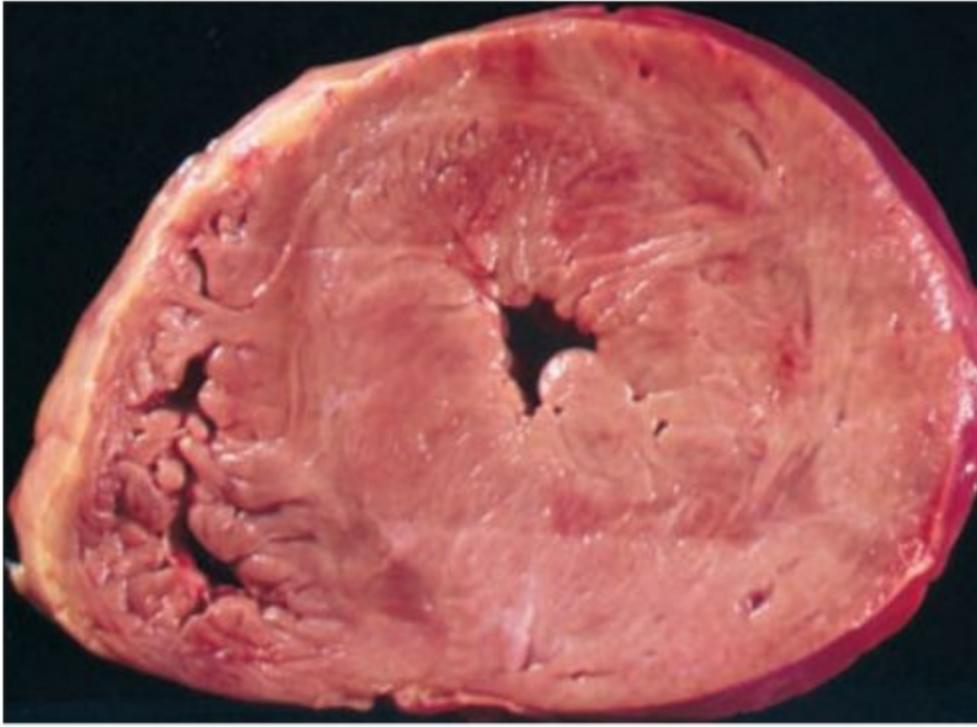


1. The illustration shows a section of the heart from a 45-year-old African-American man with long-standing hypertension who died of a “stroke.” Which of the following adaptive changes is exemplified in the illustration?



(A) Aplasia (B) Atrophy (C) Hyperplasia (D) Hypertrophy (E) Hypoplasia

2. An impending myocardial infarction was successfully averted by thrombolytic (clot-dissolving) therapy in a 55-year-old man. Which of the following biochemical events most likely occurred during the period of hypoxia?

- (A) Decreased hydrogen ion concentration
- (B) Increase in oxidative phosphorylation
- (C) Loss of intracellular  $\text{Na}^+$  and water
- (D) Stimulation of ATP synthesis
- (E) Stimulation of anaerobic glycolysis and glycogenolysis

3. A 45-year-old man with a long history of alcoholism presents with severe epigastric pain, nausea, vomiting, fever, and an increase in serum amylase. During a previous hospitalization for a similar episode, computed tomography scanning demonstrated calcifications in the pancreas. A diagnosis of acute pancreatitis superimposed on chronic pancreatitis was made. In this condition, which of the following types of necrosis is most characteristic?

- (A) Caseous
- (B) Coagulative
- (C) Fat
- (D) Fibrinoid
- (E) Liquefactive

4. A 29-year-old man hospitalized for acquired immunodeficiency syndrome (AIDS) is found to have pulmonary tuberculosis. Which type of necrosis is found in the granulomatous lesions (clusters of modified macrophages) characteristic of this increasingly frequent complication of AIDS?

- (A) Caseous
- (B) Coagulative
- (D) Fibrinoid
- (E) Liquefactive

5. A 45-year-old woman is investigated for hypertension and is found to have enlargement of the left kidney. The right kidney is smaller than normal. Contrast studies reveal stenosis of the right renal artery. The size change in the right kidney is an example of which of the following adaptive changes?

- (A) Aplasia
- (B) Atrophy
- (C) Hyperplasia
- (D) Hypertrophy
- (E) Metaplasia

6. A 56-year-old man recovered from a myocardial infarction after his myocardium was entirely "saved" by immediate thrombolytic therapy. If it had been possible to examine microscopic sections of his heart during his ischemic episode, which of the following would be the most likely cellular change to be found?

- (A) Karyolysis
- (B) Karyorrhexis
- (C) Pyknosis
- (D) Swelling of the endoplasmic reticulum

7. A 64-year-old woman presents with fever, chills, headache, neck stiffness, vomiting, and confusion. The Kernig sign (passive knee extension eliciting neck pain) and Brudzinski sign (passive neck flexion eliciting bilateral hip flexion) are both positive. Examination of the cerebrospinal fluid reveals changes consistent with bacterial meningitis, and brain imaging

demonstrates a localized abscess. Which of the following types of necrosis is most characteristic of abscess formation?

- (A) Caseous
- (B) Coagulative
- (D) Fibrinoid
- (E) Liquefactive

8. A 56-year-old man dies 24 hours after the onset of substernal chest pain radiating down his left arm to the ulnar aspect of his fingertips. Which of the following morphologic myocardial findings is an indicator of irreversible injury?

- (A) Cell blebs
- (B) Depletion of glycogen
- (C) Mitochondrial swelling
- (D) Myelin figures
- (E) Pyknotic nuclei

9. A 75-year-old woman with Alzheimer disease dies of congestive heart failure. The brain at autopsy is shown in the image. This patient's brain exemplifies which of the following responses to chronic injury?



- (A) Anaplasia
- (B) Atrophy
- (C) Dysplasia
- (D) Hyperplasia
- (E) Hypertrophy

صعب حبتين 10.

A 53-year-old man comes to the emergency department due to a few weeks of severe heartburn and difficulty swallowing. He has had mild to moderate heartburn for several years and has tried weight loss, elevating the head of the bed while sleeping, and several months of proton pump inhibitor therapy. Other medical problems include hypertension and hypothyroidism. Temperature is 36.7 C (98.1 F), blood pressure is 130/80 mm Hg, pulse is 78/min, and respirations are 16/min. BMI is 25 kg/m<sup>2</sup>. Physical examination is unremarkable. An upper gastrointestinal endoscopy is performed, and esophageal biopsy shows columnar epithelium with interspersed goblet cells. A similar adaptive response can be seen in which of the following scenarios?

- A. Bronchial epithelial cells in a chronic cigarette smoker
- B. Epidermal cells in a patient with psoriasis
- C. Melanocytes in a large, irregular mole
- D. Myocardial cells in a patient with aortic stenosis
- E. Skeletal myocytes after prolonged immobility

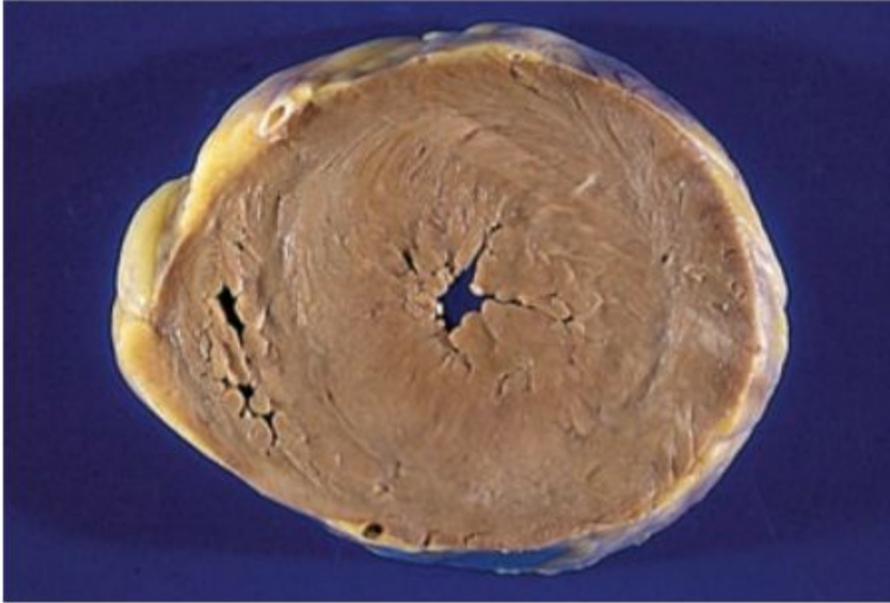
11. برضو صعب حبتين وجمع اكثر من مادة (ميكرو و اميونو وباثو و حبتين ميتا)

A 61-year-old man comes to the emergency department due to fever, chills, and a productive cough with thick, blood-tinged sputum for the past several days. His temperature is 38.8 C (102 F), blood pressure is 90/60 mm Hg, and pulse is 110/min. On examination, the patient is lethargic and ill appearing. Bronchial breath sounds and crackles are present in the right lung. Blood and sputum cultures grow *Klebsiella pneumoniae*. It is determined that the bacteria express a lipopolysaccharide on their outer membrane surface that stimulates toll-like receptors in the inflammatory cells. This in turn leads to degradation of the I $\kappa$ B inhibitor protein, which normally binds to a latent transcription factor found in the cytoplasm. Which of the following factors is most likely to be directly activated by the removal of this inhibitor protein?

- A. Granulocyte colony-stimulating factor
- B. Janus kinase 2
- C. Nuclear factor-kappa B
- D. Transforming growth factor- $\beta$
- E. Tumor necrosis factor- $\alpha$

اسهل من الي قبله بس بده شوية تفكير عميق

12. A 64-year-old man with long-standing angina pectoris and arterial hypertension dies of spontaneous intracerebral hemorrhage. At autopsy, the heart appears globoid. The left ventricle measures 2.8 cm on cross section (shown in the image). This adaptation to chronic injury was mediated primarily by changes in the intracellular concentration of which of the following components?



- (A) DNA
- (B) Glycogen
- (C) Lipid
- (D) mRNA
- (E) Water

زي الي قبله

13. A 30-year-old man with AIDS-dementia complex develops acute pneumonia and dies of respiratory insufficiency. At autopsy, many central nervous system neurons display hydropic degeneration. This manifestation of sublethal neuronal injury was most likely mediated by impairment of which of the following cellular processes?

- (A) DNA synthesis
- (B) Lipid peroxidation
- (C) Mitotic spindle assembly
- (D) Plasma membrane sodium transport
- (E) Ribosome biosynthesis

Robbin's questions

Type of cell death which is energy-dependent, tightly regulated, and associated with normal cellular functions.

2- Type of cell death which results from a pathologic cell injury.

3- Type of cell death associated with inflammation

4-It is the irreversible condensation of chromatin in the nucleus of a cell undergoing necrosis or apoptosis

5-It is the destructive fragmentation of the nucleus of a dying cell

6-It is the complete dissolution of the chromatin of a dying cell

7- This is the first manifestation of almost all forms of injury to cells

8- Surface blebs, increased eosinophilia of the cytoplasm, cellular swelling

9-Cell injury with loss of nuclei, cellular fragmentation and leakage of cellular contents.

#### Answers to MCQ

1. D
2. E
3. C
4. A
5. B
6. D
7. E
8. E
9. B
10. A
11. C
12. D
13. D

#### Answers to Robbin's questions

1. Apoptosis
2. necrosis
3. necrosis
4. Pyknosis
5. Karyorrhexis
6. Karyolysis
7. Cellular swelling
8. Reversible/ Early Ischemic Injury
9. Irreversible/ Necrotic cellular injury