

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

The discovery of insulin

Pandemics are outbreaks of infectious disease spread over multiple countries. Some spread rapidly but are less damaging, such as the pandemic swine flu of 2009. Others spread slowly but are highly dangerous, such as Ebola. A few spread quickly and make many who catch it very ill. The COVID-19 outbreak that erupted in 2020 is one such pandemic. The Great Influenza was one of the most devastating pandemics in history, killing 50 million people in the wake of World War I. Like COVID-19, this was caused by a virus - now identified as a deadly strain of the H1N1 influenza virus. A major discovery in the century between these two outbreaks is that all it can take to trigger a pandemic is a tiny chance mutation in a virus, especially an influenza virus or a coronavirus such as the virus that causes COVID-19. That mutation conceals the virus's identity, leaving the human body defenceless. The proximity of people and animals in the modern world makes such mutations highly likely. Pandemics are complex global threats that test to the limits how people and governments behave. Epidemiologists have made much progress in understanding how an epidemic spreads from one area to multiple countries (at which point it becomes a pandemic), and experts provide detailed protocols for taking action. Yet vaccines remain the one proven weapon against such outbreaks. In 2005 - more than 80 years after the Great Influenza pandemic - American virologist Jeffery Taubenberger revealed the complete genetic structure of the 1918 H1N1 virus, enabling it to be reconstructed and analysed. This was a landmark achievement in increasing scientists' ability to pin down the exact nature of a mutant virus and provide the necessary data to create a vaccine quickly.

1. What was the cause of the Great Influenza pandemic in the wake of World War I?

- A. A strain of H1N1 influenza virus
- B. A deadly strain of H5N1 influenza virus
- C. A highly contagious form of Ebola
- D. A coronavirus similar to COVID-19
- E. A variant of the common cold virus

2. Why is it mentioned that some pandemics spread slowly but are

highly dangerous, like Ebola?

- A. Because the Ebola virus conceals its identity
- B. Because Ebola is an airborne virus
- C. Because Ebola causes mild symptoms
- D. Because it's a highly contagious virus
- E. Because Ebola is caused by a bacterium

3. What major discovery occurred in the century between the Great Influenza and COVID-19 outbreaks?

- A.** The critical role of vaccines in preventing pandemics
- B.** The development of effective vaccines against all viruses
- C.** The understanding of how pandemics occur due to climate change
- D.** The eradication of all influenza viruses
- E.** The discovery of a highly effective antiviral medication

4. What is mentioned as a potential trigger for a pandemic in the modern world?

- A.** Increased human-animal proximity
- B.** Strict quarantine measures
- C.** Improved healthcare systems
- D.** Decreased international travel
- E.** Widespread hand hygiene practices

5. What is the common feature of both influenza viruses and coronaviruses mentioned in the text?

- A.** They can conceal their identity through mutation
- B.** They are caused by bacteria
- C.** They are unrelated to pandemics
- D.** They are always slow-spreading viruses
- E.** They are resistant to vaccines

6. According to the text, what remains the one proven weapon against pandemics?

- A.** Vaccines
- B.** Quarantine measures
- C.** Antibiotics
- D.** Social distancing
- E.** Hygiene practices

7. What is the primary role of epidemiologists in addressing

pandemics?

- A.** Understanding how epidemics become pandemics
- B.** Developing vaccines
- C.** Analyzing genetic mutations in viruses
- D.** Providing medical treatment to infected individuals
- E.** Studying the behavior of government officials

8. Ebola is caused by a highly contagious virus that spreads rapidly.

- A.** False
- B.** True
- C.** Not given
- D.** -
- E.** -

9. American virologist Jeffery Taubenberger developed a vaccine for the 1918 H1N1 virus.

- A.** Not given
- B.** True
- C.** False
- D.** -
- E.** -

10. Epidemiologists have provided detailed protocols for taking action against pandemics, including measures other than vaccines.

- A.** True
- B.** False
- C.** Not given
- D.** -
- E.** -

11. What hereditary disorders cause sickle cell anemia?

- A.** Gene mutation
- B.** Disturbances of the mechanisms of genetic information transmission
- C.** Crossing-over
- D.** Genomic mutation
- E.** Transduction

12. At the molecular level, the process of spontaneous passive transport of water-soluble molecules across the cell membrane takes place in living organisms. The molecules move across the cell membrane from the area of a higher concentration towards the area of a lower concentration using specific transmembrane integral proteins. This type of transport does not directly require the chemical energy obtained in the process of ATP hydrolysis. Name this process.

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

13. A man has been diagnosed with a subdural hematoma in the temporal region. What artery is damaged in this case?

- A.** Middle meningeal artery
- B.** Middle cerebral artery
- C.** Posterior communicating artery
- D.** Anterior meningeal artery
- E.** Anterior cerebral artery

14. What anatomical structures are connected by the ductus arteriosus (ductus Botalli) during the intrauterine period of fetal development?

- A.** Pulmonary trunk and aorta
- B.** Right and left ventricle
- C.** Aorta and inferior vena cava
- D.** Right and left atrium
- E.** Pulmonary trunk and superior vena cava

15. During examination, a 35-year-old woman was diagnosed with diffuse toxic goiter. What cells are hyperfunctional in this case, causing the disease?

- A.** Thyrocytes
- B.** Parathyrocytes
- C.** Parafollicular cells
- D.** Endocrinocytes of the zona glomerulosa of the adrenal cortex
- E.** Endocrinocytes of the zona fasciculata of the adrenal cortex

16. After organ heterotransplantation, transplant rejection was detected. What cells cause this process?

- A.** Killer T cells
- B.** Macrophages
- C.** B lymphocytes
- D.** Helper T cells
- E.** Suppressor T cells

17. What type of cells is normally predominant in the epithelium of the crypts in the large intestine?

- A.** Goblet cells
- B.** Columnar villous epithelial cells
- C.** Endocrinocytes
- D.** Acidophilic granular cells
- E.** Poorly differentiated cells

18. A puncture material obtained from myeloid tissue of a 6-year-old child contains cells with pyknosis and cellular enucleation that occur in the process of their differentiation. What type of hematopoiesis can be characterized by these morphological changes?

- A.** Erythropoiesis
- B.** Thrombopoiesis
- C.** Granulopoiesis
- D.** Lymphopoiesis
- E.** Monopoiesis

19. A histological specimen demonstrates a blood vessel. Its tunica intima consists of endothelium, subendothelium, and internal elastic lamina. The tunica media is lined with smooth muscle cells. What vessel can be characterized by these morphological features?

- A.** Muscular artery
- B.** Elastic artery
- C.** Capillary
- D.** Non-muscular vein
- E.** Muscular vein

20. A baby has a delay in eruption of the first teeth. What vitamin is deficient in this baby?

- A.** D_3
- B.** A
- C.** K
- D.** PP
- E.** E

21. After removal of the parathyroid glands, a 43-year-old man developed complaints of lethargy, thirst, and a sharp increase in neuromuscular excitability. These symptoms are caused by disturbed metabolism of a certain substance. Name this substance.

- A.** Calcium
- B.** Manganese
- C.** Chlorine
- D.** Molybdenum
- E.** Zinc

22. What test should the patient undergo to confirm the diagnosis

of gonorrhoea?

- A.** Microscopy of the pathological material
- B.** Serological study
- C.** Bacteriophage testing
- D.** Hemagglutination reaction
- E.** Immobilization reaction

23. A 13-year-old child has been diagnosed with tonsillitis and prescribed a combined sulfonamide drug with a bactericidal effect. What drug was prescribed to the child?

- A.** Biseptol (Co-trimoxazole)
- B.** Enteroseptol
- C.** Sulfalene
- D.** Aethazolum
- E.** Urosulfanum

24. What microbiological material must be obtained to confirm the diagnosis of recurrent epidemic typhus?

- A.** Blood
- B.** Urine
- C.** Cerebrospinal fluid
- D.** Feces
- E.** Lavage from the nasopharynx

25. During a fire, a woman developed carbon monoxide poisoning. What hemoglobin compound will be detected in this patient?

- A.** Carboxyhemoglobin
- B.** Methemoglobin
- C.** Carhemoglobin
- D.** Deoxyhemoglobin
- E.** Oxyhemoglobin

26. After one week of starvation, blood glucose of a person remains at a sufficient level, because of the activation of which process?

- A. Gluconeogenesis
- B. Glycolysis
- C. Glycogenolysis
- D. Tricarboxylic acid cycle
- E. Glycogen phosphorylation

27. When motility of the large intestine is disturbed, the processes of protein decay increase, resulting in formation of toxic products, in particular phenol. From which amino acid does this organic compound form?

- A. Tyrosine
- B. Tryptophan
- C. Threonine
- D. Proline
- E. Histidine

28. In alkaptonuria, concentration of a certain acid increases in urine. Name this acid.

- A. Homogentisic acid
- B. Phenylpyruvic acid
- C. Acetoacetic acid
- D. Uric acid
- E. Pyruvic acid

29. During amniocentesis, fetal cells contained two sex chromatin bodies (Barr bodies). What disease can be characterized by this finding?

- A. Trisomy X
- B. Klinefelter syndrome
- C. Turner syndrome
- D. Down syndrome
- E. Patau syndrome

30. A 71-year-old man with angina pectoris takes 100 mg of acetylsalicylic acid daily. For what purpose does this patient take acetylsalicylic acid?

- A. Inhibition of platelet aggregation
- B. Inhibition of blood coagulation
- C. Dilation of the coronary vessels
- D. Reduction of prothrombin levels
- E. Reduction of cholesterol levels

31. A man has been diagnosed with gigantism. What endocrine gland is dysfunctional in this case?

- A. Pituitary gland
- B. Pineal gland
- C. Thyroid gland
- D. Thymus
- E. Adrenal glands

32. During the examination of a 10-year-old child, a dentist detected numerous brown spots with a smooth surface and without enamel defects, located all over the surface of the dental crowns. What is the most likely dental pathology in this child?

- A. Fluorosis
- B. Enamel erosion
- C. Enamel hypoplasia
- D. Acid-induced necrosis of enamel
- E. Spot stage of caries

33. Autopsy of the body of a man revealed cavities in his lungs. The inner walls of the cavities consist of granulation tissue of varying degree of maturity. Marked pneumosclerosis and bronchiectasis are observed. Some of the cavities have areas of caseous necrosis. What pathological condition has developed in the patient?

- A.** Fibrocavitary tuberculosis
- B.** Infiltrative tuberculosis
- C.** Caseous pneumonia
- D.** Acute cavernous tuberculosis
- E.** Bronchiectasis

34. The patient's laboratory findings are as follows: leukocytes — $14 \cdot 10^9/L$; myeloblasts — 71%; promyelocytes, myelocytes, and metamyelocytes — 0%; band neutrophils — 6%, segmented neutrophils — 13%; lymphocytes — 7%; monocytes — 3%. What pathological condition has developed in the patient?

- A.** Myeloblastic leukemia
- B.** Neutrophilic leukocytosis
- C.** Chronic myeloid leukemia
- D.** Lymphoblastic leukemia
- E.** Chronic lymphocytic leukemia

35. During meiosis, various combinations of genes form in the gametes, which ensures the appearance of new traits in the offspring. What type of variability is it?

- A.** Combinative variability
- B.** Modificational variability
- C.** Mutational variability
- D.** Chromosomal variability
- E.** Phenotypic (modificational) variability

36. For preventive purposes, during a surgery on the maxilla, a patient with increased bleeding was administered a drug that improves blood coagulation by increasing the synthesis of prothrombin and other blood clotting factors (VI, VII, IX, X) that takes place mainly in the liver. What drug was administered in this case?

- A.** Vikasol (Vitamin K)
- B.** Cyanocobalamin
- C.** Ascorbic acid
- D.** Heparin
- E.** Neodicoumarin (Ethyl biscoumacetate)

37. Following the treatment with anti-tuberculosis drugs, a 48-year-old woman developed optic nerve neuritis, memory impairment, and seizures. What anti-tuberculosis drug was she taking?

- A.** Isoniazid
- B.** Para-aminosalicylic acid (PAS)
- C.** Rifampicin
- D.** Ethambutol
- E.** Kanamycin sulfate

38. Histology of a jaw bone tumor shows that it consists of epithelial islands with signs of cellular atypism and a small amount of keratinized substance in their center — "cancer pearls". What oncological condition has developed in the patient?

- A.** Primary intraosseous carcinoma
- B.** Malignant ameloblastoma
- C.** Ameloblastic odontosarcoma
- D.** Ameloblastic fibrosarcoma
- E.** Burkitt's tumor

39. No nitrogenous base that is a component of one DNA codon can be at the same time a component of another codon. What characteristic of the genetic code is it?

- A.** Non-overlapping
- B.** Triplet structure
- C.** Specificity
- D.** Universality
- E.** Collinearity

40. A 50-year-old woman complains of constant thirst, high fluid intake, and increased diuresis. Laboratory testing detects blood glucose levels of 12 mmol/L. Glucose was detected in her urine. What endocrine organ is dysfunctional in this case?

- A.** Pancreas
- B.** Thyroid gland
- C.** Parathyroid gland
- D.** Adrenal glands
- E.** Pituitary gland

41. What pathological condition is caused by the absolute deficiency of vitamin K in the body?

- A.** Hypocoagulation
- B.** Disturbed platelet adhesion
- C.** Intestinal dysbiosis
- D.** Hypercoagulation
- E.** Disturbed platelet aggregation

42. A woman has been diagnosed with right-sided purulent parotitis. The doctor performed a surgery on the parotid gland, after which the patient noted asymmetry of her face and drooping of her upper eyelid and right angle of the mouth. What nerve has been damaged by the doctor in this case?

- A.** *N. facialis*
- B.** *N. ulnaris*
- C.** *N. maxillaris*
- D.** *N. hypoglossus*
- E.** *N. axillaris*

43. What anatomical structure in the nasal cavity contains the receptors of the olfactory analyzer?

- A.** Superior nasal meatus
- B.** Middle nasal meatus
- C.** Inferior nasal meatus
- D.** Common nasal meatus
- E.** Choanae

44. As a result of an injury, the patient developed a dysfunction of the parotid salivary gland. What nerve ensures its secretion?

- A.** *N. petrosus minor*
- B.** *N. petrosus major*
- C.** *N. petrosus profundus*
- D.** *N. auricularis minor*
- E.** *N. auricularis major*

45. Examination of the kidneys of a man, who died of uremia, revealed their atrophy, induration, and pale color. Congo Red staining of the microslides revealed red deposits in the glomeruli, vessel wall, stroma, and under the tubular epithelium. What pathological process was detected by the doctor in this case?

- A.** Amyloidosis
- B.** Hyalinosis
- C.** Fibrinoid swelling
- D.** Sclerosis
- E.** Obesity

46. A 10-year-old boy with marked hemorrhagic syndrome has no antihemophilic globulin A in his blood plasma. What mechanism of coagulation hemostasis is disturbed in this case?

- A.** Activation of prothrombinase
- B.** Conversion of prothrombin to thrombin
- C.** Conversion of fibrinogen to fibrin
- D.** Blood clot retraction
- E.** Fibrinolysis

47. A 37-year-old man has been diagnosed with dilation of the subcutaneous veins of the anterior thoracic and abdominal wall, intestinal bleeding, and splenomegaly. What pathological condition is observed in the patient?

- A.** Portal hypertension syndrome
- B.** Ascites
- C.** Left ventricular failure
- D.** Right ventricular failure
- E.** Hypertensive syndrome

48. A 64-year-old man has a 10-year-long history of ischemic heart disease and has been taking furosemide for a long time as a component of complex therapy for this disease. What drug should be prescribed to the patient to prevent the development of hypokalemia?

- A.** Asparcam (potassium and magnesium aspartate)
- B.** Potassium permanganate
- C.** Potassium bromide
- D.** Calcium bicarbonate
- E.** Nitroglycerin

49. A 30-year-old woman diagnosed with systemic lupus

erythematosus developed dry mouth. Histology of the biopsy material obtained from the salivary glands revealed signs of chronic sialadenitis with significant lymphocytic infiltration of the stroma and parenchymal atrophy with proliferation of the connective tissue. What pathological condition has developed in the patient?

- A.** Sjogren's syndrome
- B.** Systemic scleroderma
- C.** Adenolymphoma
- D.** Acute serous sialadenitis
- E.** Acute purulent sialadenitis

50. A patient has been hospitalized into the intensive care unit with the diagnosis of ketoacidotic coma. During examination, loud rapid breathing with deep inhalation and intensified exhalation is observed. What type of pathological breathing is it?

- A.** Kussmaul breathing
- B.** Cheyne-Stokes breathing
- C.** Apneic breathing
- D.** Biot breathing
- E.** Grocco breathing