

I. Read the text and answer 10 questions to it.

MUMPS

The causative agent is a filtrable virus. It is found in the saliva of patients, where it may be present for at least 24 hours before swelling of the salivary glands develops, and throughout the entire period of glandular enlargement. Spread is by droplet infections or direct contact with materials contaminated with infected saliva. Most cases occur in children between 5 and 15 years of age; the disease is unusual in children under 2 years. Infants up to 10 months ordinarily are immuned. However, the disease may occur at any age, and cases in the older age groups may be seen.

After an incubation period of 14 to 21 days onset is marked by chilly sensations, headache, anorexia and malaise. This is accompanied by a low to moderate fever which may last from 12 to 24 hours before any involvement of the salivary glands. In mild cases, these prodromal symptoms may be absent. Pain on chewing or swallowing is the earliest symptom of parotitis. There is marked sensitivity to pressure over the angle of the jaw. With development of parotitis, the temperature frequently rises to 103 or 104 F. Swelling of the gland reaches its maximum about the 2nd day and is associated with swelling, involving the cheek and area below the ear. In most cases, both parotid glands are involved. Occasionally the submaxillary and sublingual glands also may be swollen, or, more rarely, may be the only glands affected. In such cases, there is swelling of the neck beneath the jaw.

The diagnosis of typical cases during an epidemic is simple, but sporadic cases present a more difficult problem. Swelling of the parotid or other salivary glands due to the mumps virus must be distinguished from: (1) bacterial parotid involvement occurring in streptococcal throat infections, diphtheria, or debilitated patients with poor oral hygiene, typhoid or typhus fever; (2) malignant tumors of the salivary glands; (3) postoperative parotitis.

In uncomplicated mumps, prognosis is extent. However, relapses may occur occasionally after about 2 weeks. In complicated cases, deafness or facial paralysis has been known to occur following involvement of the nervous system.

1. The virus is spreading with the saliva of the people, who are sick:

- B** A. False
B. True

2. Mumps can be complicated with deafness:

- B** A. False
B. True

3. Choose the correct statement:

- B** A. Most cases of the disease occur in children younger than two years old
B. Most cases of the disease occur in children older than five years old
C. Most cases of the disease occur in infants under ten months

4. It is always easy to diagnose this disease:

- A** A. False
B. True

5. Choose the correct statement:

- A** A. The first symptom of parotitis is a pain when swallowing
B. The first symptom of parotitis is a headache
C. The first symptom of parotitis is fever

6. Only parotid salivary glands can be affected in the case of mumps:

- A** A. False
B. True

7. The virus which causes mumps can be found in the urine of the patients:

- A** A. False
B. True

8. In some cases, mumps must be distinguished from diphtheria:

- A** A. True
B. False

9. Usually, only one ^{both} parotid gland is affected by the disease:

- A** ☐ A. False
☒ B. True

10. Elder people are immune to mumps:

- B** ☐ A. True
☒ B. False

II. Choose the right answer.

11. A molecular-level-process of spontaneous passive transport of water-soluble molecules across a cell membrane is modeled. The molecules move across cell membranes from an area of higher concentration toward an area of lower concentration via specific transmembrane integral proteins. This transport does not directly require chemical energy from ATP hydrolysis. Which of the following transport mechanisms is most likely mentioned?

- A. Pinocytosis
- B. Facilitated diffusion**
- C. Osmosis
- D. Active transport
- E. —

12. A 70-year-old patient is brought to the emergency department by his son because of blurry vision and dysarthria. His son says, that the father is always thirsty and has difficulty with urination. Examination reveals dry skin, cutaneous vasodilation, nonreactive mydriasis, and hyperthermia. Drug overdose is suspected. Which of the following drugs is the most likely cause of this patient's toxicity?

- A. Metamizole
- B. Clonidine
- C. Reserpine
- D. Atropine**
- E. Carbachol

13. All of the teeth in the mouth together are referred to as the dentition. Humans have two dentitions throughout life: one during childhood, called the primary dentition, and one that will hopefully last throughout adulthood, called the permanent (secondary) dentition. The first permanent molars usually begin their eruption by/at:

- A. Four to five years of age
- B. Birth
- C. —
- D. Twelve months of age
- E. Six to seven years of age**

14. A 34-year-old woman goes into labor at 38 weeks. After several hours of labor a male infant is born with fever, hydrocephalus, hepatosplenomegaly, jaundice, bilateral chorioretinitis and cerebral calcifications. Which of the following protozoan infections is the most likely cause of the infant's

condition?

- A. Balantidiasis
- B. Trichomoniasis
- C. Amebiasis
- D. Toxoplasmosis**
- E. Giardiasis

15. A 42-year-old female comes to the physician 2 days after the sudden onset of pain and swelling of her right knee. She has had no injury. Examination of the right knee shows warmth, erythema, and effusions. Laboratory studies show an increase in the concentration of acute phase reactants. Which of the following is the most appropriate pharmacotherapy for this patient?

- A. Antidepressants
- B. Sulfonamides
- C. Nonsteroidal anti-inflammatory drugs (NSAIDs)**
- D. Opioids
- E. Antibiotics

16. A previously healthy 8-year old boy is brought to the emergency department by his parents because of fever and progressively worsening sore throat and dysphagia. Physical examination shows pharyngeal erythema with tender left and right cervical lymphadenopathy. Contrast-enhanced computed tomography (CT) shows fluid accumulation in the retropharyngeal space. A diagnosis of retropharyngeal abscess is suspected. Which of the following fasciae is most likely involved in this process?

- A. —
- B. Parotid fascia
- C. Masseteric fascia
- D. Temporal fascia
- E. Buccopharyngeal fascia**

17. Histologic examination of a biopsy specimen shows a structure of the oral cavity composed of the bone tissue, which is covered by stratified squamous non-keratinizing epithelium and lamina propria. The specimen has also minor mucous salivary glands. In all parts of the lamina propria the collagenous fibers form thick bundles that bind the mucosa to the periosteum. Based on these findings, which of the following is the most likely structure?

- ☐ A. Hard palate
- ☐ B. Tongue
- ☐ C. Soft palate
- ☐ D. Lip
- ☐ E. Cheek

A

18. A 58-year-old woman comes to her dentist complaining of a «strange mass» in her mouth. On intraoral examination of the oral mucosa the dentist reveals a vegetative lesion with a pedunculated base observed at the soft palate level lateral to the base of the uvula. An excisional biopsy is performed and histopathological examination shows proliferations of stratified keratinized squamous epithelium with fibrovascular connective tissue stroma and many papillary infoldings of the epithelium. Which of the following is the most likely pathology revealed by the dentist?

- ☐ A. Basal-cell carcinoma
- ☐ B. Fibrolipoma
- ☐ C. Papilloma
- ☒ D. Epithelial hyperplasia
- ☐ E. Fibroma

C

19. Histologic examination of an eye specimen shows multilayer structure. The outermost layer is represented by special pigment epithelium, which is composed of cuboidal melanin-containing cells that absorb light. The photoreceptor layer contains photosensitive outer segments of rods and cones. Which of the following eye structures is mentioned?

- ☐ A. Sclera
- ☐ B. Iris
- ☐ C. Ciliary body
- ☐ D. Choroid
- ☒ E. Retina

E

20. Calcification of the intercellular substance of bone tissue is accompanied by the deposition of hydroxyapatite crystals along the collagen fibers. This process requires the presence of alkaline phosphatase in the intercellular matrix. Which of the following cells most likely produces this enzyme?

- ☐ A. Osteoclast
- ☒ B. Osteoblast
- ☐ C. Chondrocyte
- ☐ D. Osteocyte
- ☐ E. Chondroblast

B

21. A 43-year-old cattle farm worker is brought to the surgeon with fever, malaise, and inflamed lesions on his

hands and arms. He reports that about 2 weeks before his presentation at the hospital he noticed small, painless, pruritic papules that quickly enlarged and developed a central vesicle. The vesicles developed into erosion and left painless necrotic ulcers with black, depressed eschar. Gram's staining of the ulcer reveals gram-positive spore-forming bacilli. Which of the following diseases is the most likely cause of these findings?

- ☐ A. Chickenpox
- ☐ B. Tularemia
- ☐ C. Plague
- ☒ D. Anthrax
- ☐ E. Syphilis

D

22. A 38-year-old woman presents to the emergency room with severe shortness of breath, cough and wheezing. She has a history of bronchial asthma. Her vitals are as follows: respiratory rate is 39/min., pulse is 121/min., blood pressure is 130/70 mm Hg, and temperature is 37.2°C. On physical exam, she looks confused and has bilateral diffuse wheezes on chest auscultation. Which of the following is the β_2 -agonist and is the most appropriate drug to rapidly reverse her respiratory distress?

- ☐ A. —
- ☐ B. Atropine
- ☐ C. Adrenaline
- ☐ D. Ipratropium bromide
- ☒ E. Albuterol (Salbutamol)

E

23. Persistent and heavy proteinuria (albuminuria) associated with nephrotic syndrome leads to hypoalbuminemia, which changes plasma pressure resulting in severe generalized edema. According to the description which of the following circumstances tends to cause nephrotic edema?

- ☒ A. Increased tissue hydrostatic pressure
- ☐ B. Decreased venous pressure
- ☐ C. Increased plasma oncotic pressure
- ☐ D. —
- ☒ E. Decreased plasma oncotic pressure

E

24. In the experiment an investigator reveals that glucose is actively taken up by cells (except brain cells). Moreover, gluconeogenesis in liver is stimulated and glycogen synthesis in liver and muscles is increased. Which of the following hormones is most likely responsible for

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these changes?

- A. Insulin
- B. Triiodothyronine (T3)
- C. Aldosterone
- D. Somatostatin
- E. Glucagon

A

25. The dentist should inject a local anesthetic to reduce pain sensation in the maxillary molars and adjacent facial soft tissue and gingiva. He inserts the needle through oral mucosa at the height of the maxillary vestibular fornix just posterior to the maxillary tuberosity. The needle is directed medially and superiorly toward the alveolar canals. Which of the following nerves is most likely to be blocked?

- A. Inferior alveolar nerve
- B. Posterior superior alveolar nerve
- C. Nasopalatine nerve
- D. —
- E. Buccal nerve

B

26. A 35-year-old woman is brought to the physician because of a 4-month history of progressive weakness of both lower limbs. She notes difficulty climbing stairs and complains of lethargy and loss of muscle bulk. Her diet consists primarily of polished rice. A diagnosis of dry beriberi is suspected. Deficiency of which of the following vitamins is most likely to be detected in her blood?

- A. Vitamin C (ascorbic acid)
- B. Vitamin B₁ (thiamine)
- C. Vitamin B₆ (pyridoxine)
- D. Vitamin B₂ (riboflavin)
- E. Vitamin B₃ (niacin)

B

27. A 25-year old woman is admitted to the hospital because of a 6-week history of double vision and difficulty to talk after prolonged speaking. Her husband reports fluctuating droopy eyelids in the morning and evening. An immunologic assay detects the presence of circulating autoantibodies against the certain receptors at the neuromuscular junction. Affected binding of which of the following neurotransmitters is the most likely cause of this patient's symptoms?

- A. Epinephrine
- B. Acetylcholine
- C. Dopamine
- D. Serotonin
- E. γ -aminobutyric acid (GABA)

B

28. A research lab is investigating the rate of differentiation of hematopoietic cells in order to better understand acute myeloid leukemia in children. A bone marrow biopsy of a 6-year-old boy shows the differentiation stage in which hemopoietic cell extrudes its nucleus. Which of the following processes is most likely associated with biopsy findings?

- A. Lymphocytopoiesis
- B. Erythropoiesis
- C. Monocytopoiesis
- D. Thrombopoiesis
- E. Granulopoiesis

B

29. At autopsy, section of the right ovary shows a round lesion 2.5 cm in diameter with a clear serous fluid, surrounded by a smooth glistening membrane. Which of the following macroscopic lesions best represents the autopsy findings?

- A. Ulcer
- B. Nodule with central necrosis
- C. Infiltrate
- D. Cyst
- E. Nodule

D

30. A 34-year-old male comes to the dentist because of a 1-year history of swelling in the right upper jaw. On intraoral examination, a single diffuse 2x1.5 cm swelling is seen on the right side of anterior maxilla. A biopsy specimen of the lesion shows numerous thin-walled sinusoids in the connective tissue, hemosiderin deposition, and numerous giant cells in a hemorrhagic background. Which of the following is the most likely diagnosis?

D

- A. —
- B. Gingival fibromatosis
- C. Granular cell ameloblastoma
- D. Giant cell epulis
- E. Cavernous hemangioma

31. A 58-year-old male patient visited his dentist with the chief complaint of itching and burning sensation in his mouth. On intraoral examination, diffuse white patches were seen on his tongue, right and left buccal mucosa, as well as on his hard palate and soft palatal region. The potassium hydroxide (KOH) preparation of the specimen revealed non-pigmented septate hyphae. Administration of which of the following is the most appropriate initial step in treatment of this patient?

- A. Nystatin
 B. —
 C. Penicillin
 D. Tetracycline
 E. Gentamicin

A

32. A 28-year-old female patient dies of progressive respiratory failure after she was diagnosed with comminuted fracture of the right hip. Prior to her death she developed severe hypoxemia, neurologic abnormalities, and petechial rash. At autopsy, examination of pulmonary microvasculature shows intraluminal orange sudanophilic droplets. Which of the following complications is the most likely cause of this patient's death?

- A. Air embolism
 B. Fat embolism
 C. Tumor embolism
 D. Thromboembolism
 E. Amniotic fluid embolism

B

33. In microanatomy of some organs, there is a sheet-like structure, which underlies virtually all epithelia. It consists of basal lamina (made of type IV collagen, glycoproteins, and proteoglycans) and reticular lamina. Under the microscope, you can see it as a pink line under the epithelial cells. Which of the following is described above?

- A. —
 B. Plasma membrane
 C. Endoplasmic reticulum
 D. Nucleus
 E. Basement membrane

E

34. A 40-year-old male comes to the physician because of recurrent painful flares and swelling of the metatarsal-phalangeal joint of the great toe. Laboratory study of urine sample shows extremely low pH and pink discoloration. Which of the following metabolic intermediates is the most likely cause of changes in this patient's urine?

- A. Ammonia
 B. Uric acid
 C. Tricalcium phosphate
 D. Chloride
 E. Magnesium sulfate

B

35. A 36-year-old male comes to the dental office for extraction of the tooth. Two weeks after the procedure is performed, the stratified squamous epithelium regenerates at the site of extraction. Which of the following

organelles is most likely involved in the mucosa regeneration?

- A. Mitochondria
 B. Smooth endoplasmic reticulum
 C. Centrosomes
 D. Ribosomes
 E. Lysosomes

D

36. A 49-year-old man comes to his physician with complaints of moderate headaches and profuse sweating. He mentions that his coworkers have made comments about his apparent increase in gloves and boots size. He says that since he joined his company 10 years ago he has changed the size of clothes at least 4 times. Physical examination shows hyperhidrosis, noticeable large pores, hypertrichosis, widely spaced teeth and prognathism. Which of the following is the most likely cause of this pathology?

- A. Excess secretion of vasopressin
 B. Decreased secretion of insulin
 C. Excess secretion of growth hormone
 D. Decreased secretion of glucocorticoids
 E. —

C

37. An extreme undernourishment, known as starvation, can be caused by insufficient protein intake. As an example, Kwashiorkor is a form of malnutrition caused by a lack of protein in the diet where decreased plasma protein concentration leads to increased filtration of fluid into interstitium. Which of the following proteins is the most likely cause of decreased oncotic plasma pressure in a starving patient?

- A. Albumin
 B. β -globulins
 C. γ -globulins
 D. α -globulins
 E. Fibrinogen

A

38. A 37-year-old male was admitted to a hospital complaining of abdominal pain, difficulty in swallowing and breathing, constipation, and nausea. He developed respiratory failure and required endotracheal intubation and ventilation. Two days before, the patient consumed dried salted fish bought from an artisanal producer. Laboratory investigation for infectious pathogen was performed using Kitt-Tarozzi's method. Observation under a bright field microscopy revealed the presence of typical microorganisms with «tennis racket» appearance. Which of the

following is the most likely diagnosis?

- A. Typhoid fever
- B. Cholera
- C. Botulism**
- D. Nontyphoidal Salmonella infection
- E. Shigella infection

39. An 11-year-old boy comes to the pediatric dentist with the chief complaint of «not being able to close his left eye or smile». Examination reveals the disappearance of the nasolabial fold, the left eyebrow sagging, and partial inability to close the left eye. Which of the following nerves is most likely affected?

- A. Accessory nerve
- B. Hypoglossal nerve
- C. Trigeminal nerve
- D. Glossopharyngeal nerve
- E. Facial nerve**

40. A group of dental students is studying bacteria and their pathogenesis. They have identified that a substantial number of bacteria cause human diseases by producing a poisonous substance. This substance is typically a protein, that has different mechanisms of action and acts at different sites. It is secreted by anaerobic bacteria and leads to a potentially life threatening symptoms which can be prevented by administration of specific antibodies. Which of the following is the most likely substance?

- A. Toxoid
- B. —
- C. Exotoxin**
- D. Antitoxin
- E. Enterotoxin

41. A 10-year-old boy is brought to the physician by his parents because of fever, cough, and fatigue. He has been admitted to the hospital five times because of pneumonia. Attempts to induce immunity using the pneumococcal vaccine have failed. The first hospitalization was at the age of 12 months. Laboratory findings show marked reduction in all classes and subclasses of serum immunoglobulins. Which of the following immune cells is most likely to be reduced in the peripheral blood of this patient?

- A. B-cells**
- B. Macrophages
- C. Neutrophils
- D. T-cells
- E. NK-cells

42. Fluorination of teeth is one of the major procedures which is used for enamel strengthening. Due to fluoride ions and fluoridation of the enamel, the teeth get protection from acidic environment and therefore dental caries is prevented. Which of the following is the most likely mechanism of fluorine's anticaries effect?

- A. Hydroxyapatite synthesis
- B. Chlorapatite synthesis
- C. Teeth mineralization
- D. Fluorapatite synthesis**
- E. Teeth demineralization

43. A 6-year-old girl with diphtheria is administered an intravenous injection of diphtheria antitoxin. Ten days after the initial administration of drug, she develops a pruritic rash, fever, and arthralgias. Which of the following is the most likely diagnosis?

- A. Anaphylaxis
- B. Atopy
- C. Serum sickness**
- D. Allergic contact dermatitis
- E. Delayed type hypersensitivity

44. A 56-year-old woman comes to the emergency department complaining of severe abdominal pain for the last several hours. The pain is cramp-like in nature, constant and has worsened over time. She gives a history of episodic right upper abdominal pain for the past few months, mostly after consuming fatty foods, radiating to the tip of the scapula. Ultrasound of the gallbladder shows hyperdense structures with an acoustic shadow (gallstones) and a thickened wall. Which of the following processes is most likely disturbed in presence of the stone in the gallbladder?

- A. Emulsification of lipids**
- B. Inhibition of saliva secretion
- C. Hydrochloric acid (HCl) secretion in stomach
- D. Proteins digestion to amino acids
- E. Carbohydrates digestion to monosaccharides

45. During histologic examination of the skeletal muscle specimen, the

investigator discovers an organelle that has 2 membranes: smooth outer membrane and internal, that forms multiple ridges of visible folds (crysts). Which of the following is the most likely function of this structure?

- ☐ A. Synthesis and energy accumulation in the form of ATP
- ☐ B. Synthesis of carbohydrates
- ☐ C. Formation of mitotic spindle
- ☐ D. —
- ☐ E. Intracellular digestion of macromolecules

A

46. A 66-year-old male is brought to the emergency department with central chest pain for 1 hour. He rates his pain as severe, dull in character and it is associated with profuse sweating and shortness of breath. Physical examination reveals a blood pressure of 100/70 mm Hg, pulse — 115/min, oxygen saturation of 95% on room air. An electrocardiogram is done and shows ST elevation in leads II, III and avF which is consistent with an acute myocardial infarction. The patient is given oral aspirin, sublingual nitroglycerine and intravenous morphine. Which of the following is the most likely mechanism of action of morphine?

- ☐ A. Opioid receptors agonist
- ☐ B. Phosphodiesterase inhibitor
- ☐ C. Histamine receptor antagonist
- ☐ D. Acetylcholinesterase inhibitor
- ☐ E. Adenylyl cyclase activator

A

47. A histologic section is obtained from a diaphysis of a femur and stained with hematoxylin and eosin. At examination of the slide, a thin layer of connective tissue is identified which covers an outer surface of a bone in all places except joints. It consists of an outer layer composed of coarse fibrous connective tissue with numerous blood vessels and nerves, and the inner layer which is more cellular and less vascular. According to the description which of the following structures is most likely identified during the histologic evaluation?

- ☐ A. Periosteum
- ☐ B. Inner circumferential lamellae
- ☐ C. —
- ☐ D. Outer circumferential lamellae
- ☐ E. Osteon (Haversian system)

A

48. Examination of an oral cavity shows puffy gums, pus between teeth and gums, contact bleeding. The dentist suspects gum infection that damages the soft tissue and destroys the bone that supports the teeth. This pathology can cause teeth to loosen or lead to tooth loss. Which of the following is the most likely diagnosis?

- ☐ A. Galvanosis
- ☐ B. Acute sialadenitis
- ☐ C. Xerostomia
- ☐ D. Periodontitis
- ☐ E. —

D

49. A 32-year-old woman presents with increased facial hair growth, headache and decreased libido. She is also currently concerned about sweating excessively even at room temperature. Neurological examination shows loss of visual acuity in both temporal fields of views. A skull X-ray shows sella turcica enlargement and deformity. Which of the following anatomic structures would you most likely expect to be abnormal in this patient?

- ☐ A. Pituitary gland
- ☐ B. Thalamus
- ☐ C. —
- ☐ D. Pineal gland
- ☐ E. Hypothalamus

A

50. A 10-year-old Indian boy is brought by his parents to a dentist for a routine dental care. They want to remove the noticeable yellow discoloration of his teeth. His mother reports that they immigrated to Ukraine approximately 6 months ago and a lot of children in their state had the similar staining of their teeth. On intraoral examination there are isolated areas of brown staining, which is particularly severe on the incisors and canines. In addition, some areas have pits which expose the underlying dentin. Which of the following is the most likely diagnosis?

- ☐ A. Demineralization stage of caries
- ☐ B. Enamel hypoplasia
- ☐ C. Enamel erosion
- ☐ D. Acid erosion
- ☐ E. Fluorosis

E

