Histology — tissues · Lab 2

Connective tissue proper

When	Monday 2 November 2026, 12:15–14:30
Room	A5/018
Teacher	dr hab. prof. UR Agata Wawrzyniak
Group	Lab group 2
Same day	Lecture 4, 08:00–09:30, A5/4: Connective tissue

What the lab covers

The connective tissues proper: their classification, structure and examples. The syllabus lists mesenchymal, gelatinous, loose fibrous, tendon, reticular and adipose tissue.

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

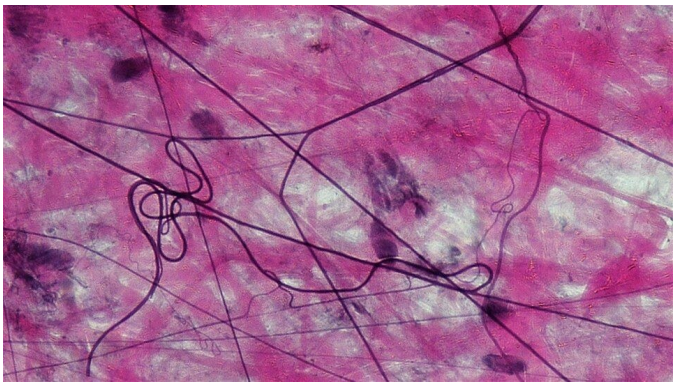
1	Recognising the slides (5)	page 2
2	Practice figures: name each numbered structure (5)	page 5
3	Key points	page 10
4	Light-microscope checklist	page 11
5	Self-test: 11 single-choice questions	page 12
	Answers: practice figures	page 13
	Answers: self-test	page 13

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1 · Recognising the slides

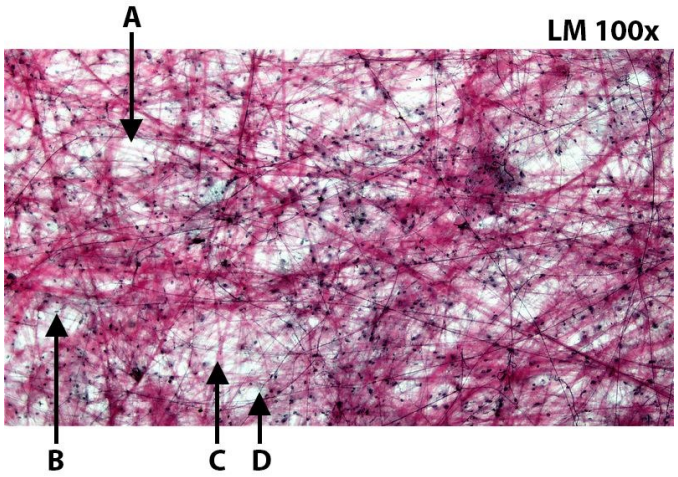
Each tissue as the Slide Box shows it: its slides, how to recognise it, and what not to confuse it with. Test yourself online: medicine.kazimiri.com/semester-1/slides/?lab=2&m=test

Loose (areolar) connective tissue · tkanka łączna luźna (wiotka)



Loose (areolar) connective tissue, a spread (400x): thin dark elastic fibres and pink collagen bundles, with scattered cell nuclei.

Berkshire Community College Bioscience Image Library · CC0 · commons.wikimedia.org/wiki/File:Connective_Tissue_Loose_Aerolar_(41743649782).jpg



Real slide (100x): loose (areolar) connective tissue, a spread: collagen and elastic fibres and fibroblasts in ground substance.

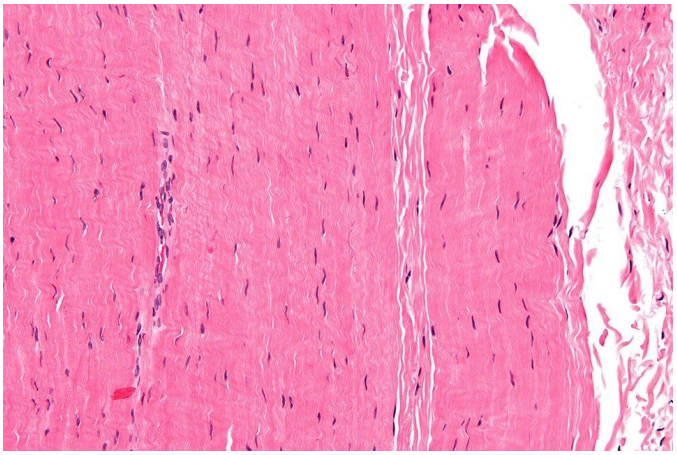
Jennifer Lange; micrograph: Berkshire Community College Bioscience Image Library (public domain) · CC BY-NC-SA 4.0 · med.libretexts.org/Bookshelves/Anatomy_and_Physiology/Human_Anatomy_(Lange_et_al.)/03%3A_Tissue_Level_of_Organization/3.08%3A_Anatomical_Atlas_-_Tissues

How to recognise it

- A loose web of fibres: thick pink collagen bundles and thin dark elastic fibres.
- Scattered cells between the fibres: fibroblasts, macrophages, mast cells with granules.
- Seen as a spread of mesentery, or deep to epithelia (lamina propria) and in the subcutis.

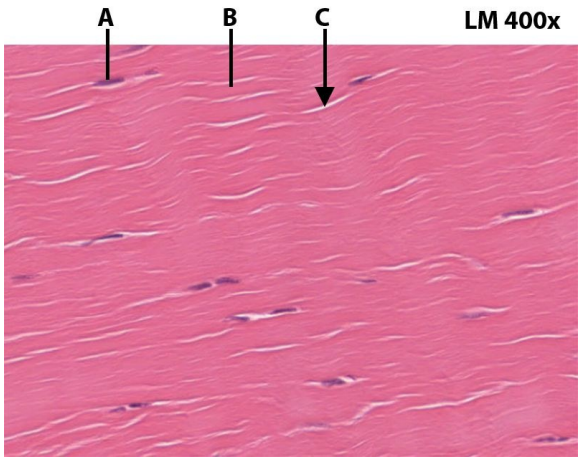
Don't confuse with: Dense irregular connective tissue: packed collagen with few cells.

Dense regular connective tissue (tendon) · tkanka łączna zbita regularna (ścięgno)



Tendon, dense regular connective tissue (H&E): parallel collagen bundles with rows of flattened fibroblast nuclei.

Nephron · CC BY-SA 3.0 · commons.wikimedia.org/wiki/File:Tendon_-_high_mag.jpg



Real slide (400x): dense regular connective tissue, parallel collagen bundles with rows of fibroblast nuclei.

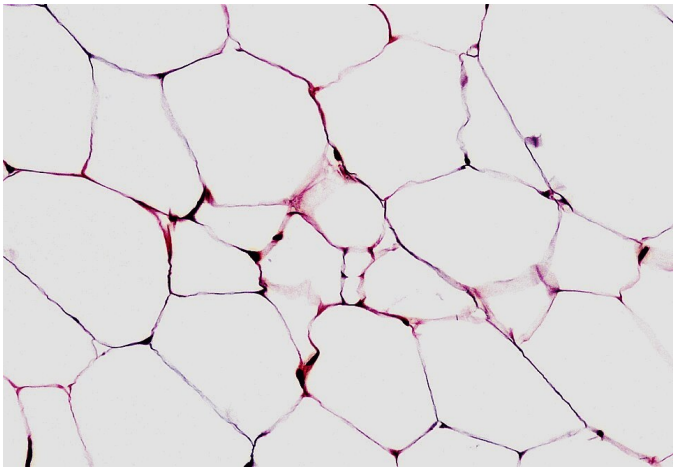
Jennifer Lange; slide: Regents of the University of Michigan Medical School · CC BY-NC-SA 4.0 · med.libretexts.org/Bookshelves/Anatomy_and_Physiology/Human_Anatomy_(Lange_et_al.)/03%3A_Tissue_Level_of_Organization/3.08%3A_Anatomical_Atlas_-_Tissues

How to recognise it

- Parallel, slightly wavy bundles of collagen, all running one way.
- Rows of flattened fibroblast (tenocyte) nuclei squeezed between the bundles.
- Very few blood vessels.

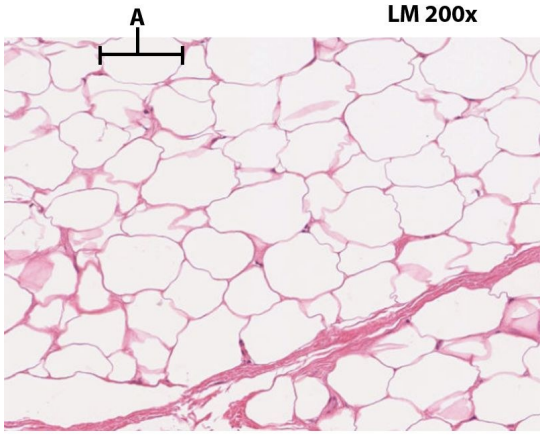
Don't confuse with: Smooth muscle: its nuclei are fatter, cigar-shaped, and sit inside the cells.

White adipose tissue · tkanka tłuszczowa żółta (biała)



Adipose tissue (400x): large empty-looking fat cells (the lipid dissolves during processing), with the nucleus squeezed to the edge.

Berkshire Community College Bioscience Image Library · CC0 · commons.wikimedia.org/wiki/File:Connective_Tissue_Adipose_(41066513194)_(cropped).jpg



Real slide (200x): adipose tissue, large fat cells whose lipid dissolved during processing.

Jennifer Lange; slide: Regents of the University of Michigan Medical School · CC BY-NC-SA 4.0 · med.libretexts.org/Bookshelves/Anatomy_and_Physiology/Human_Anatomy_(Lange_et_al.)/03%3A_Tissue_Level_of_Organization/3.08%3A_Anatomical_Atlas_-_Tissues

How to recognise it

- Large polygonal cells that look empty: the fat dissolved during processing.
- A thin rim of cytoplasm; the flattened nucleus is pushed to the edge (a "signet ring").
- Capillaries in the thin partitions between the cells.

Don't confuse with: Lung alveoli: also empty spaces, but lined by thin walls with capillaries, not full cells.

Mucous connective tissue (Wharton's jelly) · tkanka galaretowata (galareta Whartona)



Umbilical cord in cross-section: two umbilical arteries (small, thick-walled) and the wide umbilical vein, in pale mucous connective tissue (Wharton's jelly).

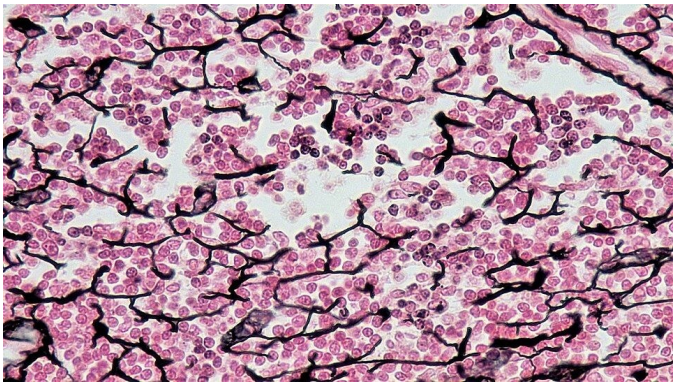
Ed Uthman from Houston, TX, USA · CC BY 2.0 · commons.wikimedia.org/wiki/File:Happy_Halloween!_(284183160).jpg

How to recognise it

- Sparse star-shaped fibroblasts in a pale, abundant jelly-like ground substance.
- Few, fine collagen fibres.
- The umbilical cord: two arteries and one vein embedded in it.

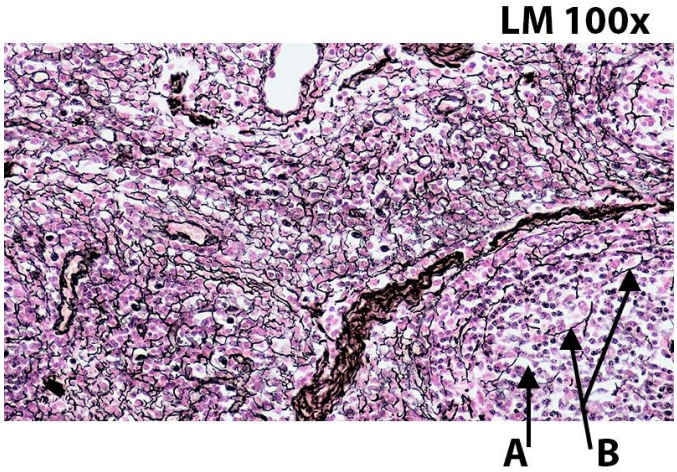
Don't confuse with: Mesenchyme: similar star-shaped cells, but in an embryo and closer together.

Reticular tissue · tkanka siateczkowata



Reticular fibres in a silver stain (400x): a black, branching mesh of collagen III, with cells filling its spaces.

Berkshire Community College Bioscience Image Library · CC0 · commons.wikimedia.org/wiki/File:Connective_Tissue_Reticular_(40885194425).jpg



Real slide (100x): reticular connective tissue, a dark mesh of reticular fibres.

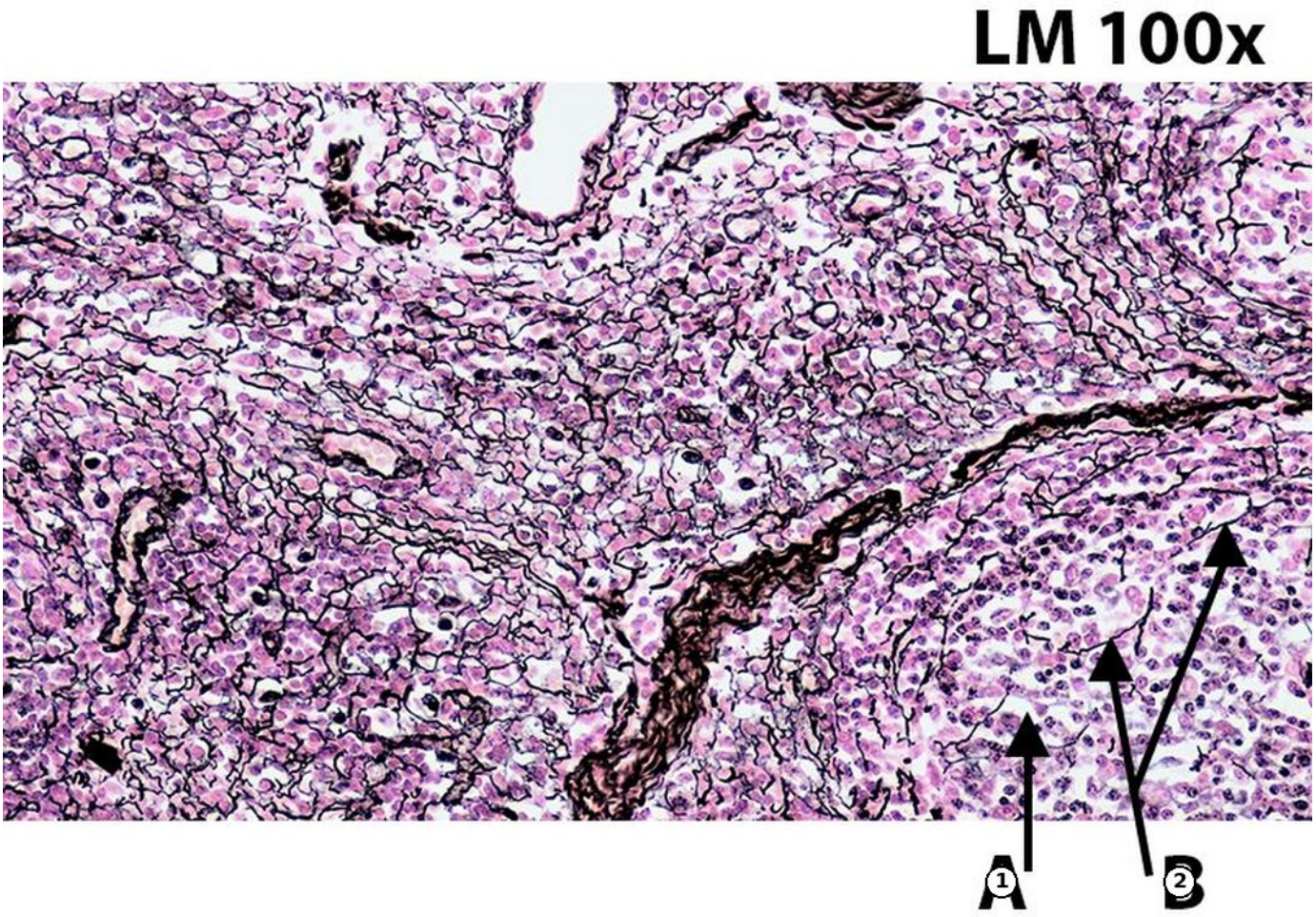
Jennifer Lange; micrograph: Berkshire Community College Bioscience Image Library (public domain) · CC BY-NC-SA 4.0 · med.libretexts.org/Bookshelves/Anatomy_and_Physiology/Human_Anatomy_(Lange_et_al.)/03%3A_Tissue_Level_of_Organization/3.08%3A_Anatomical_Atlas_-_Tissues

How to recognise it

- Silver stain: black, fine, branching reticular fibres (collagen III) forming a mesh.
- Lymphocytes and other free cells fill the spaces of the mesh.
- The framework of lymph nodes, spleen and bone marrow.

Don't confuse with: Elastic fibres: also dark, but thicker, straighter and in elastic stains.

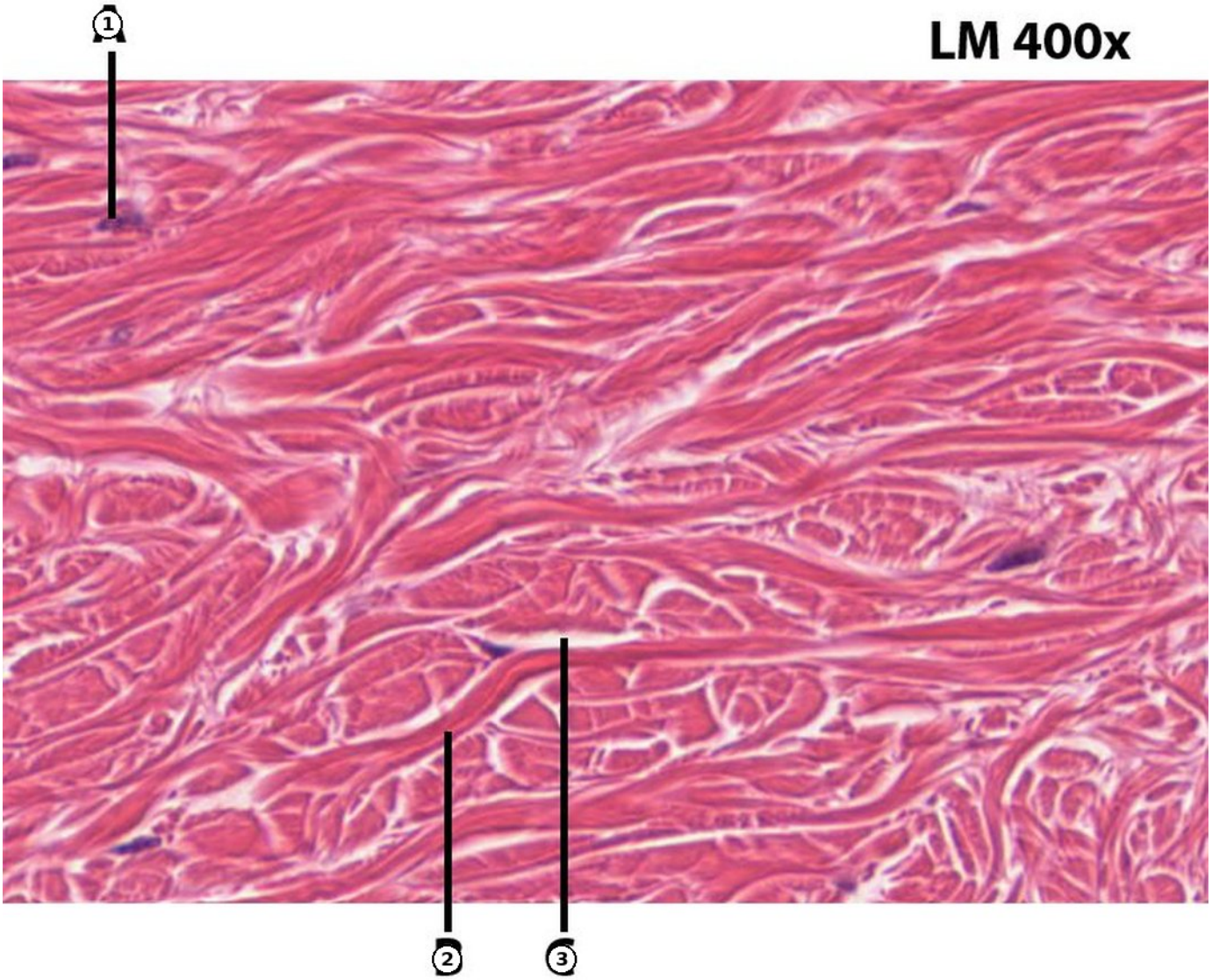
A network of fine fibres, on a real slide



1 _____ **2** _____

Credit: Jennifer Lange; micrograph: Berkshire Community College Bioscience Image Library (public domain) · CC BY-NC-SA 4.0 ·
med.libretexts.org/Bookshelves/Anatomy_and_Physiology/Human_Anatomy_(Lange_et_al.)/03%3A_Tissue_Level_of_Organization/3.08%3A_Anatomical_Atlas_-

Dense irregular connective tissue, on a real slide



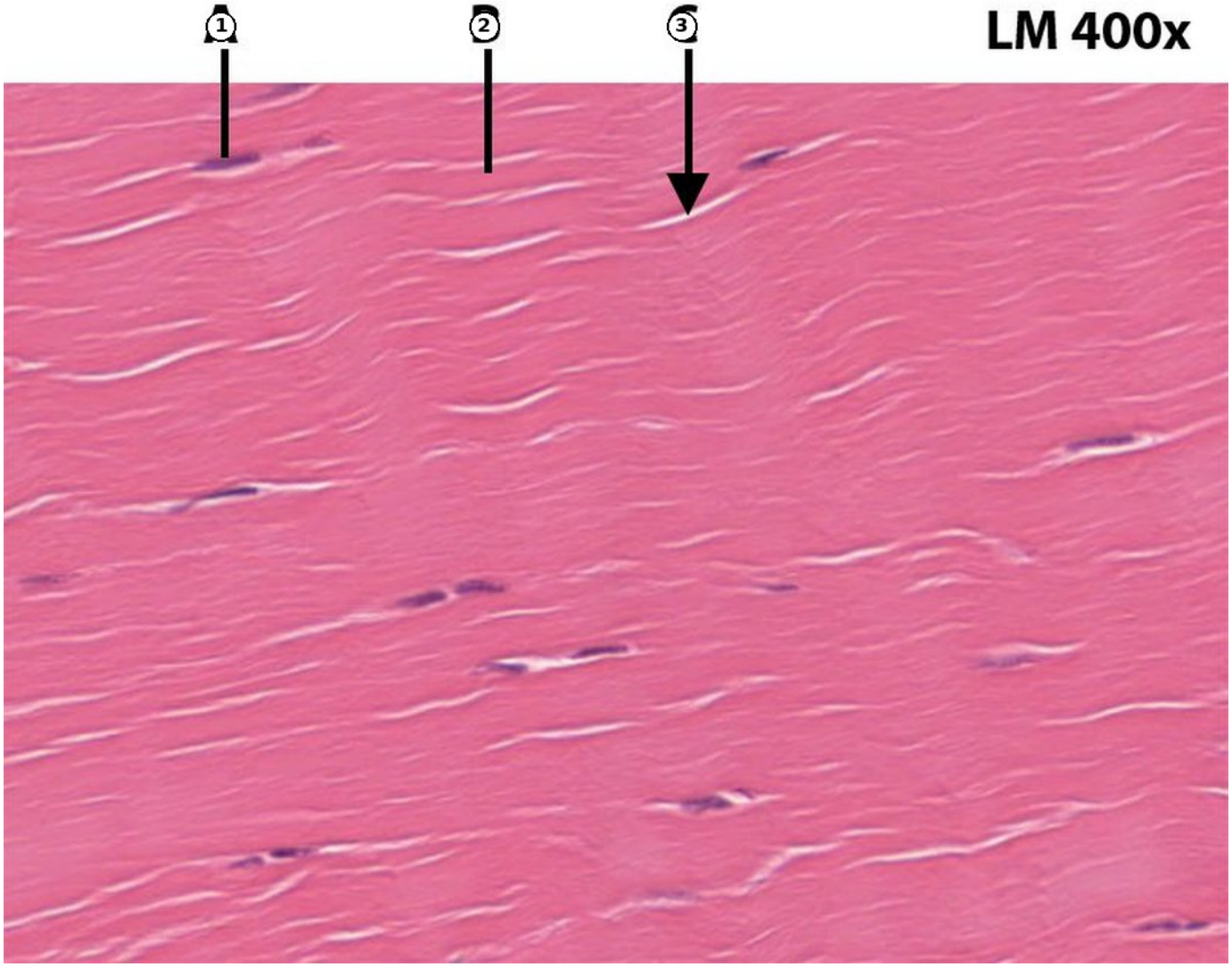
1 _____ **2** _____

3 _____

Practise online: medicine.kazimiri.com/semester-1/label/?map=subj-histology-43c79260f6

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Dense regular connective tissue, on a real slide



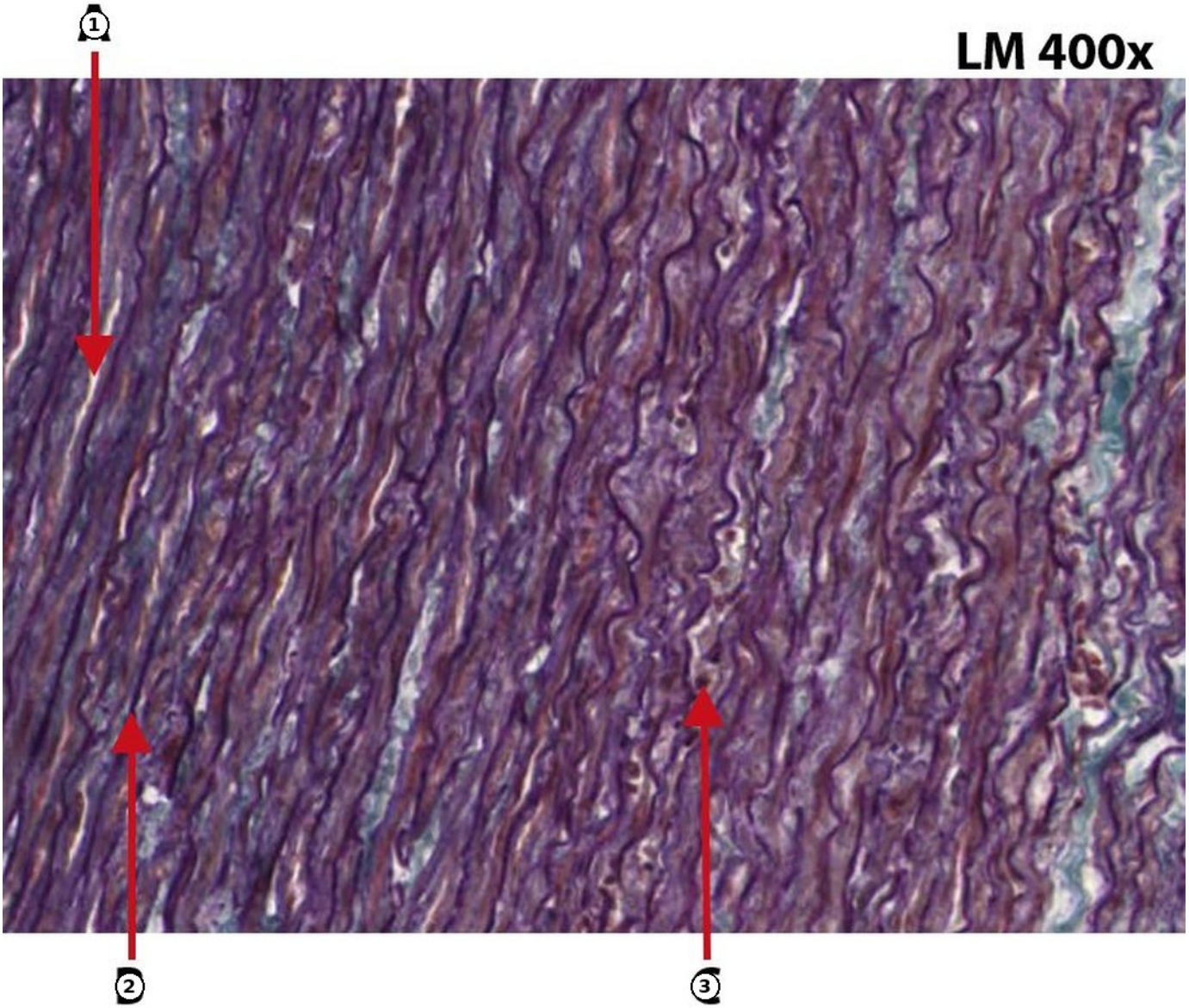
1 _____ **2** _____

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Elastic connective tissue, on a real slide



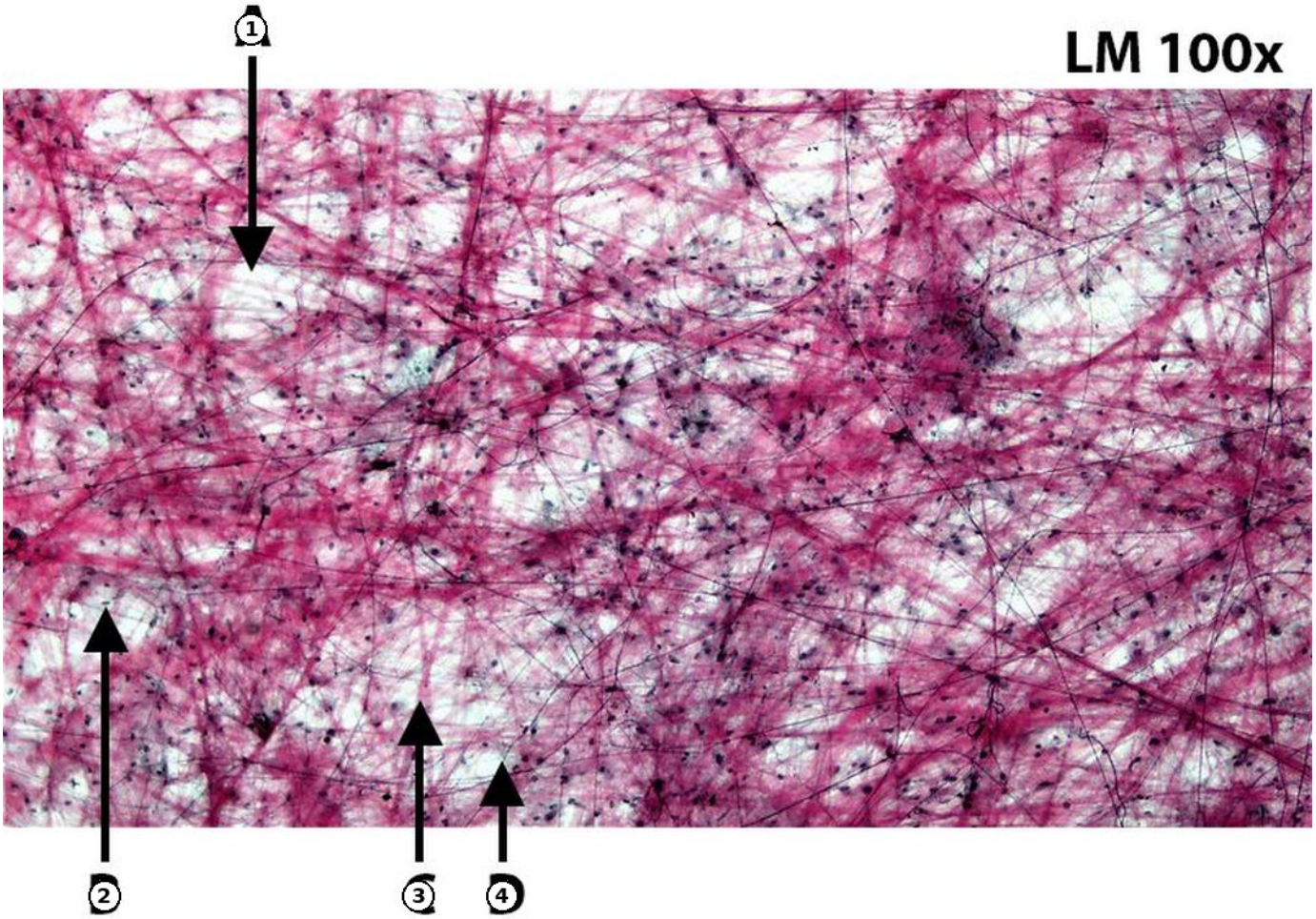
1 _____ **2** _____

3 _____

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Loose connective tissue, spread on a real slide



1 _____ **2** _____

3 _____ **4** _____

Practise online: medicine.kazimiri.com/semester-1/label/?map=subj-histology-b2d6e77dec

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3 · Key points

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

Lab 2 · Connective tissue proper

Connective tissue

- Cells: fibroblasts, macrophages, mast cells (histamine, heparin), plasma cells (antibodies), adipocytes.
- Collagen I (skin, bone, tendon), II (hyaline and elastic cartilage), III (reticular fibres), IV (basement membrane); elastic fibres = elastin + fibrillin.
- Loose (areolar), dense irregular (dermis), dense regular (tendons, ligaments); embryonic: mesenchyme, mucous tissue (Wharton's jelly).
- All connective tissues come from mesenchyme (mostly mesoderm; in the head also neural crest) and are mostly matrix, with scattered cells.
- Ground substance: glycosaminoglycans (hyaluronan, chondroitin and keratan sulfate), proteoglycans that hold water, and adhesive glycoproteins (fibronectin, laminin).
- Fibres: collagen (tensile strength, pink in H&E), reticular (thin collagen III nets in lymphoid organs, liver and marrow, black with silver), elastic (stretch and recoil: arteries, lungs, skin).
- Fibroblasts are the resident cells that make fibres and matrix. Macrophages come from monocytes and plasma cells from B lymphocytes; mast cells, eosinophils and lymphocytes also wander in.
- Adipose tissue: white (one large droplet, a signet-ring look) stores energy; brown (many small droplets and many mitochondria with UCP1) makes heat, mainly in newborns.
- Reticular tissue forms the framework of lymph nodes, spleen and bone marrow. Collagen synthesis needs vitamin C to hydroxylate proline and lysine; without it, scurvy.

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: 11 single-choice questions

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

1. Reticular fibres, black with silver, are made of collagen type:

A I
B III
C II
D IV

2. Brown fat differs from white fat in having:

A one large droplet per cell
B no blood vessels
C no nuclei
D many small droplets and mitochondria with UCP1

3. Mast cells release:

A antibodies
B collagen
C histamine and heparin
D surfactant

4. Plasma cells come from:

A monocytes
B fibroblasts
C B lymphocytes
D mast cells

5. Wharton's jelly of the umbilical cord is:

A dense regular connective tissue
B mucous connective tissue
C reticular tissue
D brown fat

6. Fibroblasts make:

A antibodies
B the fibres and ground substance of connective tissue
C histamine and heparin
D bone matrix

7. Tendons are made of:

A dense irregular connective tissue
B loose (areolar) connective tissue
C reticular connective tissue
D dense regular connective tissue

8. Reticular connective tissue is the framework of the:

A lymph nodes, spleen and bone marrow
B tendons and ligaments
C dermis
D hyaline cartilage

9. Elastic fibres are made of:

A elastin around fibrillin microfibrils
B collagen type I
C collagen type III
D keratin

10. The commonest collagen, with great tensile strength in tendon, bone and skin, is type:

A IV
B III
C II
D I

11. Most of the dermis is:

A dense regular connective tissue
B reticular connective tissue
C dense irregular connective tissue
D adipose tissue

Answers · practice figures

Figure 1 · A network of fine fibres, on a real slide

1 Ground substance **2** Reticular fibre

Figure 2 · Dense irregular connective tissue, on a real slide

1 Fibroblast **2** Collagen fibre **3** Ground substance

Figure 3 · Dense regular connective tissue, on a real slide

1 Fibroblast **2** Collagen fibre **3** Ground substance

Figure 4 · Elastic connective tissue, on a real slide

1 Ground substance **2** Elastic fibre **3** Fibroblast

Figure 5 · Loose connective tissue, spread on a real slide

1 Ground substance **2** Fibroblast **3** Collagen fibre
4 Elastic fibre

Answers · self-test

1 B III — Reticular fibres of collagen III form the fine scaffold of lymphoid organs, the liver and bone marrow.

2 D many small droplets and mitochondria with UCP1 — It makes heat, mainly in newborns.

3 C histamine and heparin — Plasma cells make antibodies; fibroblasts make fibres and matrix.

4 C B lymphocytes — Macrophages come from monocytes; fibroblasts are the resident cells.

5 B mucous connective tissue — An embryonic connective tissue, like mesenchyme.

6 B the fibres and ground substance of connective tissue — Fibroblasts secrete collagen, elastin and proteoglycans; plasma cells make antibodies, mast cells histamine, osteoblasts bone.

7 D dense regular connective tissue — Parallel bundles of type I collagen, with rows of flattened fibroblasts between them, resist pull in one direction.

8 A lymph nodes, spleen and bone marrow — Reticular fibres (collagen III) made by reticular cells hold the free cells of lymphoid and haemopoietic organs.

9 A elastin around fibrillin microfibrils — An amorphous elastin core is laid on a scaffold of fibrillin microfibrils.

10 D I — Type I: tendon, bone, dermis; II: cartilage; III: reticular fibres; IV: basal laminae.

11 C dense irregular connective tissue — The thick reticular layer of the dermis has interwoven collagen bundles that resist pull from every direction.