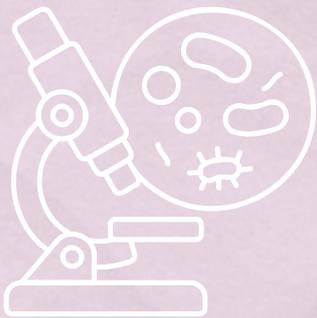


PATHOLOGY

CELL INJURY



Q1. A 77-year-old woman has chronic renal failure. Her serum urea nitrogen is 40 mg/dL. She is given a diuretic medication and loses 2 kg (4.4 lb). She reduces the protein in her diet and her serum urea nitrogen decreases to 30 mg/dL. Which of the following terms best describes cellular responses to disease and treatment in this woman

- A Adaptation
- B Apoptosis
- C Necroptosis
- D Irreversible injury
- E Metabolic derangement

Answer :A

Normal cells handle physiologic demands and maintain metabolic functions within narrow ranges, termed homeostasis. Under disease conditions with stress on cells, there is adaptation to a new steady state. In this case the loss of renal function leads to a higher urea nitrogen level as well as retention of fluid. The diuretic induces loss of the excess fluid to yield a new steady state. The protein restriction reduces urea nitrogen excretion, which also leads to a new steady state. Both are adaptations. Apoptosis refers to single cell necrosis in response to injury. An irreversible injury leads to cell death, but the changes described here are not evidence for cellular necrosis. The metabolism of cells is maintained for adaptation, with response to the diuretic and to protein restriction

Q2. A 53-year-old woman with no prior illnesses comes for a routine checkup. Her blood pressure is 150/95 mm Hg. If her hypertension remains untreated for years, which of the following cellular alterations is most likely to occur in her myocardium

- A) Apoptosis
- B) Dysplasia
- C) Fatty change
- D) Hemosiderosis
- E) Hyperplasia
- F) Hypertrophy
- G) Metaplasia

(Answer :F

The pressure load on the left ventricle results in an increase in myofilaments in the existing myofibers, so they enlarge. The result of continued stress from hypertension is eventual heart failure with decreased contractility. Apoptosis would lead to loss of cells and diminished size. Dysplasia is not a diagnosis made for the heart. Hemosiderin deposition in the heart is a pathologic process resulting from increased iron stores in the body. Though hyperplasia from proliferation of myofibroblasts is possible, this does not contribute significantly to cardiac size. Metaplasia of muscle does not occur, although loss of muscle occurs with aging and ischemia as myofibers are replaced by fibrous tissue

Q3. A 22-year-old woman becomes pregnant. A fetal ultrasound examination at 13 weeks' gestation shows her uterus measures 7 × 8 cm. At delivery of a term infant, her uterus measures 34 × 18 × 12 cm. Which of the following cellular processes has contributed most to the increase in her uterine size

- A Endometrial glandular hyperplasia
- B Myometrial fibroblast proliferation
- C Endometrial stromal hypertrophy
- D Myometrial smooth muscle hypertrophy
- E Vascular endothelial hyperplasia

Answer : D

The increase in uterine size is primarily the result of an increase in the size of myometrial smooth muscle cells. The endometrium also increases in size, mainly via hyperplasia, but it remains as a thin lining to the muscular wall and does not contribute as much to the change in size. There is little stroma in myometrium and a greater proportion in endometrium, so stroma contributes a smaller percentage to the gain in size than muscle. The vessels are a minor, but essential component in this increase in size, but not the largest component

Q4. A 16-year-old boy sustained blunt trauma to his abdomen when he struck a bridge abutment at high speed while driving a motor vehicle. Peritoneal lavage shows a hemoperitoneum, and at laparotomy, a small portion of the left lobe of the injured liver is removed. Two months later, a CT scan of the abdomen shows that the liver has nearly regained its size before the injury. Which of the following processes best explains this CT scan finding

- A Apoptosis
- B Dysplasia
- C Hyperplasia
- D Hydropic change
- E Steatosis

Answer : C

The liver is one of the few organs in the human body that can partially regenerate. This is a form of compensatory hyperplasia. The stimuli to hepatocyte mitotic activity cease when the liver has attained its normal size. Hepatocytes can reenter the cell cycle and proliferate to regenerate the liver; they do not just hypertrophy. Apoptosis is single cell death and frequently occurs with viral hepatitis. Dysplasia is disordered (increase in size) epithelial cell growth that can be premalignant. Hydropic change, or cell swelling, does not produce regeneration. Steatosis (fatty change) can lead to hepatomegaly, but not as a regenerative process. It is the result of toxic/metabolic hepatocyte injury

Q5. A 71-year-old man has had difficulty with urination, including hesitancy and increased frequency, for the past 5 years. A digital rectal examination reveals that his prostate gland is palpably enlarged to twice normal size. A transurethral resection of the prostate is performed, and the microscopic appearance of the prostate "chips" obtained is that of nodules of glands with intervening stroma. Which of the following pathologic processes has most likely occurred in his prostate

A Apoptosis

B Dysplasia

C Fatty change

D Hyperplasia

E Hypertrophy

F Metaplasia

Answer : D

Nodular prostatic hyperplasia (also known as benign prostatic hyperplasia [BPH]) is a common condition in older men that results from proliferation of both prostatic glands and stroma. The prostate becomes more sensitive to androgenic stimulation with age. This is an example of pathologic hyperplasia. Apoptosis results in a loss of, not an increase in, cells. Dysplasia refers to disordered epithelial cell growth and maturation. Fatty change in hepatocytes may produce hepatomegaly. Although BPH is often called "benign prostatic hypertrophy," this term is technically incorrect; it is the number of glands and stromal cells that is increased, rather than the size of existing cells. A change in the glandular epithelium to squamous epithelium around a prostatic infarct would be an example of .metaplasia

Q6. A 29-year-old man sustains a left femoral fracture in a motorcycle accident. His leg is placed in a plaster .cast. After his left leg has been immobilized for 6 weeks, the diameter of the left calf has decreased in size ?This change in size is most likely to result from which of the following alterations in his calf muscles

A Aplasia

B Atrophy

C Dystrophy

D Hyalinosis

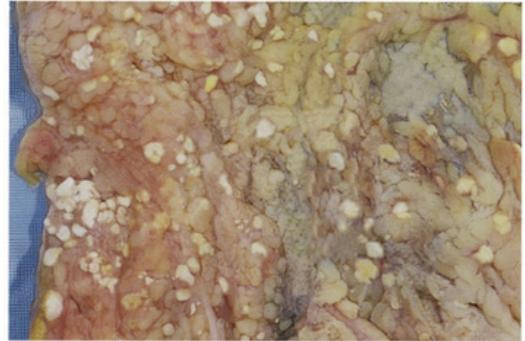
E Hypoplasia

Answer : B

Reduced workload causes cell to shrink through loss of cell substance, a process called atrophy. The cells are still present, just smaller. Aplasia refers to lack of embryonic development; hypoplasia describes poor or subnormal development of tissues. Dystrophy of muscles refers to inherited disorders of skeletal muscles that lead to muscle fiber destruction, weakness, and wasting. Hyaline change (hyalinosis) refers to a nonspecific, pink, glassy .eosinophilic appearance of cells

Q7. A 38-year-old woman has experienced severe abdominal pain over the past day. On examination she is hypotensive and in shock. Laboratory studies show elevated serum lipase. From the representative gross appearance of the mesentery shown in the figure, which of the following events has most likely occurred?

- A Acute pancreatitis
- B Gangrenous cholecystitis
- C Hepatitis B virus infection
- D Small intestinal infarction
- E Tuberculous lymphadenitis



Answer : A

The many focal, chalky white deposits in the mesentery, composed mainly of adipocytes, are areas of fat necrosis. The deposits result from the release of pancreatic enzymes such as lipases in a patient with acute pancreatitis. Gangrenous necrosis is mainly coagulative necrosis, but occurs over an extensive area of tissues. Viral hepatitis does not cause cell necrosis in organs other than liver, and hepatocyte necrosis from viral infections occurs mainly by means of apoptosis. Intestinal infarction is a form of coagulative necrosis. Infection with tuberculosis leads to caseous necrosis

Q8. A 68-year-old woman suddenly lost consciousness and on awakening 1 hour later, she could not speak or move her right arm. Two months later, a head CT scan showed a large cystic area in the left parietal lobe. Which of the following pathologic processes has most likely occurred in her brain?

- A Apoptosis
- B Coagulative necrosis
- C Fat necrosis
- D Karyolysis
- E Liquefactive necrosis

Answer : E

The high lipid content of central nervous system tissues results in liquefactive necrosis as a consequence of ischemic injury, as in this case of stroke. Apoptosis affects single cells and typically is not grossly visible. Coagulative necrosis is the typical result of ischemia in most solid organs. Fat necrosis is seen in breast and pancreatic tissues. Karyolysis refers to fading away of cell nuclei in dead cells

Q9. On day 28 of her menstrual cycle, a 23-year-old woman experiences onset of menstrual bleeding that lasts for 6 days. She has had regular cycles since menarche. Which of the following processes most likely occurs in her endometrial cells to initiate the onset of menstrual bleeding

- A Apoptosis
- B Atrophy
- C Caseous necrosis
- D Heterophagocytosis
- E Liquefactive necrosis

Answer :A

The onset of menstruation is orderly, programmed cell death (apoptosis) through hormonal stimuli, an example of the intrinsic (mitochondrial) apoptotic pathway. As hormone levels drop, the endometrium breaks down, sloughs off, and then regenerates. With cellular atrophy, there is often no visible necrosis, but the tissues shrink, something that occurs in the endometrium after menopause. Caseous necrosis is typical of granulomatous inflammation, resulting most commonly from mycobacterial infection. Heterophagocytosis is typified by the clearing of an area of necrosis through macrophage ingestion of the necrotic cells. Liquefactive necrosis can occur in any tissue after acute bacterial infection or in the brain after ischemia.

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