1. **Hydropic degeneration results from:**
2. membrane rupture
3. ATP accumulation
4. oncogene activation
5. Na/K pump dysfunction
6. cytoplasm lysis

**2. Coagulative necrosis:**

1. resemble crumbly cheese
2. may develop as a result of ischemia
3. it is reversible
4. can maintain tissue functionality for 5-7 days
5. affects only extremities

**3. Apoptosis is the result of the following processes:**

1. cellular atrophy
2. cellular death
3. cellular proliferation
4. cellular mutation
5. cellular dysplasia

**4. Identify the morphological variant of necrosis that occurs as a result of cerebral ischemia:**

1. coagulative
2. caseous
3. liquefactive
4. fat
5. post-atherosclerotic

**5. Which of the following cellular responses is indicative of injury due to faulty metabolism:**

1. hydropic swelling
2. lactate production
3. metaplasia
4. intracellular accumulations
5. hypertrophy

**6. A high serum lactate level (lactic acidosis) usually indicates the presence of:**

1. liver failure
2. hypoglycemia
3. immunologic injury
4. cellular hypoxia
5. hypocalcemia

**7. Ischemia of tissue in parenchymatous organs usually produces:**

1. coagulative necrosis
2. liquefactive necrosis
3. caseous necrosis
4. fat necrosis
5. proteic necrosis

**8. Which of the following are potentially reversible cellular responses:**

1. necrosis
2. metaplasia
3. atrophy
4. hyperplasia
5. apoptosis

**11. Which of the following are NOT evidence of irreversible cell injury:**

1. cell swelling (cellular edema)
2. calcification of mitochondria
3. nuclear pyknosis
4. rupture of the lysosomes
5. lipidic degeneration

**12. Ions of which chemical element is involved in"reperfusion injury":**

1. calcium
2. magnesium
3. phosphate
4. potassium
5. sodium

**13. Caseous necrosis is characteristic for:**

1. peripancreatic calcinosis
2. gangrenous diabetic foot
3. myocardial infarction
4. abscess
5. pulmonary tuberculosis

**14. Which of the following are NOT characteristic of reversible cell injury:**

1. reduced oxidative phosphorylation
2. ATP depletion
3. cellular shrinking
4. changes in ion concentrations
5. karyolysis

**15. Which of the following describes hyperplasia:**

1. increase in the number of cells (mitosis) in an organ or tissue
2. decrease in the number of cells (mitosis) in an organ or tissue
3. increase in individual cell size in an organ or tissue
4. decrease in individual cell size in an organ or tissue
5. reversible change in which one adult cell is replaced by another adult cell type

**16. Most forms of pathologic hyperplasia are caused by excessive hormonal stimulation or growth factors acting on target cells. What is the most likely consequence of endometrial hyperplasia:**

1. increased risk of miscarriage
2. decreased risk of miscarriage
3. increased risk of endometrial cancer
4. decreased risk of endometrial cancer
5. increased risk of neurologic disease

**17. Which of the following infectious agents is associated with hyperplasia:**

1. papillomavirus
2. enterobacteria
3. staphylococci
4. streptococci
5. parasites

**18. Which of the following describes hypertrophy:**

1. increase in the number of cells (mitosis) in an organ or tissue
2. decrease in the number of cells (mitosis) in an organ or tissue
3. increase in individual cell size in an organ or tissue
4. decrease in individual cell size in an organ or tissue
5. reversible change in which one adult cell is replaced by another adult cell type

**19. Which of the following types of atrophy is involved in ischemia:**

1. decreased workload
2. loss of innervation
3. diminished blood supply
4. inadequate nutrition (protein-calorie)
5. loss of endrocrine stimulation

**20. Which of the following is associated with cachexia in patients with chronic**

**inflammatory diseases and cancer:**

1. decreased workload
2. loss of innervation
3. diminished blood supply
4. inadequate nutrition (protein-calorie)
5. loss of endrocrine stimulation

**21. Atrophy may be accompanied by residual bodies, such as lipofuscin granules, which can give to tissues the color of:**

1. yellow
2. blue
3. brown
4. white
5. red

**22. Which of the following describes metaplasia:**

1. increase in the number of cells (mitosis) in an organ or tissue
2. decrease in the number of cells (mitosis) in an organ or tissue
3. increase in individual cell size in an organ or tissue
4. decrease in individual cell size in an organ or tissue
5. reversible change in which one adult cell is replaced by another adult cell type

**23. Which of the following cell transformation is involved in respiratory tract cancer:**

1. squamous to columnar
2. squamous to cuboidal
3. columnar to squamous
4. columnar to cuboidal
5. cuboidal to squamous

**24. In Barrett esophagus, metaplasia occurs as a result of refluxed gastric juice. Which of the following epithelial transformation occurs:**

1. squamous to columnar
2. squamous to cuboidal
3. columnar to squamous
4. columnar to cuboidal
5. cuboidal to squamous

**25. Which of the following is associated with cell death and NOT specifically with**

**reversible cell injury:**

1. membrane blebs
2. nucleus shrinking
3. swelling of endoplasmic reticulum
4. swelling of mitochondria
5. myelin figures

**26. Which of the following is NOT associated with cell death:**

1. nuclear condensation (pyknosis)
2. nuclear fragmentation (karyorrhexis)
3. dissolution of the nucleus (karyolysis)
4. decrease in intracellular Ca
5. amorphous mitochondrial densities

**28. Which of the following would NOT cause mitochondrial damage:**

1. increase in cytosolic Ca
2. oxidative stress
3. retention of cytochrome C
4. breakdown of phospholipids through the phospholipase A2 and sphingomyelin

pathways

1. lipid breakdown products (e.g. free fatty acids and ceramide)

**29. Which of the following would NOT be an ultrastructural change seen in a**

**reversibly injured cell:**

1. apoptosis
2. microvillli distortion
3. myelin figures
4. amorphous densities
5. nucleus shrinking

**30. Which of the following has a cheesy, yellow-white appearance at the area of**

**necrosis and is encountered most often in foci of tuberculous infection:**

1. coagulative necrosis
2. liquefactive necrosis
3. causeous necrosis
4. fat necrosis
5. gangrenous necrosis

**32. Chemically induced cell injury from carbon tetrachloride (CCl4) and**

**acetaminophen (Tylenol) affect which organ:**

1. brain
2. kidneys
3. pancreas
4. spleen
5. liver

**33. Which of the following diseases would most likely show glycogen abnormalities,**

**if the PAS reaction is positive in the descending loop of Henle:**

1. hypertension
2. congestive heart failure
3. abdominal aortic aneurysm
4. rheumatoid arthritis
5. diabetes mellitus

**34. Hemosiderin is a hemoglobin-derived, golden yellow-to-brown, granular or crystalline pigment that indicate a local excess of which of the following:**

oxygen

CO2

iron

macrophages

Ca

**35. Bilirubin is hemoglobin-derived and the normal major pigment found in bile. If found in excess, what color does it change the skin:**

1. black
2. white
3. red
4. yellow
5. blue

**36. Which of the following would NOT be associated with metastatic calcification:**

1. increased secretion of parathyroid hormone (PTH)
2. atherocalcinosis
3. gallbladder lithiasis
4. renal failure
5. decreased secretion of parathyroid hormone (PTH)

**37. Reperfusion cellular injury is caused by:**

1. high intracellular concentrations of Calcium
2. high intracellular concentrations of Potasssium
3. free radical release
4. vitamin E
5. nitric oxide

**38. Apoptosis:**

1. occurs following acute deprivation of blood
2. occurs during embryogenesis
3. leads to damage to neighbouring cells
4. follows activation of caspase 3
5. is triggered when there is irreversible damage to cellular DNA

**39. Langhans giant cells:**

1. are the antigen presenting cells in the skin
2. have a peripheral ring of nuclei with central clearing
3. are characteristically seen in tuberculosis
4. have nuclei scattered randomly through the cytoplasm
5. are derived from macrophage

**40. A 48-year-old male with a history of chronic alcoholism will most often have which of the following findings in liver:**

1. cholestasis
2. fatty change
3. hemochromatosis
4. hypertrophy of smooth endoplasmic reticulum
5. coagulative necrosis

**41. A 53-year-old male who is developing an acute myocardial infarction from coronary occlusion has an irreversible injury to the myocardium when:**

1. glycogen is depleted
2. cytoplasmic sodium increases
3. nuclei undergo karyorrhexis
4. intracellular pH diminishes
5. blebs form on cell membranes

**42. After years of dirty city air inhalation, lungs have accumulated:**

1. anthracotic pigment
2. lipofuscin
3. melanin
4. hemosiderin
5. biliverdin

**43. The presence of squamous epithelium in the lower trachea of a 42-year-old female with a history of smoking is called:**

1. dysplasia
2. aplasia
3. anaplasia
4. hyperplasia
5. metaplasia

**44. A 59-year-old female had a cerebral infarction. Months later, a computed tomographic (CT) scan shows a cystic area in her cerebral cortex. The CT finding is a lesion that is the consequence from:**

1. liquefactive necrosis
2. atrophy
3. coagulative necrosis
4. caseous necrosis
5. apoptosis

**45. The light brown perinuclear pigment seen on H&E staining of the cardiac muscle fibers in the heart of an 80 year old male is:**

1. hemosiderin
2. lipofuscin
3. glycogen
4. cholesterol
5. calcium

**46. Karyorrhexis refers to:**

1. disintegration of the cell cytoplasm
2. cell membrane lysis
3. fragmentation of the cell nucleus
4. mitochondrial swelling and lysis
5. oxygen toxicity

**47. The spleen at autopsy on sectioning shows a tan to white, conical -shaped lesion with base on the capsule. This most likely represents the result of:**

1. coagulative necrosis
2. abscess formation
3. metaplasia
4. caseous necrosis
5. liquefactive necrosis

**48. A 3500 gm liver from a 35-year-old female has a yellow, greasy cut surface. This appearance most likely resulted from:**

1. galactosemia
2. iron accumulation
3. tuberculous infection
4. alcoholism
5. hypoxia

**49. The marked enlargement of the uterus that occurs in pregnancy is accompanied by:**

1. increased myometrial cell numbers
2. nuclear anaplasia
3. increased cellular DNA content
4. increased myometrial cell size
5. calcification of myometrium myocyte

**50. A 73-year-old male suffers a "stroke" with loss of blood supply to cerebral cortex in the distribution of the middle cerebral artery. The most likely consequence of this is:**

1. infarction with liquefactive necrosis
2. pale infarction with coagulative necrosis
3. predominant loss of glial cells
4. recovery of damaged neurons if the vascular supply is reestablished
5. wet gangrene with secondary bacterial infection

**52. Physical examination of a 42 year old female reveals scleral icterus. Which of the following underlying conditions is most likely to contribute to this finding:**

1. hypercholesterolemia
2. thrombocytopenia
3. metastatic carcinoma
4. hepatitis
5. diabetes mellitus

**53. In which of the following cases is fat necrosis most often seen:**

1. a 31 year old male has an acute abdomen with marked abdominal pain and an elevated serum amylase
2. a 66 year old female with chronic alcoholism has an elevated serum AST
3. a 23 year old female with a decreased total serum complement has a history of systemic lupus erythematosus
4. a 70 year old female with adenocarcinoma of the colon and metastases to liver has an elevated LDH
5. a 49 year old male with sudden onset of chest pain has an elevated serum creatine kinase

**54. Melting of dead tissue is observed in:**

1. myomalacia
2. encephalomalacia
3. mummification
4. coagulation
5. ossification

**55. Which of the following can be** **myocardial infarction causes:**

1. ossification
2. angiospasm
3. petrification
4. thrombosis
5. embolism

**57. Which of the following are morphological necrosis types:**

1. paranecrosis
2. fat necrosis
3. protein necrosis
4. coagulative necrosis
5. caseous necrosis

**58. Which of the following processes are characteristic of cellular necrosis:**

hemochromatosis

1. karyopyknosis
2. hyalinosis
3. cytolysis
4. plasmolysis

**59. Which of the following are etiologic types of necrosis:**

1. lipidic type
2. vascular type
3. focal type
4. toxic type
5. infectious type

**60. Dry gangrene is characterized by:**

1. mummification
2. proliferation
3. hydration
4. encephalomalacia
5. myomalacia

**61. Which of the following are microscopic characteristics of necrosis:**

1. meiosis
2. mitosis
3. plasmorexis
4. plasmochinesis
5. plasmolysis

**62. Necrosis unfavorable outcome is:**

1. organization
2. petrification
3. purulent lysis
4. encapsulation
5. sepsis

**63. Identify changes of cell cytoplasm in necrosis:**

1. karyolysis
2. protein denaturation
3. protein coagulation
4. plasmorexis
5. nucleic acids polymerization

**64. Etiologic types of necrosis are:**

1. parenchymatous type
2. traumatic type
3. allergic type
4. caseous type
5. infectious type

**65. Which of the following are the gangrene types:**

1. wet
2. dry
3. aerobic
4. anabolic
5. caseous

**66. Which of** **the following are necrosis microscopic features:**

1. karyokinesis
2. karyorexis
3. karyolysis
4. karyomitosis
5. karyopyknosis

**67. Relatively favorable necrosis outcomes include:**

1. organization
2. petrification
3. malignization
4. purulent lysis
5. incapsulation

**68. Which of the following are nuclear changes characteristic of necrosis:**

1. chromatin condensation
2. nucleic acids depolimerization
3. glycogen synthesis
4. karyokinesis
5. karyopyknosis

**69. In tuberculosis caseous necrosis is:**

1. coagulative
2. direct
3. indirect
4. wet
5. fibrinoid

**70. Which microscopic changes are characteristic of myocardial infarction:**

1. plasmorexis
2. plasmorrhagia
3. karyokinesis
4. karyolysis
5. cytolysis

**71. In myocardial infarction an important role is assigned to the following factors:**

1. arterial thrombosis
2. hypofunction of the organ
3. allergy
4. functional overload
5. insufficient collateral circulation

**72. Varieties of cell lesion are:**

1. metaplasia
2. degeneration
3. apoptosis
4. necrosis
5. sclerosis

**73. Degeneration causes are:**

necrosis

1. dysfunction of transport systems
2. endocrine dysfunction
3. autoregulatory system of cell disturbances
4. apoptosis

**74. The types of degeneration according on their locations are:**

parenchymatous type

1. mesenchymal type
2. mixed type
3. proteic type
4. lipidic type

**75. The types of degeneration according on metabolic disturbances are:**

1. carbohydrate degeneration
2. protein degeneration
3. fat degeneration
4. parenchimatous degeneration
5. mesenchymal degeneration

**76. Fatty liver is characterized by:**

1. decreased liver size
2. dense consistency
3. rough surface
4. lipids in hepatocytes
5. absence of nuclei

**77. Which of the following are fatty liver causes:**

1. increased blood flow
2. rheumatic fever
3. hypoxia
4. hypertension
5. decreased blood flow

**78. Myocardial fatty degeneration can be detected by the following stain:**

1. hematoxilin-eosin
2. picrofuchsin
3. sudan-3
4. toluidine blue
5. kongo-red

**79. Clinical evidence of parenchymal lipidic degeneration of myocardium is:**

1. increased contractility
2. hypertention
3. decreased contractility
4. rupture of heart
5. hyperemia

**80. Liver steatosis is caused by:**

1. alcoholism
2. viral hepatitis B
3. hypertention
4. viral hepatitis A
5. intoxications

**81. Parenchymal myocardial degeneration develops in the following case:**

1. hypertension
2. avitaminosis
3. diphtheria
4. diabetes mellitus
5. protein starvation

**82. Liver steatosis is usually followed by:**

1. restoration of affected hepatocytes
2. massive necrosis
3. transformation in protein degeneration
4. transformation into liver cirrhosis
5. false lobules appearance

**83. Accumulation of lipids in the wall of the large arteries is typical of:**

1. inflammation
2. cachexia
3. aneurysm
4. obesity
5. atherosclerosis

**84. Which of the following processes is reversible:**

1. apoptosis
2. mucoid intumescence
3. hyalinosis
4. amyloidosis
5. fibrinoid intumescence

**86. Heart valves hyalinosis is typical of:**

1. congenital heart diseases
2. rheumatic fever
3. alcoholism
4. hypertensive disease
5. cardiomyopathies

**87. Systemic arteriolar hyalinosis is typical of:**

1. atherosclerosis
2. tuberculosis
3. alcoholism
4. syphilis
5. hypertensive disease

**88. Which of the following structure is subject to hyaline changes:**

1. renal stones
2. bone tissue
3. amyloid
4. cartilaginous tissue
5. fibrous tissue

**90. Which of the following statements about lipomatosis of the heart are true:**

1. lipids are deposited under the endocardium
2. lipids are deposited under the epicardium
3. lipids are deposited in myocardial stroma
4. lipids are deposited in the cell cytoplasm
5. can lead to heart rupture

**94. The followings is referred to proteic mesenchimal degenerations:**

1. mucoid intumescence
2. plasmatic impregnation
3. fibrinoid intumescence
4. amyloidosis
5. hemosiderosis

**95. Small arteries hyalinosis is typical for:**

1. essential hypertension
2. secondary hypertension
3. diabetic microangiopathy
4. diabetic macroangiopathy
5. atherosclerosis

**99. Generalized obesity contributes to:**

1. brown atrophy of the heart
2. acute pancreatitis
3. myocarditis
4. goiter
5. ischemic heart disease

**101. Connective tissue hyalinosis is characterized by:**

1. flaccid consistency
2. dense consistency
3. white – gray color
4. black color
5. semitransparent appearance

**102. Hemoglobinogenic pigments are:**

1. ferritin
2. hemosiderin
3. **bilirubin**
4. lipofuscin
5. melanin

**103. Mechanical jaundice is typical for:**

1. acute hepatitis
2. cholelithiasis
3. biliary atresia
4. hypoplasia of the bile ducts
5. hemolytic disease

**104. Brown induration of lungs is characterized by accumulation of:**

1. hydrochloric hematin
2. lipofuscin
3. bilirubin
4. coal dust
5. hemosiderin

**105. Metastatic calcification affects the following organs:**

1. lungs
2. pancreas
3. stomach
4. veins
5. heart

**106. Which pigment appears in the area of ​​hemorrhages:**

1. adrenochrom
2. hemosiderin
3. melanin
4. lipofuscin
5. lipochrom

**107. Which of the following** **statements regarding dystrophic calcification are true:**

1. it is predominantly local process
2. it is predominantly generalized process
3. it forms petrifications
4. calcium salts accumulates due to hypercalcemia

is a substrate for the formation of gouty tophi

**108. The followings are the causes of parenchymal jaundice:**

1. acute inflammation of the common bile duct
2. hepatocytes injury
3. hemolysis of erythrocytes
4. acute hepatitis
5. liver cirrhosis

**109. According to the mechanism of development jaundice is classified into:**

1. hemolytic jaundice
2. hypostatic jaundice
3. mechanical jaundice
4. **parenchymal** jaundice
5. biliary jaundice

**110. Metastatic calcification occurs in:**

1. destruction of bones by tumors
2. parathormone excess
3. calcitonin excess
4. hypocalcemia
5. parathormone insufficiency

**111. Dystrophic calcification is referred to:**

1. accumulation of calcium salts into unmodified gastric mucosa
2. calcareous metastases in the kidneys
3. calcification of necrosis foci
4. accumulation of calcium salts into unmodified lungs
5. accumulation of calcium salts into myocardium in condition of hypercalcemia

**112. Prehepatic jaundice causes are:**

1. acute hepatitis
2. hemolytic poisons
3. isoimmune and autoimmune conflicts
4. tumors of duodenal papilla
5. liver cirrhosis

**113. Necrosis is caused by:**

1. biologic factors
2. blood flow disturbances
3. allergic factors
4. pigments
5. smoking

**114. Which of the following are the causes of infarction:**

1. calcification
2. angiospasm
3. thrombosis
4. embolism
5. necrosis

**115. Humid gangrene is characteristic for:**

1. intestine
2. brain
3. kidney
4. myocardium
5. liver

**116. Which of the following disorders is manifested by wet necrosis:**

1. tuberculosis of lung
2. rheumatic pericarditis
3. myocardial infarction
4. spleen infarction
5. ischemic infarction of brain

**117. Which of the following disorders is manifested by caseous necrosis:**

1. milliary tuberculosis of lung
2. myocardial infarction
3. dysentery
4. typhoid fever
5. gangrene

**119. Identify** **localization of gangrene:**

1. kidney
2. myocardium
3. soft tissues of the lower extremities
4. brain
5. intestine