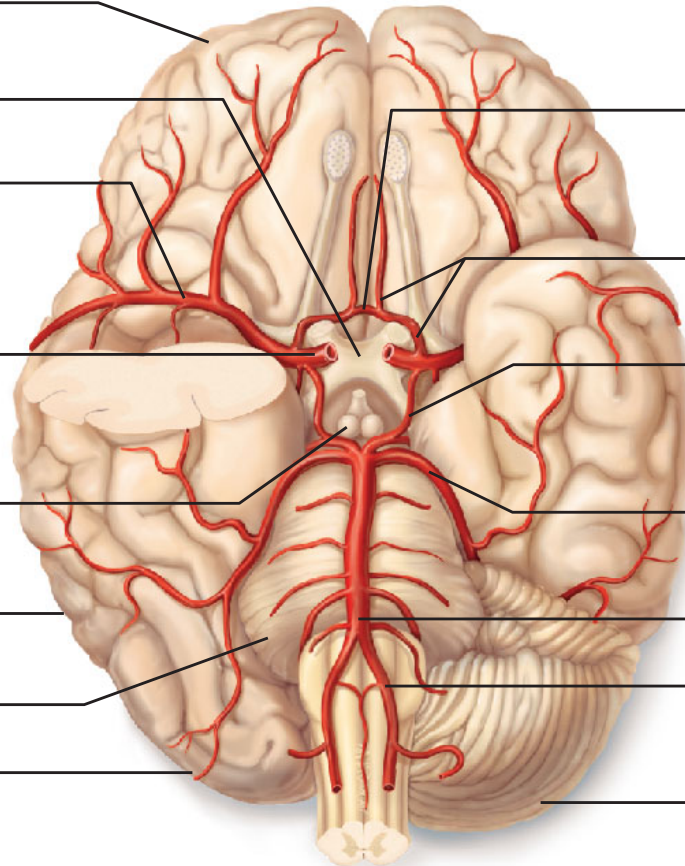
Basilar artery

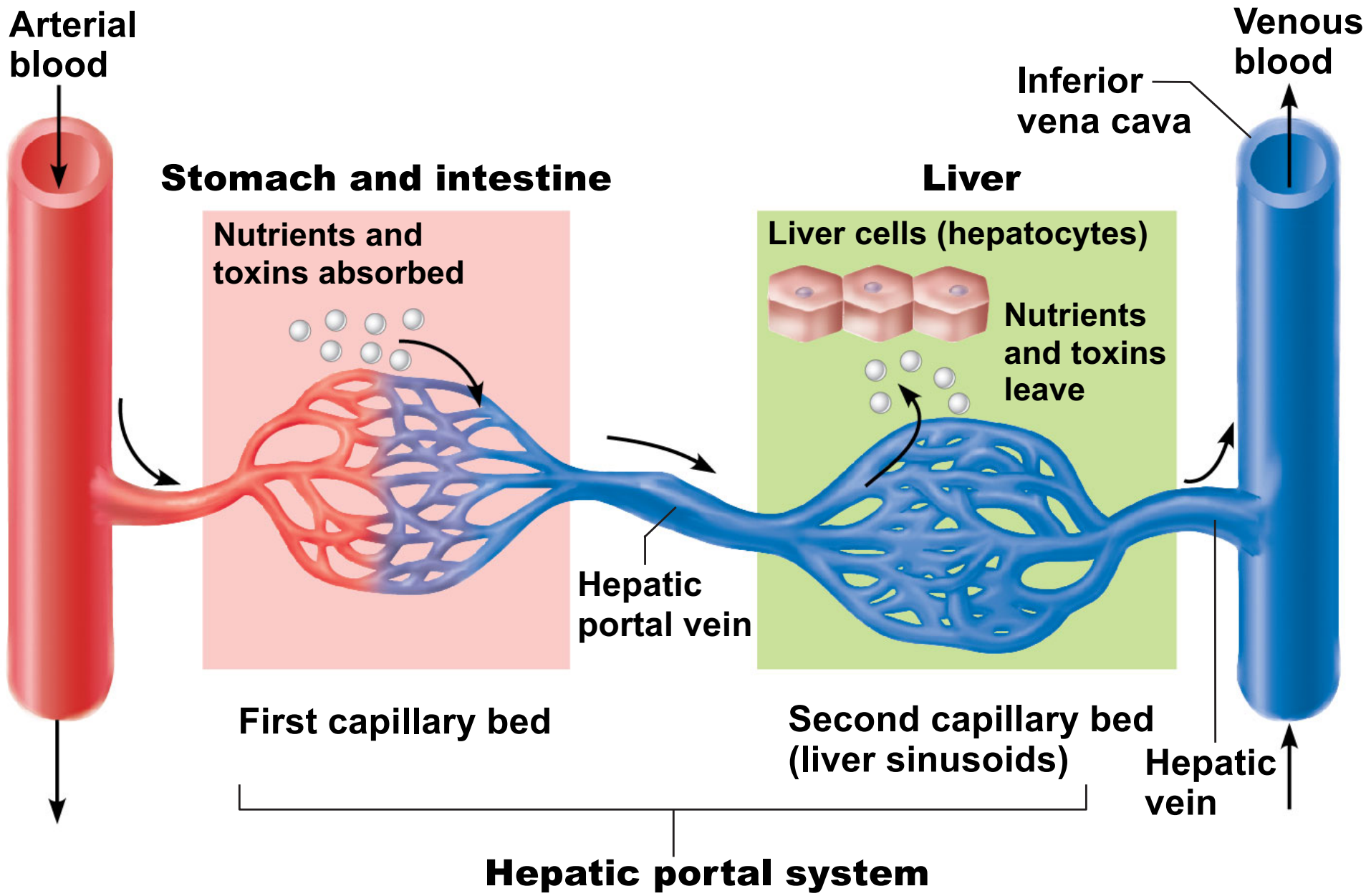
Vertebral artery

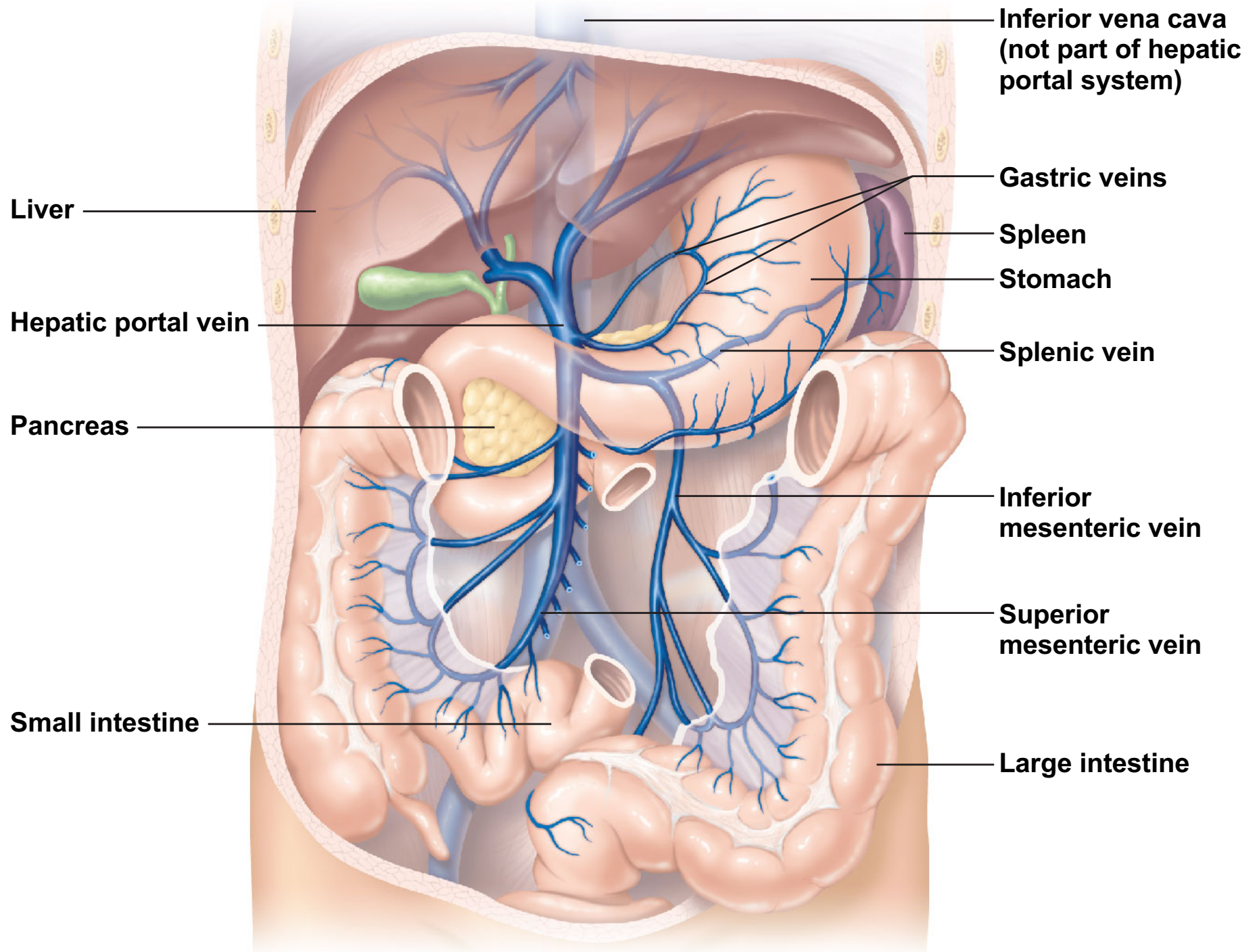
Cerebellum

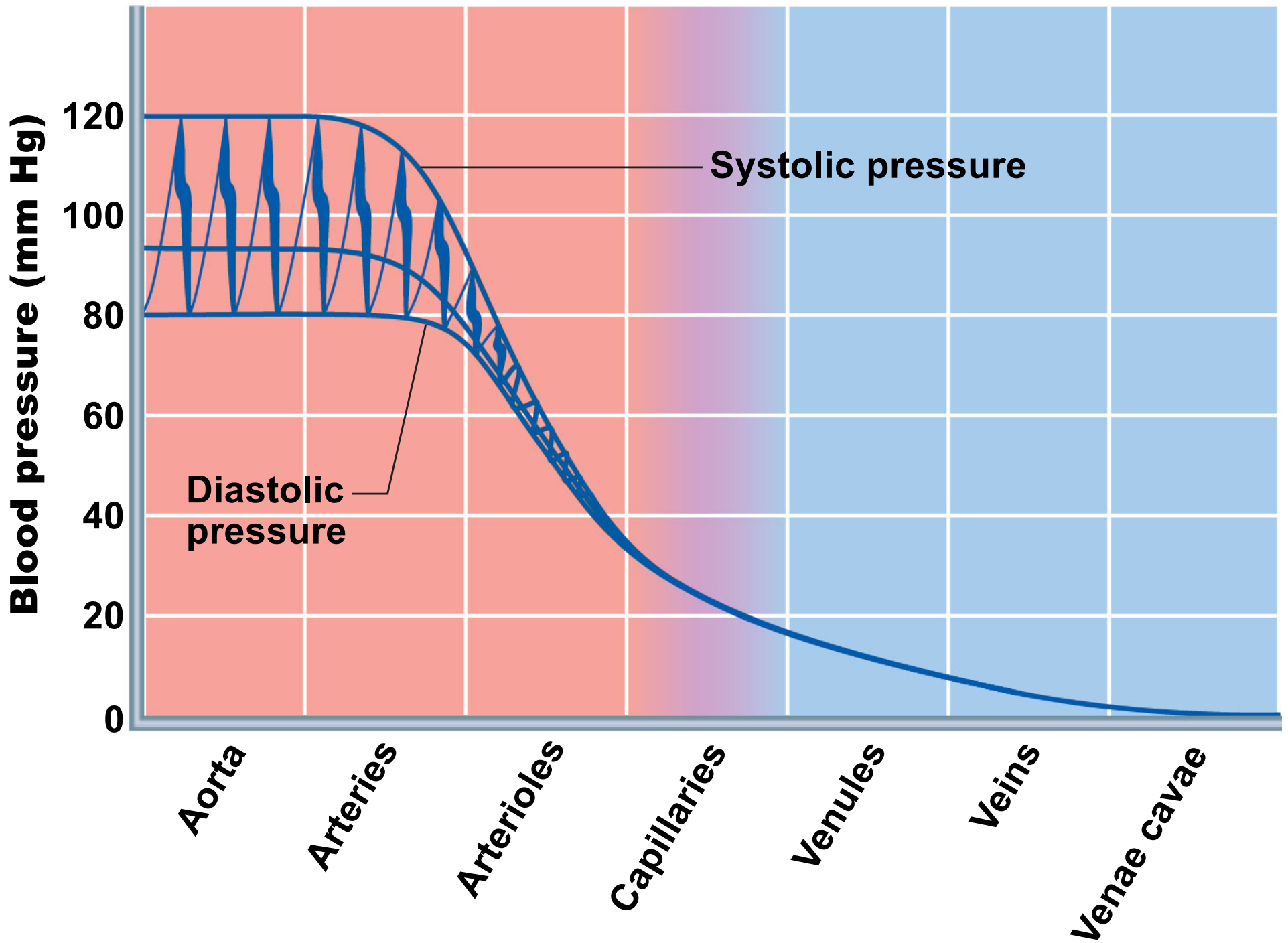
Posterior

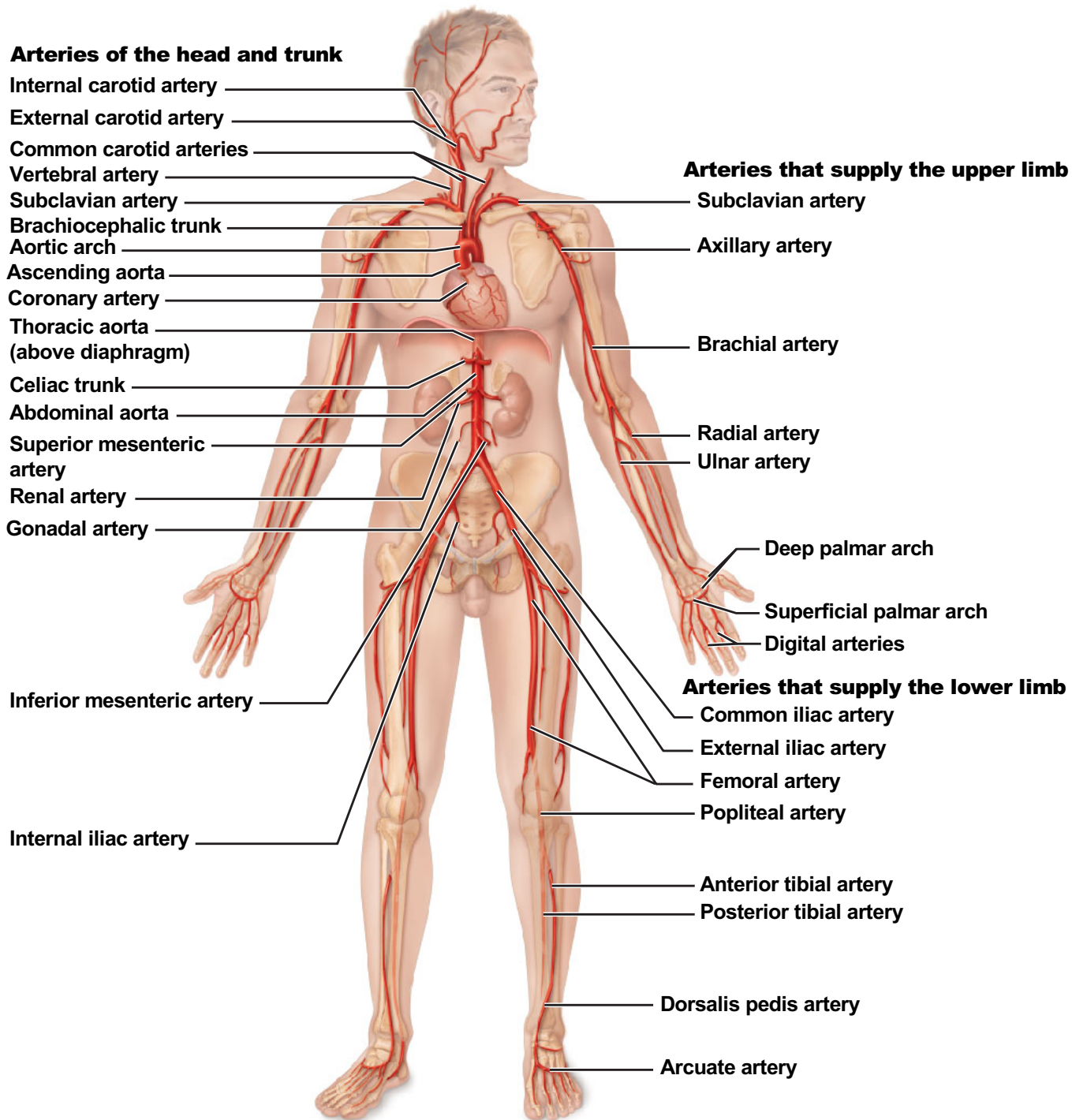
(a)











Veins of the head and trunk

Dural venous sinuses

External jugular vein

Vertebral vein

Internal jugular vein

Right and left
brachiocephalic veins

Superior vena cava

Great cardiac vein

Hepatic veins

Splenic vein

Hepatic portal vein

Renal vein

Superior

mesenteric vein

Inferior

mesenteric vein

Inferior vena cava

Common iliac vein

Internal iliac vein

Veins that drain the upper limb

Subclavian vein

Axillary vein

Cephalic vein

Brachial vein

Basilic vein

Median cubital vein

Ulnar vein

Radial vein

Digital veins

Veins that drain the lower limb

External iliac vein

Femoral vein

Great saphenous vein

Popliteal vein

Posterior tibial vein

Anterior tibial vein

Small saphenous vein

Dorsal venous arch

Dorsal metatarsal veins

