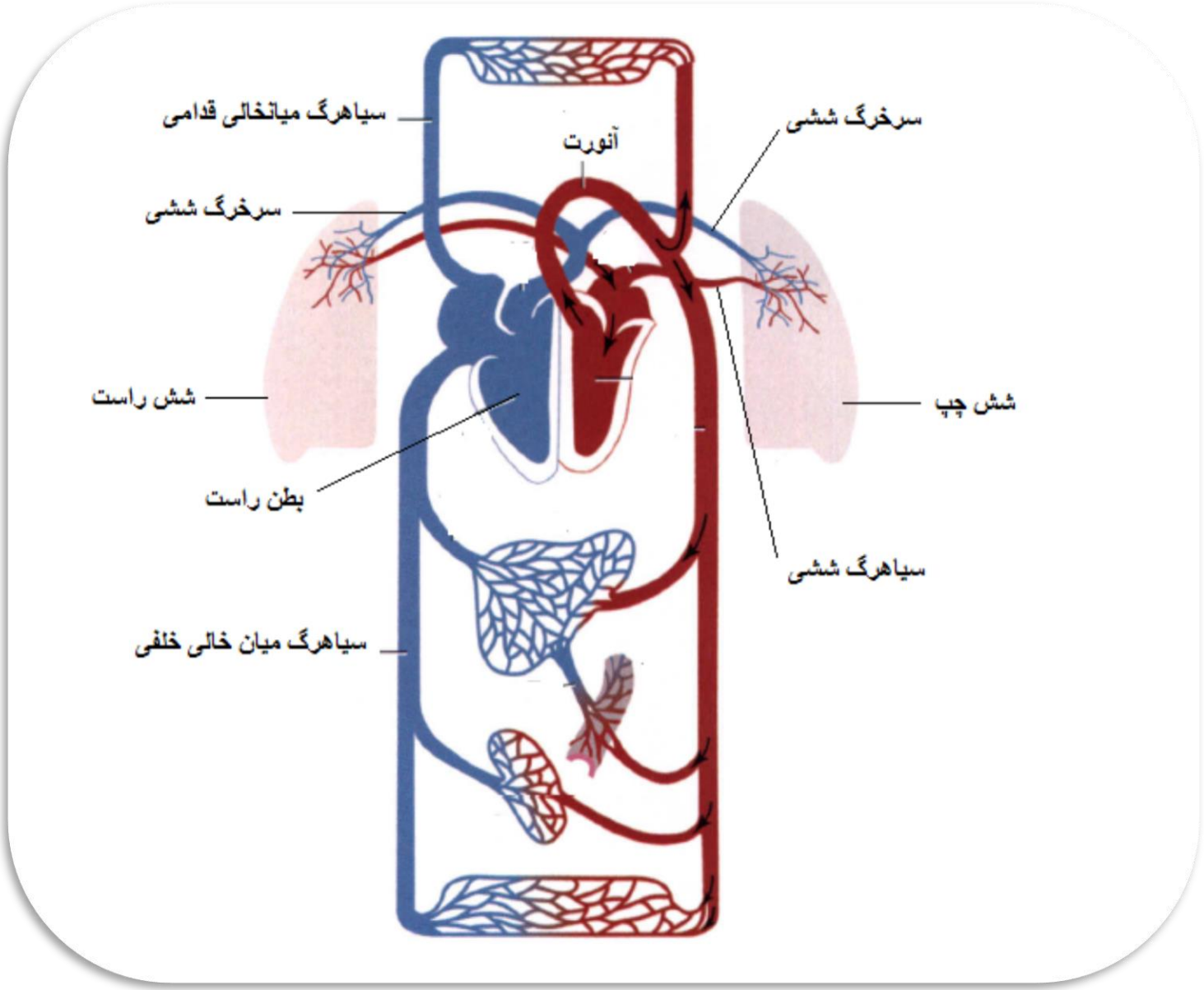
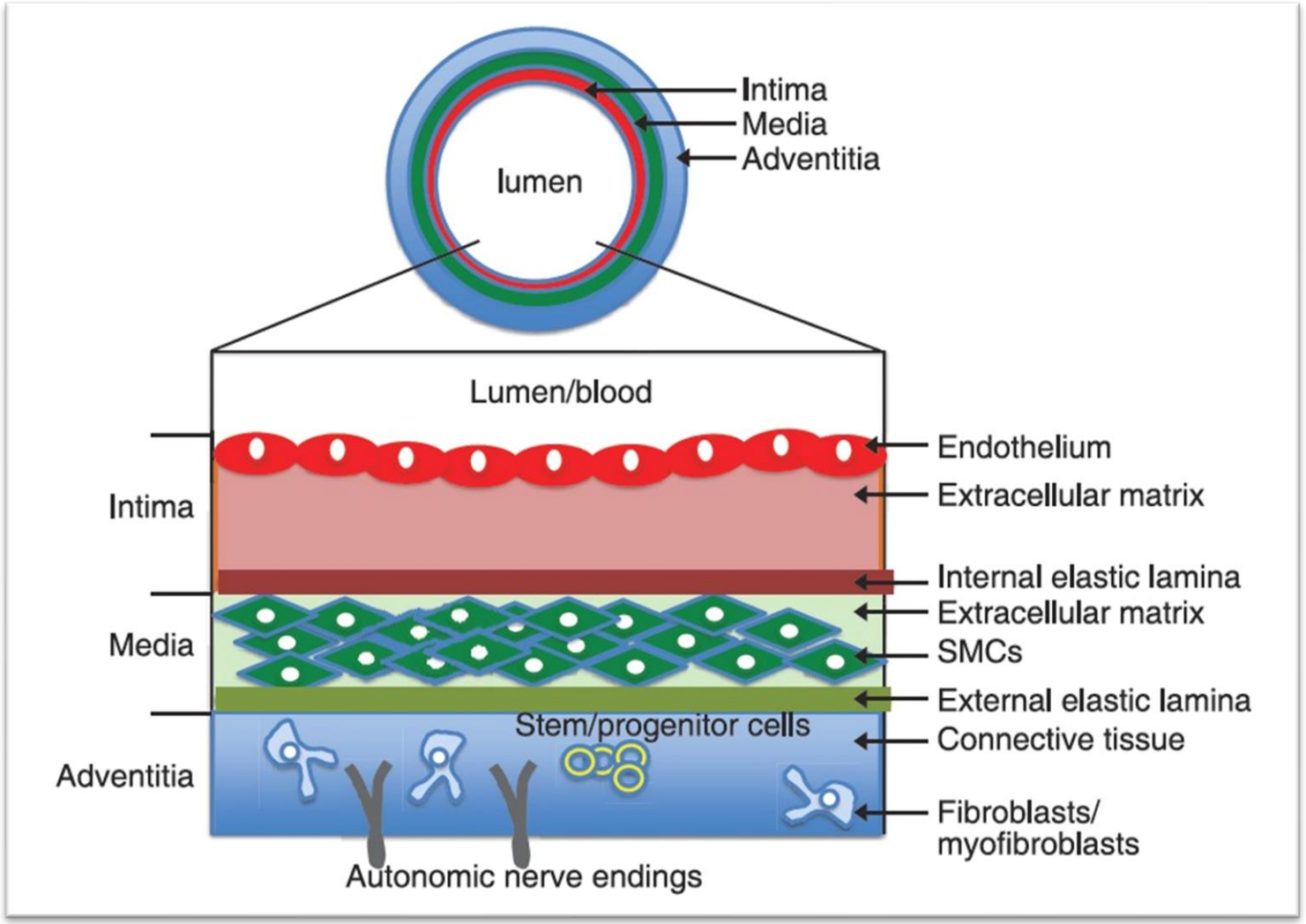
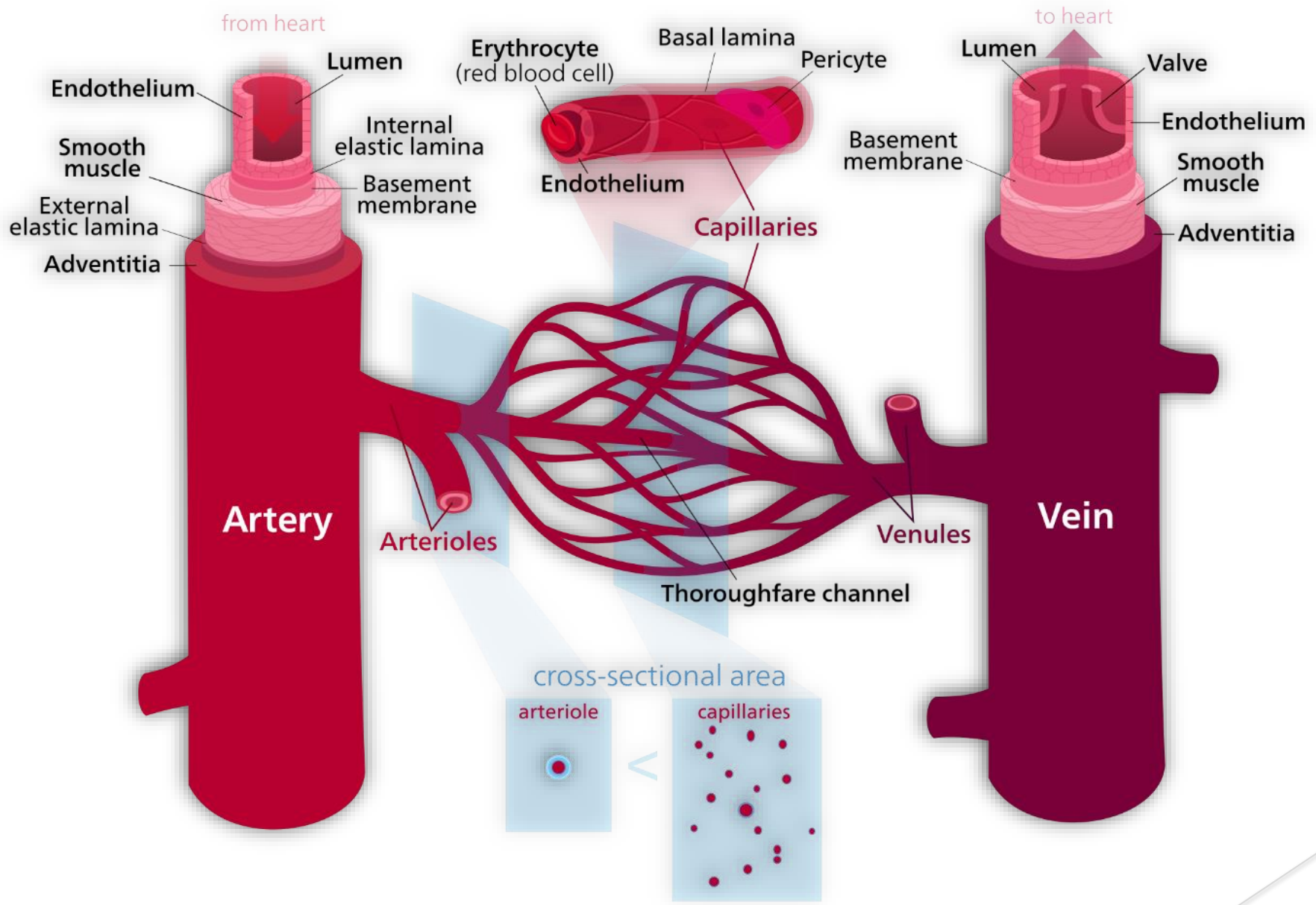
In the name of Allah


سیاهرگ میانخالی قدامی
آنورت
سرخرگ ششی
سرخرگ ششی
شش راست
شش چپ
بطن راست
سیاهرگ ششی
سیاهرگ میان خالی خلفی

Vessels Layers




from heart
Lumen
Endothelium
Smooth muscle
External elastic lamina
Adventitia
Internal elastic lamina
Basement membrane
Erythrocyte (red blood cell)
Basal lamina
Pericyte
Endothelium
Capillaries
Artery
Arterioles
Venules
Thoroughfare channel
Vein
to heart
Lumen
Valve
Endothelium
Basement membrane
Smooth muscle
Adventitia
cross-sectional area
arteriole
<
capillaries

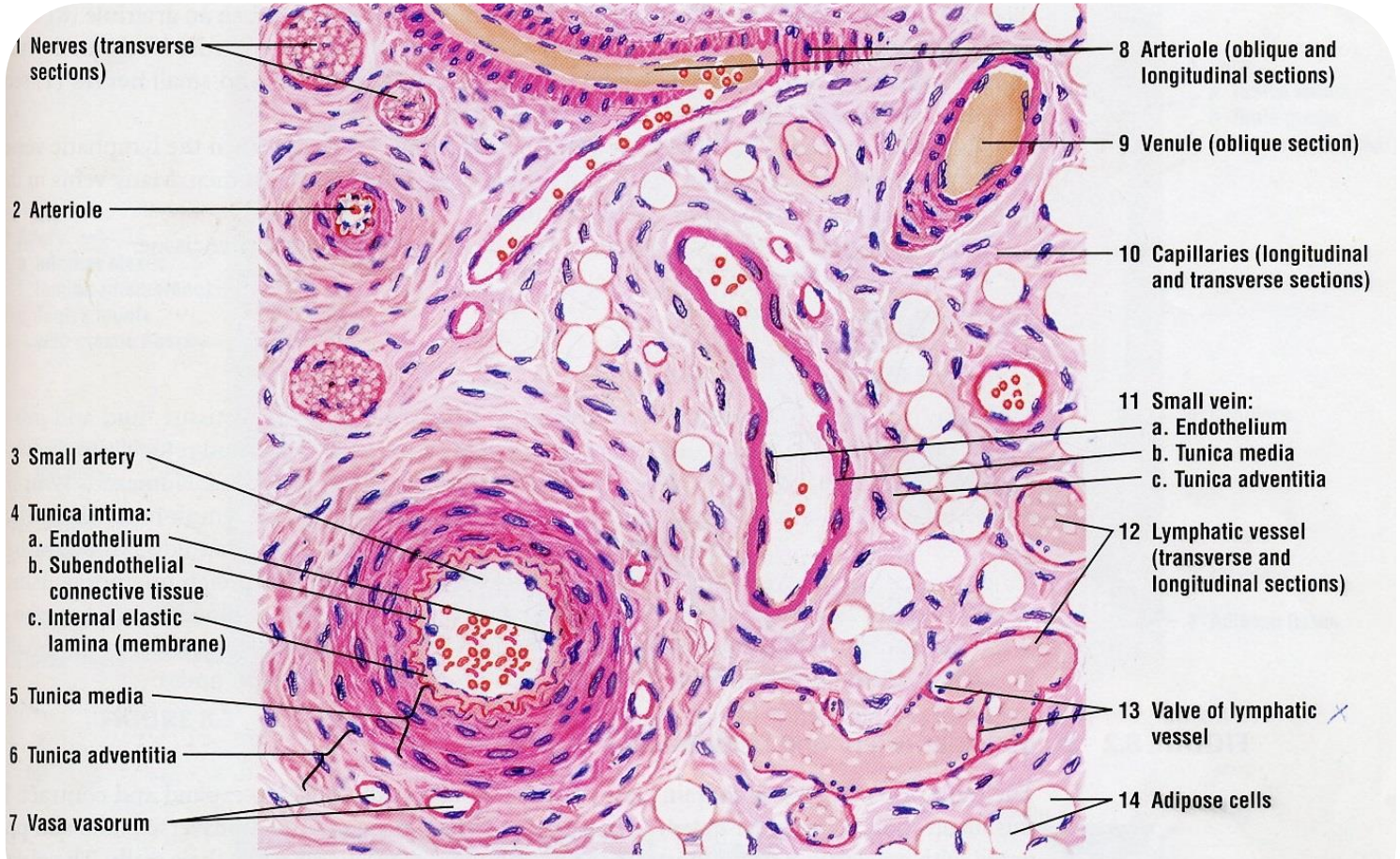
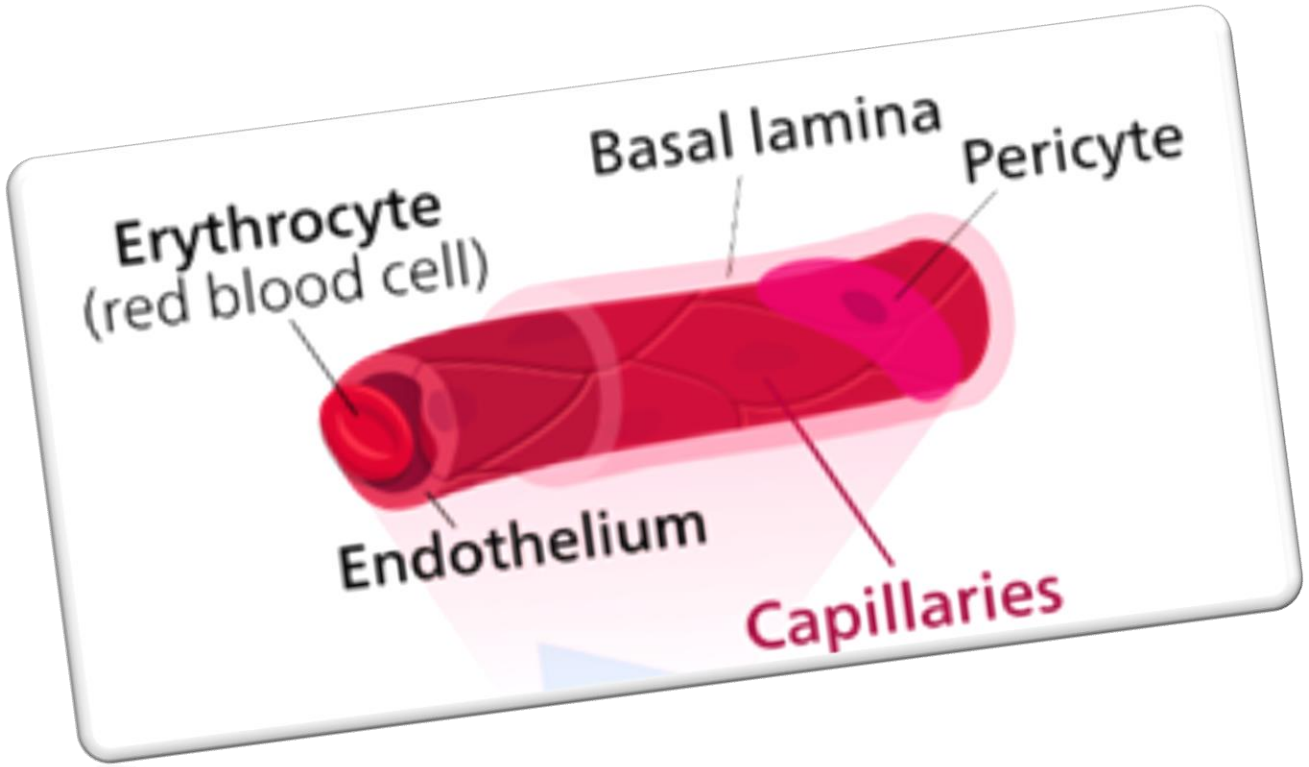
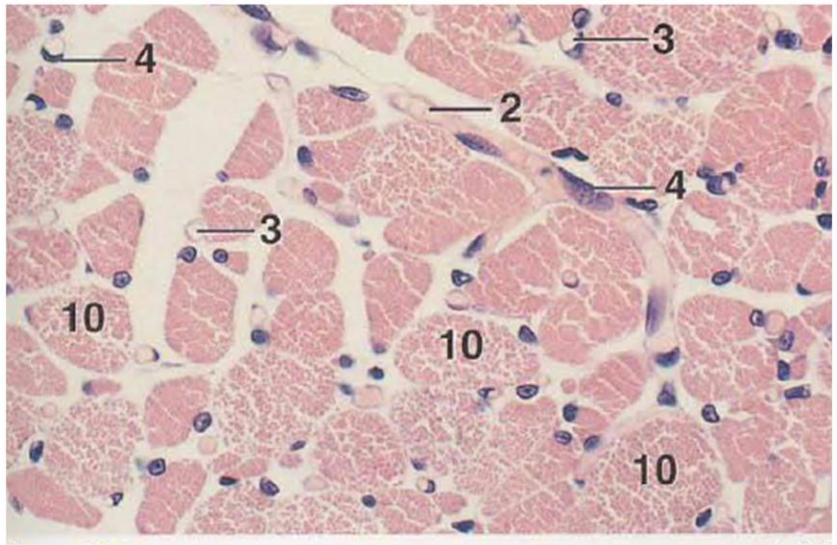


FIGURE 8.1 ■ Blood and lymphatic vessels in the connective tissue. Stain: hematoxylin and eosin. Low magnification.

Capillary


Basal lamina
Pericyte
Erythrocyte
(red blood cell)
Endothelium
Capillaries

Capillary



KEY

1. Arteriole, x.s.
2. Capillary, l.s.
3. Capillary, x.s.
4. Endothelial cell, nucleus
5. Endothelial cell, surface cut
6. Erythrocytes
7. Macrophage
8. Mast cell
9. Plasma cell
10. Skeletal muscle cell, x.s.
11. Small artery, x.s.
12. Small vein
13. Smooth muscle cell, nucleus
14. Uterine gland
15. Venule

Figure 10.2 × 625

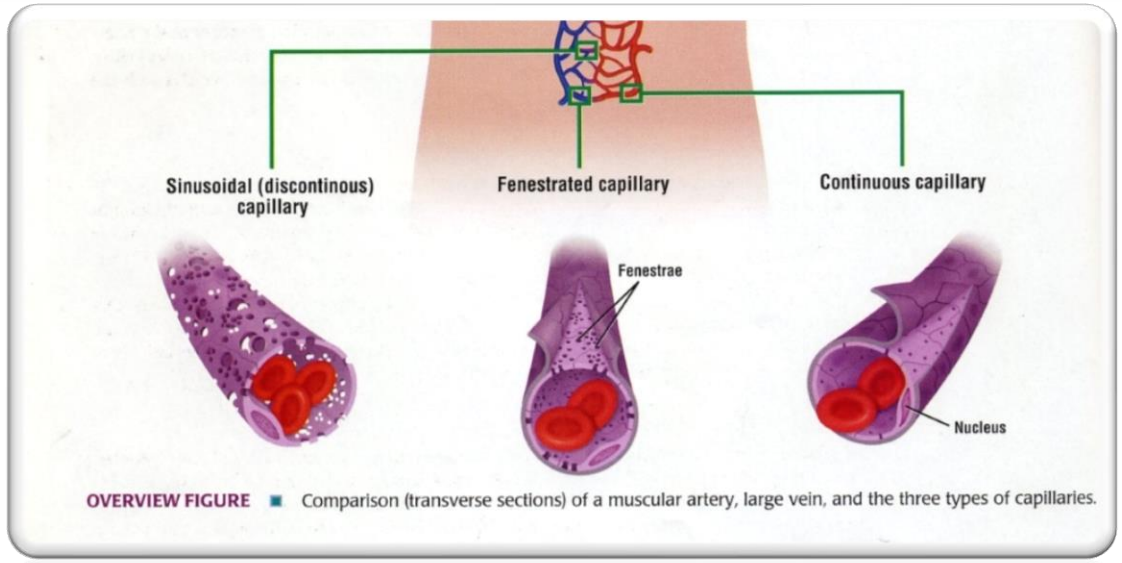
Types of Capillaries

Capillaries are the smallest blood vessels. Their average diameter is approximately 8 m, which is about the size of an **erythrocyte** (red blood cell). The human body contains three types of capillaries: continuous capillaries, fenestrated capillaries, and sinusoids. These structural variations allow different types of metabolic exchange between the blood and the surrounding tissues.

Continuous capillaries are the most common type. They are found in muscle, connective tissue, nervous tissue, and exocrine glands. In these capillaries, the **endothelial cells** are joined and form an uninterrupted, solid endothelial lining.

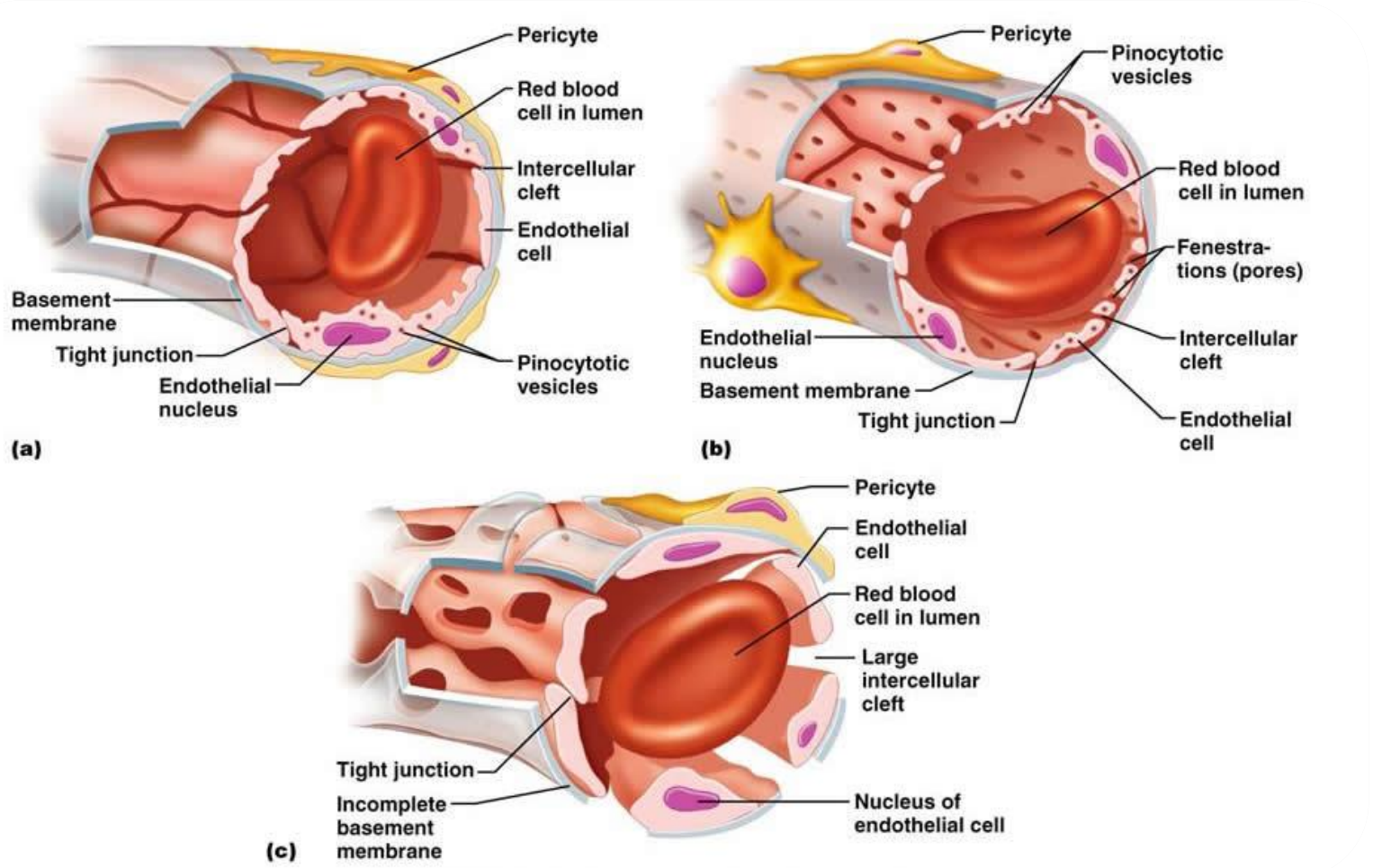
Fenestrated capillaries are characterized by large openings, or **fenestrations** (pores), in the cytoplasm of endothelial cells for rapid exchange of molecules between blood and tissues. Fenestrated capillaries are found in endocrine organs, small intestine, and kidney glomeruli.

Sinusoidal (discontinuous) capillaries are blood vessels that exhibit irregular, tortuous paths. Their much wider diameters slow the flow of blood. Endothelial cell junctions are rare in sinusoidal capillaries, and wide gaps exist between individual endothelial cells. Also, because a **basement membrane** underlying the endothelium is either incomplete or absent, direct exchange of molecules occurs between blood contents and cells. Sinusoidal capillaries are found in the liver, spleen, and bone marrow (see the overview figure).



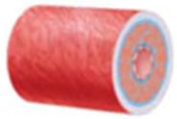
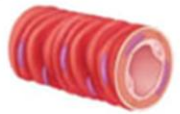
OVERVIEW FIGURE ■ Comparison (transverse sections) of a muscular artery, large vein, and the three types of capillaries.

Types of Capillaries



Artery

TABLE 20.1 Summary of Blood Vessel Anatomy

Vessel Type/Illustration*	Average Lumen Diameter (D) and Wall Thickness (T)	Relative Tissue Makeup			
		Endothelium	Elastic Tissues	Smooth Muscles	Fibrous (Collagenous) Tissues
 Elastic artery	D: 1.5 cm T: 1.0 mm				
 Muscular artery	D: 6.0 mm T: 1.0 mm				
 Arteriole	D: 37.0 µm T: 6.0 µm				
 Capillary	D: 9.0 µm T: 0.5 µm				
 Venule	D: 20.0 µm T: 1.0 µm				
 Vein	D: 5.0 mm T: 0.5 mm				

*Size relationships are not proportional. Smaller vessels are drawn relatively larger so detail can be seen. See column 2 for actual dimensions.

Artery

Elastic Artery (Large artery)

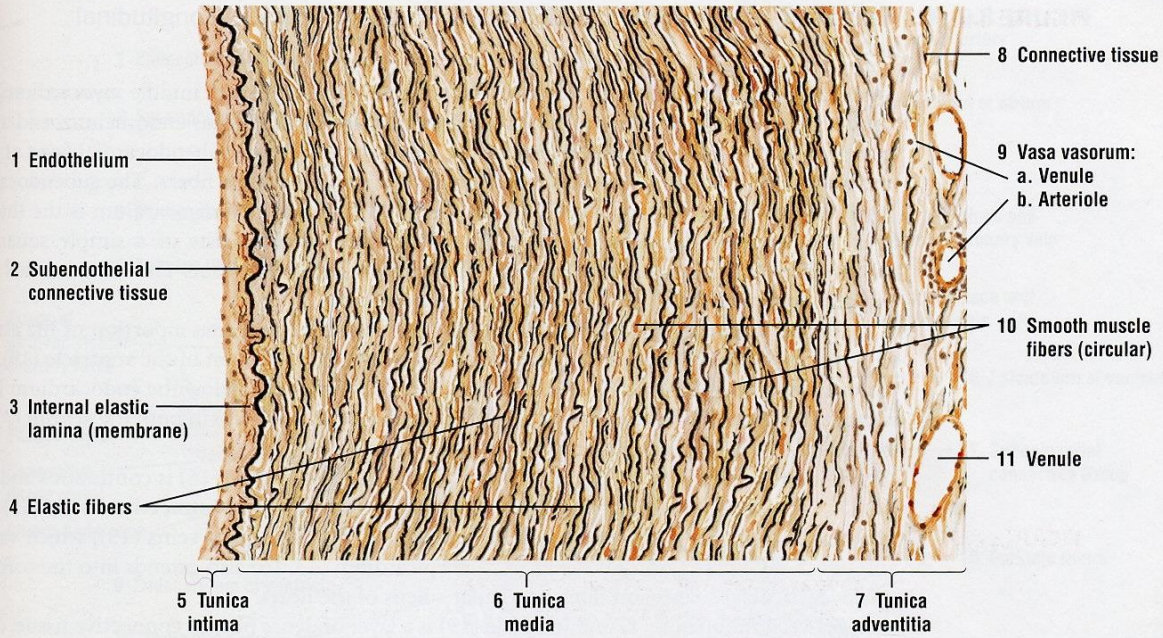
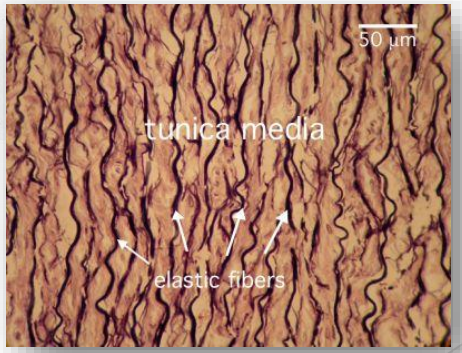


FIGURE 8.4 ■ Wall of an elastic artery: aorta (transverse section). Stain: elastic stain. Low magnification.



Artery

Muscular Artery (Middles sized artery)

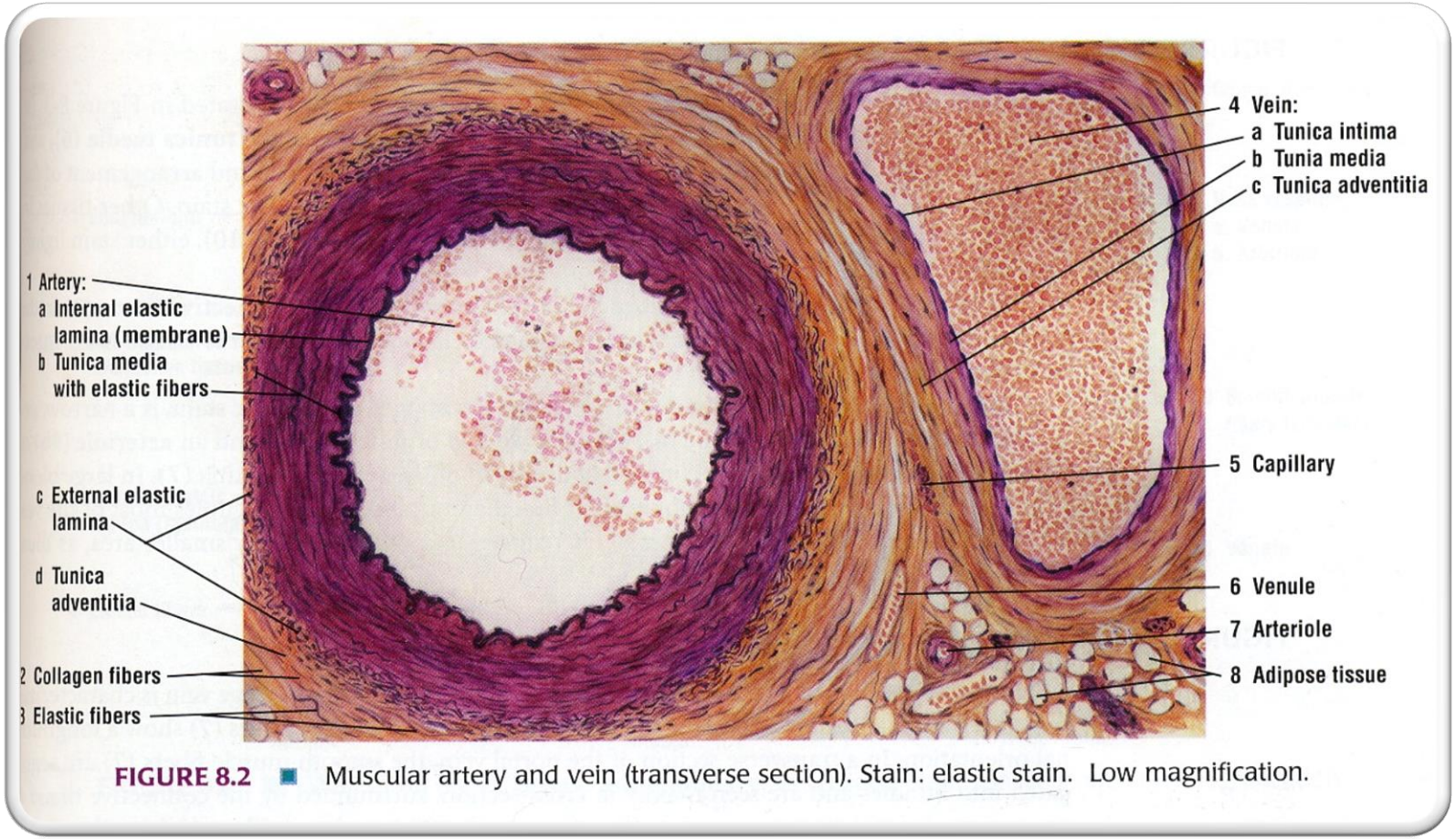


FIGURE 8.2 ■ Muscular artery and vein (transverse section). Stain: elastic stain. Low magnification.

Artery

Muscular Artery (Middles sized artery)

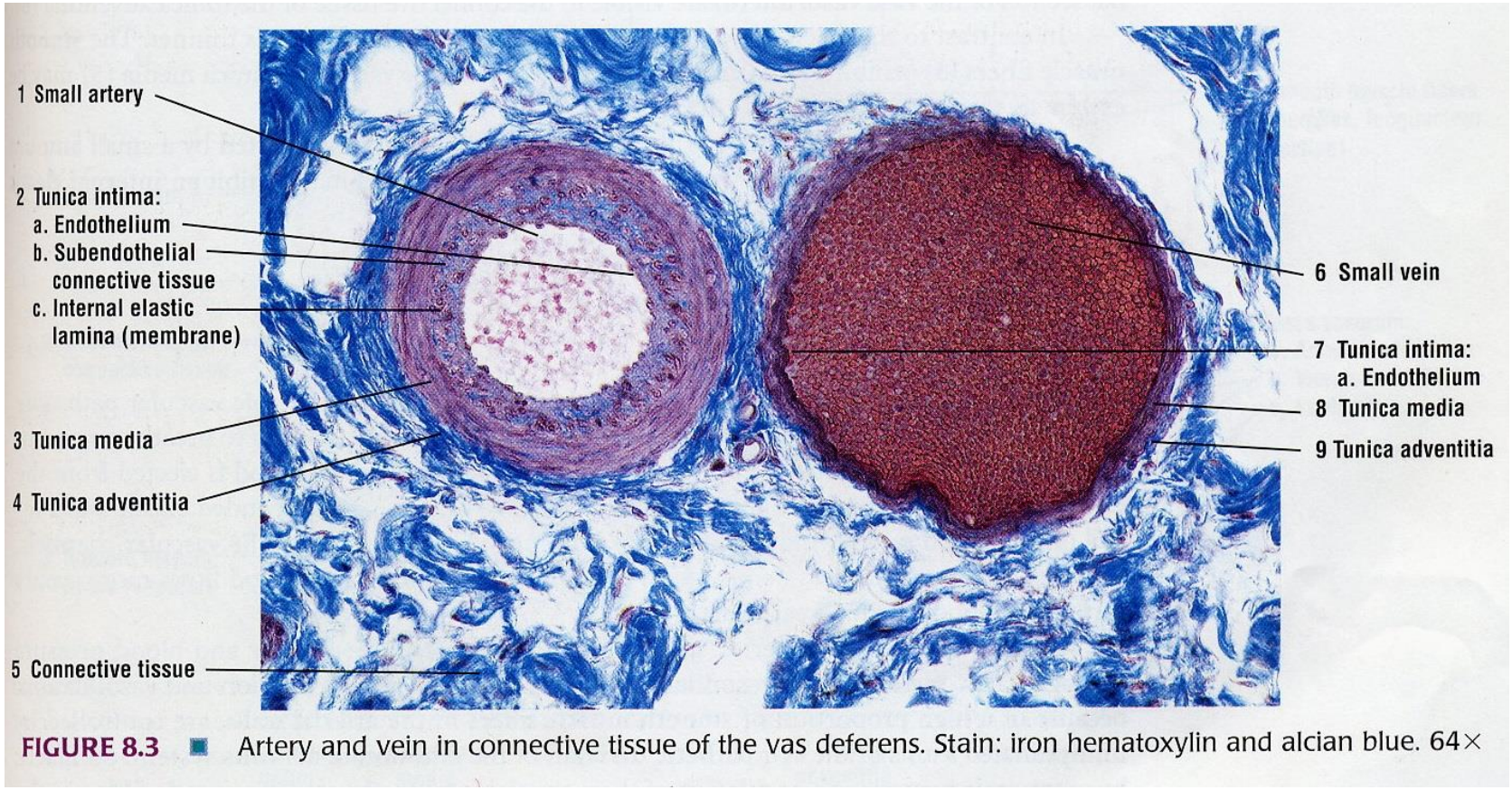


FIGURE 8.3 ■ Artery and vein in connective tissue of the vas deferens. Stain: iron hematoxylin and alcian blue. 64×

Artery

Muscular Artery

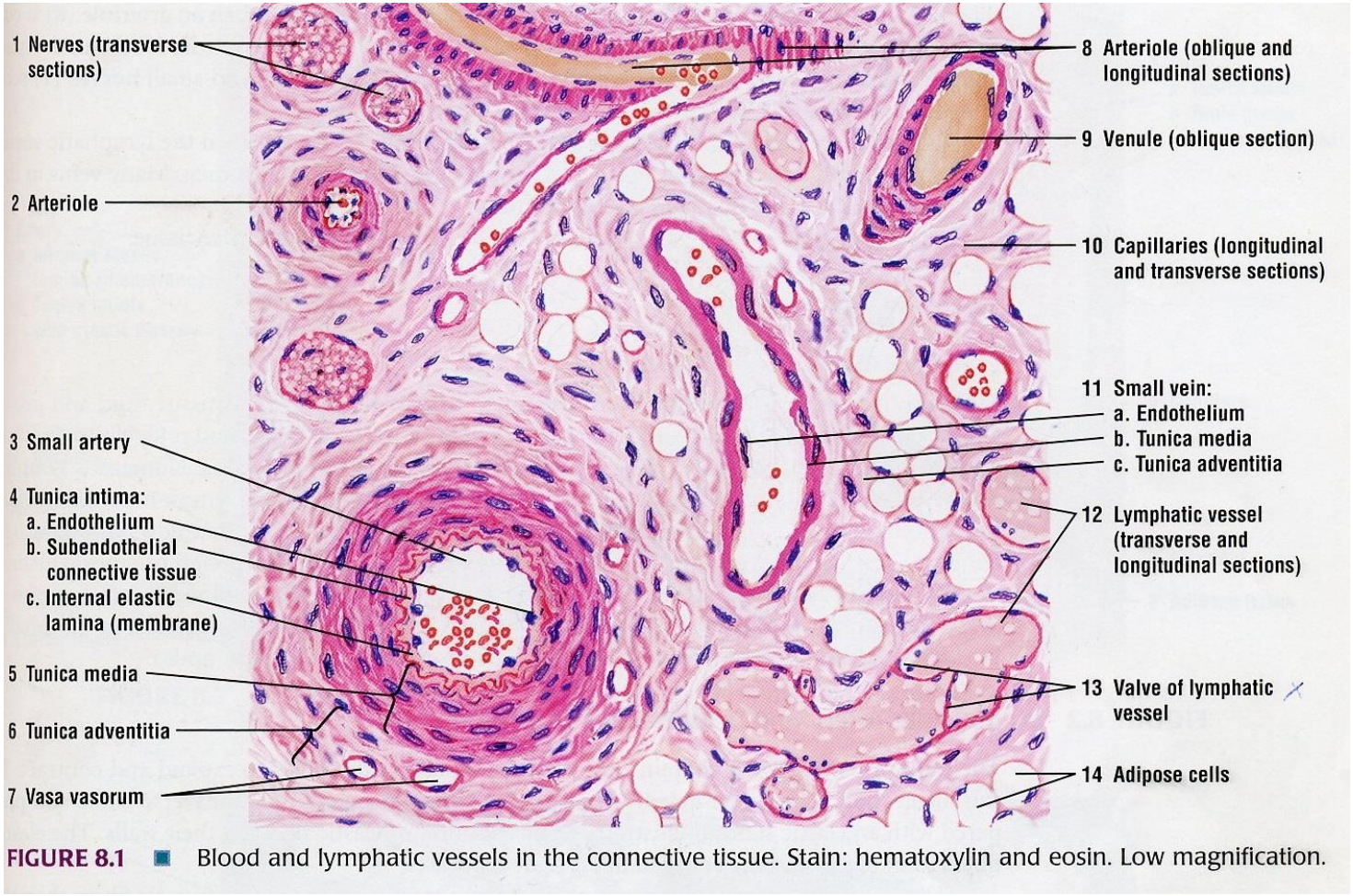
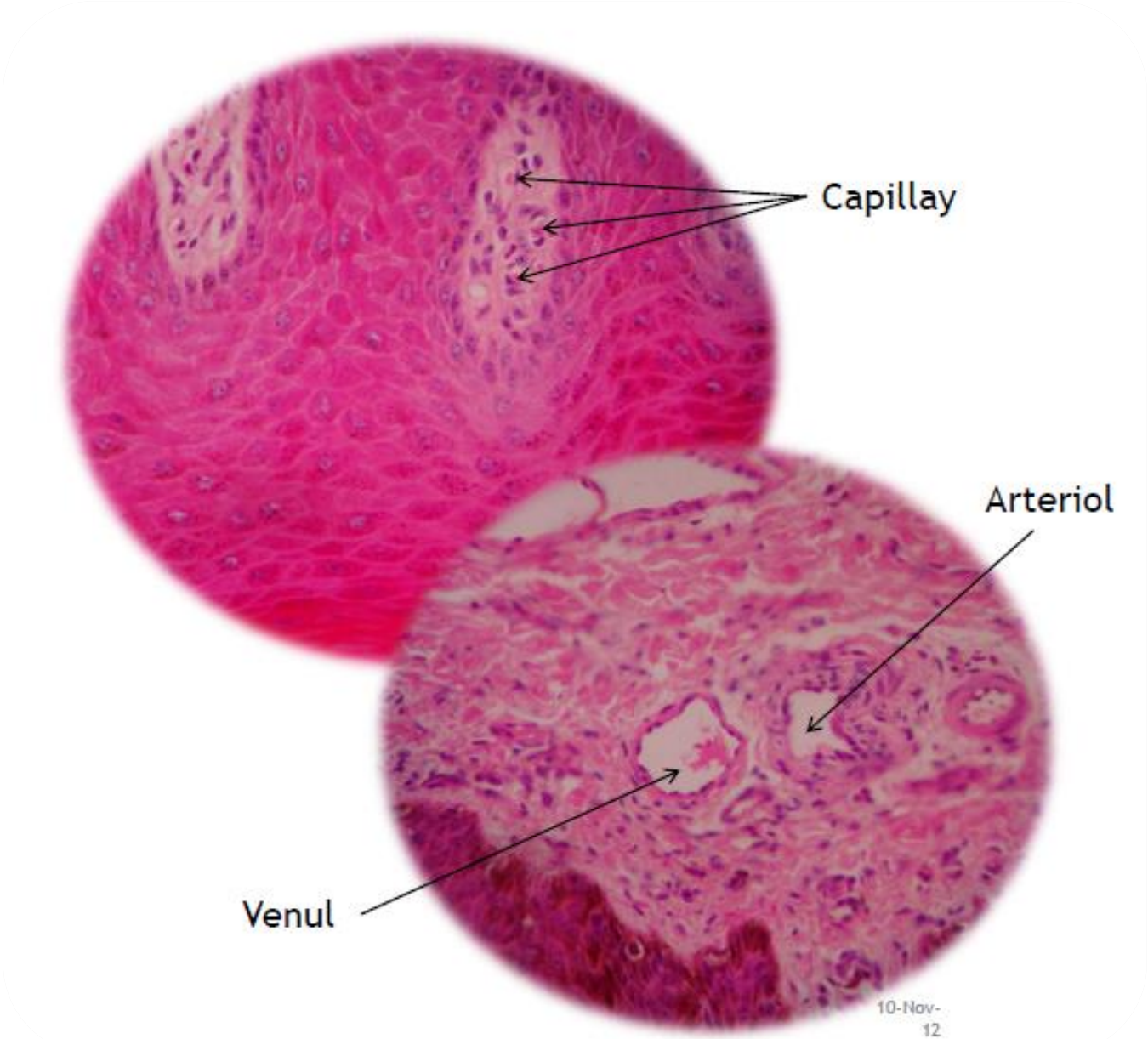
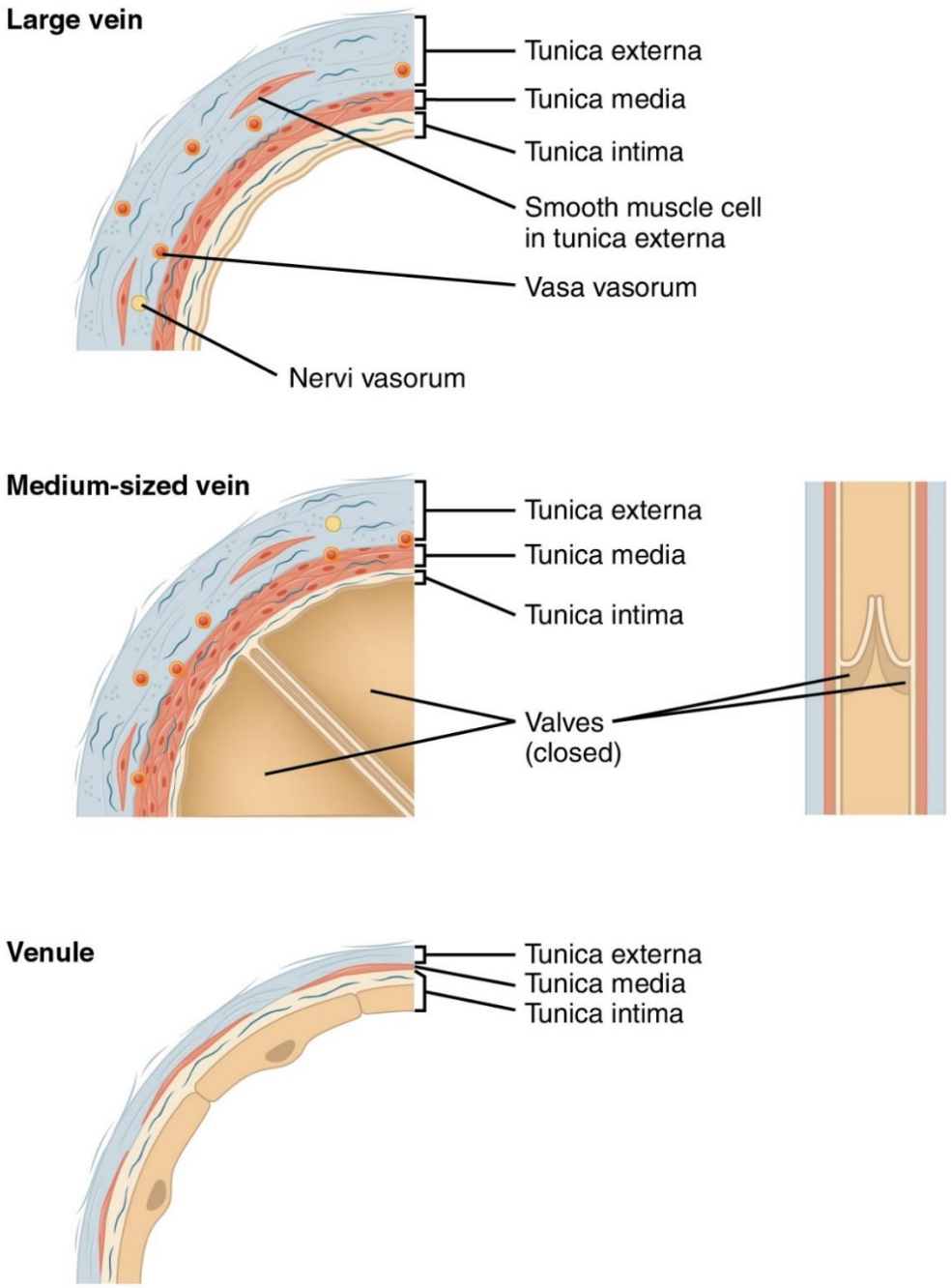
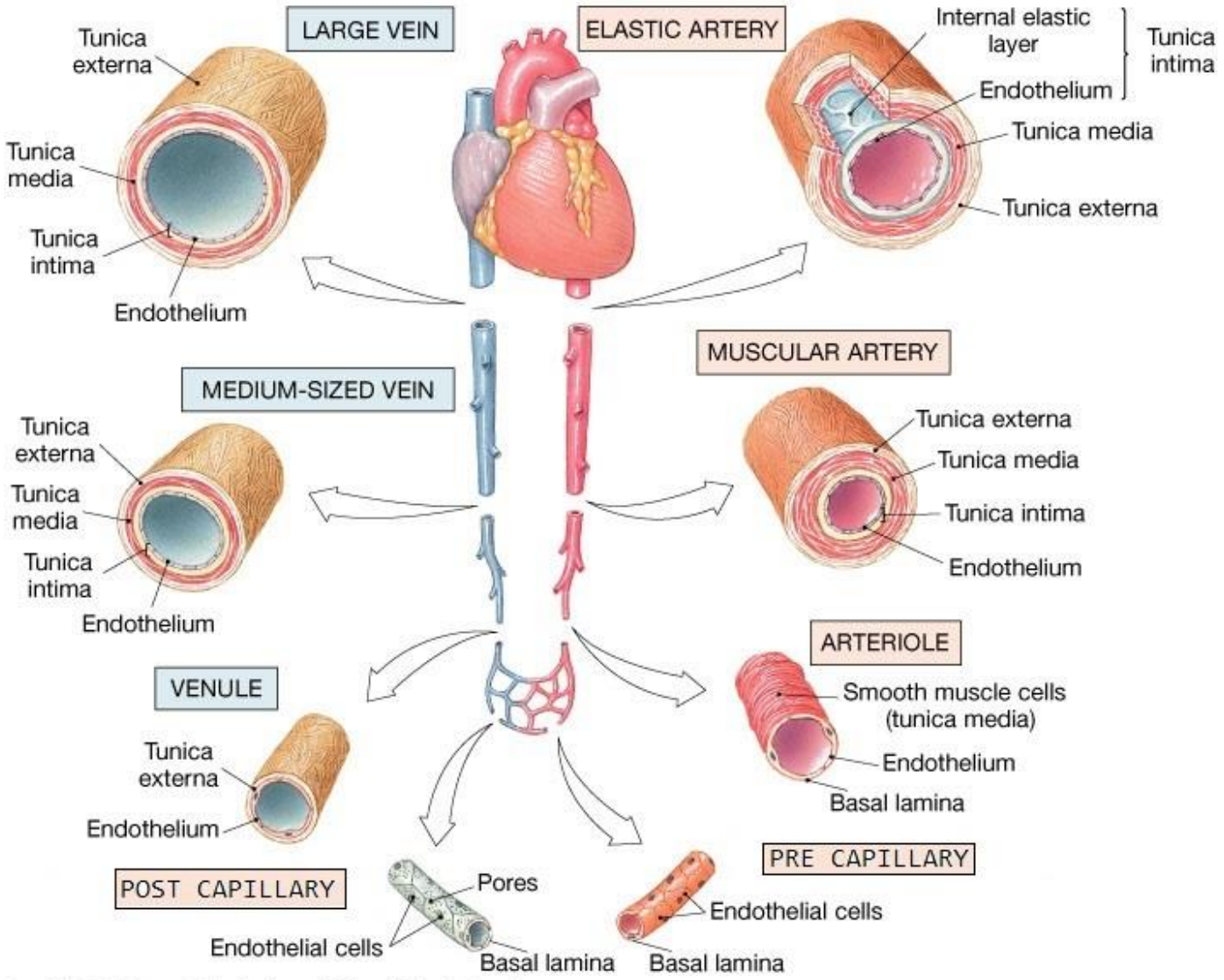


FIGURE 8.1 ■ Blood and lymphatic vessels in the connective tissue. Stain: hematoxylin and eosin. Low magnification.

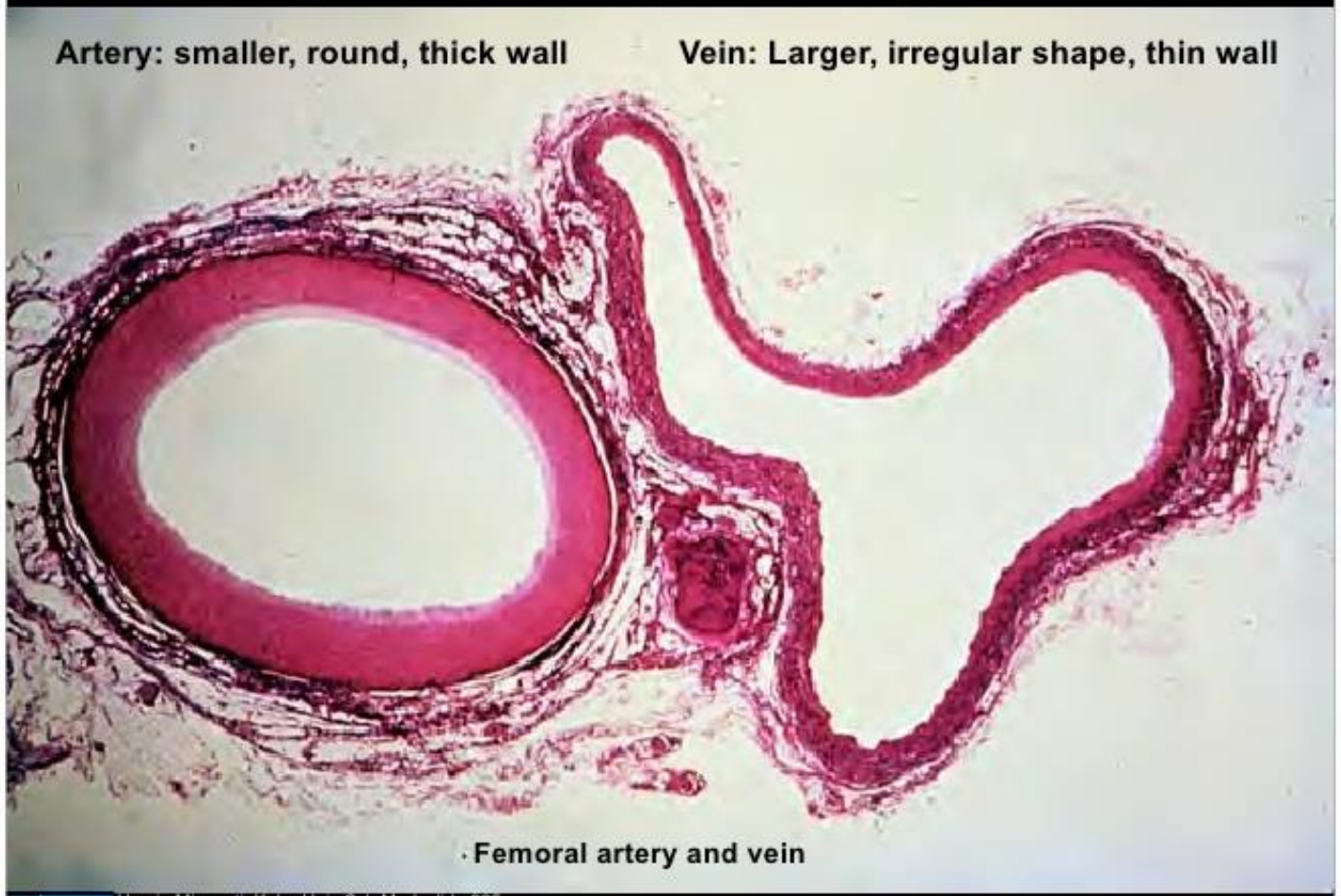

Capillay
Arteriol
Venul

Veins

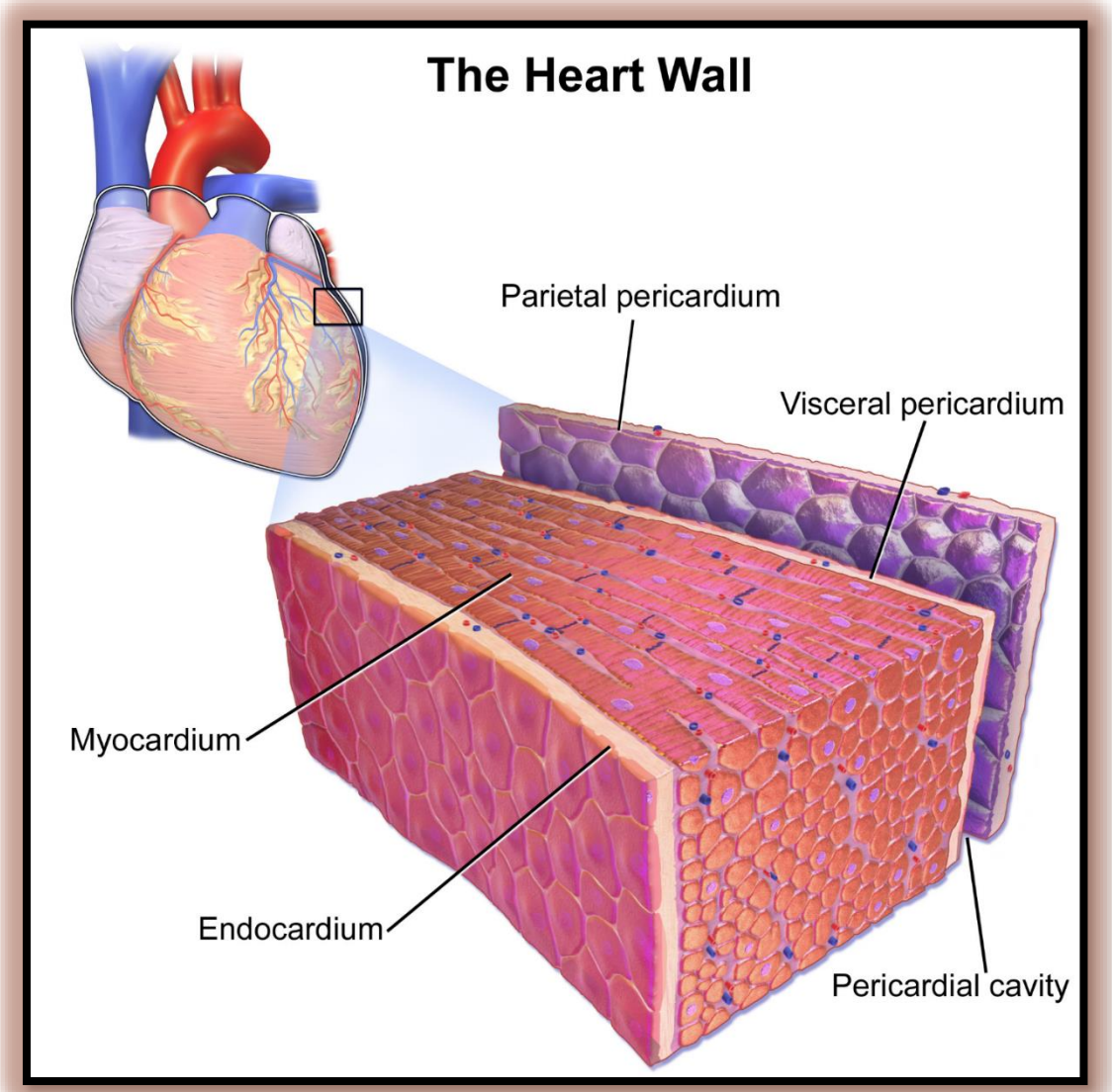

Large vein
Tunica externa
Tunica media
Tunica intima
Smooth muscle cell in tunica externa
Vasa vasorum
Nervi vasorum
Medium-sized vein
Tunica externa
Tunica media
Tunica intima
Valves (closed)
Venule
Tunica externa
Tunica media
Tunica intima



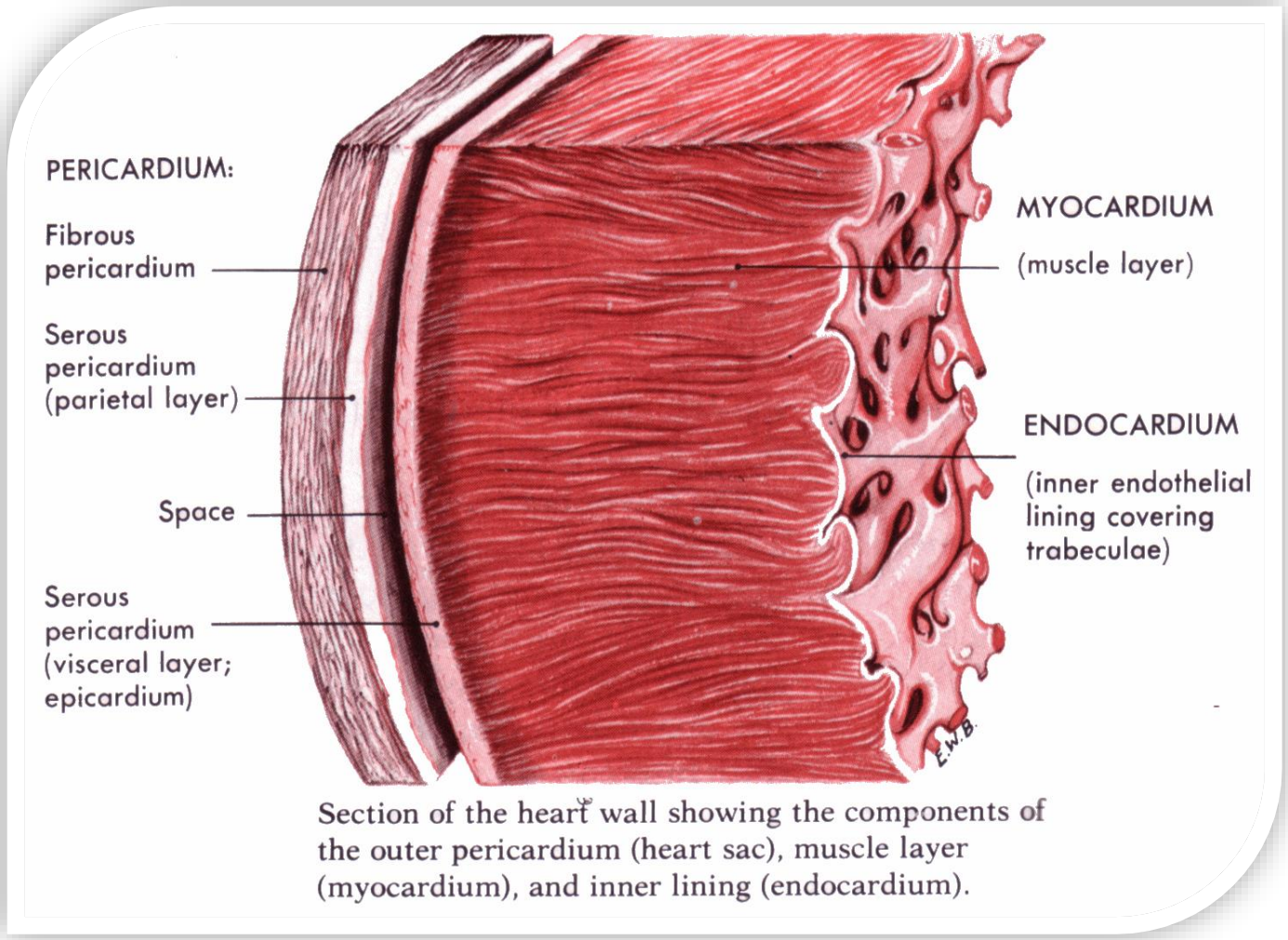
Comparison of companion artery and vein



Heart


The Heart Wall
Parietal pericardium
Visceral pericardium
Myocardium
Endocardium
Pericardial cavity

Endocardium



Section of the heart wall showing the components of the outer pericardium (heart sac), muscle layer (myocardium), and inner lining (endocardium).


Good Luck