Histology — tissues · Lab 7

Blood vessels

When	Monday 14 December 2026, 11:30–13:00
Room	A5/018
Teacher	dr hab. prof. UR Agata Wawrzyniak
Group	Lab group 2
Same day	Lecture 10, 08:00–09:30, A5/4: The immune system and lymphoid organs

What the lab covers

The circulatory system: the structure of the large vessels (elastic artery, muscular artery, lymphatic vessels), how arteries differ from veins, and the structure and types of capillaries.

How it is graded

- Recognising histological slides
- Attendance
- Two tests (at least 15 single- or multiple-choice questions each, one resit) and a practical in the winter semester
- A correctly completed exercise notebook
- Activity

The final practical exam: 15 slides under the microscope, a minute each, 60% to pass.

Bring: the exercise notebook (it is graded)

In this pack

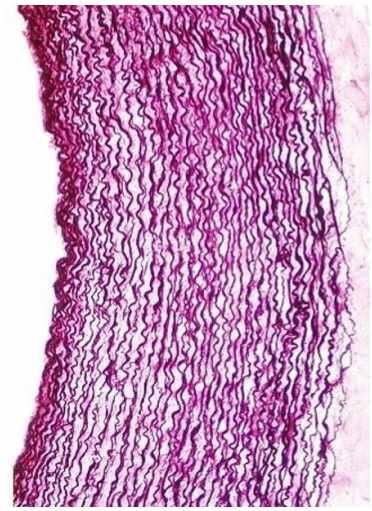
1	Recognising the slides (5)	page 2
2	Practice figures: name each numbered structure (3)	page 5
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1 · Recognising the slides

Each tissue as the Slide Box shows it: its slides, how to recognise it, and what not to confuse it with. Test yourself online: medicine.kazimiri.com/semester-1/slides/?lab=7&m=test

Elastic artery (aorta) · tętnica typu sprężystego (aorta)



The aorta, an elastic artery (Verhoeff stain): the media is packed with wavy black elastic laminae.

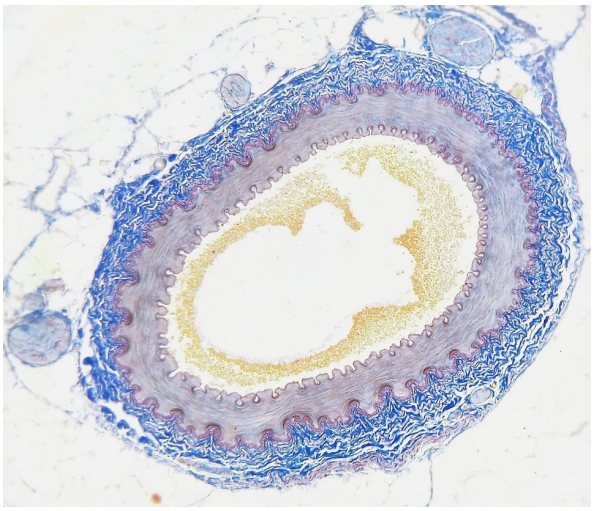
Rustredrobot · CC BY-SA 4.0 · commons.wikimedia.org/wiki/File:Elastic_lamellae_in_aorta.jpg

How to recognise it

- A very thick tunica media of many wavy elastic laminae, with smooth muscle between them.
- A relatively thick intima.
- Adventitia with small vessels of its own (vasa vasorum).

Don't confuse with: Muscular artery: one clear internal elastic lamina and a media of smooth muscle.

Muscular artery · tętnica typu mięśniowego



A human artery in cross-section: the lumen, the wavy internal elastic lamina under the lining, and a thick muscular media.

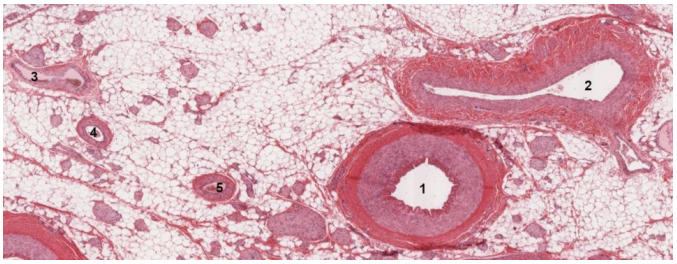
Lord of Konrad · CC0 · commons.wikimedia.org/wiki/File:Artery.png

How to recognise it

- A prominent, wavy internal elastic lamina just deep to the endothelium.
- A thick media of circular smooth muscle; an external elastic lamina at its edge.
- A round lumen with a thick wall compared with the vein beside it.

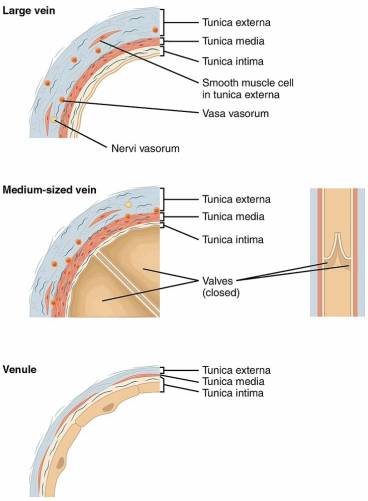
Don't confuse with: A vein: thinner media, thicker adventitia, larger irregular lumen.

Vein · żyła



Arteries and veins side by side in mesentery (H&E): 1, 4 and 5 are arteries (thick muscular walls, round lumens); 2 and 3 are veins (thin walls, wide, flattened lumens).

RWhitwam · CC BY-SA 4.0 · commons.wikimedia.org/wiki/File:Arteries_vs_veins_identify.png



A large vein, a medium vein and a venule: tunica intima, media and externa, and the valves of a medium vein.

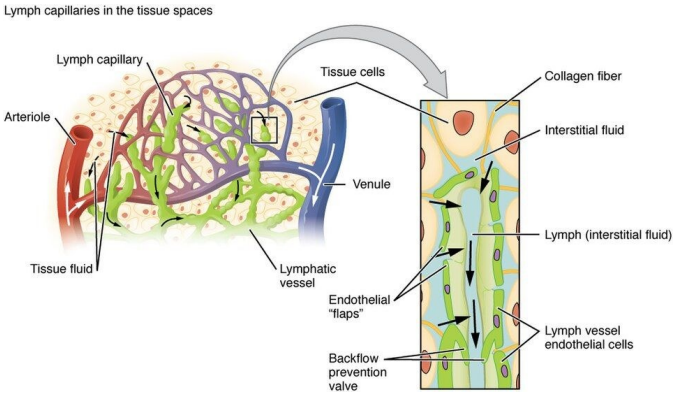
OpenStax College · CC BY 3.0 · commons.wikimedia.org/wiki/File:2106_Large_Medium_Vein_Venule.jpg

How to recognise it

- A thin media and a relatively thick adventitia.
- A large, irregular or collapsed lumen, often with blood in it.
- Valves in medium-sized veins.

Don't confuse with: The artery that usually runs beside it: thick muscular wall, round lumen.

Lymphatic vessel · naczynie limfatyczne



Lymphatic capillaries: blind-ended vessels among the blood capillaries; overlapping endothelial "flaps" let tissue fluid in, and valves stop lymph flowing back.

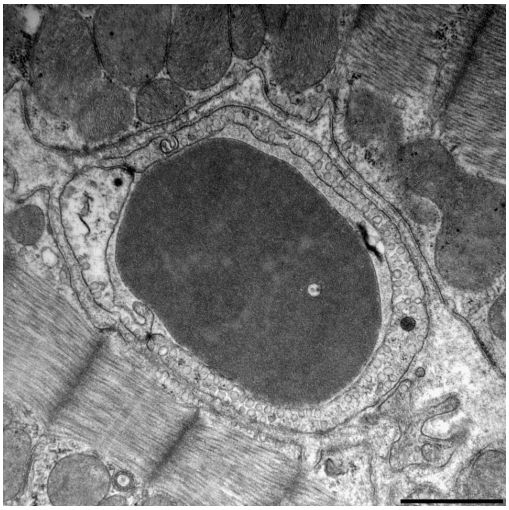
OpenStax College · CC BY 3.0 · commons.wikimedia.org/wiki/File:2202_Lymphatic_Capillaries.jpg

How to recognise it

- A very thin wall: endothelium with little or no muscle.
- An irregular lumen with pale lymph and no red cells.
- Valves.

Don't confuse with: Veins and capillaries: they contain red cells.

Capillaries · naczynia włosowate



A capillary cut across (TEM, rat heart muscle): its lumen holds a single red blood cell, inside a wall of one thin endothelial cell.

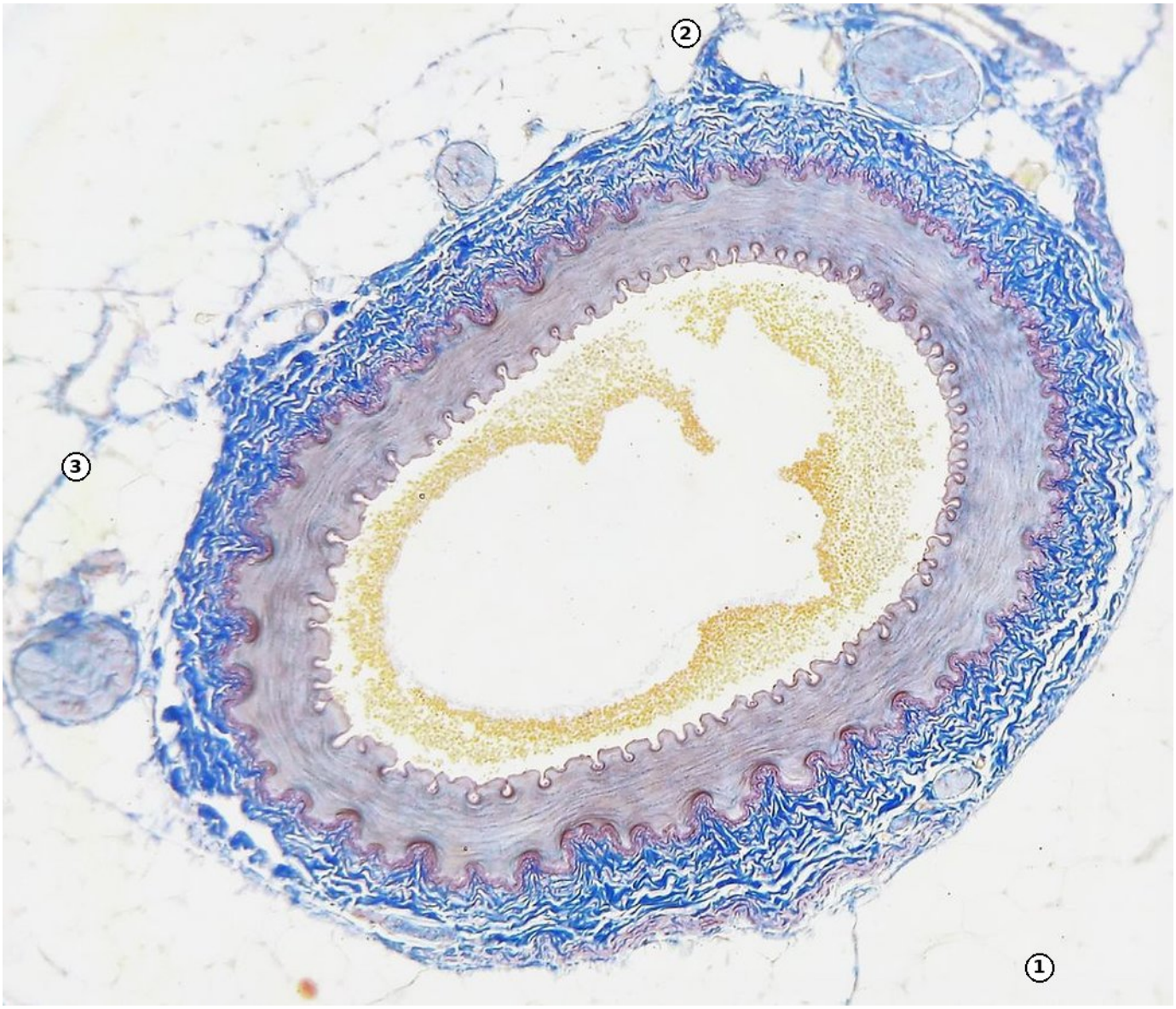
Elsnicová · CC BY-SA 4.0 · commons.wikimedia.org/wiki/File:Red_Blood_Cell_in_capillary.tif

How to recognise it

- A lumen just wide enough for one red cell.
- Walls of one or two endothelial cells (with pericytes around them).
- Continuous, fenestrated or sinusoidal types depending on the organ.

Don't confuse with: Lymphatic capillaries: wider, irregular, without red cells.

An artery in cross-section, on a real slide

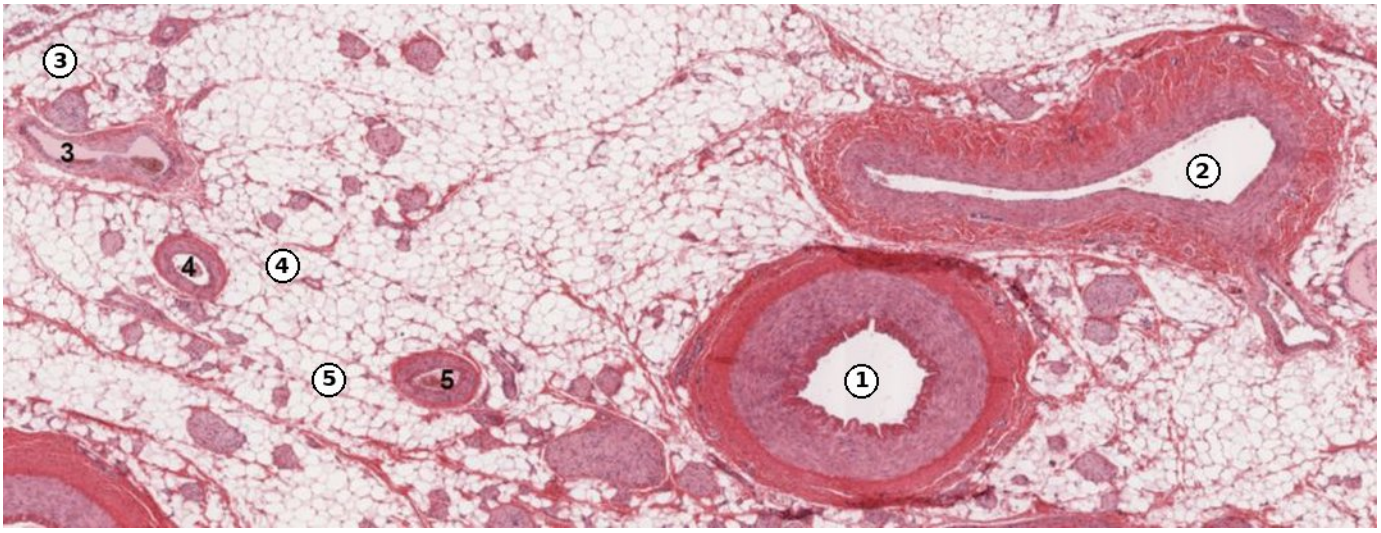


1 _____ **2** _____

3 _____

Practise online: medicine.kazimiri.com/semester-1/label/?map=subj-histology-a51b84f5b5
Credit: Lord of Konrad · CC0 · commons.wikimedia.org/wiki/File:Artery.png

Five vessels in fat, on a real slide



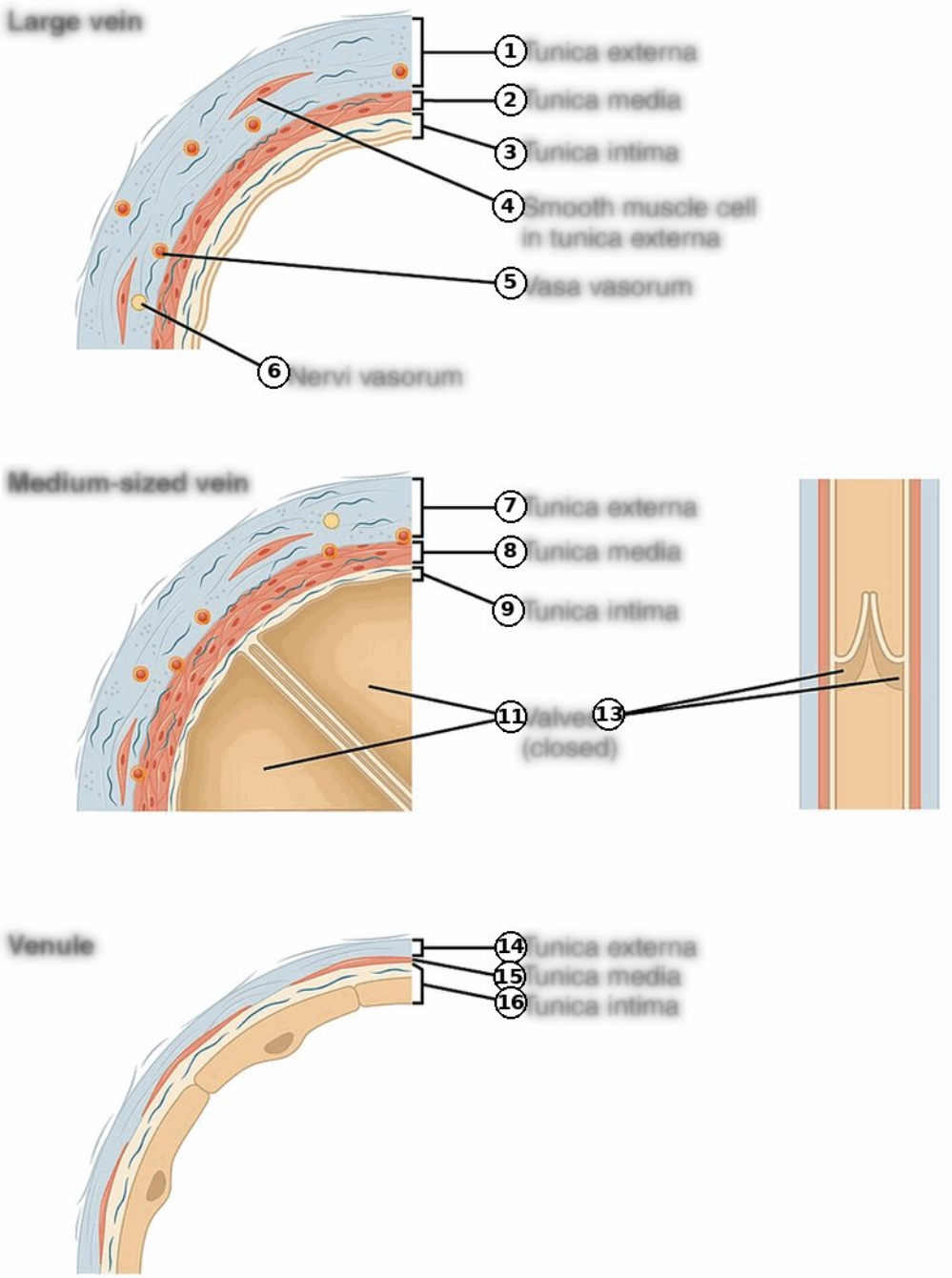
1 _____ **2** _____

3 _____ **4** _____

5 _____

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Credit: RWhitwam · CC BY-SA 4.0 · commons.wikimedia.org/wiki/File:Arteries_vs_veins_identify.png

Three veins in cross-section: a large vein, a medium-sized vein and a venule



1 _____ **2** _____

3 _____ **4** _____

5 _____ **6** _____

7 _____ **8** _____

9 _____ **10** _____

11 _____ **12** _____

13 _____ **14** _____

15 _____ **16** _____

Practise online: medicine.kazimiri.com/semester-1/label/?map=subj-histology-86eabb2f59
Credit: OpenStax College · CC BY 3.0 · commons.wikimedia.org/wiki/File:2106_Large_Medium_Vein_Venule.jpg

3 · Key points

The site's key points for these classes, word for word.

Lab 7 · Blood vessels

Circulatory system

- Wall: intima (endothelium), media (smooth muscle), adventitia. Elastic arteries (aorta), muscular arteries (prominent internal elastic lamina).
- Capillaries: continuous (muscle, lung, CNS), fenestrated (glomeruli, endocrine glands, gut), sinusoidal (liver, spleen, bone marrow).
- Veins: thin media, thick adventitia, valves. Heart: endocardium, myocardium, epicardium; Purkinje fibres are large pale cells.
- Elastic arteries (aorta, pulmonary trunk) have a media of many fenestrated elastic laminae that stretch in systole and keep blood moving in diastole.
- Arterioles, with one or two layers of smooth muscle, set the resistance and the blood pressure; precapillary sphincters control flow into the capillary bed.
- Capillaries are about 4-10 µm wide: an endothelium with its basal lamina and pericytes. Continuous capillaries with tight junctions form the blood-brain barrier.
- Veins hold about two thirds of the blood. Valves and the muscle pump return it from the legs; when the valves fail, veins become varicose.
- Lymphatic capillaries are blind-ended, with overlapping endothelial cells held by anchoring filaments; lymph reaches the veins through the thoracic duct and the right lymphatic duct.
- The heart wall: endocardium (with the Purkinje fibres deep to it), myocardium, and epicardium (the visceral pericardium, with fat and the coronary vessels). The fibrous skeleton insulates the atria from the ventricles.
- Atherosclerosis starts in the intima, where lipid-laden macrophages (foam cells) build a plaque.

4 · Using the light microscope: checklist

- ☐ Carry the microscope with both hands, one on the arm and one under the base. Lamp at minimum before switching on.
- ☐ Start with the lowest-power objective (4× or 10×) clicked into place. Slide coverslip up, label to the side, held in the mechanical stage.
- ☐ Centre the section over the light with the naked eye first.
- ☐ Watching from the side, raise the stage close to the objective with the coarse focus. Then, looking through the eyepieces, focus by moving the stage AWAY from the objective. Set the eyepiece distance for your eyes.
- ☐ Light: lamp brightness and the condenser's aperture diaphragm. Close the diaphragm for more contrast, open it for more resolution.
- ☐ Higher power: turn the nosepiece; at 40× use the fine focus only.
- ☐ Oil immersion (100×), only when the teacher allows it: a drop of oil on the coverslip, swing in the 100× objective, fine focus only. Never let the 40× objective touch the oil. Wipe oil off the lens and the slide with lens paper afterwards.
- ☐ Total magnification = objective × eyepiece (40 × 10 = 400×). The light microscope resolves about 0.2 µm.
- ☐ At the end: lowest objective in place, stage down, slide out, lamp at minimum and off, dust cover on.

5 · Self-test: 8 single-choice questions

From the site's Histology — tissues quiz (Circulatory system). One answer is right in each; circle it. Give yourself about a minute a question. The answers are on the last page.

1. Fenestrated capillaries are typical of:

A the brain
B renal glomeruli
C skeletal muscle
D the lung

2. The blood-brain barrier depends chiefly on:

A fenestrated capillaries
B sinusoids
C tight junctions of continuous capillaries
D lymphatic vessels

3. Veins hold about what share of the blood?

A a tenth
B a third
C all of it
D two thirds

4. The thickest layer of the aorta's wall is the:

A tunica intima
B tunica media
C tunica adventitia
D endothelium

5. Sinusoidal (discontinuous) capillaries are found in the:

A brain
B skeletal muscle
C liver, spleen and bone marrow
D renal glomeruli

6. A wavy internal elastic lamina is most obvious in:

A capillaries
B veins
C lymphatic vessels
D muscular arteries

7. Lymphatic capillaries differ from blood capillaries in being:

A blind-ended, with overlapping endothelial cells and little basal lamina
B fenestrated with a thick basal lamina
C wrapped in smooth muscle
D full of red cells

8. In large veins the thickest layer is the:

A tunica adventitia
B tunica media
C tunica intima
D internal elastic lamina

Answers · practice figures

Figure 1 · An artery in cross-section, on a real slide

1 Lumen
2 Internal elastic lamina
3 Tunica media

Figure 2 · Five vessels in fat, on a real slide

1 Artery
2 Vein
3 Vein
4 Artery
5 Artery

Figure 3 · Three veins in cross-section: a large vein, a medium-sized vein and a venule

1 Tunica externa
2 Tunica media
3 Tunica intima
4 Smooth muscle cell in tunica externa
5 Vasa vasorum
6 Nervi vasorum
7 Tunica externa
8 Tunica media
9 Tunica intima
10 Venous valves
11 Venous valves
12 Venous valves
13 Venous valves
14 Tunica externa
15 Tunica media
16 Tunica intima

Answers · self-test

1 B renal glomeruli — Also endocrine glands and the gut.

2 C tight junctions of continuous capillaries — Astrocyte end-feet help maintain it.

3 D two thirds — Veins are capacitance vessels: about two thirds of the blood volume sits in the veins and venules.

4 B tunica media — Dozens of fenestrated elastic lamellae with smooth muscle between them let the aorta recoil in diastole.

5 C liver, spleen and bone marrow — Wide, gappy capillaries with an incomplete basal lamina let cells and large molecules through.

6 D muscular arteries — In muscular (distributing) arteries it marks the border between intima and media, scalloped by contraction.

7 A blind-ended, with overlapping endothelial cells and little basal lamina — Their loose, overlapping cells, held open by anchoring filaments, let tissue fluid and large particles in.

8 A tunica adventitia — Veins have a thin media; their adventitia, with longitudinal smooth muscle in the venae cavae, is the thickest coat.