Cell Biology and Histology Review
A 19-year old man is brought to the ED because of a gunshot wound to the chest. An emergency thoracotomy is preformed, and in order to stop the bleeding, a segment of lung is removed. A photomicrograph of a section of lung resected is shown. Which of the following is produced by the cells indicated by the arrows?

- a. Alkaline phosphatase
- b. HCl
- c. Surfactant
- d. Immunoglobulbin
- e. Von Willebrand factor
C. Surfactant: this biopsy shows the alveolar walls. Type II pneumocytes are cuboidal-like with round nuclei and a washed-out or foamy cytoplasm due to the lipid content.

Wrong choices:
- Osteoblasts produce alk phos
- Parietal cells produce HCl
- Plamsa cells secrete Ig
Lung Histology

- Type I alveolar cells - squamous cells involved with gas exchange
- Type II alveolar cells - produce surfactant
Emphysema
Pulmonary Fibrosis
A 27-year old man comes to the physician because of heartburn and a sour taste in his throat that occurs after meals. These symptoms have not been alleviated by over-the-counter medications. Endoscopy is performed, and a biopsy of the distal esophagus show no abnormalities. Histologic examination of the biopsy is most likely to show what?

a. ciliated, columnar epithelium
b. Non-ciliated columnar epithelium
c. Pseudostratified columnar epithelium
d. Keratinized, stratified, squamous epithelium
e. Nonkeratinized, stratified, squamous epithelium
E. Nonkeratinized, stratified, squamous epithelium. The esophagus is covered by these cells for its entire length. Heartburn is a sign of GERD. This is a serious problem that may be associated with Barrett esophagus.
Barrett’s
A donor liver arrives in New York from Chicago 7 hours after harvest. A biopsy is performed on arrival to check for ischemic injury. The P450 system is very susceptible to ischemia. In which of the following histologic regions of the liver is this system located?

a. Bile ducts
b. Intermediate Zone
c. Ito cells
d. Pericentral vein zone
e. Periportal zone
D. the liver has three zones based on blood flow.
- Zone 1 = periportal, most blood, contains P450 system, most susceptible to toxic injury
- Zone 2 = intermediate.
- Zone 3 = pericentral, least blood, most susceptible to ischemic injury
A 38 year old women comes to the ED because of pelvic pain 30 minutes after being involved in a car crash. A scan of the pelvis shows no abnormalities. Which of the following cell types would most likely be found in the structure indicated on the scan?

a. Chromaffin cells
b. Goblet cells
c. Spiral arteries
d. Stratifies squamous
e. Transitional cells
- The urinary bladder is lined with an epithelium of muffin-shaped cells called transitional cells. The transitional cells epithelium lines the renal calyces, renal pelvis, ureters, and bladder.

- Chromaffin cells secrete epinephrine in the adrenal medulla.

- Goblet cells secrete mucus in the GI and respiratory tracts.

- Spiral arteries are found in the uterus.
An investigator is isolating mucin-secreting cells from various tissues to compare surface receptor types on these cells. Which of the following tissues would most likely yield the highest percentage of mucin-secreting cells?

A. Esophageal mucosa  
B. Oral mucosa  
C. Parotid gland  
D. Sublingual gland  
E. Submandibular gland
D. in their acini, salivary glands can contain predominantly serous cells, predominantly mucous cells, or both.

- Sublingual = majority mucous
- Submandibular = mixed mucous and serous
- Parotid = majority serous

L.M. Submandibular Gland (of man)
A 32-year old man is brought to the emergency department 1 hour after being involved in a motor vehicle collision. A CT of the abdomen is show. Which of the following is a microscopic characteristic of the structure identified by the arrow?

A. Cords of billroth  
B. Ito cells  
C. Kupfer cells  
D. Red fibers and white fibers  
E. Space of disse
A. that is the spleen which contains red and white pulp. The red pulp consists of cord of billroth.
Spleen

- Capsule
- Red pulp
- White pulp
- Central artery
A 41-year old man comes to the physician because of difficulty swallowing solid food for the past 4 months. Endoscopy reveals a mass. A biopsy shows malignant-appearing squamous epithelium and normal striated muscle in the same section. No smooth muscle is observed. Which of the following is the most likely site of the mass?

a. LES
b. Lower 1/3 of the esophagus
c. Middle 1/3 of the esophagus
d. UES
e. Upper 10% of the esophagus
A 5-year old boy is brought to the physician because of left arm pain after a fall from his bike. X-rays of the arm show a humeral fracture and his arm is placed in a cast. Which if the following structures is most likely to produce the majority of the bone needed to promote bone fusion?

A. Cancellous bone  
B. Cartilage  
C. Compact bone  
D. Marrow  
E. periosteum
E. when the periosteum is torn, it supplies the cells that develop into osteoblasts and are the major producers of the new bone that reunite the two ends.
- Cancellous bone - contains BM, involved with calcium maintenance
- Compact bone - skeletal support and protection, calcium stores
- Periosteum - contains progenitor cells for osteoblasts
Growing bone
A 24 year old man comes to the ED because of right knee pain that started ten days ago when he fell off his motorcycle. Initially he was able to ambulate; however, he has had progressive swelling, redness, and limitation of movement of his knee. The process causing destruction of cartilage in this individual’s knee is worsened because of which of the following?

A. Cartilage contains chondroitin sulfate  
B. Cartilage contains collagen  
C. Cartilage is not innervated  
D. Cartilage is relatively avascular  
E. Cartilage tends to become calcified
D. The patient has signs of a bacterial knee infection - septic arthritis. Hyaline cartilage in the knee has very few small blood vessels, which means the immune system cannot access it very well.
An investigator is studying the ultrasound of leukocytes in healthy people. An EM is shown. The same cell stains intensely with eosin on light microscopy. Which of the following substances is most likely contained in the granule indicated?

a. Histamine  
b. Lactoferrin  
c. Major basic protein  
d. Myeloperoxidase  
e. Tartrate-resistant acid phosphatase
C. this is an eosinophil, which produces major basic protein to destroy parasites.

- Histamine—basophils and mast cells
- Lactoferrin—neutrophils
- Myeloperoxidase—neutrophils
- Taryrate-resistant acid phosphatase—marker of leukemia in B cells.
What is this cell?
A. Neutrophil
B. Eosinophil
C. Basophil
D. Mast cell
A. Neutrophil
B. Eosinophil
C. Basophil
D. Mast cell
A 50-year old man with COPD and a history of alcohol abuse presents to the doctor’s office with worsening shortness of breath over the last week. He says that this is worse on exertion, and he frequently stops for breaks while climbing the stairs. What dose this lung biopsy suggest?

A. Left sided heart failure
B. Metastatic lung cancer
C. PE
D. Right sided heart failure
E. Hypercoaguable state
A. left sided heart failure

The image shows hemosiderin-laden macrophages, which are commonly seen in LHF, which increases pulmonary capillary pressure and causes microhemorrhages. This leads to SOB.
A patient presents with repeated episodes of tachycardia, hypertension, palpitations and anxiety. From which zone is the causative agent likely released?

A. Zona glomerulosa  
B. Zona fasciculata  
C. Zona reticularis  
D. Medulla
A 45 year old patient presents with polyuria and polydipsia. His blood glucose is elevated. What is the likely cause of this abnormal kidney biopsy?

a. Nonenzymatic glycosylation  
b. IgA deposits  
c. Normal biopsy  
d. SLE
A 24 year old man is brought to the ED after being hit by a motorist while crossing the street and sustaining an abrasion injury on his left elbow. There is a total loss of epidermis over a large area of his left arm. One month later, the abrasion has healed, with regrowth of the epidermis. Which of the following best explains the restoration of the epidermis over the abraded area?

a. Growth of epidermis from hair follicles and sweat glands in the dermis
b. Migration of endothelial cells from newly grown capillaries
c. Transformation of dermal fibroblasts into epidermal cells
d. Transformation of macrophages into epidermal cells
e. Transformation of melanocytes into epidermal cells
A. The dermis contains skin appendages (e.g., hair follicles) that contain epithelial stem cells. In the process of healing a large area where the epidermis has been lost but the dermis is intact, re-epithelialization occurs by growth of epidermal cells from the underlying skin appendages, as well as from the intact epidermis along the wound edge.