

# CELL INJURY

1. A patient is suffering from stroke and has left sided weakness and paralysis in the upper extremity. The type of necrosis associated with well-developed infarct of the brain is:

- a. Caseous necrosis
- b. Coagulative necrosis
- c. **Liquefactive necrosis**
- d. Gangrenous necrosis
- e. Fibrinoid necrosis

2. Neutrophils have short half-lives in tissues and die within a few hours after leaving the blood. Which of the following mechanisms is responsible for their death?

- a. Autophagy
- b. **Apoptosis**
- c. Autolysis
- d. Necrosis
- e. Ischemia

3. A 65-year-old man experienced severe substernal chest pain for 3 hours. An ECG showed changes consistent with an acute myocardial infarction. After thrombolytic therapy with tissue plasminogen activator (t-PA), his serum creatine kinase level increased. Which of following tissue events most likely occurred in the myocardium after t-PA therapy?

- a. Cellular Regeneration.
- b. Drug Toxicity
- c. Myofibril atrophy
- d. **Reperfusion Injury**
- e. Increased synthesis of CK

4. A 47 years old man has lung carcinoma with metastases. After one month of chemotherapy cycle, histological examination of a metastatic lesion shows many foci in which Individual tumor cells appear shrunken and deeply eosinophilic. Their nuclei exhibit condensed aggregates of chromatin under the nuclear membrane. The pathologic process affecting these shrunken tumor cells is most likely triggered by release of which of the following substances into the cytosol?

- a. BCL2
- b. Catalase
- c. Phopholipasd
- d. Lipofuscin
- e. **Cytochrome C**

5. While in a home improvement center warehouse buying paint, a 35-year-old man hears "Look out below!" and is then struck on the leg by a falling pallet rack, which strikes him on his left leg in the region of his thigh. The skin is not broken. Within 2 days there is a 5 x 7 cm purple color to the site of injury. Which of the following substances has most likely accumulated at the site of injury to produce a yellow-brown color 16 days after the injury?

- a. Lipofuscin
- b. Bilirubin
- c. Melanin
- d. **Hemosiderin**
- e. Glycogen

6. A 70-year-old man with hypercalcemia died suddenly. At autopsy, microscopic examination showed noncrystalline amorphous deposits of calcium salts in gastric mucosa, renal interstitium, and alveolar walls of lungs. Which of the following underlying conditions would most likely explain these findings?

- a. Chronic active hepatitis
- b. **Diffuse parathyroid hyperplasia**
- c. Disseminated tuberculosis
- d. Generalized atherosclerosis
- e. Normal aging process

7. A 16 years old motor cyclist boy sustained blunt trauma to his abdomen. At laparotomy, a small portion of injured left lobe of liver was removed. Two months later, a CT scan of the abdomen showed that the liver had nearly regained its normal size. Which of the following processes best explains this CT scan finding?

- a. Apoptosis
- b. Hypertrophy
- c. Metaplasia
- d. Dysplasia
- e. **Hyperplasia**

8. A 20 year old woman breastfeeds her infant. On examination, her breasts are slightly increased in size. Which of the following processes that occurred in her breasts during pregnancy enables her to breastfeed the infant?

- a. Ductal metaplasia
- b. Epithelial dysplasia
- c. Intracellular lipid deposition
- d. **Lobular hyperplasia**
- e. Stromal hypertrophy.

9. You are asked to review an electron micrograph of a section of liver from a chronic alcoholic. Which of the following is an indicator of irreversible injury?

- a. Cellular edema
- b. Chromatin clumping
- c. mitochondrial swelling
- d. Myelin figures
- e. **Rupture of plasma membrane**

10. You are asked to participate in a research project on myocardial infarctions in a rat model. Which of the following occurs in ischemic cell injury?

- a. Efflux of K<sup>+</sup> and Na<sup>+</sup>
- b. Influx of K<sup>+</sup> and H<sub>2</sub>O
- c. **Influx of Na<sup>+</sup> and Ca<sup>++</sup>**
- d. Influx of K<sup>+</sup> and Na<sup>+</sup>

11. A 10 year old boy with known history of sickle cell disease presents to the emergency department complaining of left hypochondrial pain suggestive of a splenic infarct. Microscopic examination of the spleen would most likely reveal which of the following?

- a. Caseous necrosis.
- b. Coagulative necrosis**
- c. Gangrenous necrosis
- d. Liquefactive necrosis
- e. Fibrinoid necrosis

12. A 3<sup>rd</sup> year medical student is asked to write a microscopic description of a coagulative necrosis that was found in the heart of a patient who died of a heart attack. Which of the following best describes coagulative necrosis?

- a. Central amorphous acellular eosinophilic material.
- b. Eosinophilic cytoplasm with cell outlines preserved.**
- c. Granular, friable mass of material devoid of cell outlines.
- d. Localized, solid, basophilic lesion with calcification
- e. Necrosis in which tissue is converted into a fluid

13. A 34-year-old obese woman has experienced heartburn from gastric reflux for the past 5 years after eating large meals. She undergoes upper gastrointestinal endoscopy, and a biopsy specimen of the distal esophagus is obtained. Which of the following microscopic changes has most likely occurred?

- a. **Columnar metaplasia**
- b. Goblet cell hyperplasia
- c. Lamina propria atrophy
- d. Mucosal Hypertrophy
- e. Squamous dysplasia

14. Microorganisms are cellular structures. They can grow and reproduce. Which of the following mechanism is mostly used by Bacteria to divide?

- a. Mitosis
- b. Meiosis
- c. Both meiosis & mitosis
- d. Binary fission
- e. Binary fission & mitosis**

15. What is the most likely cause of fatty liver in industrialized nations?

- a. Alcohol.**
- b. CCL4.
- c. Starvation.
- d. Malnutrition.
- e. Hepatitis A.

16. Which is true regarding metaplasia:

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- a. It is an adaptive change which can lead to carcinoma.**
- b. It is irreversible
- c. It occurs only in epithelium.
- d. There is cloudy swelling of cells.
- e. There is an increase in nucleo-cytoplasmic ratio of cells

17. A 56 year old man dies 24 hours after the onset of sub-sternal chest pain radiating down his left arm to the ulnar aspects of his fingertips. Which of the following morphological myocardial finding is indicator of irreversible injury?

- a. Cell blebs
- b. Depletion of glycogen
- c. Mitochondrial swelling
- d. Myelin figures
- e. Pyknotic nuclei**

18. Fat necrosis is expected to be found in which of the following situation?

- a. **Trauma to the breast**
- b. Trauma to the bowel
- c. Brain injury
- d. Muscle injury
- e. Trauma to abdomen

19. 50 years old women presented with acute abdomen. At laparoscopy most of bowel loops were dark purple black. Her mesenteric veins were patent. Most probable underline pathological process is:

- a. Coagulative necrosis
- b. Caseous necrosis
- c. Gas gangrene
- d. Liquefactive necrosis
- e. **Wet gangrene**

20. The epithelium of the respiratory tract of a 35 year old habitual smoker, is most likely to show:

- a. **Stratified squamous metaplasia.**
- b. Simple squamous metaplasia.
- c. Mucus hyperplasia.
- d. Smooth muscular hyperplasia.
- e. Squamous cell anaplasia.

21. In radiation injury basic mechanism is :

- a. **Free radical formation**
- b. Increase ATP production.
- c. Decrease intracellular Na...
- d. Decrease intracellular Ca.
- e. Inhibit protein synthesis.

22. A lesson shows non cellular central material surrounded by large multinucleated giant cell and epitheloid cells, the most likely lesion will be:

- a. Fibrinoid necrosis.
- b. Gangrenous necrosis.
- c. Coagulative necrosis.
- d. **Caseous necrosis.**
- e. Liquefactive necrosis.

23. Dystrophic calcification is commonly seen in:

- a. Ureter.
- b. Kidney.
- c. Pancreas.
- d. Thyroid.
- e. **Necrotic or damaged Tissues.**

24. A 55-year-old male alcoholic presents with symptoms of liver disease and is found to have mildly elevated liver enzymes. A liver biopsy examined with a routine hematoxylin and eosin (H&E) stain reveals abnormal clear spaces in the cytoplasm of most of the hepatocytes. Which of the following materials is most likely forming these cytoplasmic spaces?

- a. Calcium
- b. Cholesterol
- c. Hemosiderin
- d. Lipofuscin
- e. **Triglyceride**

25. What is argyria?

- a. Accumulation of carbon
- b. **EC Accumulation of silver**
- c. Accumulation of lead
- d. Accumulation of melanin
- e. Accumulation of lipofuscin

# INFLAMMATION

1. Which of the following is an anaphylotoxin used for chemotaxis?

- a. Bradykinin
- b. Histamine
- c. Leukotrienes
- d. IL-1
- e. **C3a & C5a**

2. Which of the following substances is produced by the action of lipoxygenase of arachidonic acid, is a potent chemotactic factor for neutrophils, and causes aggregation and adhesion of leukocytes?

- a. C5a
- b. Prostacyclin
- c. IL-8
- d. Thromboxane A<sub>2</sub>
- e. **Leukotriene b<sub>4</sub>**

3. A 15-year-old girl has had episodes of sneezing with watery eyes and runny nose for the past 2 weeks. On physical examination she has red, swollen nasal mucosa. She has had similar episodes each spring and summer when the amount of pollen in the air is high. Her symptoms are most likely to be mediated by the release of which of the following chemical mediators?

- a. Complement C3b
- b. Platelet activating factor (PAF) Histamine
- c. Fibroblast growth factor
- d. Tumor necrosis factor (TNF)
- e. **Histamine**

4. In an experiment, surgical wound sites are observed following suturing. An ingrowth of new capillaries is observed to occur within the first week. A substance elaborated by macrophages is found at the wound site to stimulate this capillary proliferation. Which of the following substances is most likely to have this function?

- a. Platelet-derived growth factor
- b. Phospholipase C
- c. **Fibroblast growth factor**
- d. Epidermal growth factor
- e. Fibronectin

5. A 56-year-old man has had increasing dyspnea for 6 years. He has no cough or fever. He was inhaling silica dust for many years in his job. A chest x-ray now shows increased interstitial markings and parenchymal 1 to 3 cm nodules. His pulmonary problems are most likely to be caused by which of the following inflammatory processes?

- a. Neutrophil infiltration with release of leukotriene
- b. Histamine release by mast cells
- c. **Foreign body giant cell formation**
- d. Plasma cell production of immunoglobulin
- e. Release of growth factors by macrophages

6. A 45-year-old man has had a fever and dry cough for 3 days, and now has difficulty in breathing and productive cough. On physical examination his temperature is 38.5 °C. Diffuse rates are auscultated over lower lung fields. A chest radiograph shows a right pleural effusion. A right thoracentesis is performed. The fluid obtained has a cloudy appearance with a cell count showing 15,500 leukocytes per microliter, 98% of which are net.o., hits. Which of the following terms best describes his pleural process?

- a. Serous inflammation
- b. **Purulent inflammation**
- c. Fibrinous inflammation
- d. Chronic inflammation
- e. Granulomatous inflammation

7. A 45-year-old man developed right lower quadrant abdominal pain over the last one day. Physical examination revealed rebound tenderness over the right lower quadrant. Appendectomy was performed and the appendix was swollen, erythematous, and partly covered by a yellowish exudate. It was removed, and microscopic section showed infiltration with numerous neutrophils. Which mediator causes pain?

- a. Complement C3b and IgG
- b. Histamine and serotonin
- c. **Prostaglandin and bradykinin**
- d. Interleukin-1 and tumor necrosis factor
- e. Leukotriene and HPETE

8. A 50-year-old man had chronic cough with fever and weight loss for the past 2 months. A chest radiograph reveals multiple nodules from 1 to 4 cm in size, some of which demonstrate cavitation in the upper lobes. A sputum sample reveals the presence of acid fast bacilli. Which of the following cells is the most important in the development of his lung lesions?

- a. Fibroblast
- b. Platelet
- c. Neutrophil
- d. Mast cell
- e. **None of the above**

9. A 20-year has experienced painful urination for 4 days. Urethritis is suspected. Numerous neutrophils are present in a smear of the exudate from the urethra. The diapedesis & chemotaxis of neutrophils is the consequence of which of the following chemical mediator?

- a. Histamine.
- b. Prostaglandin
- c. Hageman Factor
- d. Bradykinin
- e. **Complement C5a**

10. Morphological changes seen in chronic non-specific inflammation include an increase in:

- a. Lymphocytes, Neutrophils and Liquefactive necrosis
- b. Neutrophils, macrophages and fibrosis
- c. **Lymphocytes, plasma cells and fibrosis**
- d. Giant cells, macrophages and coagulative necrosis
- e. Granulomatous reaction and fibrosis

11. The most important cytokine involved in the formation of epithelioid cells is:

- a. IL-8
- b. **Interferon Gamma**
- c. PG I<sub>2</sub>
- d. interferon
- e. IL-2

12. A 25 years old female is suffering from chronic bronchial asthma. She is on steroids for her symptoms. Which of the following is MOST responsible for the anti inflammatory activity of the corticosteroids?

- a. **Inhibition of Phospholipase A<sub>2</sub>**
- b. Destruction of eosinophils
- c. Inhibition of cyclooxygenase.
- d. Increase leukocyte adhesion to endothelial cells
- e. Inhibition of lipoxygenase



**13. Which of the following is the most efficient killing mechanism of neutrophils?**

- a. Collagenase
- b. Reactive oxygen species
- c. Protease
- d. Myeloperoxidase**
- e. Defensins

**14. A child had a high grade fever due to streptococcal throat infection. His peripheral smear showed WBC count of 15,000/ul. Which of the following substances is the most likely mediator for the fever observed in this patient?**

- a. Bradykinin
- b. Histamine
- c. Nitric oxide
- d. Interleukin 1**
- e. Leukotriene B4

**15. A 55 years old man suffered from myocardial infarction and worsening congestive heart failure. There is dyspnoea and orthopnea for the last 2 months. Pleural fluid is aspirated. Which of the following characteristics of this fluid would most likely indicate that it is a transudate?**

- a. Cloudy appearance
- b. Low protein content**
- c. Increased lymphocytes
- d. Presence of fibrin
- e. Large size of effusion

**16. A clinical study is performed on patients with pharyngeal infections. The most typical clinical course averages 3 days from the time of onset until the patient sees the physician. Most of these patients experience fever and chills. On physical examination, the most common findings include swelling, erythema, and pharyngeal purulent exudate. Which of the following types of inflammation did these patients most likely have?**

- a. Granulomatous inflammation
- b. Acute inflammation**
- c. Abscess formation
- d. Resolution of inflammation
- e. Chronic inflammation

17. A 90-year-old woman has developed a fever and cough over the past 2 days. *Staphylococcus aureus* is cultured from her sputum. She receives a course of antibiotic therapy. Two weeks later she no longer has a productive cough, but she still has a fever. A chest radiograph reveals a 3 cm rounded density in the right lower lobe whose liquefied contents form a central air-fluid level. There are no surrounding infiltrates. Which of the following is the best description for this outcome of her pneumonia?

- a. Hypertrophic scar
- b. Abscess formation**
- c. Bronchogenic carcinoma
- d. Chronic inflammation
- e. Granulomatous cavitation

18. The major role of Nitric oxide (NO) in inflammation is:

- a. Inducing pain
- b. Vasodilatation**
- c. Chemotaxis
- d. Adhesion of leukocytes on endothelial cells
- e. Increased vascular permeability

19. A man 45 years has complained of mild burning substernal pain following meals for the past 3 years. Upper GI endoscopy reveals erythematous area of the lower esophageal mucosa and the biopsies show the presence of columnar epithelium with goblet cells. Which of the following mucosal alterations is most likely represented by these findings?

- a. Dysplasia
- b. Hyperplasia
- c. Carcinoma
- d. Ischemia
- e. Metaplasia**

20. In an experiment, surgical wound sites are observed following suturing. An ingrowth of new capillaries is observed to occur within the first week. A substance elaborated by macrophages is found at the wound site to stimulate this capillary proliferation. Which of the following substances is most likely to have this function?

- a. Platelet-derived growth factor
- b. Phospholipase C-gamma
- c. Fibronectin
- d. Fibroblast growth factor**
- e. Epidermal growth factor

**21. A young man got a lacerated wound on his left arm, which was stitched. A week later the stitches were removed. Healing at the wound site continued but the site became disfigured by prominent raised nodular scar in the next 2 months. Which of the following best describes the process?**

- a. Organization
- b. Dehiscence
- c. Resolution
- d. ct. Keloid formation**
- e. Secondary Union

**22. A 40-year-old man incurs a burn injury to his hands and arms while working on a propane furnace. Over the next 3 weeks, the burnt skin heals without the need for skin grafting. Which of the following is the most critical factor in determining whether the skin in the region of the burn will regenerate?**

- a. Good cardiac output with tissue perfusion
- b. Persistence of skin appendages
- c. Maintenance of underlying connective tissue
- d. Diminished edema and erythema
- e. Granulation tissue formation**

**23. The tendency of blood vessels to recoil is provided by :**

- a. Collagen
- b. Elastin**
- c. Fibronectin
- d. Laminin
- e. Proteoglycan

**24. A 25 year old female gave birth to a baby by C-section. She had a clean sutured wound. What type of healing will take place in such case?**

- a. Healing by first intention**
- a. Healing by second intention
- b. Healing by 3<sup>rd</sup> intention
- c. None of the above

**25. A 17-year-old driver of a pickup truck is involved in a collision. He incurs blunt force abdominal trauma. In response to this injury, cells in tissues of the abdomen are stimulated to enter the G1 phase of the cell cycle from the GO phase. Which of the following cell types is most likely to remain in GO following this injury?**

- a. Smooth muscle
- b. Fibroblast
- c. Skeletal muscle
- d. Endothelium
- e. Hepatocyte**

# HEMODYNAMICS :

**1. Which of the following changes best describes the pathophysiology involved in the production of pulmonary edema in patients with congestive heart failure?**

- a. Decreased plasma oncotic pressure
- b. Widespread endothelial damage
- c. Increased hydrostatic pressure**
- d. Increased vascular permeability
- e. Acute lymphatic obstruction

**2. 22-year-old second-year medical student develops a "red" face after being asked a question during lecture. Which of following statements best describes this vascular reaction?**

- a. Active hyperemia**
- b. Acute congestion
- c. Non palpable purpura
- d. Passive hyperemia
- e. Petechial hemorrhage

**3. Nutmeg Liver "is seen in:**

- a. Liver cirrhosis.
- b. Liver necrosis.
- c. Chronic passive congestion.**
- d. Thrombosis of the portal veins.
- e. Hemorrhage due to liver trauma.

**4. During the autopsy of a 46-year-old man who died when his motorcycle was hit by a truck, a 1.2-cm red mass is found within a branch of he left pulmonary artery. Grossly this mass is rubbery, gelatinous, and has a "chicken fat" appearance. Histologic section reveal that mass is not attached to wall of pulmonary artery, and alternating lines of Zahn are not seen. Which of the following statements best describes this intravascular mass?**

- a. Postmortem blood clot**
- b. Postmortem hematoma
- c. Postmortem embolic blood clot
- d. Postmortem non-embolic thrombus
- e. Postmortem non-thrombotic embolus

**5. Generalized edema results from all the following EXCEPT:**

- a. Systemic hypertension.**
- b. Congestive heart failure.
- c. Liver cirrhosis.
- d. Nephrotic syndrome.
- e. Hyperaldosteronism

**6. Disorders that predispose to thrombosis include all of the following EXCEPT:**

- a. Pancreatic carcinoma.
- b. Pregnancy.
- c. Vitamin K deficiency.**
- d. Sickle cell anemia.
- e. Oral contraceptive pills.

**7. A 19-year-old offensive tackle for a major university football team fractures his right femur during the first game of the season. He is admitted to the hospital and over the next several days develops progressive respiratory problems. Despite extensive medical intervention, he dies 3 days later. At the time of autopsy oil red O-positive material is seen in the small blood vessels of the lungs and brain. Which of the following is the most likely diagnosis?**

- a. Air emboli
- b. Amniotic fluid emboli
- c. Fat emboli**
- d. Paradoxical emboli
- e. Saddle emboli

**8. A 9-year-old boy suddenly develops severe testicular pain & taken to emergency room, where he is evaluated and immediately taken to surgery. Left testis is found to be markedly hemorrhagic due to testicular torsion. Which mechanism has caused testicular infarction?**

- a. Arterial occlusion
- b. Septic implantation
- c. Decreased collateral blood flow
- d. Increased dual blood flow
- e. Venous occlusion**

**9. Which of the followings is the mechanism of edema in patients with congestive heart failure?**

- a. Decreased plasma oncotic pressure.
- b. Endothelial damage.
- c. Increase hydrostatic pressure.**
- d. Increase vascular permeability.
- e. Lymphatic obstruction.

**10. What is the most common site of origin of thrombotic pulmonary emboli?**

- a. Lumen of left ventricle.
- b. Deep leg veins.**
- c. Lumen of right ventricle.
- d. Mesenteric veins.
- e. Superficial leg veins.

**11. Dependent edema found in congestive heart failure is most likely due to:**

- a. a Lymphatic obstruction.
- b. Increase hydrostatic pressure.**
- c. Arteriolar dilatation.
- d. Reduced plasma oncotic pressure.
- e. Endothelial injury.

**12. Which of the following statements regarding pulmonary emboli is incorrect?**

- a. Most pulmonary emboli are clinically silent.
- b. Sudden death can result from obstruction of main pulmonary trunk.
- c. Most cases are derived from superficial veins of the legs and periprostatic veins.**
- d. Pulmonary infarction can occur in patients who have congestive heart failure.
- e. Paradoxical emboli may occur in patients with atrial septa! defect.

**13. Reduced plasma oncotic pressure is the most important mechanism of edema in:**

- a. Congestive heart failure.
- b. Edema of leg affected by venous thrombosis.
- c. Edema of the arm in breast cancer patients.
- d. Nephrotic syndrome.**
- e. Brain trauma.

**14. Infarcts tend to be hemorrhagic when they occur in:**

- a. Kidney.
- b. Lungs.**
- c. Spleen.
- d. Heart.
- e. Brain.

**15. The most common site of venous thrombosis is:**

- a. Brain.
- b. Kidney.
- c. Legs.**
- d. Liver.
- e. Lung

# IMMUNOLOGY

1. A 3-month-old infant born premature at 35 weeks of gestation is being evaluated for ocular problems and seizures. An x-ray of this infant's head reveals extensive cerebral calcification in the periventricular areas. Because of this combination of clinical signs, the possibility of congenital toxoplasmosis is considered. Which one of the following types of antibodies can cross placenta and is raised in chronic inflammation?

- a) IgG
- b) IgM
- c) IgD
- d) IgE
- e) IgA

2. Which of the listed cytokines is secreted by macrophages and function as a major mediator is involved in type IV hypersensitivity reaction?

- a) Interleukin-10
- b) Interleukin-11
- c) Bradykinin
- d) **TNF**
- e) Histamine

3. After receiving incompatible blood, a patient develops a transfusion reaction in the form of back pain, fever, shortness of breath, and hematuria. Which one of the following statements best classifies this type of immunologic reaction?

- a) Systemic anaphylactic reaction
- b) Systemic immune complex reaction
- c) Delayed type hypersensitivity reaction
- d) **Type 2 Hypersensitivity reaction**
- e) Type 4 Hypersensitivity reaction

4. A 26-year-old African American woman presents with nonspecific symptoms including fever, malaise, and increasing respiratory problems. A chest x-ray reveals enlarged hilar lymph nodes, while laboratory tests find her serum calcium level to be elevated. A trans-bronchial biopsy reveals scattered chronic inflammatory cells, reactive epithelial changes, and several caseation granulomas. The pathological mechanism involved in the formation of these non-caseating granulomas involves the activation of macrophages to form epithelioid cells by the action of which substance?

- a) **Gamma-interferon**
- b) Leukotriene C4
- c) Interleukin-2
- d) Interleukin-5
- e) Interleukin-12

5. Which of the following is the definition of an allograft?

- a) A graft between a human and an animal
- b) A graft between two individuals of different species
- c) A graft between two individuals of the same species**
- d) A graft between two individuals of the same in dead strain
- e) A graft between identical twins

6. A 28-year-old woman presents with increasing shortness of breath, fatigue, arthritis and a bimalar photosensitive, erythematous rash. Biopsies from this rash reveal liquefactive degeneration of the basal layer of the epidermis with a perivascular lymphoid infiltrate. Immunofluorescence examination reveals linear deposits of IgG and complement at the dermal-epidermal junction in a granular pattern. Physical examination finds bilateral pleural effusions, the fluid from which when examined histologically reveals multiple oval eosinophilic bodies being phagocytized by phagocytic leukocytes. Which of the following is the most likely diagnosis?

- a) Dermatomyositis
- b) Rheumatoid arthritis
- c) Sjogren's syndrome
- d) Systemic amyloidosis
- e) Systemic lupus erythematosus**

7. A 25-year-old girl comes to an allergy center with complaints of runny nose and seasonal eye itch. Recurrent conjunctivitis in this patient is most likely caused by which of the following mechanisms of disease?

- a) Autoimmunity
- b) Viral infection
- c) Bacterial infection
- d) Hypersensitivity**
- e) Chemical toxicity

8. Goodpasture syndrome and myasthenia gravis are examples of which type of hypersensitivity reactions?

- a) Type 1
- b) Type 2**
- c) Type 3
- d) Type 4
- e) Type 5



9. A 20-year-old boy had typhoid fever one year ago. This year he again presented with complaints of anorexia, nausea, vomiting and intermittent fever for the last one week. He is suspected to have recurrent typhoid fever. Which immunoglobulin is predominantly seen in the primary immune response to infection?

- a) IgG
- b) IgA
- c) IgE
- d) IgD
- e) **IgM**

10. A burn victim's face was reconstructed by taking a flap of skin from his back and thigh; this represents what type of a graft?

- a) Allograft
- b) **Autograft**
- c) xenograft
- d) Isograft
- e) Homograft

11. A 28-year-old woman is found to have pulmonary sarcoidosis. Flow cytometric analysis of T cells isolated from the alveoli and lung interstitium reveals the presence of large number of T helper (Th1) cells. These cells are known to secrete which of the following substances?

- a) **IL-2 and IFN gamma**
- b) IL-8 and TGF beta
- c) Leukotrienes
- d) Elastase
- e) Complement component C5a

12. Within minutes of a bee sting, a 23-year old woman develops generalized pruritis and hyperaemia of the skin, followed shortly by swelling of the face and eyelids, dyspnea, and laryngeal edema. This reaction is mediated by:

- a) Antigen-antibody complexes
- b) IgA antibodies
- c) **IgE antibodies**
- d) IgG antibodies
- e) Cytotoxic T cells

**13. A 20 year old woman presents with malar rash, arthralgia's, low grade fever and high titer of antibodies to double stranded DNA and smith antigen. Which type of hypersensitivity reaction is seen in this disorder?**

- a) Type 1 hypersensitivity
- b) Type 3 Hypersensitivity
- c) Type 2 hypersensitivity**
- d) Type IV hypersensitivity
- e) Type I and 2 hypersensitivity

**13. Which category of hypersensitivity best describes haemolytic disease of the newborn caused by Rh incompatibility?**

- a) Anaphylactic
- b) Cytotoxic**
- c) Immune complex
- d) Delayed
- e) All of the above

**14. Which of the following substances will not stimulate an immune response unless they are bound to a larger molecule?**

- a) Antigen
- b) Virus
- c) Hapten**
- d) Mitogen
- e) Antibody

**15. B and T cells are produced by stem cells that are formed in:**

- a) Bone marrow**
- b) The liver
- c) The circulatory system
- d) The spleen
- e) The lymph nodes

# NEOPLASIA

1. A 64-year-old man present with symptoms of anemia. On workup, you discover that the patient has been losing blood from the gastrointestinal (GI) tract secondary to a tumor mass in his colon. The pathology report from a biopsy specimen indicates that this mass is an invasive adenocarcinoma. Which of the following histologic appearance is most likely to be seen in a biopsy specimen taken from this tumor mass?
- A uniform proliferation of fibrous tissue
  - An organized mass of proliferation fibroblasts and blood vessels
  - A disorganized mass of cell forming keratin
  - A uniform proliferation of glandular structures
  - A disorganized mass of cells forming glandular structures**

2. Which one of the following numbered sequences best illustrates the postulated sequence of events that precedes the formation of an infiltrating squamous cell carcinoma of the cervix?

**1 = Carcinoma in situ**

**2 = Invasive carcinoma**

**3 = Mild dysplasia**

**4 = Moderate dysplasia**

**5 = Severe dysplasia**

**6 = Squamous metaplasia**

- 3, then 4, then 5, then 1, then 6, then 2
- 3, then 4, then 5, then 6, then 1, then 2
- 5, then 4, then 3, then 1, then 6, then 2
- 6, then 3, then 4, then 5, then 1, then 2**
- 6, then 4, then 3, then 5, then 2, then 1

3. Which of the following is known as Guardian of genome?

- Ras
- P53**
- Myc
- NF-1
- ABL

4. A 52-year old man presents with symptoms of gastric pain after eating. During workup, a 3-cm mass is found in the wall of the stomach. The mass is resected and histologic examination reveals a tumor composed of cells having elongated, spindle-shaped nuclei. Which of the following is the cell of origin of this tumor?

- Adipocyte
- Endothelial cell
- Glandular epithelial cell
- Smooth-muscle cell**
- Squamous epithelial cell

5. During a routine physical examination, a 49-year-old man is found to have a 2.5-cm "coin lesion" in the upper lobe of his left lung. The lesion is removed surgically, and histologic section reveal sheets of malignant cells with clear cytoplasm (clear cell carcinoma). Which of the following is the most likely site of origin for this metastatic lung tumor?

- a. Appendix
- b. Breast.
- c. **Kidney**
- d. Pancreas
- e. Stomach

6. A 4-year-old African boy develops a rapidly enlarging mass that involves the right side of his face. Biopsies of this lesion reveal a prominent "starry sky" pattern produced by proliferating small, no cleaved malignant lymphocytes. Based on this microscopic appearance, the diagnosis of Burkett's lymphoma is made. This neoplasm is associated with chromosomal translocations that involve which one of the following oncogenes?

- a. bcl-2
- b. c-abl
- c. **c-myc**
- d. erb-B
- e. N-myc

7. A 52 years old man has had increasing fatigue for past six months. On physical examination, he has palpable spleen tip. Laboratory studies show WBC count of 189,000/microlitre. The peripheral blood smear shows many immature and mature myeloid cells. Cytogenetic analysis of cells reveal t(9:22) translocation. This translocation leads to hybrid gene that greatly increases tyrosine kinase activity. The most likely protein producing all these effects is

- a. P53
- b. R B
- c. **ABL/BCR**
- d. NF-1
- e. RAS

8. A 56 years old man has chronic cough for past 10 years. He is a non-smoker. He had an episode of hemoptysis 3 days ago. No abnormal findings are noted on physical examination. A chest X-ray demonstrates a 6cm hilar mass. A sputum sample is collected, and sputum cytology report reads atypical cells suggestive of squamous cell carcinoma. The following environmental exposure is likely to be associated with these findings.

- a. Asbestos
- b. **Radon**
- c. Silica
- d. Benzene
- e. Formaldehyde

9. A 35 years old lady was found to have firm nodule palpable on dome of uterus on routine physical examination. The nodule has slowly increased in size. On ultrasound examination the nodule is well circumscribed. The mass is excised and sent to histopathology department. On microscopy the mass is composed of interlacing bundles and fascicles of whorled smooth muscle fibers. No significant mitosis is seen. She is most likely to have:
- Adenocarcinoma
  - Leiomyosarcoma
  - Hamartoma
  - Leiomyoma**
  - Metastasis.
10. A study is performed to analyze characteristics of malignant neoplasm in biopsy specimens. The biopsies were performed on patients who had palpable mass lesions on digital examination. Of the following microscopic findings. Which is most likely to indicate that the neoplasm is malignant?
- Pleomorphism
  - Atypia
  - Invasion
  - Increased N/C ratio**
  - Necrosis
11. A 78 year old navy veteran with history of smoking, he was involved in fireproofing naval combat ships with asbestos insulation. Regarding his exposure to both asbestos and tobacco, which of these he is more prone to???
- bladder cancer
  - bronchogenic Carcinoma**
  - esophageal Cancer
  - mesothelioma
12. A 68 year old man has history of metastatic prostatic cancer presents with history of weight loss, loss of appetite and energy. His current condition can be attributed to which of the following?
- fibroblast growth factor
  - interleukin 2**
  - platelet derived growth factor
  - Tumor necrosis factor alpha
  - Interferon gamma
13. The product of the p53 anti-oncogene is a nuclear protein that regulates DNA replication and prevents the proliferation of cells with damaged DNA. It does this by stopping the cell cycle at which point?
- Between G1 and S**
  - Between G2 and M
  - Between M and G1
  - Between S and G2
  - During G3

14. A 17-year-old man present with a lesion on his face that measures approximately 1.5 cm in its greatest dimension. He has a history of numerous similar skin lesions that have occurred mainly in sun-exposed areas. The present lesion is biopsied and reveals an invasive squamous cell carcinoma. This patient most probably has one type of a group of inherited diseases associated with unstable DNA and increased incidence of carcinoma. Which of the following is the most likely diagnosis?
- Xeroderma pigmentosa
  - Wiskott-Aldrich syndrome
  - Familial polyposis
  - Sturge-Wever syndrome
  - Multiple endocrine neoplasia type I
15. A 57-year-old man presents with signs of fatigue due to anemia. Workup reveals anemia as a result of bleeding from a colon cancer located in sigmoid colon. The lesion is resected and metastatic disease is found. Which of the following markers would be most useful for future follow-up of this patient of the evaluation of possible metastatic disease form his colon cancer?
- a fetoprotein (AFP)
  - Carcinoembryonic antigen (CAE)**
  - Chloroacetate esteras (CAE)
  - Human chorionic gonadotropin (HCG)
  - Prostate-specific antigen (PSA)
16. A, 180-year-old man complains of lower abdominal pain, increasing weakness, and fatigue. He has lost 16 lb. (7.3 kg) in the past 6 months. The prostate-specific antigen test is elevated (8.5 ng/mL). Rectal examination reveals an enlarged and nodular prostate. A needle biopsy of the prostate discloses invasive prostatic adenocarcinoma. Grading of this carcinoma is based primarily on which of the following criteria?
- Capsular involvement
  - Regional lymph nodes involvement
  - Pulmonary metastases
  - Resemblance to normal tissue of origin**
  - Volume of prostate involved by
17. A 50-year-old man complains of dry cough and muscle weakness for 6 months. He has been a chronic smoker 25 years. A chest X-ray shows a 3.5-cm central, left lung mass. Lab studies reveal hyperglycemia & hypertension. On trans-bronchial biopsy, small cell carcinoma was diagnosed. Metastases to liver detected by CT scan. Which of following account for the development of hyperglycemia & hypertension in this patient?
- Adrenal metastases
  - Paraneoplastic syndrome**
  - Pituitary adenoma
  - Pituitary metastasis
  - Thrombosis of the renal artery

18. During a routine checkup, a 60-year-old man in good state of health was found to have hematuria. An abdominal CT scan reveals a 2-cm right renal mass. Staging of this tumor is key for selecting treatment and prognosis. Which of the following is the most important staging factor?
- Histologic grade of the tumor
  - Proliferative capacity of the tumor cells
  - Somatic mutations in the p53 tumor suppressor gene
  - Tumor cell karyotype (aneuploidy)
  - Metastases to regional lymph nodes**
19. A 25 year old lady has a right cystic ovarian mass measuring 10cm. On removal of mass, the cystic cavity was found to have black hair and sebaceous material. Histology of cyst wall reveals variety of tissue containing skin, cartilage, brain and mucinous glandular epithelium. What is the diagnosis?
- Adenoma
  - Chondroma
  - Hamartoma
  - Teratocarcinoma
  - Teratoma.**
20. A 40-year-old lady with chronic bronchitis presents with shortness of breath. A chest X-ray reveals a 2-cm "coin lesion" in the upper lobe of the left lung. A histo-pathological report from coin lesion states diagnosis of hamartoma. Which of the following describes the histologic features of this lesion
- Benign neoplasm of epithelial origin
  - Granulomatous inflammation
  - Disorganized normal tissue**
  - Granulation tissue
  - Ectopic islands of normal tissue
21. A 73-year-old woman presents with a massively swollen abdomen. The patient was diagnosed with papillary serous cyst adenocarcinoma of the ovary 3 years ago. She dies in a hospital 1 month later. At autopsy, the peritoneum is studded with small tumors, and there are 4 liters of ascetic fluid. What will be the route of tumor metastasis in this case?
- Direct tumor extension
  - Hematogenous spread
  - Lymphatic spread
  - Seeding of body cavity**
  - Venous spread.

22. A 45-year-old woman who has had multiple sexual partners for the past 20 years has an abnormal Pap smear with cytological changes suggesting human papillomavirus infection. Without treatment, she is most likely to develop which of the following lesions?
- Hodgkin's lymphoma
  - Basal cell carcinoma
  - Adenocarcinoma
  - Leiomyoma
  - Squamous cell carcinoma**
23. A 65-year-old man has complained of hematuria and dysuria and fever for the past week. On cystoscopy, a slightly erythematous 1 cm area was seen on bladder mucosa. Microscopy of biopsy specimen showed cells with marked hyperchromatism and increased nuclear/cytoplasmic ratio involving the full thickness of the epithelium. However, these changes are confined to the epithelium above the basement membrane. Which of the following terms best describes these biopsy findings?
- Metaplasia
  - Carcinoma in situ**
  - Minimal dysplasia
  - Micro-invasion
  - Hyperplasia
24. A 60-year-old man with an 80 pack per year history of smoking experiences an episode of hemoptysis. On physical examination he has puffiness of the face, some pedal edema, bruises of the skin, and a blood pressure of 165/100 mm Hg. A chest radiograph reveals a 5 cm right upper lobe lung mass. FNAC of mass yields cells consistent with small cell anaplastic ("oat cell") carcinoma. A bone scan shows no metastases. Immunohistochemical staining of the tumor cells is likely to be positive for which of the following hormones?
- Parathormone related peptide
  - Erythropoietin
  - ACTH**
  - Insulin
  - Gastrin
25. A child is born with a single functional allele of a tumor suppressor gene. At the age of five the remaining normal allele is lost through a point mutation. As a result, the ability to continue the transition from G1 to the S phase of cell cycle is un-checked. Which of the following neoplasms is most likely to arise via this mechanism?
- Infiltrating ductal carcinoma of breast
  - Small cell anaplastic carcinoma of the lung
  - Retinoblastoma of eye**
  - Cerebral astrocytoma
  - Chronic myeloid leukemia



# GENETICS

1. A 13 year old boy has been drinking large quantities of fluids and has an insatiable appetite. He is losing weight and has become more tired and listless for the past month. Laboratory findings include normal CBC and fasting serum glucose of 175mg/dl. His parents, two brothers and one sister are healthy. A maternal uncle is also affected. Which of the following is the probable inheritance pattern of the disease?
  - a) Autosomal dominant
  - b) Autosomal recessive
  - c) Mitochondrial DNA
  - d) Multifactorial**
  - e) X-linked recessive
2. Multiple members of a family have a disease that is associated with a genetic change that involves substitution of adenine for thymine involving one base pair on homologous chromosomes. What is the best term to describe this finding?
  - a) Copy number variation
  - b) Deletion
  - c) Epigenetic change
  - d) Single nucleotide polymorphism/point mutation**
  - e) Trinucleotide repeat mutation
3. A female infant born at term shows failure to thrive and failure to achieve developmental milestones. A pedigree reveals only this child is affected out of four generations on both sides of the family. Tissue fibroblasts obtained from this child shows a 46,XX karyotype. Cultured fibroblasts show accumulation of an intermediate product in a metabolic pathway in which multiple enzymes are involved. What is the most likely recurrence risk for this condition in siblings of this infant?
  - a) 3%
  - b) 8%
  - c) 15%
  - d) 25%**
  - e) 50%
4. A 22 year old man has a sudden loss of vision in the eye. On physical Examination, there is a subluxation of the right crystalline lens. On auscultation of the chest, a mid systolic click is audible. An echocardiogram shows a floppy mitral valve and dilated aortic arch. The patient's brother and his cousins are similarly affected. He is prescribed a beta blocker. A genetic defect involving which of the following substances is most likely to be present in this patient?
  - a) Collagen
  - b) Dystrophin

- c) **Fibrillin-1**
  - d) NF-1 protein.
  - e) e. Spectrin
5. A 22 year old primigravida notes absent fetal movement for 2 days. The fetus is delivered stillborn at 19 weeks gestation. The macerated fetus shows marked hydrops fetalis and a large posterior cystic hygroma of the neck. At autopsy, internal anomalies include aortic coarctation and a horseshoe kidney. Which of the following karyotypes is most likely to be present in cells obtained from this fetus?
- a) **45,X**
  - b) 47,XX,+18
  - c) 47,XX,+21
  - d) 47,XYY
  - e) 69,XXX
6. A 23 year old woman, G2, P1, gives birth at 37 weeks to a small for gestational age male infant. The hand of the infant shows a single palmar flexion crease and a single flexion crease on the fifth digit. During the pregnancy, fetal ultrasound showed an endocardial cushion defect and polyhydramnios from probable duodenal atresia. Which of the following chromosomal abnormality is most likely to be present?
- a) Turner syndrome
  - b) **Down Syndrome**
  - c) Klinefelters syndrome
  - d) None of the above
7. A 39 year old woman gives birth to a term infant with an umbilical hernia, brushfield spots on the iris, macroglossia, low set ears, oblique palpebral fissures and a heart murmur. The infant survives—id—Childhood and-exhibits only mild mental retardation. Which of the following chromosomal abnormality is most likely to be present in somatic cells of this child?
- a) Haploidy
  - b) Monosomy
  - c) **Mosaicism**
  - d) Tetraploidy
  - e) Triploidy
8. A 27 year old man and his 24 year old wife have been trying to conceive for 6 years. Physical examination shows he has gynecomastia, reduced testicular size, reduced body hair & increased length between soles of his feet and pubic bone. Semen analysis indicates oligospermia. Lab studies show increased FSH levels & slightly decreased testosterone levels. Identify Karyotype?
- a) 46,Xi(Xq)

- b) 47,XYY
  - c) 47XXY**
  - d) 46,XX/47XX,+21
  - e) 46,XY,del(22q11)
9. A 22 years old woman with amenorrhea has never had menarche. On physical examination she is 145cm (4 ft 9 in) tall, has webbed neck, broad chest, and widely spaced nipples. Strong pulses are palpable in upper extremities, weak pulses in the lower extremities. On MRI her ovaries are small, elongated & tubular. She is suspected to have turner syndrome Karyotypes will be:
- a) 45 X/46XX**
  - b) 46,X,X(fra)
  - c) 47,XXY
  - d) 47,XXX
  - e) 47,XX,+16
10. An organism with two identical alleles is
- a) Dominant
  - b) Recessive
  - c) Hybrid
  - d) Homozygous**
  - e) Heterozygous
11. The allele which is unable to express itself in the presence of another is called
- a) Co-dominant
  - b) Recessive**
  - c) Supplementary
  - d) Complementary
  - e) Dominant
12. When a single gene affects more than one trait the phenomenon is called
- a) Epistasis
  - b) Pleiotropy**
  - c) Pseudodominance
  - d) Multifactorial inheritance
  - e) Single gene polymorphism
13. When dominant and recessive alleles express itself together it is called
- a) Dominance
  - b) Pseudo dominance
  - c) Co-dominance**
  - d) Amphidominance
  - e) Pleiotropy