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

The discovery of insulin

In May 1921, Banting and Best began to conduct experiments on dogs. They removed the pancreas of some dogs and tied off the pancreatic duct of others. The dogs whose pancreas had been removed altogether developed diabetes, as expected, while the dogs whose ducts had been tied did not. While the pancreatic cells that produced digestive secretions degenerated in the dogs whose pancreatic duct had been tied, the islets of Langerhans remained undamaged. Clearly, the islets of Langerhans produced the secretions that prevented diabetes occurring. Banting and Best wanted to extract and isolate these secretions, but it was difficult to keep the dogs alive long enough to carry out tests.

After numerous setbacks, resulting in the deaths of several dogs, they succeeded in keeping a severely diabetic dog alive with injections of an extract made from the tied-off pancreas. They called this extract isletin. Their next challenge was to find a way of producing enough extract to make it a practicable treatment for diabetes.

Realizing that relying on a supply of dogs was going to hold back research, Banting and Best moved on to using the pancreas of cows, obtained from a local slaughterhouse. They managed to extract a substance that contained a greater amount of the active ingredient and injected it into one of the laboratory dogs that had had its pancreas removed. The dog's blood sugar dropped significantly.

Human testing

At the end of 1921, Macleod invited James Collip, a skilled biochemist to help purify Banting and Best pancreatic extract for clinical testing in humans. On 11 January 1922, the extract was injected into 14-year-old Leonard Thompson a diabetic patient who was close to death, at the Toronto Gene Hospital. The first test proved disappointing, but it was repeated with a purer version of the extract around two weeks later, this time with much better results.

Thompson's blood sugar returned to normal levels and his other symptoms abated.

'In May 1922, Macleod delivered a paper, "The Effects Produced on Diabetes by Extracts of Pancreas", on behalf of the team at the annual conference of the Association of American Physicians. He received a standing ovation. The paper used the word "insulin"for the first time.

1. Who conducted experiments on dogs to investigate the role of pancreatic secretions in preventing diabetes?

A. Banting and Best
B. Thompson and Macleod
C. Langerhans and Collip
D. Gene and Extract
E. —

2. What happened to dogs whose pancreatic ducts were tied off in the experiments?

A. They remained healthy
B. They developed diabetes
C. They produced more insulin
D. They died
E. —

3. What did Banting and Best call the extract they obtained from the tied-off pancreas of dogs?

A. Isletin
B. Insulin
C. Isletix
D. Langerhansin
E. —

4. Why did Banting and Best switch from using dogs to using cow pancreases for their research?

A. Cow pancreases contained a greater amount of the active ingredient
B. Dogs became expensive
C. Dogs were hard to keep alive
D. Dogs were not available
E. —-

5. Who was invited to help purify Banting and Best's pancreatic extract for human testing in 1922?

A. James Collip
B. Leonard Thompson
C. Isletin researcher
D. Gene Hospital specialist
E. —

6. How did Leonard Thompson's condition change in the second test with a purer version of the pancreatic extract?

A. His blood sugar returned to normal levels
B. His symptoms worsened
C. He developed new symptoms
D. No change in his condition
E. —

7. What did Macleod's paper at the Association of American Physicians conference in May 1922 introduce for the first time?

A. The word "insulin"
B. A new research method
C. A different treatment for diabetes
D. A revolutionary medical device
E. —

8. Why was it challenging to conduct research using dogs for insulin extraction?

A. Dogs could not survive the experiments
B. Dogs were too expensive
C. Dogs did not have the necessary islets of Langerhans
D. Dogs had another type of insulin production
E. —

9. The dogs used in the experiments survived long enough for the tests to be conducted successfully.

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

10. Banting and Best initially conducted experiments on cats to investigate the role of pancreatic secretions in preventing diabetes.

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

11. A man with infertility requested medical genetic counseling. One Barr body was detected in the nuclei of most of the cells in his buccal mucosal epithelium. What is the likely cause of this pathological condition?

A. Klinefelter syndrome
B. Turner syndrome
C. Triple X syndrome
D. Down syndrome
E. Triple Y syndrome

12. Microscopy of a fecal smear detected cysts with 4 nuclei. Which protozoan parasite do they belong to?

A. *Entamoeba histolytica*
B. *Balantidium*
C. *Giardia*
D. *Trichomonas*
E. *Toxoplasma*

13. When performing trepanation of the mastoid process of the temporal bone due to purulent otitis, the dental surgeon risks damaging the facial (fallopian) canal and causing bleeding as a result. What artery passes along with the facial nerve in the canal?

A. *A. stylomastoidea*
B. *A. facialis*
C. *A. auricularis posterior*
D. *A. meningea media*
E. *A. occipitalis*

14. A 52-year-old woman came to a neurologist with complaints of the loss of sensitivity in the skin of the right half of her face in the area of the lower eyelid, nasal bridge, and upper lip. What nerve branch is damaged in this case?

A. Maxillary division of the trigeminal nerve
B. Greater petrosal nerve, a branch of the facial nerve
C. Ophthalmic division of the trigeminal nerve
D. Mandibular division of the trigeminal nerve
E. Chorda tympani, a branch of the facial nerve

15. A patient has a dysfunction of the parotid salivary gland. What nerve increases its secretion?

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

16. When examining the patient's oral cavity, the dentist noticed a significant tremor of the tongue. Exophthalmos is observed in the patient, as well. The doctor advised the patient to consult an endocrinologist. During the examination, the diagnosis of Basedow's disease was made. This condition is mainly caused by the hyperfunction of certain cells. Name these cells.

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

17. A skin injury with damage to the reticular layer of the dermis was received. The regeneration of this layer will occur because of the activity of certain cells. Name these cells.

A. Fibroblasts
B. Macrophages
C. Lymphoblasts
D. Tissue basophils
E. Plasma cells

18. Some diseases of the small intestine are associated with dysfunction of exocrinocytes with acidophilic granules (Paneth cells). Where are these cells located?

A. At the bottom of the intestinal crypts
B. In the apical parts of the intestinal villi
C. On the lateral surfaces of the intestinal villi
D. At the crypt-villus junction
E. In the apical parts of the intestinal crypts

19. In the peripheral zone of the pulp, the cell activity is temporarily inhibited for certain reasons. What dental tissue is at risk of developing a deficiency of its physiological regeneration in this case?

A. Dentin
B. Enamel
C. Pulp
D. Cellular cementum
E. Acellular cementum

20. A 60-year-old patient presents with impaired perception of high-frequency sounds. What structures

of the auditory analyzer are impaired in this case, causing such changes?

A. Cochlear basilar membrane near the oval window
B. Cochlear basilar membrane near the helicotrema
C. Eustachian tube
D. Middle ear muscles
E. Tympanic membrane

21. Among the amino acids that contain a hydroxyl group, one is of the greatest importance in the formation of the structure of collagen and the organic matrix of the tooth. What is this amino acid?

A. Oxyproline
B. Serine
C. Threonine
D. Tyrosine
E. Homoserine

22. What mineral substance is present in the dental hard tissues in the largest amount?

A. Hydroxyapatite $[Ca_{10}(PO_4)_6(OH)_2]$
B. Carbonate apatite $[Ca_{10}(PO_4)_5CO_3]$
C. Fluorapatite $[Ca_{10}(PO_4)_6F_2]$
D. Chlorapatite $[Ca_{10}(PO_4)_6Cl_2]$
E. Calcium phosphate $[Ca_{10}(PO_4)_6]$

23. A baby presents with 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

24. The liquidator of the consequences of the accident at the Chornobyl nuclear power plant received an ionizing radiation dose of 6 Gray. What changes in the leukocyte formula can be expected in this patient in 10 days?

A. Agranulocytosis
B. Lymphocytosis
C. Leukocytosis with lymphocytopenia
D. Basophilia
E. Eosinophilia

25. Blood testing of a 35-year-old patient shows the following: Hb — 58 g/L, erythrocytes — $1.3 \cdot 10^{12}$/L, color index — 1.3, leukocytes — $2.8 \cdot 10^9$/L, platelets — $1.1 \cdot 10^9$/L, reticulocytes — 2%, ESR — 35 mm/hour. Polysegmented neutrophils, Jolly bodies, Cabot rings, and megalocytes can be detected. What type of anemia is it?

A. B_{12} and folate deficiency anemia
B. Hypoplastic anemia
C. Posthemorrhagic anemia
D. Hemolytic anemia
E. Iron deficiency anemia

26. Purulent exudate accumulates in the abdominal cavity of a patient with peritonitis. The exudate contains a large amount of neutrophils. What is the main function of neutrophil granulocytes in the inflammation focus?

A. Phagocytosis
B. Secretion of prostaglandins
C. Degranulation
D. Release of histamine
E. Regulation of local blood circulation

27. A 30-year-old patient was diagnosed with a tumor of the body of the mandible that appeared several months ago. Macroscopically, the tumor was represented by a dense whitish tissue that was destroying the patient's jawbone. After its removal, the tumor was examined microscopically. It was revealed that the tumor consisted of a network of odontogenic epithelial strands with various types of branching. What kind of tumor did the patient have in this case?

A. Plexiform ameloblastoma
B. Follicular ameloblastoma
C. Acanthomatous ameloblastoma
D. Basal cell ameloblastoma
E. Granular cell ameloblastoma

28. The tonsils of a 28-year-old patient are significantly enlarged, plethoric, and painful. On their surface, there are dense dirty-gray films that spread to the hard palate and are tightly attached to the underlying tissues. Attempts to remove the films provoke bleeding. What pathological process causes these morphological changes?

A. Diphtheritic exudative inflammation
B. Croupous exudative inflammation
C. Catarrhal exudative inflammation
D. Purulent exudative inflammation
E. Hemorrhagic exudative inflammation

29. Autopsy of the body of a 69-year-old woman, who was overeating and died of an acute myocardial infarction, detected numerous whitish, dense formations in the intima of the coronary arteries. The formations protrude into the vascular lumina, sharply narrowing them. What stage of atherosclerosis can be characterized by these changes?

A. Liposclerosis
B. Lipoidosis
C. Atheromatosis
D. Atherocalcinosis
E. A stage of atheromatous ulcer formation

30. Bacteriology of the stools of a person, who works as a chef at a restaurant and has no clinical manifestations of the disease, resulted in growth of small colonies with a metallic sheen on a bismuth sulfite agar. What microorganisms are likely in this case?

A. Salmonella
B. Shigella
C. Escherichia
D. Staphylococci
E. Streptococci

31. A 50-year-old patient suddenly developed headache, dizziness, and nausea. Blood pressure — 220/110 mm Hg. During the intravenous administration of a 0.1% hygronium solution (trepirium iodide), the patient's condition improved. What is the mechanism of action of this drug?

A. Blockade of ganglionic nicotinic receptors
B. Activation of α_2-adrenoceptors
C. Angiotensin-converting enzyme blockade
D. Blockade of β_1-adrenoceptors
E. Blockade of Ca^{++} channels

32. A 25-year-old patient has been hospitalized with the diagnosis of syphilis. After testing, it was determined that the patient was hypersensitive to bicillin-5. What can be used as a replacement of this drug?

A. Tetracycline
B. Levomycetin (Chloramphenicol)
C. Streptomycin
D. Ampicillin
E. Biseptol (Co-trimoxazole)

33. Due to the presence of a malignant tumor on the tongue, the patient has been referred for its surgical removal. Where is it easy to find the lingual artery and ligate it?

A. Pirogov triangle
B. Carotid triangle
C. Omoclavicular triangle
D. Omotrapezoid triangle
E. Omotracheal triangle

34. During a fire, a person developed carbon monoxide poisoning. What changes occurred in the patient's blood as a result?

A. Formation of carboxyhenoglobin
B. Formation of methemoglobin
C. Formation of carbhemoglobin
D. Formation of reduced hemoglobin
E. Development of acidosis

35. The bile, secreted in the duodenum, contains bile acids and participates in emulsification and digestion of lipids. What acid is a component of bile?

A. Cholic acid
B. Linoleic acid
C. Arachidonic acid
D. Oleic acid
E. Myristic acid

36. A patient diagnosed with tuberculosis developed red coloring of urine, saliva, and tear fluid after starting the treatment of this disease. Red spots appeared on the patient's underwear. What drug could have caused these phenomena?

A. Rifampicin
B. Isoniazid
C. Ciprofloxacin
D. Benzylpenicillin sodium salt
E. Iodine alcohol solution

37. The patient's blood levels of calcium ions sharply dropped. It will result in increased secretion of a certain hormone. Name this hormone.

A. Parathyroid hormone
B. Vasopressin
C. Aldosterone
D. Somatotropin
E. Thyrocalcitonin

38. A 25-year old woman complains of double vision and rapid fatigability after prolonged speaking. Her condition has been observed for the last 6 weeks. Her husband reports that fluctuating droopiness is observed in her upper eyelids in the morning and evening. Immunologic testing detects the presence of circulating autoantibodies against certain receptors in the neuromuscular junction. This clinical presentation is caused by the disturbed binding of a certain neurotransmitter. Name this neurotransmitter.

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

39. During the examination of a pregnant woman, a dentist detected 3 round formations on her oral mucosa. The formations appeared 3 days ago. They have a white-gray surface with a red rim and are up to 1 cm in diameter. What disease corresponds with such pathological changes?

A. Aphthous stomatitis
B. Leukoplakia
C. Catarrhal stomatitis
D. Necrotizing ulcerative stomatitis
E. Gangrenous stomatitis

40. When extracting a tooth, the dentist destroys the bonds between the cementum of the dental root and the tooth socket. What structure is it?

A. *Periodontium*
B. *Gingiva*
C. *Pulpa dentis*
D. *Dentinum*
E. *Cementum*

41. A 34-year-old patient came to a dentist complaining of a swelling in the right upper jaw that appeared 1 year ago. Examination of the oral cavity detects a single large formation 2x1.5 cm in size on the right front surface of the maxilla. The biopsy material revealed a connective tissue that contained numerous thin-walled sinusoids, areas of hemorrhage, foci of hemosiderin deposition, and giant cells. What disease corresponds with such pathological changes?

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

42. Extreme emaciation or starvation can be caused by insufficient protein intake. As an example, Kwashiorkor is a form of malnutrition caused by the lack of protein in the diet, where decreased plasma protein concentration leads to increased filtration of fluid with its accumulation in the interstitium. What proteins are the most likely cause of decreased oncotic plasma pressure in a starving patient?

A. Albumins
B. Fibrinogens
C. β-globulins
D. α-globulins
E. γ-globulins

43. The patient's leukogram is 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 is the patient's blood pathology?

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

44. A 66-year-old man was hospitalized with chest pain lasting for 1 hour. The patient describes his pain as very intense and dull and accompanied by profuse sweating and tachypnea. Physical examination reveals the following: blood pressure — 100/70 mm Hg, pulse — 115/min., oxygen saturation — 95% on ambient air. ECG shows ST elevation in leads II, III, and avF, interpreted as an acute myocardial infarction. The patient was given aspirin orally, nitroglycerine sublingually, and morphine intravenously. What is the most likely mechanism of the action of morphine?

A. Stimulation of opioid receptors
B. Blockade of histamine receptors
C. Phosphodiesterase blockade
D. Adenylate cyclase stimulation
E. Acetylcholinesterase blockade

45. Teeth fluoridation is one of the most common procedures for enamel strengthening. Because of fluoride ions and fluoridation of the enamel, the teeth receive protection from an acidic environment, preventing the development of dental caries. What is the most likely mechanism of the anticaries effect in teeth fluoridation?

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

46. A patient, who was taking a highly effective anti-tuberculosis drug, developed gynecomastia at the end of the treatment course. What drug has caused this side effect?

A. Isoniazid
B. Rifampicin
C. Ciprofloxacin
D. Ethambutol
E. Florimycin sulfate (Viomycin sulfate)

47. Name the change in the nucleotide sequence of a gene that is associated with the rotation of a certain DNA segment by 180^o.

A. Inversion
B. Deletion
C. Duplication
D. Translocation
E. Repair

48. The most important thing in the specific treatment of

anaerobic infections is the timely administration of the serum that contains specific antibodies. In this case, the serum aims to neutralize:

A. Exotoxin
B. Anatoxin
C. Antitoxin
D. Enterotoxin
E. Anaerobic bacteria

49. The patient's ability to perceive a bitter taste is disturbed. What lingual papillae are affected in this case?

A. *Papillae vallatae*
B. *Papillae foliatae*
C. *Papillae conicae*
D. *Papillae filiformes*
E. *Papillae fungiformes*

50. For caries prevention, dentists recommend limiting the intake of simple carbohydrates. What is the role of a cariogenic diet in the pathogenesis of defects of hard dental tissues?

A. Decreased pH in the oral cavity
B. Disorders of the calcium and phosphorus metabolism
C. Saturation of dental enamel with fluorine
D. Formation of chelating substances
E. Activation of the remineralization process