

Midterm histology – Summer Course

- 1- Describing collagen **fibres**, which of the following is **wrong**?
  - a) collagen type I is responsible for acidophilia of bone matrix.
  - b) collagen type II is responsible for basophilia of hyaline cartilage
  - c) collagen type III is argyrophilic
  - d) collagen type IV forms the lamina densa
  - e) collagen type VII forms anchoring fibrils
  
- 2- Which of the following characteristics is ( are ) common to **all three types of cartilage**?
  - a) both appositional and interstitial growth
  - b) basophilic matrix
  - c) type II collagen in its matrix
  - d) lack both a blood supply and lymphatic vessels
  - e) more than one of the above
  
- 3- **Articular cartilage** . Choose the wrong statement:-
  - a) formed mostly of hyaline cartilage
  - b) gets nourished from synovial fluid
  - c) grows appositionally
  - d) shows poor regeneration in the adult
  - e) shows basophilic matrix
  
- 4- Which is **not true** of the **Basement membrane**?
  - a) surrounds smooth and skeletal muscles in the form of external lamina
  - b) the more common type is formed of basal and reticular laminae
  - c) in the kidney glomerulus it is formed of a thick central lamina lucida with a lamina densa on either side .
  - d) integrins connect the epithelial cells to the laminin and fibronectin
  - e) all components of the lamina reticularis are produced by fibroblasts
  
- 5- **Comparing mast cell and plasma cell**, choose the wrong statement:
  - a) to function properly the plasma cell needs the mast cell
  - b) both participate in immediate hypersensitivity reaction
  - c) one produces IgE, the other has receptors for it
  - d) neither of them is a member of MPS
  - e) both can be found in loose connective tissue.
  
- 6- **A bony trabeculum** contains all the following components **Except**:-
  - a) Lamellae
  - b) Osteocytes inside lacunae
  - c) Collagen
  - d) Osteoprogenitor cells on its surface
  - e) Osteoblasts and osteoclasts
  
- 7- Choose the **wrong statement**:-
  - a) Rickets and osteomalacia are characterized by abnormally low amounts of osteoid
  - b) Osteoporosis is a decrease in bone mass caused by a higher rate of osteoclastic resorption compared to bone formation by osteoblasts
  - c) All newly formed bone is spongy
  - d) Bone canaliculi interconnect lacunae
  - e) Bone canaliculi contain cytoplasmic processes of osteocytes

8- Choose the **wrong statement**:-

- a) Long bones continuously adapt to stress by remodeling their internal structure
- b) In compact bone remodeling involves bone deposition or resorption
- c) at the upper end of femur remodeling involves realignment of the bony trabeculae
- d) when a limb is not used for a long time remodeling results in more bone formation than resorption
- e) remodeling may involve removal of unwanted parts of a bone .

9- **Bone formation and growth**:- all of the following are true **Except**:-

- a) Diaphysis is the shaft of bone that develops from the primary centre of ossification
- b) Epiphysis is the part of bone which develops from one secondary center of ossification
- c) The growing end of a bone is the end which ossifies first and fuses with the shaft before the other end
- d) The epiphyseal plate is responsible for growth of bone in length
- e) The deep cells of periosteum are responsible for growth of bone in thickness

10- **Endochondral ossification** : all of the following are true **Except**:-

- a) the bone formed within the primary and secondary centres is laid down first as spongy bone
- b) in the diaphysis the spongy bone is either resorped or is transformed to compact bone
- c) in the epiphysis most of the formed bone persists as spongy bone
- d) the epiphyseal plate is the only hyaline cartilage which persists for sometime in the epiphysis
- e) the shaft of a long bone is formed by the periosteal collar

11- The following are **true** of **spongy** bone and **hyaline cartilage** **Except**:-

- a) both can be converted into compact bone
- b) both are present at the end of a long bone
- c) cartilage does not contain blood vessels in its matrix
- d) both contain cells imprisoned inside lacunae
- e) both can grow by appositional growth

12- which is **not true** of **bone mineralization**?

- a) the combined local concentration of calcium and phosphate must be above a threshold value
- b) needs osteocalcine produced by osteoclasts
- c) needs alkaline phosphatase enzyme produced by osteoblasts
- d) the matrix vesicles are the most important factor for mineralization
- e) failure of mineralization in the child results in rickets

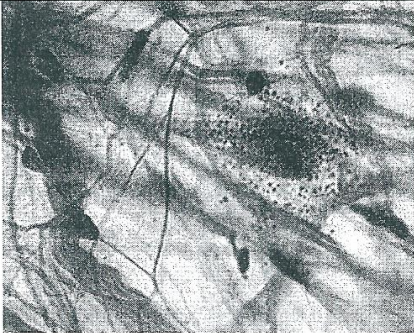
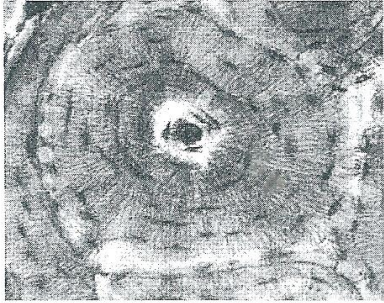
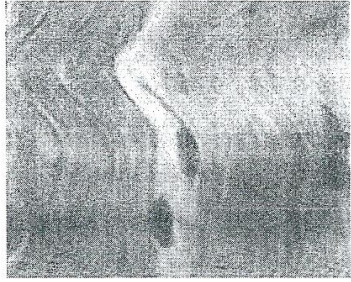
13- which is **not true** of bone **resorption**?

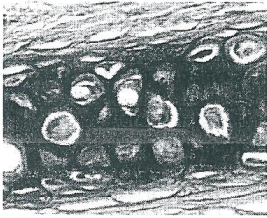
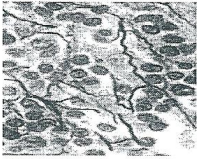

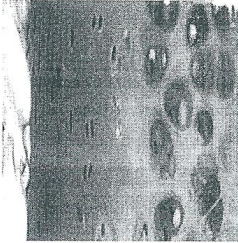
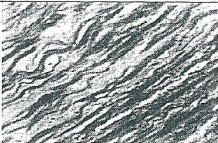
- a) carried out mainly by the osteoclasts
- b) needs lysosomal enzymes to dissolve the inorganic component of the matrix
- c) needs carbonic anhydrase enzyme
- d) HCl provides low PH near the ruffled border
- e) inhibited by calcitonin


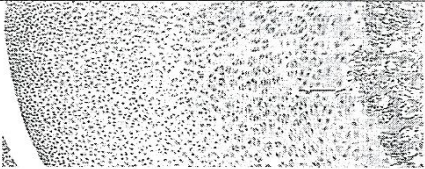
14- Choose the **unsuitable combination** :

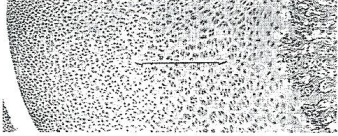
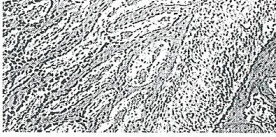
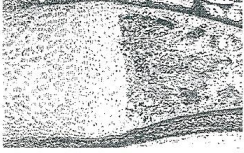
- a) Ehlers – Danlos syndrome → hypermobile joints
- b) immediate hypersensitivity reaction → plasma cell
- c) marfans syndrome → collagen fibres do not develop normally
- d) IgE antibodies → mast cells and basophils
- e) opsonization → phagocytosis

- 15- which is **not true** of **collagen synthesis**?
- a) there is a separate mRNA for each type of alpha chain
  - b) registration peptides prevent collagen fibre formation within the cell
  - c) fibrillar structure needs covalent bonds between proline and hydroxyproline
  - d) hydroxylation of proline needs Vitamin C
  - e) tropocollagen units are arranged in parallel, overlapping by quarter – lengths
- 16- Which is **not true** of **phagocytosis**:-
- a) carried out by neutrophils and macrophages of the mononuclear phagocyte system (MPS)
  - b) cannot go on without opsonization
  - c) neutrophils are the most active phagocytic type of white blood cells
  - d) in addition to phagocytosis, macrophages activate the immune response
  - e) neutrophils can moderate the allergic reaction and phagocytose antibody – antigen complex.
- 17- **laminin** functions in which of the following :-
- a) as an integrin
  - b) in cell –cell adhesion
  - c) in adherence of epithelia to the basement membrane
  - d) as part of the lamina densa
  - e) the filtering function of the basal lamina
- 18- which of the following is a major contributor to the **tensile strength** of **collagen**?
- a) intermolecular cross links
  - b) the overlaps of the heads and tails of the tropocollagen molecules
  - c) removal of the propeptides from the procollagen molecule
  - d) tight helical configuration of the procollagen molecule
  - e) hydroxylation of proline
- 19- **Adipose tissue** : choose the **incorrect** statement:-
- a) the cells of unilocular type have signet- ring appearance
  - b) the multilocular type is rich in mitochondria
  - c) in both unilocular and multilocular types sympathetic fibres end on the wall of adipocytes
  - d) multilocular type is limited to the neck and interscapular regions
  - e) the Unilocular type is present in the female breast
- 20- The **filtering function** of the **basal lamina** is due to:-
- a) presence of glycoproteins laminin and entactin
  - b) the integrins that project from the epithelial cell membrane into the basal lamina
  - c) meshwork of type IV collagen forming its lamina densa
  - d) the positive charge of its heparin sulphate
  - e) the presence of type I and type II collagen
- 21- Choose the **unsuitable combination**:-
- a) Osteoclasts → maintain ionized calcium of blood in chronic hypocalcemia
  - b) Elastic cartilage → many isogenous groups of chondrocytes
  - c) Osteoclasts → monocytes
  - d) Scapula → compact bone
  - e) Calcified matrix of cartilage → Basophilic

Which type of collagen forms the coarse collagen fibres in dense regular and irregular connective tissues?	
Which compound is responsible for the viscous character of the ground substance?	
Which class of molecules, in addition to proteins, forms proteoglycans? Be specific.	
Which type of collagen forms the collagen fibres in reticular connective tissues?	
Identify this tissue:	
Identify the thin strands:	
Identify the thick strands:	
Identify the small dark purple structures:	
Identify the large granular-looking cell:	
Identify this tissue:	
Identify the dark circular structure at the center:	
Identify the series of ring-like layers surrounding the center::	
Identify the fine meshwork of structures seen throughout	
Identify this tissue:	
What type of cell produces this tissue	
Identify the elongated purple structures:	

8	Identify the specific tissue shown here:	
	Identify the type of cells that produce this tissue:	
	Identify the spaces in which these cells reside:	
	Identify a specific location where this tissue is found:	
9	Identify this tissue:	
	Identify the dark strands:	
	Identify the round purple structures:	
10	Identify this tissue:	
	Identify the specific cell type shown here:	
11	Identify this tissue:	
	Identify the large blue cells to the right:	
	Identify the dark blue regions around the cells:	
	Identify the light opaque regions between the cells:	
	Identify the dark fibrous region to the left:	
12	Identify this tissue:	
	Identify the thick strands:	

13	Identify this type of cartilage tissue:	
	What are the two materials that constitute the matrix of this tissue:	
	All connective tissue, including this tissue, are derived from what embryonic tissue:	
14	The fibers of the extracellular matrix of bone are composed primarily of :	
15	The expanded portion at each end of the bone shaft is called the	
16	The layer of connective tissue that covers the outer surface of a bone is called the	
17	The layer of cells that covers the inner surface of a bone is called the :	
18	Unmineralized bone matrix is called	
19	Bone grows by what type of growth ?	
20	Bone formation that occurs directly in the embryonic connective tissue is referred to as _____ ossification	
21	Bone formation in which bone matrix is laid down on the surface of preexisting cartilage is referred to as _____ ossification	
22	What region is spanned by the double headed arrow?	

23	What region is spanned by the double headed arrow?	
24	What type of bone formation is seen in this image?	
25	What type of bone formation is seen in this image?	
26	<p>Comparison of Cartilage and Bone</p> <p>Choose one of following to fill in brackets : "bone", "cartilage", "both", "neither":</p> <p>1- Cells reside in lacunae (        )</p> <p>2- It is an avascular tissue.(        )</p> <p>3- Is penetrated by blood vessels (        )</p> <p>4- Matrix is normally mineralized (        )</p> <p>5- Has an extracellular matrix composed of collagen fibers and GAG-rich ground substance (        )</p> <p>6- Tissue fluid diffuses through the matrix (        )</p> <p>7- Tissue fluid can not diffuse through the matrix (        )</p> <p>8- Grows only by appositional growth (        )</p> <p>9- Grows only by interstitial growth (        )</p> <p>.10- Grows by both interstitial and appositional growth (        )</p>	

27	The mode of tissue growth that results from the division of cells within the tissue is referred to as what?
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28	The fibers of the cartilage matrix consist predominately of what?
29	Which type of cartilage is flexible, but brittle enough to break when struck sharply?
30	Which type of cartilage resumes its shape after being deformed?
31	Which type of cartilage resists extension and deformation without breaking?
32	Tissue fluid is forced out of the blood by:
33	Tissue fluid is drawn back into the blood by :
34	What is the name given to the medical condition that results from an excessive accumulation of tissue fluid in tissues?
35	<p>Functions of Cells of the Ordinary Connective Tissues</p> <p>Identify the cell that responsible for each of these functions:</p> <p>1 Synthesizes and secretes most of the fibers and ground substance of the ordinary connective tissues (      )</p> <p>2-- Phagocytic cell that removes dead cells and other debris (      )</p> <p>3- Releases histamine and other substances in response to allergins, thereby contributing to an allergic response. (      )</p> <p>4- Secretes soluble antibodies. (      )</p> <p>5- Responsible for cellular immunity. (      )</p> <p>6- Provides defense against parasites and functions in the allergic response. (      )</p> <p>7- Stores lipids, serves as "packing material" and provides insulation.(      )</p> <p>8- Stores and metabolizes lipids to produce heat. (      )</p>



The answers:

1	Type 1
2	proteoglycans
3	GAGS (glycosaminoglycans)
4	Type 3
5	Areolar connective tissue / Elastic fibers / Collagen fibers / Nuclei of fibroblasts / Mast cell
6	Compact bone tissue / Central (Haversian) canal / Lamellae / Canaliculi
7	Dense regular connective tissue / Fibroblasts / Nuclei of fibrocytes / Tendons, ligaments
8	Elastic cartilage / Chondrocytes / Lacunae/ Epiglottis, external ear
9	Reticular connective tissue/ Reticular fibers (fine collagen)/ Nuclei of reticular cells/
10	Adipose/ Adipocyte
11	Hyaline cartilage/ Chondrocytes / Lacunae/ Matrix / Perichondrium
12	Elastic connective tissue/ Elastic fibers
13	Fibrocartilage/ Fibers and ground substance/ Mesenchyme
14	Collagen
15	Epiphysis
16	Periosteum
17	Endosteum
18	Osteoid
19	Appositional growth
20	Intramembranous
21	Endochondral
22	Zone of hypertrophy
23	Zone of proliferation
24	Intermembranous
25	Endochondral

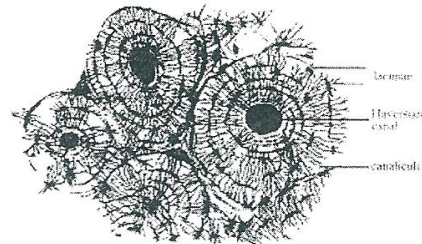
26	1-both 2- cartilage 3- bone 4- bone 5-both 6- cartilage 7- bone 8-bone 9-neither 10- cartilage
27	Interstitial growth
28	Type 2 collagen
29	Hyaline
30	Elastic
31	Fibrocartilage
32	Hydrostatic pressure
33	colloid osmotic pressure
34	edema
35	1-fibroblast 2-macrophage 3- mast cell 4- plasma cell 5- lymphocyte 6- eosinophil 7-white adipocyte 8- brown adipocyte

**MID-TERM MATERIAL:**

- 1) All of the following is true concerning plasma cell and mast cell EXCEPT:  
plasma cell depends in function on mast cell
- 2) A picture of loose CT ,, pointed at collagen ,elastic and a cell ( might be macrophage or fibroblast ) ,, choose the wrong statment ,, answer is : this tissue is found in dermis
- 3) In basal lamina, which is responsible of filtration?  
A-positive sulphate  
B-meshwork of collagen IV  
C- fibronectin ....  
D- glycoprotein collagen IV  
Answer: B
- 4) What is the wrong statement about adipocytes?  
It was about sympathetic innervation.
- 5) All of these structures are found in a bone trabeculam Except:  
Answer: Osteoprogenetior cells.
- 6) About complement proteins, the wrong statement is:  
They are chemeotactic factor for eosinophil or they are important to it's function.
- 7) What is responsible for tensile strength in collagen?  
A- Cross linking.  
B- Procollagen triple helix.  
C- Hydroxylation of proline into hydroxyproline.  
D- Propeptides deletion.  
E- Overlapping between head and tails of tropocollagen.
- 8) Wrong statement about bone resorption:  
Answer: Lysosomal enzymes are responsible 4 the dissolving of inorganic components.
- 9) Which of the following do plasma cell synthesise?  
A-IgA.

- B-Histamine
  - C-Heparin
  - D-Prostaglandin
- Answer: IgA

10) In the adjacent section;  
What is the component that can  
be seen using the electron  
microscope?



Answer: Canaliculi

- 11) What is wrong about mineralization?
- a- the combined local concentration of  $Ca^{++}$  and phosphate ions must be above a threshold value
  - b- osteocalcin is produced by osteoclast
  - c- the most important factor is matrix vesicle
  - d-failure of mineralization leads to rickets in children
  - e- osteoblast produces alkaline phosphatase

Answer: B

12) The wrong statement about long bone ends is:  
Answer: The growing end fuses before the other end.

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13) The wrong statement about glomeruli connection with vessels is:

Answer: Sometimes the basement membrane formed of a thick central lamina lucida with a lamina densa on the both sides.

14) Osteoclast picture,, this cell will be active in :

- A-osteopetrosis
- B-Chronic hypocalcemia
- C-Both
- D-Neither

Answer: B

15) Whats the function of laminin

- A- cell-cell adhesion
- B- filtration
- C- Fixes epithelium to basal lamina.

Answer : C

16) What is wrong about PLASMA CELL & MAST CELL ?

- a)Both from fibroblast
- b)One is stimulus & the other has a receptor
- c)Plasma cell need mast cell

Answer: C

17) There was a picture for compact bone (haversian system) under light microscope what is/ are the structure/s we can distinguish?

- a- osteoblast
- b- osteoclast
- c- osteocytes in their lacunae
- d- canaliculi
- e- more than one of the above

Answer D

18) What is common between the three types of cartilage?  
All lack blood vessels and lymphatics.

19) A picture of ( neutrophil cell + lymphocyte) .... what is the wrong statement:

- a- they both act in acute inflammation
- b- the cell number 1 (basophil) needs the mast cell to function properly.
- c- the cell number 2 (lymphocyte) can differentiate to the plasma cell.

Answer: A

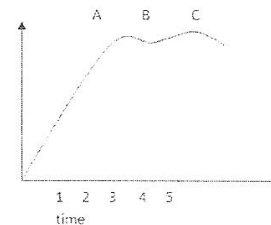
20) You won't find this in patients with Osteomalacia & Rickets.

Answer: Deficiency Of Osteoid .

21) One of the following is wrong:

Answer: c) Both A & B act as chemotoxins.

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22) Extra lab question : What is the wrong statement concerning histological slide preparing?

Answer: hydration then sectioning.

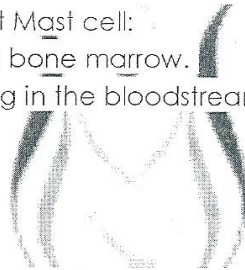
23) Concerning bone and cartilage ; one of the following is wrong.  
Cartilage is sometimes CONVERTED to compact bone.

24) Practical: Mast cell photo, secretes what?

- A-histamine
  - B-complement
  - C-kininogenase
  - D-more than one of the above
- ANSWER: HISTAMINE

25) Wrong about Mast cell:

- A- Originated from bone marrow.
  - B- Keeps wandering in the bloodstream then migrates to connective tissue.
- Answer: B



26) All are true about collagen except :

- a- Collagen type I responsible for the acidophilia of bones.
- b- Collagen type II responsible for the basophilia of cartilage.
- c- Collagen type III is argyrophilic
- d- Collagen type IV present in lamina densa
- e- Collagen type VII is anchoring fibers

Answer: B

27) The trabeculum contains all of the following except:

- a- osteocytes inside lacunae
- b- osteoblasts and osteoclasts
- c- osteoprogenitors

Answer: C

28) There was a picture of loose CT-choose the wrong statement :

- A- the thin line is elastic fiber
- B- the thick line is collagen
- C- the nucleus could be for fibroblaste or macrophage
- D- this tissue can be found in the dermis

ANSWER D

29) In the pointed structure (spongy bone cavity) , when examined by microscope you can find:

- a)Osteoprogenitor cell
- b)Osteblast
- c)Colaagen III
- d)More than one of the above

Answer: A

30) One of the following statements is wrong about adipocytes:

- a)Sympathatic innervation ends in both types within the capillries
- b)Unilocular adipocytes is present in female breast.
- c)Multilocular adipocytes are rich in mitochondria.

Answer: A

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