# GENERAL PATHOLOGY – PAST QUESTIONS (2007-19)

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## ▪ CELLULAR ADAPTATION, INJURY, AND DEATH

### Cellular Adaptations

1. A 55 years old female with history of gastroesophageal reflux presents with acute epigastric pain in emergency. Endoscopic findings include replacement of esophageal squamous cells by intestinal columnar cells. **(Annual 2018)**
   a) Name the cellular adaptation. Give two other examples of this adaptation. **(0.5+2)**
   b) What are different types of adaptation in response to stress? **(2.5)**

2. A 65-year-old habitual cigarette smoker for past 20 years has chronic cough. Now he presents with fever and history of weight loss. What is the change in phenotype of differentiated cells in respiratory tract of such a patient and what is likely complication? **(Supple 2017 held in 2018)**

3. A 32 years old habitual cigarette smoker complains of persistent chronic cough and frequent severe respiratory infections for the last 15 months. **(Annual 2017)**
   a) Which type of adaptive changes is most likely to occur in the respiratory epithelium? Is this change reversible? **(1)**
   b) Give the mechanisms of this cellular adaptation. **(2.5)**
   c) Enlist three other types of cellular adaptations with one example for each. **(1.5)**

4. A 12-year-old girl notices enlargement of her breasts while taking a bath.
   a) What is the main physiological cause of this enlargement of breast? **(1.5)**
   b) What are its morphological features and types? **(2)**
   c) what is the mechanism of this adaptation? **(1.5)**
   **[Supple 2016 held in 2017]**

5. Gross examination of brain on autopsy of a 90-year-old man with a long history of atherosclerotic disease reveals shrunken brain with loss of brain substance, narrowed gyri and widened sulci. **(Annual 2015)**
   a) Which type of cellular adaptation has occurred? Give the underlying mechanism. **(1+2)**
   b) Give any two other causes of this cellular adaptation with examples. **(2)**

6. A 21-year-old female gives birth to her 1st baby. She started to give breast feed right after birth and continued till 1 year with no difficulties and complications.
   a) Name and define the cellular processes that started in breast during pregnancy that allowed her to nurse the baby during this period of time.
   b) Give three pathological examples of this process and describe its pathogenicity/mechanism. **(Supple 2015)**
7.
   a) A body builder develops his muscle arms by doing exercise. What type of adaptation is this?
   b) What is the mechanism of this adaptation?
   **(Annual 2014)**

8. The endocervix of the uterus is lined by mucus secreting columnar epithelium in healthy adult females. A biopsy was taken in a 35-year-old female and the endocervix was found to be lined by benign stratified squamous epithelium.
   a) What is this phenomenon called?
   b) Describe mechanism of this change and enumerate more examples.
   **(Annual 2012)**
9.
   a) A 45-year-old woman was investigated for hypertension and was found to have enlargement of the left kidney and the right kidney was smaller than normal. Contrast studies revealed stenosis of right renal artery. The size change in the right kidney is an example of which of the adaptive changes?
   b) Give the underlying mechanism of such change.
   **(Annual 2010)**

10. Define and differentiate between hyperplasia and metaplasia. **(Annual 2008)**

## Cell Injury

1.
   a) Enumerate any six causes of cell injury.
   b) What are the two main morphological correlates/features of reversible cell injury. Briefly give the microscopic appearance of these changes.
   **(Supple 2013)**

2. Cell membrane permeability defect is an essential component of cell injury. What are the various biochemical mechanisms that can damage the cell membrane during cell injury? **(Supple 2012)**

3. A 60-year-old male, chronic alcoholic dies in a roadside accident. On autopsy, liver was found to be moderately enlarged, yellowish, soft and greasy.
   a) Discuss pathogenesis of the lesion. **(3)**
   b) Describe microscopic appearance. **(2)**
   **(Annual 2009)**

4. The causes of cell injury range from gross physical trauma of a motor vehicle accident to the single gene defect that result in a defective enzyme underlying a specific metabolic disease. **(Annual 2008)**
   a) Mention six categories in which they are found.
   b) List 4 potentially toxic agents encountered daily in our polluted environment.

## Necrosis and Apoptosis

1.
   a) What are histologic signs of necrosis? Give two examples of coagulative necrosis. **(2+1)**
   b) In a tabulated form, give the differences between necrosis and apoptosis. **(2)**
   **[Supple 2018 held in 2019]**

2.
   a) What is apoptosis? Give two pathological conditions showing apoptosis. **(2)**
   b) Briefly describe the morphological features that characterize cells undergoing apoptosis. **(3) [Annual 2016]**

3. A 24-year-old male is admitted to the hospital with jaundice for past one month. His LFTs show a rise in ALT and AST. Serology confirms the diagnosis of Hepatitis C infection. A liver biopsy is taken. Histological examination findings are presence of dead hepatocytes in the form of pink bodies with mild inflammatory infiltrate.
   a) Which pathological process results in the formation of these bodies? **(1)**
   b) Describe briefly the different pathways of apoptosis. **(4)**
   **[Supple 2015 held in 2016]**

4.
   a) Differentiate between apoptosis and necrosis.
   b) Briefly explain $CCl_4$ induced changes in cell. **(Annual 2014)**

5.
   a) What is apoptosis?
   b) Describe the cell morphology and biochemical changes in apoptosis.
   **(Supple 2014)**

6. An autopsy was carried out on a 70-year-old male who died after an attack of myocardial infarction. Describe the changing morphology of infarcted area till it finally heals by a scar. **(Annual 2012)**

7. What are the types of necrosis? Describe the morphology of any two types. **(Annual 2011)**

8.
   a) Give in tabulated manner the mechanism of apoptosis.
   b) What are the examples of cell injury and necrosis? **(Annual 2011)**

9.
   a) Describe the morphology of the necrotic cell.
   b) Give a brief account of various morphological patterns of necrosis. **(Supple 2010)**

10.
   a) What is apoptosis?
   b) Describe cell morphology and biochemical changes in apoptosis. **(Supple 2010)**

11. What are morphological features of apoptosis? Support your answer with the help of a diagram. **(Annual 2007)**

12.
   a) Define necrosis
   b) List its morphological types with examples. **(Annual 2007)**

### Intracellular Accumulations

1. An 83-year-old man dies and undergoes autopsy. His heart muscle on H&E staining shows light brown skin. What is it called and how it develops? **(Supple 2011)**

## ▪ ACUTE & CHRONIC INFLAMMATION

### Acute inflammation

1.
   a) What would be the sequential vascular events in case of acute inflammation? **(2)**
   b) Tabulate the differences between acute and chronic inflammation on the basis of pathogenesis, cells involved and outcomes. **(3)**
   **[Annual 2018]**

2. A seven-year-old girl fell from the swing. She developed swelling and redness on the right leg after a short while. What is the underlying mechanism for the swelling and redness? **(2.5) [Supple 2017 held in 2018]**

3. A 15-year-old boy presents with right lower quadrant pain for 14 hours duration. An appendectomy is performed. The surgical specimen shows marked infiltration of neutrophils in the wall of appendix. Enlist three outcomes of acute inflammatory reactions. **(1.5) [Annual 2016]**

4. Appendicitis is diagnosed in a 20-year-old nurse presenting in emergency room with severe pain in right iliac fossa. On laparotomy, appendix removed is red and swollen. Histologic section of appendix shows marked edema, infiltration of neutrophils and engorged capillaries. **[Supple 2016]**
   a) Enlist the mechanisms causing edema in acute inflammation. **(2)**
   b) Describe the steps involved in migration of inflammatory cells from lumen of vessels to site of injury. **(3)**

5. A 20-year-old housewife burnt her finger while working in the kitchen. A blister filled with clear fluid appeared at the site of burn. **[Annual 2015]**
   a) Which morphological pattern of acute inflammation does the blister indicate? Give its basis. **(1+1)**
   b) Enumerate any two other morphological patterns of acute inflammation and give their underlying mechanism. **(3)**
6.
   a) Define acute inflammation. What are its 3 major components?
   b) Write down categories of stimuli for acute inflammation and of endogenous chemoattractants. **[Supple 2015]**

7. Describe vascular changes during acute inflammation. **[Annual 2014]**

8. A 25-year-old male develops a red, hot fluctuant swelling on the upper arm after receiving an intramuscular injection at this site. The cause of fluctuant swelling is local fluid exudate formation. Describe the mechanism of this fluid exudate formation. **[Annual 2011]**

9. A 30-year-old housewife developed a skin blister filled with serous fluid on her forearm resulting from a burn sustained while cooking.

a) Name the morphological pattern of acute inflammation as seen in this burn injury. Give its basis.
b) What are other morphological patterns of acute inflammation?
**[Supple 2011]**

10. 'Acute inflammatory response' is comprised of various components occurring at the local site of injury. Enlist the important components along with the chemical mediators of inflammation playing their role in these different components.
**[Annual 2010]**

11. Cellular exudates formation in acute inflammatory response comprises exudation of leukocytes from inside the vessels into the extravascular interstitial compartment.
a) What factors attract WBCs out of blood vessels?
b) What is the objective of their exudation out of vessel? How do they achieve this objective? **[Annual 2009]**

12.
a) A routine examination blood count performed on a 22-year-old medical student revealed an abnormality in the differential leukocyte count. She had been complaining of frequent sneezing and watery eyes during the past several weeks and reported that she frequently had such episodes in the spring and summer. Which of the cell types is most likely to be increased?
b) Enlist the sequence of events in chronological order in events of acute inflammation. **[Supple 2009]**

13. In a 12-year-old boy following an injury, a tender, red, hot swelling developed at the local site. Trace the sequence of events leading to development of this picture.
**[Annual 2008]**

## Mediators of Inflammation

1.
a) What are cytokines? Briefly discuss the role of cytokines involved in systemic acute phase response. **(1+2)**
b) What are four most important plasma derived mediators of inflammation? **(2)**
**[Supple 2018 held in 2019]**

2. A 15-year-old boy presents with right lower quadrant pain for 14 hours duration. An appendectomy is performed. The surgical specimen shows marked infiltration of

neutrophils in the wall of appendix. Tabulate the role of mediators in different reactions of inflammation. **(3.5) [Annual 2016]**

## Chronic inflammation

1. Tabulate the differences between acute and chronic inflammation on the basis of pathogenesis, cells involved and outcomes. **(3) [Annual 2018]**

2. Draw and label a tuberculous granuloma. **(2.5) [Supple 2017 held in 2018]**

3. A 66-year-old male laborer presented in medical outdoor with complaints of persistent cough, weight loss, low grade fever and night sweats. His chest x-ray revealed right-sided apical infiltration with cavitation.
   a) Which type of chronic inflammation is present in the patient's lungs? **(1)**
   b) Enlist the causes of chronic inflammation. **(2)**
   c) Briefly enumerate the morphological features of chronic inflammation. **(2) [Annual 2017]**

4. A 65-year-old male presents with complains of anorexia and recurrent diarrhea. He is investigated and small ulcerative lesions are seen in small intestine. Histologic examination of sample taken shows non-caseating granuloma and lymphocytic infiltration. **[Supple 2017]**
   a) Define granulomas. Enlist two non-caseating granuloma producing diseases. **(1+1)**
   b) Briefly discuss the pathogenesis of immune granulomas. **(3)**

5. Define granulomatous inflammation and give example of disease with granulomatous inflammation. **[Annual 2014]**

6. A 60-year-old male attended the hospital with history of fever, loss of weight and hemoptysis. He was diagnosed to have tuberculosis. **[Annual 2013]**
   a) What are the causes of chronic inflammation?
   b) Enumerate the chemical mediators of inflammation derived from cells (newly synthesized) and the role of cytokines in chronic inflammation.

7. Macrophages play a key role in chronic inflammation. Describe the role of macrophages in mediating a local chronic inflammatory reaction with reference to their mediators released. **[Supple 2011]**

8.
   a) Enlist any six causes of chronic granulomatous inflammation.
   b) Enlist any four types of macrophages as a part of reticuloendothelial system with their sites. **[Annual 2010]**
9.
   c) Define chronic inflammation. Give two characteristics of chronic inflammation.
   d) Enumerate three causes of chronic inflammation. **[Annual 2007]**

## ▪ TISSUE REPAIR & HEALING

### Cell and Tissue Regeneration

1. The tissues of body are divided into three categories based on their proliferative activity. Enumerate these groups. Give their characteristics and examples of tissues in each. **(3) [Annual 2015]**

2. What is the difference between regeneration and repair? What are the components of tissue repair? **(1+2) [Annual 2016]**

3. What are labile cells? Which tissue has labile cells? **[Supple 2011]**

4. Give two examples each for labile cells, stable cells and permanent cells. **[Annual 2007]**

### Repair by Connective Tissue Deposition

1. A 19-year-old boy suffered from first degree burn. Under these conditions, the main healing process is repair by deposition of collagen and other ECM components, causing the formation of a scar. **[Supple 2018 held in 2019]**
   a) What is granulation tissue? **(1)**
   b) What is the role of macrophages in wound healing? **(2)**

2. Enumerate six growth factors and cytokines affecting various steps in cutaneous wound healing. **(3) [Annual 2017]**

3. A boy while playing hockey fell on the ground and started bleeding from the ulcerated wound inflicted on his right arm. This wound finally healed after two weeks by scar formation. Briefly describe the sequences that lead to repair by scar formation. **(2.5) [Supple 2017]**

4. A construction worker presents in surgical emergency with a large lacerating wound on his leg after a fall from roof top. The wound gets infected and finally healed by formation of substantial scar. Enlist four important growth factors and four cytokines affecting various stages in wound healing. **(2) [Supple 2016]**

5. Enlist any four growth factors and cytokines affecting various steps in healing. **[Annual 2014]**

6. Scar tissue is formed at the site of healed clean surgical wound.
   a) Enumerate three processes involved in its formation.
   b) Describe fibroblast migration and proliferation during scar formation. **[Annual 2012]**

7. In a road accident, a lacerating wound was inflicted on the thigh of a young male. It got infected and took long in healing with wide irregular scar formation. Describe in chronological order the sequential steps of changes at the local site leading to this scar formation. **[Annual 2011]**

8. Following cholecystectomy in an obese lady the site of surgical sutures did not heal for 3 months and pus kept oozing out intermittently. What is the role of granulation tissue in healing of clean surgical wounds? **[Annual 2009]**

9. Following a caesarian section, gynecologist applied neat surgical sutures to the incision. Trace the steps of healing in this patient in chronological order. **[Supple 2009]**

## Factors That Influence Tissue Repair

1. A 19-year-old boy suffered from first degree burn. Under these conditions, the main healing process is repair by deposition of collagen and other ECM components, causing the formation of a scar. Give any two systemic factors with examples that can impair wound healing. **(2) [Supple 2018 held in 2019]**

2. A 48-year-old diabetic patient undergoes diaphragmatic hernia repair. The incision site got infected and surgeon had to drain the pus twice, resulting in poor wound healing. Give three systemic factors with examples that can impair wound healing. Which factor is most likely to be deficient in this patient? **(1.5+ 0.5) [Annual 2017]**

3. Enumerate any two local and two systemic factors affecting wound healing. **[Annual 2018]**

4. Name the factors that can influence wound healing. **[Annual 2014]**

5. Give brief account of factors that affect wound healing. **[Supple 2011]**

6. Which factors can delay wound healing? **[Annual 2009]**

7. A 35-year-old female patient of type 2 Diabetes Mellitus cut her hand with knife in the kitchen. The wound failed to heal even after 2 weeks. **[Annual 2008]**
   a) What cause/causes of delayed healing you would suspect in this patient?
   b) List four local and systemic factors that influence wound healing.

## Clinical Examples of Tissue Repair

1. How does healing by first intention differ from secondary healing? **(3) [Annual 2018]**
2. 
   a) What are the different phases of cutaneous wound healing? **(2)**
   b) How is healing by first intention different from healing by second intention? **(3) [Supple 2017 held in 2018]**

3. How does wound contraction occur in a large surface wound? **(2.5) [Supple 2017]**

4. A 19-year-old sustained a deep, open lacerated wound on his right leg in a motor cycle accident. He was brought to trauma center where his wound was cleaned and only partially sutured. It took over 5 years to heal with substantial scar formation.
   a) What is the above type of healing called? Write down the sequence leading to wound healing.
   b) Name the cell type and its characteristics responsible for contraction of wound to facilitate healing. **[Supple 2015]**

5. A 35-year-old male presented in surgical emergency with large excisional wound on his left leg creating a large defect on skin surface. Name the type of healing in this condition. **[Annual 2014]**

6. An ulcer is formed on the heel due to ill-fitting shoes of a female. **[Supple 2010]**
   a) Describe steps involved in healing of the open wound
   b) Mention how the process differs from healing of a clean surgical incision.

7. Briefly describe the phenomenon of wound contraction. **[Supple 2009]**.

8. An American predator fired two shell fire missiles on a remote house in North Waziristan. Many family members died, but a few survive despite lack of medical or surgical treatment. There was an excessive loss of cells and tissue and large defects were created on the body surfaces with extensive loss of normal architecture.
   a) What will this type of healing be known as?
   b) How does it differ from primary healing? **[Annual 2008]**

## Abnormalities in Tissue Repair

1. Enumerate the complications which can occur in tissue repair. **(2) [Annual 2018]**

2. Give a brief account of complications that occur during wound healing. **(3) [Supple 2016]**

3. An 18-year-old boy required sutures for a cut on his left hand. The sutures were removed after one week but wound healing continued at the site of injury. The site became disfigured by a raised nodular scar that developed over the next two months. Which process has occurred at the site? What are the other two complications in tissue repair? **(1+1) [Annual 2016]**

# ▪ HEMODYANMICS, THROMBOEMBOLIC DISEASE & SHOCK

## Edema and Effusions

1. A patient presents with proteinuria, hypoalbuminemia and edema. Give pathogenesis of his generalized condition. **[Annual 2014]**
2. 
   a) Which pathophysiologic change is involved in the production of pulmonary edema in patients of congestive cardiac failure?
   b) Give the pathogenesis of cardiac edema.
   **[Annual 2010]**

3. A 70-year-old hypertensive patient presents with complaints of dyspnea, raised JVP and edema of legs. He was diagnosed a case of congestive heart failure. **[Supple 2009]**
   a) Explain the mechanism of edema development in this patient.

b) What is the mechanism of action of edema in case with loss of proteins in urine?

## Hyperemia and Congestion

1. Enlist two differences between hyperemia and congestion. **(2)**
   **[Supple 2018 held in 2019]**

## Thrombosis

1. A 48 years old woman presents sin the emergency with history of increasing dyspnea over the past few days. A diagnosis of myocardial infarction is made. She died of sudden cardiac arrest after a few hours. **[Annual 2018]**
   a) Enumerate the three primary abnormalities that lead to a thrombus formation. **(1.5)**
   b) What are the different fates of thrombus in the following days to weeks if the patient survives? **(1.5)**
2.
   a) What is Virchow's triad in thrombosis? **(2)**
   b) How are venous thrombi different from arterial thrombi regarding the vessels affected, the color and the size? **(3)**
   **[Supple 2017 held in 2018]**

3. A 65-year-old lady is bedridden due to a cardiac problem. She develops swelling of the right leg. The clinician suspects deep vein thrombosis. **[Annual 2017]**
   a) Define thrombosis. Enumerate three important sites where venous thrombi could be formed. What complications can develop with an arterial thrombus? **(0.5+1.5+1)**
   b) What is Virchow's triad? What is recanalization of thrombus? **(1.5+0.5)**

4. A 70-year-old woman, bedridden due to multiple fractures of her hipbone for the last 5 months, dies suddenly. On autopsy, cause of death is reported as pulmonary embolism origination from deep vein thrombosis in her right leg.
   a) What is the pathogenesis of thrombus formation in this patient? **(3)**
   b) Enlist the possible fates of thrombus. **(2)**
   **[Supple 2016 held in 2017]**

5. What is the fate of thrombus? **(2) [Supple 2015 held in 2016]**

6. Enumerate three primary influences on thrombus formation and name this triad. **(2)**
   **[Annual 2015]**

7. A 70-year-old bedridden lady develops swelling of right leg. Color Doppler was carried out which revealed deep vein thrombosis. Treating physician now wants to know the possible outcomes of this thrombus. Explain the possible outcomes to the physician. **[Annual 2011]**

8. An 85-year-old male admitted in geriatric ward with paraplegia dies suddenly. On autopsy cause of death was declared as pulmonary embolism. Source of this embolism was deep vein thrombosis in the leg veins. **[Supple 2010]**
   a) What is the pathogenesis of thrombus formation in this patient?
   b) Briefly describe the fates of thrombus.

9. Give morphological differences between deep venous thrombus and post-mortem clot. **[Annual 2014]**

## Embolism

1. A 43-year-old man was hospitalized due to multiple fractures of long bone in a motorcade accident. He was in stable condition until 3 days later when he develops dyspnea, tachypnea and tachycardia followed by loss of consciousness and death. What is most likely diagnosis? Give the pathogenesis of this condition. **(1+2) [Supple 2018 held in 2019]**
2. A truck driver fractured the shaft of his right femur, humerus and several other bones in a road side accident. He was admitted in the hospital and fractures were stabilized surgically. Two days later, he suddenly developed dyspnea, cyanosis and died. On autopsy, hematopoietic tissue and fat micro emboli were seen in lungs. What type of embolism is responsible for his death? Give its pathogenesis. **(3) [Supple 2015 held in 2016]**

3. A 20-year-old hockey player fractured his femur during a game. Over the next few days in hospital, he developed progressive respiratory problems, and died three days later. On autopsy, oil-red O-positive material is seen in the small blood vessels of lung and brain. What complication has occurred in him? Give its pathogenesis. **(1+2) [Annual 2015]**

4. Define embolism and its types. **[Annual 2013]**

## Infarction

1. A 48 years old woman presents sin the emergency with history of increasing dyspnea over the past few days. A diagnosis of myocardial infarction is made. She died of sudden cardiac arrest after a few hours. On the basis of color, which type of infarct is likely to occur in the heart of a patient diagnosed to have myocardial infarction? Give the most common cause of infarction. **(1+1) [Annual 2018]**

2. A 55-year-old man suffered from an attack of myocardial infarction due to thrombotic occlusion of the coronary artery branch supplying the affected area of myocardium.
   a) What is the mechanism of injury to the myocardial fibers in this patient?
   b) Describe the morphology of infarcted area.
   **[Supple 2009]**

## Shock

1. A middle-aged male is admitted in emergency room with hypotension, a week and rapid pulse, tachypnea, cool, clammy, cyanotic skin. He gives history of excessive vomiting and water diarrhea for past two days. **[Annual 2016]**
   a) What is your diagnosis? **(0.5)**
   b) Classify shock with one clinical example of each. **(3)**
   c) Enumerate the different stages of shock. **(1.5)**
2. A 55-year-old female had fever and felt faint for the past 2 days. On physical examination, her temperature: 38.6 C, BP: 85/40 mm Hg. She has marked peripheral vasodilation. Serum lactic acid is elevated. **[Supple 2015]**
   a) What is most likely diagnosis?
   b) Which lab tests you would consider most likely to be helpful to know the cause of clinical condition?
   c) Briefly discuss the pathogenesis of this condition.

3. A 40-year-old firefighter emerged from a burning house with third degree burns over 70% of his body. The patient expires after 24 hours. **[Annual 2013]**
   a) What is the cause of death in this patient?
   b) Briefly discuss the pathogenesis of the whole process.

4. What is shock what are the major types of shock? **[Annual 2013]**

5. What is the pathogenesis of septic shock? **[Supple 2012]**

# ▪ GENETICS

## Mutations

1. Define mutation. Describe its various types. **[Annual 2011]**

2. What is gene mutation and what is its clinical significance? **[Annual 2009]**

## Mendelian Disorders

1.
   a) What is X-linked inheritance? Explain the main features of X-linked inheritance. **(1+2)**
   b) Enlist names of four major autosomal recessive diseases. **(2)**
   **[Supple 2018 held in 2019]**

2. What are Niemann-pick disease types A and B? Briefly discuss its clinical manifestations and diagnosis. **(3) [Annual 2018]**

3.
   a) What do you understand by autosomal recessive disorders? Give its three characteristic features and two examples. **(0.5+2.5)**
   b) How does autosomal recessive disorder differ from autosomal dominant disease? **(2) [Annual 2017]**

4. What is X-linked inheritance? Give two examples. **(2) [Supple 2016 held in 2017]**

5.
   a) What is the difference between autosomal recessive and autosomal dominant disorders? **(3)**
   b) Enlist any four autosomal dominant and autosomal recessive disorders respectively. **(2) [Supple 2015 held in 2016]**

6. Mutations involving single gene typically follow one of the three patterns of inheritance, autosomal dominant, autosomal recessive and X-linked. Give the characteristics of each pattern and give two examples of disorders transmitted by each pattern of inheritance. **(5) [Annual 2015]**

7.
   a) Write a brief note on X-linked disorders.
   b) Name four X-linked recessive disorders with the systems or organs predominantly involved. **[Supple 2015]**

8. Write short note on X-linked disorders. **[Annual 2013]**

9.
   a) What are various transmission patterns of autosomal dominant disorders?
   b) Enlist three autosomal dominant disorders affecting skeletal system.
   **[Annual 2010]**

## Chromosomal Disorders

1. Enlist four chromosomal disorders with karyotypes. **(2) [Annual 2018]**

2. A male baby was born at a hospital with flat fissures that slant down to midline. There was excess skin at the back of neck. The hands were broad with single palmar crease. He also had VSD.
   a) Give your diagnosis and different karyotypes of this condition. **(2)**
   b) How does the mother's age affect the incidence of this condition? **(2)**
   c) Name two likely complications in such children. **(1)**
   **[Supple 2017 held in 2018]**

3. Give the karyotypes and enlist four features of Klinefelter syndrome. **(3)**
   **[Supple 2016 held in 2017]**

4. A 41-year-old female gave birth to a boy with flat facial profile, oblique palpebral fissure, epicanthic folds and severe mental retardation.
   a) What genetic disorder does this child have? Give its karyotype. **(2)**
   b) Briefly discuss the clinical problems associated with this disorder. **(3)**
   **[Annual 2016]**

5.
   a) Name three chromosomes involving chromosome 13,18 and 21.
   b) Give the characteristic features of trisomy 21.
   **[Annual 2014]**

6. A patient comes to genetic OPD as he has a distinctive body habitus with increase in length between soles and pubis bone. There is reduced facial, body and pubic hair. The patient has hypogonadism and gynecomastia.
   a) Name the cytogenetic disorder most likely present in this patient.
   b) Give its karyotype and underlying defect that results in this karyotype. Which hormone level estimation will help in diagnosis?
   **[Supple 2013]**

7. Describe the underlying genetic abnormality in Down Syndrome.
   **[Annual 2012]**

8. A 40 years old female gives birth to a child with flat facial profile, epicanthic folds, oblique palpebral fissures and mental retardation.
   a) What is possible underlying chromosomal abnormality in this child?
   b) Describe the mechanism of development of this genetic abnormality.
   **[Supple 2012, Supple 2011]**

9. Give an account of numerical and structural alterations in various cytogenetic disorders. **(5) [Supple 2010]**

10. What is mosaicism? Explain with examples. **[Supple 2009]**

11. A child brought to a pediatrician is mentally retarded, has flat facial profile with epicanthic folds, simian creases, abundant neck skin, umbilical hernia, hypotonia with increased gap between $1^{st}$ and $2^{nd}$ toes. **[Annual 2008]**
   a) What is this child suffering from?
   b) What is chromosomal abnormality and what is its cause?

12. A mother notices that her 1-year old child is unresponsive to the environment, has abundant neck skin, transverse palmar crease, flat facial profile, epicanthic folds and wide set ears. **[Annual 2007]**
   a) What genetic disorder does this child have?
   b) What is the pathogenesis?

# ▪ NEOPLASIA

## Characteristics of Benign and Malignant Tumors

1. Briefly describe the hematogenous pathway of disseminated tumors. **(3) [Supple 2018 held in 2019]**

2. Enumerate the differences in benign and malignant tumors. **(3)**
   **[Supple 2017 held in 2018]**

3. A 45-year-old man had a soft mobile painless swelling on the trunk. The tissue excised on gross examination was yellow and greasy on cut section.
   a) Give pathology. **(2)**
   b) Dew and label the microscopic features of the above pathology. **(3)**
   **[Supple 2017 held in 2018]**

4. A 21 years old girl is operated for an ovarian mass. The tumor removed is cystic and 10 cm in diameter. The cystic cavity is found to contain hair and sebaceous material. Histological examination of cyst reveals benign differentiated tissues including skin, cartilage, brain and mucinous glandular epithelium. **[Supple 2016 held in 2017]**
   a) Name the tumor and germ layers from which it arises. **(2)**
   b) Tabulate the main differentiating features between benign and malignant tumors. **(3)**

5.
   a) Name one benign and one malignant tumor of mesenchymal origin (composed of one parenchymal type) of each of the following:
      i) Connective tissue and derivatives
      ii) Muscles
      iii) Melanocytes **(3)**
   b) What is sentinel lymph node? How can it be delineated? **(2)**
   **[Annual 2015]**

6.
   a) Define the term neoplasm.
   b) Give a difference between benign and malignant neoplasm.
   c) How the benign and malignant tumor of smooth and striated muscles are named?
   **[Supple 2015]**

7. Give in a flow chart manner the steps involved in hematogenous spread of cancer. **[Annual 2013]**

8. Give morphological features of anaplastic cells. **[Supple 2013]**

9. Breast cancer usually produces its metastasis in axillary lymph nodes.
   a) What is the route by which breast cancer cell has reached this site of metastatic deposit?
   b) What other pathways are available to malignant tumors for spread in the body? **[Annual 2011]**

10. A 24-year-old female with a history of heavy and painful menstrual period has been having difficulty conceiving despite months of trying to become pregnant. Her workup included a bimanual pelvic examination and an ultrasound, which demonstrated a massive uterus that was presumed to be leiomyoma. Enlist any four mesenchymal benign tumors other than leiomyoma. **[Annual 2010]**

## Epidemiology of Cancer

1. A 65-year-old male is diagnosed with malignancy of liver. His occupational history revealed that he has been working with vinyl chloride in a plastic industry making pipes. **[Annual 2016]**
   a) What is the most likely diagnosis? **(1)**
   b) Name four occupational cancers with associated carcinogens. **(2)**

## Molecular Basis of Cancer

1. What are tumor suppressor genes? Name three tumor suppressor genes and their associated familial syndromes. **(3) [Annual 2018]**
2. 
   a) Define oncogenes and enlist three oncogenes (nuclear regulator/cell cycle regulator) with one example of associated human tumor. **(2.5)**
   b) Discuss briefly the role of p53 in oncogenesis. **(2.5)**
   **[Supple 2015 held in 2016]**

3. Briefly summarize the main features of cell cycle and its control mechanisms. **[Supple 2013]**

4. Enlist any five tumor suppressor genes. **[Supple 2009]**

5. Describe briefly the role of p53 in oncogenesis. **[Supple 2009]**

6. List phases of cell cycle. **[Annual 2007]**

## Carcinogenic Agents and their Cellular Interactions

1. Enumerate the best-established environmental factors increasing cancer risk. **(2) [Annual 2018]**

2. A person is working in plastic industry for past 15 years. Now he has developed hematuria. **[Annual 2014]**
   a) Which malignant tumor he is likely to be suffering from?
   b) Enumerate the 3 viruses which are implicated in causation of tumor.

3. Name the various types of carcinogenic agents. **[Annual 2013]**

4. Enumerate any two oncogenic DNA viruses that are strongly associated with human cancer. Give examples of tumors they cause. **[Supple 2013]**

5. Chemical carcinogens produce neoplastic change in cell after passing through various steps. **[Supple 2010]**
   a) Enlist steps involved in chemical carcinogenesis.
   b) Quote some examples of important chemical carcinogens and the type of cancer produced by them.

6. A 60-year-old male working in a rubber factory for the past thirty years presented to the medical ward with complaints of hematuria. On cystoscopy, a bladder tumor was seen which was proved to be transitional cell carcinoma in biopsy. **[Supple 2009]**
   a) What could be possible carcinogenic agent involved in development of bladder cancer in patient?
   b) What is mechanism of action?

7. Name five chemical carcinogens which can affect lung, skin, prostate, stomach and hematopoietic system of body. **[Annual 2008]**

## Clinical Aspects of Neoplasia

1. What is difference between staging and grading of tumors? **(2)**
   **[Supple 2018 held in 2019]**

2. A 53-year-old woman feels a lump in her right breast. Her physician palpates an irregular 3 cm mass that appears to be fixed to the chest wall and the overlying skin. A non-tender 2 cm mass is also palpable in the right axilla. However, CT scan of the lungs is clear. The pathologist is asked grade and stage the tumor. **[Annual 2017]**
   a) How are tumors graded? What is staging of tumor? Explain. **(3)**
   b) What are paraneoplastic syndromes? Give two examples of with its underlying cancer. **(2)**

3. A 40-year-old woman has an ovarian mass. Her CA 125 is elevated. Define CA 125 and what are the conditions in which it is elevated? **[Supple 2014]**

4. A 60-year-old man has a 3 cm liver mass. How can tumor markers help in diagnosis? **[Supple 2014]**

5. A 40-year-old obese looking man who is a chain-smoker comes to the hospital with a history of chronic cough and weakness. On investigation, he is diagnosed to have carcinoma lung. **[Annual 2013]**
   a) What do you understand by paraneoplastic syndromes? What are the expected clinical syndromes in carcinoma lung?
   b) Name the various lab diagnostic procedures for neoplasia.

6.
   a) What is meant by grade of tumor? Enumerate with examples.
   b) What is meant by stage of cancer? Enumerate with examples.
   **[Annual 2012]**

7. A 70-year-old male suffering from lung cancer presents with swollen face, purple striae on abdominal skin and cushingoid features. **[Supple 2011]**
   a) Explain the reason for such presentation.
   b) Enumerate other possible manifestations related to this phenomenon in cancer patients.

8. How would you grade a tumor? **[Annual 2010]**