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Assessment tools for midterm assessment

Microbiology, Virology

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|---------------------|---------------------------|
| Qualification | Specialist |
| Specialty | 31.05.01 General Medicine |
| Form of education | Full-time |
| Designer Department | Morphology and physiology |
| Graduate Department | Internal diseases |

TYPICAL TASKS FOR CONTROL WORK

CONTROL WORK

List of referats – 4th term

1. Work regulations (rules of work) in microbiological laboratory
2. Special features of structure of prokaryotic and eukaryotic cells
3. Taxonomy and classification of bacteria, basic taxonomic categories
4. Morphology and ultrastructure of a bacterial cell
5. Microscopic method of infectious diseases diagnostics
6. Morphological and tinctorial properties of microorganisms. Basic forms (shapes) of bacteria
7. Simple and complex methods of bacteria staining. Mechanism and steps of staining by Gram method
8. Composition of nutrient media
9. Classification of nutrient media
10. The conception of asepsis and antisepsis, their types. The conception of disinfection methods, disinfection and disinfection efficiency
11. The conception of sterilization, methods, equipment and regimes of sterilization
12. Methods of determining the sterilization efficiency
13. The conception of species, strain, colony, pure culture of microorganisms
14. Methods of isolation of the pure bacterial culture of microorganisms
15. Bacteriological method of infectious diseases diagnostics. The purpose and sequence of the 1st stage of bacteriological method of aerobic bacteria isolation
16. The technique of inoculation of microorganisms on the liquid and solid media
17. The features of anaerobic microorganisms' cultivation.
18. Equipment used for cultivation of anaerobic bacteria
19. Metabolism of bacteria
20. Enzymatic systems of microorganisms
21. Classification of bacteria according to the nutrition types. The sources of carbon, nitrogen, macro- and microelements, growing factors for microbes
22. Mechanisms of entering nutritional substances into the bacterial cell of bacteria
23. Classification of bacteria according to the sources of energy
24. Sanitary microbiology. Representatives and basic characteristics of sanitary - indicative microorganisms of water, air and soil
25. Microflora of water, air and soil

26. Methods of detection of sanitary- indicative microorganisms of water
27. Methods of detection of air microflora. Methods of detection of soil microflora
28. Normal microflora of different biotopes of human organism
29. Functions of normal microflora of the human body
30. Methods of examination of the human microflora
31. Principles of dysbacteriosis diagnostics and treatment
32. Definition of the concept 'immunity'. Kinds of immunity.
33. Cell-mediated factors of innate immunity (nonspecific resistance).
34. Phagocytosis: phagocytes' cells, mechanism of action, stages.
35. Morphofunctional characteristic of the NK-cells
36. Humoral factors of innate immunity (nonspecific resistance).
37. Definition of the concept 'antigen'. Properties of antigens. Kinds of antigens
38. Definition of the concept 'antibody'. Structure of antibodies (immunoglobulins) molecules.
Properties of antibodies classes
39. Immunological reactions: definition, using for diagnostics of infectious diseases
40. Agglutination reaction: definition, mechanism, variants
41. Mechanism of passive haemagglutination reaction. Erythrocyte diagnostics

List of referats – 5th term

1. Staphylococci, general characteristics. The role in human pathology. Pathogenicity factors and mechanisms of pathogenesis of staphylococcal infections. Microbiological diagnosis. Principles of treatment and prevention of staphylococcal infections
2. Streptococci, classification. General characteristics. Pathogenicity factors. Antigenic structure. Pathogenesis, immunity, microbiological diagnosis, principles of treatment and prevention of streptococcal infections
3. Classification of Neisseria. Meningococcus, general characteristics. Meningococcal infections, mechanisms of pathogenesis, immunity, methods of diagnostics, prevention
4. Gonococci, general characteristics. Mechanisms of pathogenesis and immunity. Microbiological diagnostics of acute and chronic gonorrhoea
5. E. coli, common characteristic. The biological role of Escherichia coli. Diseases caused by Escherichia
6. Salmonella. General characteristics. Members of the genus. Serological classification by Kaufmann-White. Molecular biological typing. Pathogens of typhoid, paratyphoid A and B, general characteristic. Phage typing. Vi-antigen and its value
7. Immunity in typhoid fever. Serological diagnostics of typhoid and paratyphoid. Specific prophylaxis
8. Salmonellosis. Characteristics of pathogens and diagnostic methods. Nosocomial salmonellosis
9. Shigella. Classification. Characteristics. Pathogenesis, immunity. Methods of microbiological diagnostics of acute and chronic dysentery
10. Klebsiella. Classification, general characteristics. Pathogenesis, immunity, methods of microbiological diagnostics of klebsiellosis
11. Pseudomonas aeruginosa, general characteristics, pathogenicity factors. The role in human pathology
12. Pathogens of intestinal yersiniosis, general characteristics. Pathogenesis. Methods of diagnostics of yersiniosis
13. C. diphtheria, general characteristics. Differences from non-pathogenic corynebacteria. Mechanisms of pathogenesis and microbiological diagnosis of diphtheria
14. Determination of antitoxic immunity. Principles of therapy and prevention of diphtheria

15. The causative agent of whooping cough, general characteristics. Differentiation with parapertussis agent. Pathogenesis, immunity. Microbiological diagnosis, principles of treatment and prevention of pertussis
16. General characteristics of the causative agents of tuberculosis. Pathogenesis, immunity, diagnostics and specific prevention of tuberculosis. Mycobacteriosis
17. The causative agent of leprosy. Characteristic, pathogenesis, immunity
18. Particularly dangerous infections. Classification mode, basic rules of sampling, sending and transportation of infectious material. General principles of diagnosis TELO
19. *V. cholera*. Systematics. General characteristics. Differentiation of biovars. Pathogenesis, immunity, principles of treatment and prevention. Methods of microbiological diagnostics
20. The causative agent of plague, a general characteristic. The pathogenesis of plague. Immunity, the principles of therapy and prevention of plague
21. *B. anthracis* characteristic. Pathogenesis, immunity, principles of treatment and prophylaxis of anthrax
22. The causative agent of tularemia, general characteristic. Pathogenesis, immunity, principles of treatment and prophylaxis of tularemia
23. Pathogens of brucellosis, a general characteristic. Differentiation of *Brucella* species. Pathogenesis, immunity, principles of treatment and prevention of brucellosis
24. Spirillae family. *Campylobacter*, characteristics, the role in human pathology. *Helicobacter*
25. The causative agent of tetanus, general characteristics. Pathogenesis, immunity, principles of treatment and prevention of tetanus
26. Gas gangrene pathogens, general characteristics. Pathogenesis, principles of treatment and prevention of gas gangrene
27. The causative agent of botulism, general characteristic. Pathogenesis, principles of botulism prevention and therapy. Clostridial gastroenteritis
28. Methods of diagnostics of anaerobic infections
29. Classification and general characteristics of spirochetes. Classification of treponemes and treponemal diseases. Characteristics of syphilis causative agent. Pathogenesis, immunity, diagnostic tests for syphilis
30. Leptospire. General characteristics. The pathogenesis of leptospirosis, immunity, specific prevention. Microbiological diagnostics of leptospirosis
31. *Borrelia*, general characteristics. Recurrent fever pathogenesis, immunity. Microbiological diagnostics. The causative agent of Lyme borreliosis
32. Systematic position and characterization of *Rickettsia*. Pathogenesis, immunity, methods of diagnostics of typhus
33. Characteristics of chlamydia. Causative agents of trachoma, psittacosis, respiratory and urogenital chlamydiosis. Pathogenesis and methods of diagnosis of chlamydia
34. General characteristics of mycoplasma, pathogenicity factors, the role in human pathology. Methods of mycoplasmosis diagnostics
35. Classification and taxonomy of viruses. Morphology and ultrastructure of viruses. Features of viral genome structure. Stages of interaction of a virus with a host cell
36. Methods of viruses' cultivation. Types of tissue (cell) cultures. Stages of virological method of diagnostics
37. Influenza virus
38. Parainfluenza virus
39. Epidemic parotitis (mumps) virus
40. Measles virus
41. Rubella virus
42. Herpes viruses (HSV I, II, Varicella zoster virus, Cytomegalovirus, Epstein-Barr, etc)
43. Adenoviruses

44. Polioviruses
45. Coxsackie viruses
46. Rabies virus
47. Vesicular stomatitis virus
48. Hepatitis A, B, C, D, E virus
49. HIV

TYPICAL TASKS FOR EXAM (5th term)

The exam tasks contain 3 theoretical questions.

| Tasks for competence assessment «Knowledge» | Task type |
|--|---------------------|
| <p>List of theoretical points for oral quiz</p> <ol style="list-style-type: none"> 1. Definition of microbiology as the science. Branches of microbiology: general, medical, veterinary, technical, agricultural, ocean, space microbiology. Medical microbiology and its sections: bacteriology, virology, protozoology, mycology. 2. Stages of development of Microbiology, its branches. Medical Microbiology. History and scope. Impact in Microbiology made by L. Pasteur. R.Koch as the founder of microbiology. 3. Origin and evolution of microorganisms. Modern classification of procaryotes. Bacterial taxonomy. Main taxons. species as the main taxonomic unit. Bacterial taxonomy. 4. Morphology and bacterial structure. Role of bacterial components of bacterial cells in vital activity of bacteria and pathogenesis of infectious diseases. Differences between procaryotic and eukariotic cells. 5. Cell envelope. Components. Cell wall. Structure in Gram-positive and Gram-negative bacteria. Functions. Differential stains. Gram's stain. 6. Study of morphology of bacteria. Optical methods: oil immersion microscopy, phase contrast microscopy, dark ground microscopy. Staining of bacteria. 7. Capsule. Functions. Demonstration of capsule. Capsular stain. India ink method (after Burri-Gience). Spores. Structure of spores. Function. Formation of spores. Types of bacterial spores. Spore stain. Modified acid fast techniques (Gansen's method). 8. Staining of bacteria. Dyes used in microbiology. Differential stains. Gram's stain. Principle. Procedure. Mechanisms: chemical and physical theories. 9. Spirochetes. Taxonomy, classification, general properties, morphological structure. The most common pathogens. 10. Bacterial methabolism. Nutritional requirements of bacteria. Culture media. The basic requirement to culture media. Classification of media. 11. Cultivation of viruses. Animal inoculation indication of the viruses in inoculated animals. 12. Discovery of viruses. Main stages in the development of virology. Modern classification of viruses. 13. Acid fast bacteria. Ziehl Neelsen stain. Principle and technique. 14. Bacterial metabolism. Respiration of bacteria. Classification of bacteria according to type of respiration. Anaerobes. Anaerobic culture methods of isolating anaerobic pure cultures. 15. Viral replication. Relationship between the virus and the host cell. | -theoretical |
| <p>Stages of viral replication. Replication cycle of human DNA viruses. Replication cycle of human RNA viruses.</p> | |

16. Protoplasts, spheroplasts, L-forms of bacteria. Morphology, type of growth. Role in the human pathology.
17. Chlamydiae. Classification. C.pittaci, C.trachomatis, C.pneumoniae. General properties. Life cycle. Cultivation of chlamydiae.
18. Morphology of Rickettsia. Methods of staining of Rickettsia.
19. Metabolism of microorganisms. Bacterial nutrition. Classification of bacteria on the basis of nutritional requirements.
20. Metabolism and the conversion of energy Respiration of bacteria. Anaerobes. Methods of anaerobic culture. Anaerobic jar. GASPAK.
21. Bacterial growth and multiplication. Phases of bacterial growth, starting with an inoculum of stationary phase cells. Enzymes of microorganisms. Role of enzymes in metabolism, the conversion of energy and pathogenicity of bacteria.
22. History of discovery of viruses. D.I.Ivanovsky as the founder of virology. Stages of development of virology. Morphology and viral ultrastructure. Types of symmetry. Chemical composition. Functions of viral subunits.
23. Viruses. Definition and properties. Classification. Morphology of viruses. Virion structure. Chemical properties. Functions of viral components. Culture and isolation of viruses.
24. Sterilization, disinfection, and antiseptics. Methods of sterilization. Methods of disinfection. Classification of disinfectants. Chemical disinfectants.
25. Antibiotics. History of discovery. Role of A.Fleming. Classification. General criteria for effective antibiotic action. General principles of effective antibacterial therapy.
26. Normal microflora of the human body. Role of normal microflora in the physiological and pathological processes. Gnotobiology. Role of I.I. Mechnikov in the development of study of normal microflora. Dysbacteriosis and causes of its origin.
27. The notion of chemotherapy and chemotherapeutic agents. Chemotherapeutic index. Mechanism of antibacterial action of Sulfonamides. Role of P.Erlich and T.Domagk in the development of study of chemotherapy.
28. Extra chromosomal genetic elements of bacteria. Plasmids, their properties and classification. Transposable genetic elements: insertion sequences and transposons.
29. Clinical microbiology. Collection and transport of clinical specimens. Specimen containers and their transport. Handling of specimen in the laboratory. Selection of laboratory investigations.
30. Achievements in microbiology. Modern methods of detection of pathogen-specific macromolecules. Detection of nucleic acid sequences: nucleic acid probe tests, polymerase chain reaction.
31. Modern views on the nature and origin of viruses. Position of viruses in the system of the living. Means of classification and naming of viruses. Families of DNA viruses. Families of RNA viruses. Some important members.
32. Bacteriophage. History of its discovery. General characteristics. Structure and replication. Types of bacteriophage infection: virulent (lytic) and temperate (lysogenic) infections. Phage typing of bacteria. Using bacteriophages for phage therapy and phage prophylaxis.
33. Host defenses against viral infection: natural barriers, nonspecific immune defenses, antigen-specific immune responses. Viral

immunopathogenesis.

34. Viral detection: hemadsorption, hemagglutination. Hemagglutination inhibition test. Mechanism and technique. Interpretation of results.

35. The family Mycoplasmataceae. classification. General characteristics. Morphological properties and culture. Staining of mycoplasma.

36. Protozoa. Classification. General characteristics. Morphological properties. Microscopic detection: blood samples, tissue samples, sputum samples. Specimen collection. Examination. The Romanovsky-Giemsa staining.

37. Basic concepts in immunity. Central and periferal organs of the Immune System. Inductive and productive phases of immune response.

38. Basic concepts in Infection. Role of microorganisms in infectious process. Pathogenicity. Virulence. Factors predisposing to microbial pathogenicity. Doses and methods of their detection.

39. Immune System. Structure and functions. Cells of the Immune System. Classification. Characteristics. Cooperation of immunocompetent cells in immune response.

40. Live attenuated vaccines, principles of preparation, control. Practical use of live vaccines. Efficiency.

41. The study of infection. Dynamics of development of infectious diseases. Periods. Classification of infection: carriage, reinfection, superinfection, relapse (recurrence) of infections.

42. Toxoides, their preparation, purification, units of measurement, use, efficiency.

43. Antibodies. Immunoglobulin types and structures. Antibody response: primary versus secondary (anamnestic) responses. Dynamic. Autoantibodies. Monoclonal antibodies. Hybridomas.

44. Efficacy of antiparasitic immune responses.

45. Bacterial resistance to antibacterial agents: acquisition of bacterial resistance, mechanisms of bacterial resistance, bacterial resistance according to drug class. Antibiotic susceptibility. Minimal inhibitory concentration (MIC): methods for MIC determination, tube dilution, Kirby- Bauer disk diffusion test.

46. Hypersensitivity of delayed type (DTH). Mechanisms.

Important characteristics of the types of DTH reactions. Skin allergic tests.

47. Immunity. Modern determination of the notion of "Immunity". Stages of the development of immunology. Types of immunity and forms of its manifestation.

48. Nonspecific defense mechanisms. Phagocytosis. Phagocytic cells. Steps of phagocytosis. Complete and incomplete phagocytosis.

49. Immunoglobulin classes, their structure and properties. Complete and incomplete antibodies. Immunoglobulin specificities.

50. Nonspecific defense mechanisms: local and systemic. The complement system: components of complement (C), classical and alternative pathways of C activation, biological effects of C, deficiencies of the complement system.

51. Interferons and antiviral agents. Classes of antiviral agents. Sites of action of antiviral compounds. Types of interferons. Mechanism of action. Clinical uses. Resistance to antiviral agents.

52. Genetics of microorganisms. Organization of the genetic bacterial apparatus. Genotypical and phenotypical variation of microorganisms, its practical significance. Dissociation in bacteria.

53. Precipitation reaction. Mechanism of precipitation. Applications of precipitation reaction. Electroimmunodiffusion.

54. Reactions with "labelled" antibodies and antigens. Immunofluorescence: direct and indirect. The flow cytometer.
55. Serologic testing. General considerations. Clinical applications. Interpretation. Complement fixation tests. Technique, purpose, and clinical examples.
56. Serologic testing in virology. General considerations. Virus neutralization tests. Techniques. Practical guidelines.
57. Bacterial mutation. Origins. Types. Detection. Mutation repair mechanisms. Mutation suppression.
58. Types of vaccines. Classification. Recombinant vaccines. DNA vaccines.
59. Humoral immune response. Steps of the antibody production. Primary and secondary (anamnestic) responses. Immunological memory, its mechanism.
60. Immunology of malignancy. Tumour antigens. Immune response in malignancy. Immunotherapy of cancer.
61. Passive immunoprophylaxis and immunotherapy. Immune sera and immunoglobulins. Classification. Principles of preparing. Titration of antitoxic serum. Complication of usage of immune sera: anaphylactic reaction, serum sickness.
62. The notion of gene pool, genotype, and phenotype. Types of variation in bacteria.
63. Antibiotic susceptibility testing. Minimal inhibitory concentration (MIC). Methods for MIC determination: tube dilution, Kirby-Bauer technique, B-lactamase tests.
64. Bacterial resistance to antibacterial agents: intrinsic and acquired resistance. Basic mechanisms of resistance to antibiotics. Mutation and transfer of resistance genes among bacteria.
65. Agglutination reaction. Mechanism of agglutination. Passive agglutination tests. Applications of agglutination reaction.
66. Genetic engineering and biotechnology. Common enzymes used in molecular biology (restrictases, polymerases, reverse transcriptases, ligases). Cloning of foreign DNA in vectors.
67. Cultivation of viruses. Embryonated eggs. Structure. Technique of inoculation of specimens. Detecting viral growth in embryonated eggs.
68. Essence of antiviral immunity. Humoral immunity. Cell-mediated immunity. Pathologic consequences of the antiviral immune response. Evasion of the immune response.
69. Antigens. Complete antigens and haptens. Determinants of antigenicity. Antigenic structure of bacteria. Antigenic structure of viruses.
70. The phenomenon of antagonism in microbes. Antibiotics, their definition. Classification of antibiotics according to their points and mechanisms of action.
71. Enzyme-linked immunosorbent assay (ELISA). Radioimmunoassay (RIA). Western blot analysis. Mechanisms and applications of the reactions.
72. Infection. Definition. Classification of infection. Types of infectious diseases: endemic, epidemic, and pandemic diseases. Sources of infection in man. Methods of transmission of infection: contact, inhalation, ingestion, inoculation, insects
73. Vaccines. Classification. Immunization schedules. Killed (inactivated) vaccines. Vaccines as immunotherapeutic agents.
74. Characters of pathogens. Pathogenicity, virulence. Bacterial virulence factors: capsules, adhesions, exoenzymes, toxins, invasiveness. Study the

virulence and toxigenicity of microorganisms.

75. Structure and function of immune system. Central lymphoid system. Thymus. Functional classification of T cells. Bone marrow. Bursa of Fabricius. Peripheral lymphoid system: lymph nodes, spleen. Cells of lymphoreticular system.

76. Toxigenicity of microorganisms. Bacterial toxins. Distinguishing features exotoxins and endotoxins. Genetic basis of bacterial pathogenicity.

77. Laboratory diagnosis of viral infections. Culture and isolation. Serology. DNA hybridization.

78. Viral Genetics. Viral genomes. Viral mutation. Interaction between viruses. The role of genetic variation in the evolution of viruses.

79. Laboratory diagnosis of bacterial infections. Microscopic examination of patient specimens. Detection of pathogen-specific macromolecules. Culture and isolation of microorganisms. Serologic testing.

80. DNA transfer between bacteria. Conjugation. Transformation. Transduction.

81. Hypersensitivity. Classification of hypersensitivity reaction. Immediate hypersensitivity. Reaginic (anaphylaxis), cytolytic and cytotoxic types of reactions. Immune complex disease (serum sickness). Mechanisms and mediators.

82. Immunodeficiency diseases. Primary immunodeficiency. Classification of primary immunodeficiency syndromes. Secondary immunodeficiency.

83. Activators and stimulators of immune functions: cytokines, lymphokines, and chemokines. Sources, major targets, and functions.

84. Salmonella. Classification. *S. typhi*, *S. paratyphi A* and *paratyphi B* as the causative agents of enteric (typhoid and paratyphoid) fever. General properties. Determinants of pathogenicity. Pathogenesis and clinical disease. Epidemiology. Immunity. Laboratory diagnosis. Diagnosis of carriers. Treatment. Control and prevention.

85. Shigella. Taxonomy. Classification. General characteristics. Antigenic structure. Determinants of pathogenicity. Epidemiology. Pathogenesis and immunity of dysentery. Clinical syndromes. Laboratory diagnosis. Treatment, prevention, and control.

86. The family Micrococcaceae. Taxonomy, general properties, classification. The genus *Staphylococcus*. Classification, structure, culture, biochemical characteristics, antigenic structure, resistance to physico-chemical factors, determinants of pathogenicity. Pathogenesis and clinical disease. Laboratory diagnosis of staphylococcal infections. Immunity. Treatment. Control and prevention.

87. The Rickettsiaceae family. Classification. General characteristics. Epidemic typhus. *R. prowazekii*: antigenic structure, determinants of pathogenicity, epidemiology, transmission, pathogenesis, and clinical disease, laboratory diagnosis, treatment, prevention, and control.

88. The Enterobacteriaceae family. Taxonomy, general properties. Classification. The genus *Escherichia*: culture, biochemical characteristics, antigenic structure, determinants of pathogenicity. Enteropathogenic *E. coli* Role in the human's pathology. Laboratory diagnosis of enterocolitis.

89. The genus *Neisseria*, general characteristics and classification. *N. meningitidis* *N.gonorrhoeae*. : classification, culture and isolation, determinants of pathogenicity. Pathogenesis and clinical disease. Epidemiology, immunity.

Laboratory diagnosis. Treatment. Chemo- and immunoprophylaxis.

Differentiation of the meningococci and nasopharyngeal Gram negative

diplococci.

90. The genus *Streptococcus*: general properties, classification. *Streptococcus pneumoniae* (the pneumococcus): general properties, classification, virulence factors. Pathogenesis and clinical disease. Epidemiology. Laboratory diagnosis Treatment. Control and prevention.
91. Chlamydiae. Classification. General properties. Life cycle. Determinants of pathogenicity. *C. trachomatis*. Serotypes. *C. pneumoniae*. *C. psittaci*. Clinical disease. Epidemiology. Laboratory diagnosis. Treatment. Control and prevention.
92. The genus *Streptococcus*: general properties, classification. Group A streptococci (*S. pyogenes*). Group B streptococci (*S. agalactiae*). Determinants of pathogenicity: proteins, capsule, exotoxins, hemolysins, spreading factors. Pathogenesis and clinical disease of streptococcal infections. Laboratory diagnosis. Treatment. Control and prevention.
93. *Leptospira*. General properties. Classification. Pathogenesis and clinical disease of leptospirosis. Laboratory diagnosis. Epidemiology. Treatment and prevention
94. Mycobacteria. The most significant human pathogens. *M. tuberculosis*. General properties. Culture and isolation, identification. Determinants of pathogenicity. Pathogenesis and clinical disease of tuberculosis. Epidemiology. Laboratory diagnosis. Treatment. Control and prevention. Mycobacteria other than tuberculosis.
95. The genus *Bacillus*. Classification. Defining characteristics. *B. anthracis*. Determinants of pathogenicity. Anthrax. Pathogenesis and clinical disease. Epidemiology. Laboratory diagnosis. Treatment. Control and prevention.
96. The family Mycoplasmataceae. General characteristics. Classification. *M. pneumoniae*, *M. hominis*, *Ureaplasma urealyticum*. Pathogenesis and clinical disease of mycoplasmosis. Immunity. Epidemiology. Laboratory diagnosis. Treatment, prevention, and control.
97. Pathogenic Protozoa, their biological properties. Taxonomy of kingdom Protozoa. Classification. Role in the human pathology. *Toxoplasma gondii*. Morphological properties. Life-cycle. Epidemiology. Pathogenesis and clinical disease of toxoplasmosis. Laboratory diagnosis. Treatment, prevention, and control.
98. The family Vibrionaceae. Taxonomy, general properties. Classification. *Vibrio cholerae* 01 and 0139. Culture, biochemical characteristics, antigenic structure, determinants of pathogenicity, epidemiology. Pathogenesis and clinical disease of cholera. Laboratory diagnosis. Treatment, prevention, and control. *Vibrio parahaemolyticum*. *Vibrio vulnificus*.
99. The family Enterobacteriaceae. Classification. The genus *Klebsiella*: *K. pneumoniae*, *K. ozaenae*, *K. rhinoscleromatis*. Taxonomy, general properties, structure, biochemical characteristics, antigenic structure, determinants of pathogenicity, epidemiology. Pathogenesis and clinical disease. Laboratory diagnosis. Treatment, prevention, and control.
100. The genus *Yersinia*. *Y. pestis*, *Y. enterocolitica*, *Y. pseudotuberculosis*. Taxonomy, general properties, resistance to physico-chemical factors, determinants of pathogenicity. Plague. Epidemiology. Pathogenesis and clinical disease. Laboratory diagnosis. Treatment, prevention, and control.
101. The genus *Clostridium*. Classification. *C. tetani*. *C. perfringens*. Taxonomy, general properties, resistance to physico-chemical factors, determinants of pathogenicity, toxin production, transmission. Pathogenesis and immunity of tetanus. Epidemiology. Clinical syndromes: generalized,

localized, and neonatal tetanus. Laboratory diagnosis. Treatment, prevention, and control.

102. The genus *Francisella*. *F. tularensis*. Taxonomy, general properties. Determinants of pathogenicity. Transmission. Clinical symptoms of tularemia. Laboratory diagnosis. Treatment, prevention, and control.

103. Anaerobic bacteria. General characteristics. Classification. Non-spore-forming Gram-positive cocci (*Peptostreptococcus*) and Gram-negative bacilli (*Bacteroides*, *Prevotella*, *Fusobacterium*). Epidemiology. Virulence factors. Pathogenesis. Clinical manifestations. Laboratory diagnosis. Treatment.

104. The family Spirochaetaceae. General properties. Classification. The genus *Borrelia*. *B. recurrentis*. (Epidemic relapsing fever). *B. burgdorferi*. (Lyme disease). Determinants of pathogenicity, epidemiology, pathogenesis, and clinical disease. Laboratory diagnosis of epidemic relapsing fever and Lyme disease. Treatment, prevention, and control.

105. The genus *Bordetella*. The genus *Corynebacterium*. *C. diphtheriae*. Taxonomy, classification, general properties, resistance to physico-chemical factors, toxin production, transmission. Pathogenesis and clinical symptoms of diphtheria. Laboratory diagnosis. Treatment and immunoprophylaxis.

106. The family Spirochaetaceae. Classification. The genus *Treponema*. *T. pallidum*. General properties. Determinants of pathogenicity. Syphilis. Pathogenesis and clinical disease. Epidemiology. Immunity. Laboratory diagnosis. Treatment.

107. *Campylobacter* and *Helicobacter*. General properties. Classification. Determinants of pathogenicity. Epidemiology. Gastroenteritis caused by *C. jejuni*. Gastritis, gastric peptic ulcers, and gastric carcinoma associated with *H. pylori*. Pathogenesis and clinical disease. Laboratory diagnosis. Noninvasive tests of urease activity. Treatment.

108. The family Rickettsiaceae. Classification. General characteristics. Rickettsiosis. Classification. Q fever. Epidemiology. Pathogenesis and clinical presentation. Laboratory diagnosis. Treatment and immunoprophylaxis.

109. Paramyxoviruses. Classification. General characteristics. Measles virus. Mumps virus. Parainfluenza virus. Respiratory syncytial virus. The genus *Rubivirus*. General characteristics. Epidemiology. Clinical disease. Laboratory diagnosis. Treatment. Prevention.

110. Adenoviruses. General characteristics: structure, serotypes. Epidemiology. Pathogenesis and clinical disease. Laboratory diagnosis. Treatment. Prevention.

111. Poxviruses. Classification. Structure. Smallpox, cowpox, and monkeypox. Epidemiology, clinical disease. Laboratory diagnosis. Prevention. Declaration of the World Health Organization: the world «smallpox-free».

112. Retroviruses. Human Immunodeficiency viruses (HIV). General characteristics. Acquired Immune Deficiency Syndrome (AIDS). Epidemiology. Pathogenesis. Clinical stages of HIV infection. Laboratory Diagnosis. Treatment. Immunoprophylaxis.

113. Picornaviruses. Classification. General characteristics. Biological properties. Antigens. Role in human's pathology. Coxsackie viruses. Echoviruses. Epidemiology. Pathogenesis and clinical disease. Laboratory diagnosis. Treatment. Prevention. Newer enteroviruses.

114. Rhabdoviruses. General properties. Rabies. Epidemiology. Pathogenesis and clinical disease. Treatment. Control and prevention.

115. Orthomyxoviruses. The influenza viruses. Structure. Classification. Pathogenesis and immunity of influenza virus infection. Non-specific

and

specific defense mechanisms of anti influenza immunity, treatment, prevention, and control. Severe acute respiratory syndrome (SARS).

116. Polioviruses. Classification. General characteristics. Poliomyelitis. Epidemiology. Pathogenesis. Immunity. Clinical disease. Laboratory diagnosis. Prevention.

117. Hepatitis viruses. Classification. Hepatitis B virus. General properties. Associated antigens. Epidemiology. Pathogenesis and clinical disease. Laboratory diagnosis. Treatment. Prevention: passive and active immunization.

118. Arboviruses. Classification. Main families and genera of Arboviruses. General characteristics. Pathogenesis of arbovirus infections. Yellow fever. Dengue fever. Encephalitis. Viruses associated with hemorrhagic fever. Filoviruses (the Marburg virus and the Ebola virus). Epidemiology. Pathogenesis and clinical diseases. Laboratory diagnosis. Control and prevention.

119. Herpesviruses. Classification. General characteristics. Herpes simplex virus. Varicella-Zoster virus. Epstein-Barr virus. Cytomegalovirus. Epidemiology. Pathogenesis and clinical syndromes of herpesvirus infections. Laboratory diagnosis. Treatment and immunoprophylaxis.

120. Hepatitis viruses. Classification. Hepatitis C virus (HCV), hepatitis D virus (HVD), hepatitis G virus (HGV) and other. Pathogenesis and clinical disease. Immunity. Laboratory diagnosis. Treatment and prevention.

121. Hepatitis viruses. Classification. Hepatitis A virus (HAV). Hepatitis E virus (HEV). General characteristics. Epidemiology. Pathogenesis and clinical disease. Laboratory diagnosis of hepatitis A and hepatitis E. Immunity. Treatment. Prevention.

122. The family Picornaviridae. Cardio-viruses. Epidemiology. Pathogenesis. Clinical syndroms. Laboratory diagnosis. Treatment. Prevention.

123. The family Picornaviridae, Rhinoviruses. Epidemiology, clinical syndromes. Laboratory diagnosis. Treatment. Prevention.

124. Oncogenic viruses. General principles of viral oncogenesis. Proviruses and oncogenes. Mechanism of malignant transformation. DNA tumor viruses. RNA tumor viruses. Identifying viral oncogenic behavior.

125. Prions and slow virus diseases (prion diseases). Structure of cellular and scrapie prion proteins. Resistance to physico-chemical factors. Functions of cellular prion protein. Pathogenic characteristics of scrapie prion protein.

Model for proliferation of prions. Epidemiology, pathogenesis and clinical syndromes of prion diseases. Laboratory diagnosis. Treatment, prevention, and control.